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A. B. RENDLE, D.Sc., F.R.S., F.L.S.
KEEPER, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NAT. HIST.).

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CORRIGENDA

P. 140, line 20 from top, *for* "H. ALBICAULIS" *read* "A. ALBICAULIS."
P. 210, line 6 from bottom, *for* "P. Meslin" *read* "R. Meslin."
P. 298, line 19 from bottom, for "*R. P. Lowe*" read "*R. T. Lowe.*"

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HUNGARIAN SPECIES OF *ONOSMA*.

By Dr. Alexander Jávorka.

(English translation by C. C. Lacaita.)

[The papers by Dr. Alexander Jávorka that appeared in *Annales Musei Nationalis Hungarici* for 1906, pp. 406–449, with two plates, are by far the most important contribution that has been made to the study of the genus *Onosma*. With the exception of the diagnoses and the Clavis Specierum, which are in Latin, the whole is in Magyar, a language that is unfortunately quite unintelligible, not only to British, but to most other European botanists.

It is therefore hoped that the following English version, published by Dr. Jávorka's kind permission, may render his work more widely accessible, but as I am no exception to the general ignorance of the Magyar tongue, I have been obliged to translate from a German version of the original, made for me by Dr. C. Schermann, of Budapest.

That version is so very diffuse that I have not felt bound to render it literally, though not venturing on greater compression for fear of departing from the original meaning of the author.

For economy of space, the long Latin diagnoses have been omitted, except in the case of the new species, *O. tornense*, as they are accessible in Ann. Mus. Nat. Hung. For the same reason the lists of the numerous Hungarian localities have been left out for species which are widely distributed and plentiful in that region, but retained for rarer forms. A few observations by the translator will be found in notes A to F.—C. C. L.]

Part I. contains General Considerations.—I. Historical. II. Morphological. III. Anatomical. IV. Ecology and Distribution. Part II. contains a systematic description of the several species.

PART I.

I. Historical Survey.

The genus *Onosma* was established by Linnæus *, and the name was probably taken from Dioscorides through Pliny. Linnæus knew three species—*O. echioides*, *orientalis*, *simplicissima*; he included the plant afterwards described by Waldst. & Kitaib. as *O. arenarium* under *O. echioides* β, which Jacob Winterl †, the first Professor of Botany at the University of Budapest, had already recognised as an independent species. Later on, W. & K. described *O. stellulatum*, a species inhabiting a narrowly circumscribed area, which name very soon came to be used collectively for almost all the European asterotrichous species, until at last Kerner ‡ proved that *O. stellulatum* W. & K. is not identical with the most widely distributed asterotrichous species of the Mediterranean floral region, and that Linnæus most probably meant the latter species by *O. echioides* α. Other species that occur in our region have been described by Clementi (*O. Visianii*), Schur (*O. pseudo-arenarium*), Borbás (*O. viride* and *O. fallax*), whilst the discovery of the Oriental kinds is connected chiefly with the names of Pallas, Ledebour, and Boissier. Whilst Lehmann § knew of 19 species and De Candolle ‖ 44, Boissier ¶ was acquainted with 56, and the number of species known up till to-day exceeds 100.

De Candolle distinguished two sections according to the structure of the calyx—*Euonosma* and *Aponosma*,—and divided the section *Eunosma* into two groups according to whether the base of the bristles is surrounded by smaller hairs arranged in the form of a star or is naked; Boissier based his division chiefly on this character and establishes the sections *Asterotricha* and *Haplotricha*, and between these, as an intermediate group, the section *Heterotricha*. In the last some bristles are naked, but others have stellate hairs. More recently-described species have revealed so many transitions between the sections *Heterotricha* and *Asterotricha*, that it is hardly possible to distinguish the two.

Important contributions to the elucidation of the systematic position of the different species have been made by Lehmann, Stephen *, Boissier, Borbás †, Wettstein ‡, and others.

* We also find the name *Onosma* in Matthiolus, Bauhin, and the other fathers. They all follow Pliny in deriving this name from the Greek ὄνοσμα and treat it as neutral. Nevertheless, Linnæus and after him the majority of the authors use it in the feminine, as meaning ὄνου ὀσμή, "a smell agreeable to asses." It is only lately that the name has again been correctly used in the neuter. Moreover, we find a few species of *Onosma* mentioned in Bauhin's *Pinax* (p. 255) under the name of *Cerinthe flore luteo*, but in Clusius, Rar. Stirp. Pann. &c. (p. 677), as *Anchusa flore exalbido*.

† Ind. Hort. Bot. Univ. Hung. (1788).

‡ "Veget. Verhältn. d. mittl. u. östl. Ungarns u. angrenzenden Siebenbürgens" in Öst. bot. Zeitschr. xxiii. 161 (1873).

§ *Plantæ e familia Asperifoliarum nuciferæ*, ii. 358–80 (1818).

‖ *Prodromus*, x. 57 (1846).

¶ *Flora Orientalis*, iv. 178 (1879).

II. Morphological.

Of the external morphological characters, I will only mention some of the more important. As regards duration, the species are mainly perennial or suffrutescent, some only being biennial like *O. Visianii*, our only representative of the haplotrichous group. *O. frutescens*, a native of Cyprus, alone forms a low bush. Our haplotrichous and heterotrichous species in most cases have a stem with fairly numerous branches, whilst that of the *Asterotricha* ends in a simple borageoid inflorescence, and in their case copious ramification of the creeping rhizome is substituted forth at of the overground stem.

The inflorescence is the characteristic one of the Boraginaceæ, a cyme divided into two unequal sympodial branches and involute before the flowers open. According to Muth §, the want of symmetry between the two branches, as well as their nodding habit, is probably the consequence of mechanical factors. The development of one of the branches is often suppressed, in which case the inflorescence resembles a unilateral raceme. The form of the bracts of the individual flowers and their relative length in comparison with the calyx offer a fairly constant character for the establishment of the systematic position of the several species. The same remark applies also to the length of the calyx and to the form, indumentum, and colour of its segments, which, however, has been unnoticed by most authors. In *O. Visianii* there even occurs a more or less complete adhesion of two or three, or, indeed, of all the calyx-segments. In those of *O. arenarium*, on the contrary, I very seldom have found such adhesion.

The corollas of the flowers that open first are always larger than those of the later flowers. The relative length of corolla and calyx, the glabrous or downy nature of the former, also offer some systematic characters. The throat of the corolla is glabrous; scales, which are characteristic of most genera of the Boraginaceæ, are absent in *Onosma*. Instead of these, the inside of the corolla is protected by the connivent anthers, in which, moreover, it is characteristic that the lower ends of their divergent lobes in most cases come into contact with those of the neighbouring anthers. The filaments are usually inserted below the middle of the corolla. The relative length of the free upper part of the filament and of the anther varies; thus, in species with long corollas the length of

* "Observationes in Asperifolias Tauro-Caucasicas" in Bull. Soc. Imp. Nat. Mosc. xxvi. no. 2, 584–96 (1851).

† "Adatok Arbe és Veglia" etc. in Math. Term. Közlem. xiv. 406–22 (1876–7).

‡ "Die in Oesterreich-Ungarn vorkommenden Arten der Gattung *Onosma*" in Bot. Centralbl. xxvi. 239 (1886).

§ "Untersuch. über d. Entwickelung d. Inflorescenz u. d. Blüthe von *Symphytum officinale*," *Flora*, xci. 56–111 (1902).

the anther is equalled or even exceeded by that of the free portion of the filament; this is due to the fact that the anthers always strive to reach with their points the level of the edge of the corolla (in certain Oriental species they protrude a long way out of the corolla), and as the length of the anthers is fairly constant, even in species with long corollas—in many cases the anthers are even shorter,—they can only reach the edge of corolla by prolongation of the filaments.

The connective, which unites the two introrsely-opening anther-lobes has a white membranous appendage 1–3 mm. long, projecting beyond the points of the anthers. This appendage plays the part of a dredging-apparatus for the dissemination of the pollen, for when it is touched the pollen is scattered and comes into contact with the bodies of the insects; this happens the more easily because the corolla, when bursting into flower, hangs down in consequence of the curvature of the inflorescence, and the stigma, slipping through between the closely connivent anthers, protrudes several mm. beyond the corolla.

The raised glandular disc, which forms a ring round the base of the pistil, exudes rather plentiful nectar; the insect-visitors of our native species are butterflies, wasps, and especially humble-bees. According to Knuth's biological subdivision, the flowers of *Onosma* consequently belong to the class "Entomophilæ" of the group "Diomesogamæ." If, however, pollination is not effected by insects, self-pollination is possible at the moment when the corolla falls off.

The fruit consists of four nucules, of which often only one or two are developed. In our species they are ovate, with three faces, more or less pointed upwards, with, on the anterior face, a sharp keel, which runs out to the point, whilst on each side they are arched into a rounded or blunt point. The foveola is flattish or slightly concave, often bright green. The nucules of our native species of the astero-trichous or heterotrichous groups are fairly similar in shape—small, smooth, and shining, but at the same time blotched, striped, or spotted. On the other hand, the nucules of the species of the group of *O. Visianii* are much larger and show considerable variation in shape; moreover, their surface may be either smooth or covered with fine warts.

III. Anatomical.

More complete details of the anatomical relationships in the genus *Onosma* are chiefly to be found in the works of Schibler * and Solereder †, or in Jodin's recently published treatise on the anatomical relationships of the Boraginaceæ ‡, although he has hardly included *Onosma* in the compass of his researches. My own studies in this field have been restricted to the establishment of the more important systematic characters in our native species, so as to support, where possible, the small external morphological differences by anatomical characters.

* Anatomie d. Blattes u. Stengels d. Borragineen, Inaug. Diss., Bern, 1887.
† Systematische Anatomie d. Dicotyledonen, 1899.
‡ Ann. Sci. Nat. ser. 8, xvii. 263.

Leaf-structure. The epidermis shows in all our native species a xerophytic type corresponding to their ecological conditions. The epidermis consists of a single layer with a rather thick cuticle, especially on the upper face of the leaves, where, too, the thickness of the cells is correspondingly greater than on the lower face; the ratio between the thickness of the cells and of the cuticle of the two faces is as 3 to 2. The cell-wall of the epidermis-cells toward the mesophyll is also relatively thick, as has already been pointed out by Schibler.

The free upper surface of the epidermis-cells is somewhat arched; in the tangential direction the cells are long-polyhedric, with 5–6 sides, the side-walls mostly straight, less often slightly bent or wavy. The shape of the epidermis-cells is constant in all our native species; the undulations of the lateral walls are somewhat deeper on the lower face of the leaf.

The stomata belong to the Crucifer-type, which is characteristic of all the Boraginaceæ; the size of the guard-cells varies, according to my observations, from 18 by 20 μ to 20 by 28 μ; their number is rather larger on the lower face than on the upper, where there are from 200–250 to the square millimetre. The stomata of the upper face are hardly depressed, those of the lower are mostly raised; in *O. Visianii* even those of the upper face are raised above the surface.

The structure of the tissue of the mesophyll approaches the equi-lateral type. Schibler has already found that in *Onosma* and *Echinospermum Lappula* the mesophyll possesses an upper and a lower palisade-layer fairly rich in chlorophyll. Of these layers the upper consists of two perfectly similar rows of cells, but the lower is formed by a single row only. The cells of the palisade-layers lie in close contact with each other; it is only below the stomata that they form larger gaps. Between the upper and lower palisade-layers there lies the relatively thin spongy parenchyma, poor in chlorophyll, and composed of more or less closely-packed, somewhat flattened cells placed horizontally one upon the other. Of the thickness of the leaf—reckoned at 0·2 mm.—24 μ fall to the upper epidermis, 80 μ to the upper palisade-layer, 40 to the spongy parenchyma, 40 μ to the lower palisade-layer, and 16 μ to the lower epidermis.

The nervation of the leaves only offers external morphological characters, for all European species, except *O. Spruneri*, and occasionally *O. stellulatum*, as well as the majority of the Oriental, have only one very thick and strongly prominent, often bone-white, central rib, which sends out to the edge of the usually narrow leaf-blade only very thin lateral nerves, not conspicuous to the naked eye; easily visible nerves are only present in very few species. It is only along the edge of the leaf that there run one or two stronger lateral nerves, which diverge from the central rib close to the plane of insertion of the leaf; outwardly these are only indicated by the slightly thickened edge of the leaf. The vascular bundles of the central rib are bounded above and below by fairly thick collenchyma, which is surrounded by broad parenchymatous cells. This parenchyma passes gradually into collenchyma with thin walls toward both the upper and the lower epidermis.

Hairiness.—One of the most characteristic properties of the genus *Onosma* is the hairy indumentum, very distinct from that of the other genera of Boraginaceæ; its great variety affords good specific characters and forms the basis of the subdivision of the genus. The hairs of the stem and leaves may be arranged under three types: namely, large bristles (setæ), small bristles (setulæ), and the stellate bristles set round the base of the large ones more or less in the form of a star (asterosetulæ). The glandular hairs ending in a one-celled head, that are so plentiful in some genera of Boraginaceæ, are absent in *Onosma*.

The large bristles, so characteristic of the family, are always formed by a single cell with a somewhat thick, stiff, outer wall impregnated with silicic acid. This has often a warty surface from the presence in it of crystals of carbonate of lime. The bristles of our native species of *Onosma* are frequently more than 5–7 mm. long, and their relatively great thickness exceeds that attained in other genera of the family. At their base, where they stand out sharply immediately above the epidermis, they form a so-called hair-bulb. This hair-bulb is surrounded by protruding helmet-shaped epidermis-cells in 4–5 rings, mostly arranged concentrically and more or less radiate, whose lumina are gradually enlarged toward the base of the bristle. This epidermal structure, called by many authors a tubercle or hair-callus, can in my opinion be best regarded as a flat hair-cushion. The cells of the ring nearest to the hair-bulb—that is to say, of the innermost ring—are more or less bluntly conical, and their inner wall is formed by the wall of the hair-bulb itself. Beneath the hair-bulb, close upon the palisade-cells, we also find 2–5 thin-walled, angular epidermis-cells, so that the hair-bulb seems to be embedded in epidermis-cells both beneath and laterally. The palisade-cells come immediately below this hair-cushion. The hair-cushion certainly exists in other genera of the family (*Echium*, *Lithospermum*), but then it is usually of a simpler structure, as the hair-cushion consists of at most 1–2 concentric rings of cells.

It is, moreover, characteristic of the hair-cushions that the siliceous contents of the wall of the bristles pass on into the walls of all the cells of the cushions, but not into those of the rest of the unaltered epidermis-cells, wherefore the air-cushion differs markedly—as can well be seen by the naked eye—from the rest of the epidermis by its whitish (or, at any rate, lighter) colour. This is especially well seen in certain species (as in *O. Visianii*) of the haplotrichous group; indeed, in *O. rhodopeum* the surprising size of the cushions affords a good specific character.

The number of the concentric cell-rings that constitute the cushion varies from one to five; each cell-ring is composed of five to fifteen, but the outer ring of as many as twenty-five cells. There often occur, however, in the various forms of one and the same species, especially on the lower face of the leaves, cushions composed of only one ring of cells, or the cushions may be altogether wanting, and then only the very voluminous hair-bulb is present (*e. g.*, in *O. arenarium*); in some other Oriental species, particularly those with completely adpressed

indumentum (*O. sericeum*, *O. simplicissimum*), the absence of the cushion affords a constant specific character.

The second type of hair-structure, the small bristles (setulæ), is found between the large bristles in the haplotrichous group; these are straight, weak, small, one-celled bristles at most 0·5 mm., usually 0·15–0·3 mm. long, standing out at right angles to the surface; their cell-wall is not, or only slightly, siliceous. Around them the nearest epidermis-cells, usually 5 to 10, are arranged radially. The thickness of the small bristles is fairly constant in each species. In certain Oriental species they form so close an indumentum that leaves and stem have a grey appearance. In *O. Visianii* this fine downy indumentum can well be seen with 5- to 10-fold enlargement; in that species we find this class of bristle alone on the lower face, large bristles only occurring along the central rib and on the edge of the leaf. In *O. arenarium* these small bristles are more sparse, shorter and more enlarged at their base; on the older leaves they have often been rubbed off. In certain Oriental species (e. g., *O. kilouyense*) the small bristles are arranged radially round the cushion of each large bristle, upon the non-siliceous epidermis-cells, the cushion itself remaining naked, whereby there arises an appearance of hair-structure of the asterotrichous type. These few species form a part of Boissier's *Heterotricha*, although they can really only be regarded as of modified haplotrichous type. Transitions between the large and small bristles are, in general, only to be found exceptionally.

Finally, a third kind of hair-structure is represented by those bristles which in the asterotrichous group we know as stellate bristles. Similar star-like branched bristles are, indeed, to be found in *Cordia Gerascanthus*, but in this the high conical hair-cushion bears on its summit several divergent branches of equal length. In *Onosma*, on the contrary, each single stellate bristle is developed from a single cell of the large bristle; these star-bristles are therefore nothing but one-celled [illegible] bristles with a siliceous cell-wall. Their number varies in the heterotrichous group; thus in *O. arenarium* in the simplest case it is only one or two of the cells of the cushion that carry very small stellate bristles; otherwise several cells of the concentric cell-ring of the cushion may bear such bristles, whereby there arises a small ring of stellate bristles placed radially round the base of the large bristle, and more or less parallel to the surface of the epidermis; so in the species of the heterotrichous group (*O. arenarium*, *O. pseudo-arenarium*) the number of stellate bristles is small, especially on the upper leaf-face, 1 to 7, and they are relatively short, so that the cushion remains easily visible, not concealed by the star-bristles; but on the under side of the leaf these stellate bristles are always closer and longer, even in the heterotrichous group, and the cushion is composed of a smaller number of concentric cell-rings.

Finally, in the asterotrichous group the cushion is in most cases not visible, because the stellate bristles are so close together on the upper face of the leaf; their number is from 3 to 15 on each cushion, but in certain Oriental species (*O. albo-roseum*, etc.) it may rise to 50. In the latter case they are very long and thin, and, being

interwoven with those of the neighbouring cushions, clothe the plant with a very close and thick silky-white garment.

The stellate bristles of the heterotrichous and asterotrichous groups are mostly far longer than the small bristles of the haplotrichous group; on the other hand, they are much shorter than the large bristles, especially in the case of the bristles of the upper leaf-face of the heterotrichous type. In the Transylvanian *O. viride* and the Mediterranean *O. echioides* the ratio on the upper leaf-face is 1/5 to 1/2, whilst on the under face the large bristles are frequently hardly longer and thicker, or often are completely absent, in which case stellate bristles alone are present. The large bristles and stellate bristles of the *Asterotricha*, especially in the European Mediterranean species, nestle on the epidermis; they often lie quite close to it (*O. stellulatum*, *O. angustifolium*, *O. Spruneri*), whence the plant seems to be clothed in grey, which is generally characteristic for the species of this group.

In all species of *Asterotricha* the small bristles are always absent; it is only in those of the *Heterotricha* that we find a few on the edge of the leaves and on the under face of the leaves along the central rib. This substitution of stellate for small bristles in the *Asterotricha* may therefore be conceived as a localisation on the cushions of the small bristles that are characteristic of the *Heterotricha*: such a modified form of hairiness may be better adapted to its physiological purpose (since the stellate bristles nestle against the epidermis and come into contact with the neighbouring bristles) than the patent, scattered, small bristles of the *Haplotricha*; accordingly this form of hairiness suggests that there is a greater degree of xerophytism in the species of the asterotrichous group.

A characteristic mark of the large bristles is their warty surface, which, moreover, is frequently found in other genera of the Boraginaceæ; the whole bristle is covered with short, blunt, conical or rounded warts, which often occur in varying degrees of density in one and the same species. In those of the haplotrichous group they are usually scarce and often entirely absent—then the bristles look smooth and shining; but in cases where these are closely covered, the plant looks dull and whitish. The warts do not occur in small bristles nor, usually, on the stellate bristles; thus it is partly to be ascribed to this lack of warts that in *O. viride* and *O. echioides* the star-bristles are not easily noticed by the naked eye, on account of their smoothness and transparency, whereas the large bristles and star-bristles of *O. stellulatum* are clearly visible, owing partly to their copious warts, partly to their thickness and closer adhesion to the surface of the epidermis.

Very often the cystolithic formations that have been observed in several genera of Boraginaceæ, and occur especially in the asterotrichous species of *Onosma*, are characteristic of the bristles and cushions. In the cells of the cushions concentric layers of carbonate of lime are deposited, issuing from a spot in the inner cell-wall, which more or less fill up the lumen of the cells of the cushions and often those of the bristles as well, and contain an organic substance.

These thickenings or calcareous incrustations of the cell-wall in the cushions arise, according to the researches of Mez*, mainly in a similar manner to the well-known typical cystoliths of the Moraceæ and Urticaceæ, from which they differ principally in not being connected with the cell-wall by a slender stalk, but closely attached to it from the point of their insertion, and, moreover, in not appearing independently in any part of the surface of the epidermis, but always in the bulb of the bristles alone and particularly in the cells of the embracing cushion. Such a filling of the cells of the cushion by cystolithic formations gives to the cushion and to the stellate bristles an opaque white colour, perceptible to the naked eye. Especially frequent is this on the lower leaf-face and in the basal region of the radical leaves of heterotrichous and asterotrichous species. It is also very clearly to be seen on the whole upper leaf-face of *O. echioides* and often in *O. stellulatum* also, where the base and the cushion of a large proportion of the bristles are conspicuous by their white colour, whilst the base of the non-cystolithic bristles, that are already inconspicuous from their want of warts, remains dark.

As a fourth kind of hairiness we may consider the small, soft, pliable hairs that occur on the upper portions of the corolla of *Onosma*; the epidermis-cells of the corolla and of the border of the anthers, moreover, are strongly projecting, conical, and possess a somewhat papillose surface.

(To be continued.)

NOVITATES AFRICANÆ.

[Under this heading we hope to publish from time to time batches of descriptions of new species from Mrs. L. Bolus, Curator of the Bolus Herbarium, University of Cape Town.—Ed. Journ. Bot.]

Oxalis crassipes L. Bolus (*Oxalidaceæ*). *Herba* caulescens eglandulosa, supra terram 11–15 cm. alta, *caule* brunneo-purpureo piloso, pilis erectis canis, basi 1·5 mm. diam., internodiis inferioribus ad 1 cm., superioribus 2–7 mm., longis. *Folia* adscendentia petiolata, petiolo complanato, vix ad 2 mm. longo, 1 mm. lato, foliolis 3, linearibus, inferne parum angustatis obtusis, integris vel leviter emarginatis, supra glabris, subtus pilosis, ad 7 mm. longis, 1·5 mm. latis. *Pedunculi* laterales 1-fl. graciles, apice 2-bracteati, 1·2–2·5 cm. longi, fructiferi autem infra bracteas ad 3 cm., supra bracteas (pedicelli veri) 1·6 cm. longi, pedicellis superne gradatim incrassatis, apice fere 1·5 mm. diam. *Sepala* lanceolata acuta pilosa, dense cano-ciliata, pallida, saturate marginata, 5 mm. longa. *Corolla* 2·1 mm. longa, petalis rotundatis pallidissime roseis, subtus dimidio purpureo-notatis, 8 mm. latis, tubo infundibuliformi luteo, 5 mm. longo. *Filamenta* edentata alba, 3 et 5 mm. longa. *Ovarium* subovatum, superne pilosum, vix 1·5 mm. longum. *Capsula* breviter conica, profunde

* Engl. Bot. Jahrb. xii. 526 (1890).

5-lobata, lobis inter sepala protrudentibus, seminibus solitariis, anguste ovalibus, 2 mm. longis.

Hab. Cape Province: South-Western Region; exact locality uncertain, *C. L. Leipoldt* (Bolus Herbarium, No. 18701).

Flowered in my garden, June 1927, from bulbs collected in 1925. The name, *crassipes*, refers to the thickening of the fruiting-pedicel, a phenomenon I have not seen so pronounced before in the genus. Nor has the lengthening of the fruiting-pedicel to so great a degree been recorded before, so far as I have been able to ascertain.

Oxalis Pageæ L. Bolus *Bulbus* ovatus vel oblongo-ovatus, tunicis levissimis atro-brunneis. *Caulis* 1–3 cm. longus, cum ætate ad 4 cm. vel parum ultra elongatus, ramis e unico vel e pluribus squamis orientibus. *Folia* inferne densa late patentia, petiolis parce pubescentibus pilis patentibus glanduliferis interjectis 0·5–3 cm. longis, trifoliolatis, foliolis dormientibus complicatis, obovato-oblongis, emarginatis inferne subcuneatis, minute ciliolatis, ciliis adpressis, supra glabris, infra parce pubescentibus, pilis adpressis, sæpe ad 7 mm. longis 4 mm. latis. *Flores* solitarii, pedunculo 5 cm. longo, apicem prope 2-bracteato, bracteis interdum fere basim calycis attingentibus vix 2 mm. longis. *Sepala* ovato-lanceolata vel lanceolata, acuta, parce adpresse pilosa, dense piloso-ciliata, ad 4 mm. longa. *Corolla* late infundibuliformis, intus aurea, laminæ dimidio superiore testaceo-salmoneo, vitta pallida angusta transverse interjecta, 1·3–1·8 cm. longa, petalis obtusissimis fere truncatis, extus tubo levissime pubescentibus, omnino eodem more quam intus coloratis sed parum pallidioribus. *Filamenta* libera vel brevissime connata, ad 7 mm. longa. *Ovarium* subcylindricum breviter pilosum, fere ad 2 mm. longum, loculis ad 4-ovulatis, stigmatibus aureis conspicue penicillatis. *Capsula* non visa.

Hab. Cape Province: South-Western Region; Montagu Div., Donker Kloof, near Montagu Baths, fl. April 1923, *Mary M. Page* (Bolus Herbarium, No. 17473).

Described from numerous living specimens which have flowered in cultivation from April to June for four years. The leaflets in the wild specimens are barely 3 mm. long: in cultivation after flowering they attain a length of 1·3 cm., and are often 6–7 mm. broad.

Oxalis subsessilis L. Bolus. *Herba* caulescens eglandulosa ramosa copioseque ramulosa, ramis patentibus pilosis, demum glabris politisque, sæpe 25 cm., vel in nemorosis ad 37 cm. longis, 1·5 mm. diam., internodiis ad 3 cm., sæpius 1 cm. longis, ramulis sæpius 5–10 cm. longis. *Folia* patentia vel subrecurvata, subsessilia, petiolo complanato, ad 1 mm. longo, foliolis 3 cuneato-linearibus obtusis, integris vel leviter emarginatis, callis inconspicuis sparsis, subtus primum cano-pilosa, demum glabrescentia, 7–9 mm. longa, 2–3 mm. lata. *Pedunculi* laterales 1-fl. pilosi, 1·2–1·8 cm., rarius ad 2·5 cm., longi, supra medium 2-bracteati, bracteis 2–3 mm. longis. *Sepala* lineari-lanceolata, acuta vel subobtusa, sæpius pilosa, 5–6 mm. longa. *Corolla* hypocrateriformis, fere ad 2 cm. longa; petala oblongo-obovata ad 5 mm. lata, pallide lilacina, inferne sordide lutea.

Filamenta edentata, ad 9 mm. longa, connata per 3 mm. *Ovarium* glabrum, loculis (in ovario unico examinato) 1–2-ovulatis, stylis longissimis ad 1·1 cm. longis.

Hab. Cape Province: South-Western Region; ? Worcester Div., *C. L. Leipoldt* (Bolus Herbarium, No. 18702).

Described from several living plants which flowered in my garden during May, June, and July of 1926 and 1927.

Mesembrianthemum pachyphyllum L. Bolus (*Aizoaceæ-Mesembrieæ*). Planta glabra, *caule* multo abbreviato, ramulis confertis, dense 4–6-foliatis. *Folia* sæpius fere erecta, duo paris valde inæquilonga (majore ad 5·5 cm., minore ad 3·9 cm., longo) marginibus carinaque valde acutis interdum leviter cartilagineis, supra plana vel apicem versus subconcava basi semi-tereti intus pustulata ad circum 1 cm. diam. lataque lateraliter visa superne dilatata ad 2·2 cm. diam., carina sæpe conspicue eccentrica. *Flores* solitarii, meridie expansi, 3·7–4 cm. diam. *Pedunculus* subteres, in receptaculum gradatim transiens, 2–3 cm. longus, immo basi bracteatus, bracteis parvis tenuibus ovatis acutis purpureis, 5·5–6 mm. longis. *Sepala* 5 inter se subæquilonga oblongo-lanceolata, 3 angustissime membranaceo-marginata. *Petala* circa 4-seriata, sat crassa, densa lineari-spathulata, apice sæpius 1–3-denticulata, læte purpureo-rosea, inferne pallidiora, ad 2 cm. longa, 2–2·5 mm. lata. *Stamina* erecta conferta, apice 3–5 mm. diam., staminodiis acuminatis albidis circumdata, filamentis glabratis 1·5–7 mm. longa; discus annularis inconspicuus. *Ovarium* supra fere planum, obscure lobatum, stigmatibus subulatis acutis, 2 mm. longis. *Capsula* unica immatura visa, more generis, alis loculi bene evolutis, tuberculo nullo, ut videtur.

Hab. Cape Province: South-Western Regions; Oudtshoorn Div., hillsides at Klip River, near Oudtshoorn, fl. July 1925, *R. Marloth*, 12182.

Described from a living specimen which flowered in Miss Arbuthnot's garden May–June, 1926 and 1927. The general habit and the shape of the leaves are similar to those of *M. Tugwelliæ* L. Bolus, but the flowers differ in several respects.

Delosperma Lavisiæ L. Bolus (*Aizoaceæ-Mesembrieæ*). Planta cæspitosa, partibus herbaceis olivaceo-viridibus purpureo-suffusis, in cultis demum viridibus, papillis minutis orbicularibus. *Caudex* crassus, 1 cm. diam., ramos multos prostratos, sæpe radicantes, rubicundos, 9 cm. longos, sæpius 1 mm. diam., internodiis 1–3 cm. longis, emittens. *Folia* erecta, sæpe leviter recurva, linearia, basin versus attenuata, acuta, supra leviter, cum ætate sat profunde, canaliculata, subtus convexa, basi fere distincta, 1·5–2 cm. longa, ad 2 mm. lata. *Flores* solitarii, vel 3-nati, lateralibus tardissime irregulariterque evolutis meridie expansi, 1·4–2 cm. diam., pedunculis teretibus gracilibus, per 0·3–1·8 cm. ultra folia ultima productis, receptaculum turbinatum, prope apicem leviter constrictum, 3 mm. diam. *Sepala* 5, inter se valde inæquilonga 4–8 mm., vel postanthesin ad 1·1 cm. longa, acuta, 3 membranaceo-marginata. *Petala* 3-seriata, inter se distantia,

roseo-purpurea, extima lineari-spathulata, apice sæpius irregulariter interdumque profunde 2-dentata, 7–9 mm. longa, fere ad 1·5 mm. lata, interiora multo angustiora, acuta. *Stamina* conferta, apice 1·5 cm. diam., staminodiis apice recurvis, acutis, pallide roseis, ad 5 mm. longis, circumdata, filamentis pallidis barbatis, ad 4 mm. longis, antheris pollineque pallidis; glandulæ 5, obscure crenulatæ. *Ovarium* supra leviter convexum, stigmatibus 5, subulatis, 3 mm. longis.

Hab. Kalahari Region: Orange Free State; about 6 miles from Fouriesburg, "growing all over the rocks," July 1926, *M. Lavis* (Bolus Herbarium, No. 18587).

Described from living specimens which flowered in Miss Arbuthnot's garden during November and December 1926.

The nearest ally appears to be *D. macellum* N. E. Br., from which it differs in having the leaves concave above; the receptacle turbinate; distant, or more laxly arranged, petals; longer filaments and styles; pallid anthers and pollen; as well as by the prostrate habit of growth and the inflorescence.

Ruschia albiflora L. Bolus (*Aizoaceæ–Mesembrieæ*). Planta robusta rigida glabra, ad 14 cm. alta, copiose ramoso, ramis adscendentibus, ad 7 mm. diam., internodiis more sectionis "Uncinata." *Folia* quasi longe vaginantia, vagina longitudinaliter impresso-lineata, 5–12 mm. longa, folia vera patentia, acuta apiculata, glauco-viridia, carina marginibusque subcorneis acutis, 8–10 mm. longa, 4–6 mm. lata diametroque. *Flores* solitarii sessiles meridiani, ad 1·8 diam.; receptaculum globose turbinatum. *Sepala* inter se parum inæquilonga, ad 8 mm. longa. *Petala* 2-seriata lineari-filiformia acuta alba, 7 mm longa, sæpius in 5 fasciculos stellatim composita. *Stamina* conico-collecta, apice 3 mm. diam., staminodiis albis circumdata, filamentis basi fere glabris albis, ad 5 mm. longis; discus annularis crenulatus. *Ovarium* supra convexum, stigmatibus 10, anguste subulatis, 3 mm. longis. *Capsula* 7–9 mm. diam., valvis 10, late patentibus, carinis inferne parallelis et subcontiguis, superne divergentibus, ad dimidium valvæ attingentibus, alis semi-lanceolatis acuminatis, apicem valvæ fere attingentibus, loculi alis fere omnino loculum tegentibus, marginibus leviter recurvatis, tuberculo inconspicuo.

Hab. Cape Province: Western Region; Little Namaqualand, Copperberg, fl. Sept. 1926, *N. S. Pillans*, 4930.

Described from several partially dried specimens and some cultivated material. The 10 stigmas and 10-valved capsule may be regarded as constituting a subgenus of *Ruschia*. In every other respect our species conforms to the generic character of the type.

Ruschia parvifolia L. Bolus. *Fruticulus* compactus pulviniformis rigidus, 8 cm. altus, copiose ramosus, ramis erecto-patentibus, 2–3 mm. diam., ramulis erectis, sæpius dense 4–6-foliatis, axillis gemmiferis. *Folia* fere patentia, demum subrecurva, spinescenti apiculata, supra plana, lateribus leviter convexis, carina cum marginibus conspicua subpellucida, prope apicem, oblique post apiculum, 1-dentata, dente erecto vel sæpius recurvo, vix 1 mm. longo, levia glauca, pellucide viridi-punctata, 6–8 mm. longa, ad 3 mm. lata diametroque, vagina vera 1 mm. longa, linea exarata 2–3 mm. longa vel ultra. *Flores* solitarii meridie expansi, ad 2 cm. diam., pedunculis in vagina foliorum omnino inclusis 1·5 mm. longis; receptaculum obovatum, lateraliter subcompressum, prope apicem leviter constrictum, apice ad 5 mm. diam. *Sepala* 5, inter se fere æquilonga, 2 foliis exacte similia, interiora lanceolata apice tantum leviter carinata, membranaceo-marginata, 4–4·5 mm. longa. *Petala* 3-seriata, sat laxa, sæpissime in 5 fasciculos disposita itaque corolla stelliformi, anguste linearia, superne leviter ampliata, acuta, rosea, interiora filiformia, ad 8 mm. longa, 0·5 mm. vel rarius fere ad 1 mm., lata. *Stamina* conico-collecta, staminodiis apice recurvis, pallide roseis, 5 mm. longis, circumdata, filamentis parce barbatis, pallide roseis, ad 4 mm. longis, antheris minutis pallidis, polline aureo; discus annularis crenulatus, fere 4 mm. diam. *Ovarium* supra subpentagonum convexum, apice subtruncatum, 5-lobum, stigmatibus 5, anguste subulatis setaceo-acuminatis, 4 mm. longis. *Capsula* generis, tuberculo inconspicuo.

Hab. Cape Province: Karroo Region; stony hills from near Beaufort West, June 1923, *L. Bolus* (Bolus Herbarium, No. 18588).

Described from two living plants which flowered freely in Miss Arbuthnot's garden at Wynberg during November and December 1926.

LEIPOLDTIA UNIFLORA L. Bolus (*Aizoaceæ–Mesembrieæ*). *Herba* perennis erecta glabra, 17 cm. alta, copiose ramosa; rami fere erecti virgati, ad 2 mm. diam.; internodiis 3–5 mm. vel in cultis ad 2 cm. longis. *Folia* demum patentia nunc subglobosa 4 mm. longa, 3 mm. diam. vel 4–7 mm. longa, 3–5 mm. diam., nunc oblonga dorso roundata vel obscure carinata leviter decurrentia obtusa, ad 1·1 cm. longa, 3 mm. diam., vagina 1 mm. longa. *Flores* solitarii, meridiani, 1·7 cm. diam.; pedunculi teretes, 1–1·2 cm. longi; receptaculum crateriforme. *Sepala* 5, subæquilonga, oblongo-ovata, omnia anguste marginata, 3 mm. longa. *Petala* 1-seriata, linearia, inferne angustata, subacuta, rosea, 8 mm. longa, ad 1 mm. lata. *Stamina* conico-collecta, staminodiis subnullis, filamentis infra medium barbatis, vix ad 5 mm. longis; discus annularis crenulatus. *Ovarium* supra convexum, stigmatibus 10, subfiliformibus 3 mm. longis, fere ad apicem staminum attingentibus. *Capsula* senecta tantum visa, more generis.

Hab. Cape Province: Western Region; Little Namaqualand, between Port Nolloth and Holgat, Oct. 1926, *N. S. Pillans*, 5740.

Described from a living specimen which flowered in Mr. Pillans's garden in May 1927.

GLADIOLUS ROBERTSONIÆ Bolus f. (*Iridaceæ–Iridoideæ*) (§ *Eugladiolus*). *G. prismatosiphon* Schltr. affinis, sed spathæ valvis angustioribus obtusis, floribus minus erectis, perianthii tubo minus subito apicem versus constricto, segmentis superioribus obtusioribus distinguitur.

Cormus globosus tunicis fibrosis tenuibus crebrisque (nonnunquam

vetustioris vestigiis superne instructus), 1·7–2·2 cm. longus, 1·3–2 cm. diam. *Caulis* erectus vel suberectus, teres, glaber, gracilis, 18–30 cm. longus (spica excepta). *Folia* basalia 2, laminis suberectis vel patentibus, anguste linearibus, acutis vel acuminatis, planis, glabris, marginibus incrassatis, medio nervo prominente, infimis 7–30 cm. longis, 0·2–0·3 cm. latis, superioribus valde brevioribus; folium caulinum unum, lamina ad 1 cm. longa. *Spica* secunda, simplex (valde raro 1-ramosa), axi substricto tereti glabro, 1·8–5 cm. longa, 2–5-fl.; spathæ valvæ oblongæ vel lineari-oblongæ obtusæ, crebre nervosæ, exteriores (circa in media spica) 1·2–1·8 cm. longæ, 0·4–0·5 cm. latæ, interiores parum breviores. *Perianthii* tubus suberectus, subcurvatus, albidus vel pallide lilacinus, 2·8–3·7 cm. longus, medio circa 0·2 cm. diam., segmentis ellipticis, obtusis vel subacutis, nonnunquam minute apiculatis, tenue nervosis, albidis, ad apicem pallide lilacinis, 3 inferioribus 1·5–1·9 cm. longis, 0·65–0·8 cm. latis. *Stamina* dimidium segmentorum attingentia, antheris linearibus, 0·7 cm. longis; stylus dimidium segmentorum vel ultra attingens.

Hab. Orange Free State: Kalahari Region; Vrede Div., near Villiers, fl. Dec. 1916, *D. M. Robertson* (Bolus Herbarium, No. 15053).

Allied to *G. prismatosiphon* Schltr. but distinguished by the narrower obtuse spathe-valves, the less erect flowers, the perianth-tube being less suddenly constricted towards the apex, and by the more obtuse upper segments.

The flowers are said to have a strong scent, and the buds sometimes to be a deep mauve.

Gladiolus Patersoniæ Bolus f. (§ *Eugladiolus*), foliorum vestigiis basi caulis capillaceis, folio uno bene evoluto, spathæ valvis roseis, perianthii tubi forma et staminibus subexsertis satis distinguitur.

Cormus depresso-globosus, circa 1·8 cm. longus, 2·2 cm. diam., tunicis submembranaceis, dimidio superiore fere integris. *Caulis* erectus, substrictus, teres, glaber, 62–65 cm. longus (spica excepta), basi foliorum vestigiis tenue fibrosis (plerumque capillaceis) ad 12 cm. longis circumdatus. *Folia* basalia 3, vaginis striatis glabris, summa longissima, laminis linearibus, planis vel involutis, glabris, infima ad 9 cm. longa, media rigida, nervis incrassatis, apicem versus valde torta, 42–50 cm. longa, ad 0·4 cm. lata, summa brevissima; folium caulinum unum, lamina ad 4·5 cm. longa. *Spica* æquilateralis, simplex, axi subflexuoso tereti glabro, 3 cm. longa, 3-fl.; spathæ valvæ oblongæ, obtusæ, apicem versus tortæ, dimidio superiore pallide-roseæ, crebre nervosæ, exteriores membranaceæ, 2·1–3·3 cm. longæ, 0·6–0·8 cm. latæ, interiores hyalinæ, parum breviores. *Perianthii* tubus (parte cylindracea 0·25–0·3 cm. longa) subito dilatatus, infundibuliformis ad $\frac{2}{3}$–$\frac{3}{4}$ longitudinis (ob segmenta lateralia cum inferioribus magis coalita quam consueto in genere), valde curvatus, 0·9–1·2 cm. longus, segmentis obtusis, rotundatis, summo obovato-vel oblongo-spathulato, 1·3–1·45 cm. longo, 1–1·1 cm. lato, lateralibus oblongis vel elliptico-oblongis, 0·9–1·1 cm. longis, 0·6–0·8 cm. latis, inferioribus elliptico-oblongis, 0·7–0·9 cm. longis, 0·45 cm. latis,

medio parum breviore et minus obtuso. *Stamina* stylusque attingentia vel parum excedentia apicem segmenti summi, antheris linearibus, 0·8 cm. longis.

Hab. Cape Province: Karroo Region; Willowmore Div., Steytlorville, fl. Sept. 1910, *Florence Paterson*, 17.

Fairly well marked by the hair-like remains of the leaves at the base of the stem, by the one well-produced leaf, by the pink spathe-valves, by the shape of the perianth-tube, and by the more or less exserted stamens.

Described from two dried specimens. The tube of the perianth is infundibuliform for $\frac{2}{3}$–$\frac{3}{4}$ of its length. This is considerably more than is usual in the genus, and is due to the greater coalition of the lateral segments with the lower.

Aloe Pillansii L. Guthrie (*Liliaceæ–Aloineæ*). Planta arborescens, ad 10 met. alta, trunco 2 met. longo, prope basin 1·7 met. diam., pallido, inferne longitudinaliter cicatricoso cortice corneo dirumpente, diruptis lamellas ad 5 cm. latas, marginibus ad 1·5 cm. altis, formantibus; rami pauci, supra basin subcylindrici, ca. 15 cm. diam. *Folia* apice ramorum dense rosulata ensiformia, leviter falcata, levia glauco-viridia, ad 60 cm. longa, 10 cm. lata, supra basin 1·5 cm. crassa, ad apicem gradatim attenuata, marginibus denticulatis, dentibus deltoideis pallidis, ca. 2 mm. longis, primum contiguis, deinde magis distantibus, demum versus apicem folii usque 1 cm. inter se distantibus. *Inflorescentia* ramosa diffusa, ca. 60 cm. longa, racemis laxis, 10–14 cm. longis, pedicellis adscendentibus, patentibus, vel cernuis, 1·2–1·8 cm. longis; bracteæ declinatæ, e basi parum ampliato filiformes, 3–6 mm. longæ. *Perianthium* oblongum, pallide luteum, 3·5 cm. longum, 1·2 cm. diam., tubo 1·3 cm. longo, segmentis exterioribus basi 1 cm. latis, ad apicem subacutum viridem gradatim angustatis, interioribus simillimis, leviter angustioribus. *Stamina* perianthis subæquilonga; stylus demum exsertus per 5 mm.

Hab. Cape Province: Western Region; Little Namaqualand, plentiful on western slopes of flat-topped hills, south-west of Anisfontein, Oct. 1926, *N. S. Pillans*, 5012.

Ad *A. dichotomam* accedit, sed præcipue differt ramis paucioribus, crassioribus, erectioribus; foliis majoribus, patentibus reflexisque; inflorescentia diffusa; staminibus minus exsertis.

A NEW HIMALAYAN ORCHIS.

By Dr. Ralph Soó, Tihany, Hungary.

Orchis Graggeriana Soó, sp. nov. *Caulis* erectus, usque ad 40 cm. altus, tubera bi-triloba. *Folia* 4–6 elongato-lanceolata longe acuminata ligulata supra medium latissima 18–20 mm. lata, inferiora erecto-patentia, superiora multo minora bracteæformia, cauli adpressa. *Spica* magis laxa elongato-cylindrica 12–20-flora, bracteæ anguste lanceolatæ longe acuminatæ flores subæquantes vel paullo longiores. *Flores* ca ·2 cm. longi purpureo-lilacini, sepala oblongo-obtusiuscula

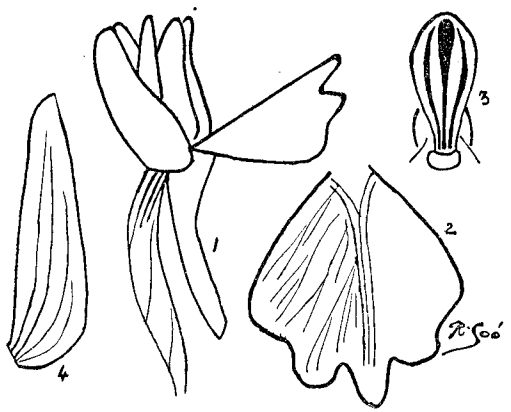
6–9 × 1·5–2 mm., petala ovata basi dilatata apice acuminata 6–7 × (basi) 2 mm. *Labellum* late-orbiculare sæpius longitudine latius, acumine protracto usque 10 mm. longum, 7–12 mm. latum, antice leviter 3- usque 5-lobatum, lobo intermedio vulgo producto, lobis lateralibus successive minoribus triangularibus acutis, sinubus obtusis. *Calcar* cylindricum apicem versus attenuatum ovarii ¾ partem æquans vel eo paullo brevius 7–10 mm. longum. *Gynostegium* erectum ad 3 mm. longum; *anthera* elliptica, *ovarium* cylindricum ad 12 mm. longum.

Rarius forma labello fere integro, obscurissime lobulato: f. *Inayati* Soó.

Hab. India boreali-orientalis, Kashmir: Siddar Valley, Battu-Kamrinala, Kukarnag-Baranginala, Baisaran; legit Inayat.

Specimina 4 in herb. Musei Bot. Berolinensis pro *C. latifolia*!

Habitu, forma et structura labelli calcarisque ab omnibus speciebus *Dactylorchidis* subgeneris diversa. Maxime tamen affinis *C. persicæ* Schlechter in Fedde, Repert. regni veget., Berlin, 1919, 290, sed hæc



Orchis Graggeriana Soó, n. sp.
1 Flower. 2. Labellum. 3. Gynostegium. 4. Sepalum.

species kurdistanica et persica præter alias notas labello ovali antice breviter trilobo, usque 6 mm. lato (*cf.* Schlechter, *Monographie und Iconographie der Orchideen*, i. 184, t. 19, no. 74, orig.! (1927) et icon nostrum) a planta nostra differt.

O. Graggeriana ad honorem dicata est professoris berolinensis linguæ et historiæ Hungaricæ in autumno 1926 defuncti, R. GRAGGER, cui gratias maximas agere debeo.

O. HATAGIREA Don, Prodr. Fl. Nepal. 23 (1825), est species absolute alia Afghaniæ, Indiæ (Himalaya, Nepal, Kashmir) et provinciæ Tibet incola. *O. hatagirea typica* habet habitum elatum, folia 4–5 late lanceolata 10–12 cm. × 2–2·5 cm. apicem versus gradatim decrescentia, bracteas inferiores floribus longiores, superiores flores

subæquantes, apicem plus-minus densam *O. maculatæ* similem, labellum floris exacte trilobum, lobos subæquales, medium acutum, lateralos sæpe crenulatos, calcar cylindricum ovarium subæquans vel paullo brevius, nonnunquam labellum suborbiculare lobo medio parvo protracto.

Var. **Schlaginweitii** Soó, var. nov., a typo habitu humiliore (ad 20 cm.) gracili, foliis anguste lanceolatis nonnunquam arcuatis patentibus, spica laxa tenui, labello suborbiculari integro, calcari cylindrico paullo saccato, diversa.

Hab. Tibet, prov. Balti: Haldi-Tsorkonda, Skardo, prov. Ládal: Timti-Kharbu-Koma; leg. Schlaginweit.

Var. **Doniana** Soó, var. nov., a typo habitu elatiore valido, foliis strictе erectis, labello antice levissime trilobo (tricrenato) diversa.

Hab. Tibet: Upper Chenab; leg. Baden Powell.

Var. ? **afghanica** Soó, var. nov., [anne magis ad *O. turcestanicam* Klinge pertinet? a typo foliis anguste lanceolatis apicem versus vix decrescentibus, spica laxiore labello orbiculari integro, apice protracto (*O. turcestanicæ* simili), sed calcari subsaccato-cylindrico ovario breviore diversa.

Hab. Afghania: Valley Kurrum; leg. Aitchison, 570!

Typus: loca natalia nova: Kumaon, Valley Giri; leg. Inayat. Hazára: Nila, Kagan; leg. Inayat. Pangi: Pass Sanch; leg. Harsukh.

LICHENOLOGICAL NOTES—III.

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.

PHYSCIA SCIASTRELLA (Nyl.) Harmand (*P. parvula* Wain.). On pales, Norton Fitzwarren, v.c. 5. This species belongs to the group of *P. obscura* and *P. lithotea*. It differs from the former in its narrower laciniæ and from the latter in its lignicolous or corticicolous habitat. When viewed by a hand-lens it looks much more like a finely-laciniate *Leptogium* than a *Physcia*. Our plants correspond to the form *nigrescens* Harm., in which the thallus is dark and rarely sorediate.

P. TRIBACIA (Ach.) Nyl. On tree, Paul, near Penzance, v.c. 1. The medulla has a strong yellow coloration with potassium hydroxide, and the plant therefore comes under *P. tribacoides* Nyl. Apart from this colour-reaction the plant agrees with *P. tribacia*, under which *P. tribacoides* is included in Mon. Br. Lich. (1918) by Miss Smith.

In Crombie's Mon. Br. Lich. (1894) Penzance is given as a locality for *P. tribacia* though *P. tribacoides* is given as a separate species.

P. SUBDETERSA Nyl. On stone upright, Buckden (64). Harmand, in Lich. de France, p. 636, gives this as synonymous with *P. enteroxanthella* Oliv. and considers it as a form of *P. pulverulenta* var. *leucoleiptes* Tuck. Miss Smith (Mon. Br. Lich., 1918, p. 246) puts it near *P. tribacia* in the group with cortex plectenchymatous on both surfaces.

PLACODIUM CIRROCHROUM (Ach.) Hepp. Brecon, v.c. 42; Harlech, v.c. 48 (*D. A. Jones*).

P. ELEGANS DC. var. *PERTENUE (Harm.), comb. nov., is a variety or form with extremely slender laciniæ (0·2–0·25 mm. wide), much slenderer than in var. *tenue*. As in the type the laciniæ are somewhat cylindrical and nodulose and are corticate on both surfaces. On rock, Haytor, Dartmoor, v.c. 3.

P. ERYTHROCARPUM (Pers.) A. L. Sm. (*P. teicholytum* DC.). On mortared tiles of barn, Staplegrove, v.c. 3.

P. DECIPIENS (Arn.) Leight. On stone roof, Cheltenham, v.c. 33 (*H. H. Knight*).

P. MEDIANS Nyl. (*Candelariella medians* A. L. Sm.). On limestone coping of cemetery-wall, Taunton, v.c. 5; on limestone, Cheltenham, v.c. 33 (*H. H. Knight*).

P. CALLOPISMUM var. BREVILOBATUM (Nyl.) A. L. Sm. On siliceous rocks near Taunton (5), Brecon (42), and Pickering (62). In the Taunton district it has been noticed not only on siliceous rock (Lynton slate) but also on a brick wall.

CALLOPISMA CERINELLUM (Nyl., sub *Lecanora*). There is only one record in the Brit. Mus. Monograph, but the plant is less rare than this indicates. It is not easy to obtain a good herbarium specimen of it, as the apothecia are usually few and scattered. It occurs on elders at Combe St. Nicholas (5), Copley Wood (6), and near Cheltenham (33, *H. H. Knight*).

C. CÆSIORUFUM (Ach., sub *Lecidea*). On siliceous rocks, Paul, near Penzance (1), Compass Cove, near Dartmouth (3), and Goodrington (3).

C. TURNERIANUM (Ach., sub *Lecidea*). The few records given for this in the Brit. Mon. (1918) are from maritime districts, but it is not necessarily a maritime lichen. It occurs on hard siliceous rocks at Dadnor, near Ross (36), and near Llanberis waterfall (49). *C. ferrugineum* var. *festivum* occurred on the same wall at Dadnor, but was quite distinct from it. The same plant is found in the Llanberis district, but not on the same rock from which *C. Turnerianum* was obtained.

C. ATROFLAVUM (Turn., sub *Lecidea*). This usually occurs on rocks in maritime districts, but it has been recorded previously in inland situations. On talus stones, Halsway Combe, Quantocks (5); on low-lying shingle amongst *Sueda fruticosa*, Blakeney Point (27 & 28).

CANDELARIA CRENATA (Wahl.), comb. nov. On wall, Brecon, v.c. 42; on rock, Harlech Castle, v.c. 48 (*D. A. Jones*).

PARMELIA PROLIXA var. *ISIDIOSTYLA (Nyl.), comb. nov. On boulders, Lanyon Cromlech (1), Sheepstor (3), Harlech (48, *D. A. Jones*), Corstorphine Hill, Edinburgh (83, *leg. McAndrew*). This variety, so far as I am aware, has not been previously recorded for the British Isles, though it has probably often been collected and labelled "*P. Delisei* var. *isidiascens*," the only isidiate variety of *P. prolixa* or its subspecies *Delisei* which is given in the B.M. Monographs (1894 & 1918). Not only is there an isidiate variety of *P. Delisei* (var. *isidiascens*) but also an isidiate variety of *P. prolixa* (var. *isidiostyla*). Nylander is the author of both these names. He first described *P. isidiostyla* in Flora, 1875, p. 8, as follows:—"Forsan varietas vel subspecies *P. prolixæ*, notanda thalli isidio verruciforme olivaceo-cinerascente, sæpe conferto, demum crasso et supra albido-sorediatulo." This is the plant for which the above records are given. He then follows on with a short description of the plant sent to him by Crombie, "*P. isidiostyla* *isidiascens est analoga *P. Delisei*, in Anglia (Crombie)." This is the plant which has been given in the B.M. Monographs as var. *isidiascens* of the subspecies *Delisei*. Harmand (Lich. de Fr. pp. 539 & 541) puts the plants with slender isidia under *P. glomellifera* Nyl., whilst those having larger isidia with subglobose heads are placed under *P. Delisei* var. *isidiostyla*. The latter name is not in accordance with Nylander's, as he distinctly gives *isidiostyla* as an isidiate *P. prolixa* and *isidiascens* as an isidiate *P. Delisei*.

LECIDEA CONFERTULA Stirt. Cader Idris (48), Harlech (48, *D. A. Jones*), Skiddaw (70, *H. H. Knight*; recorded in Trans. Brit. Mycol. Soc. 1923).

L. PHÆOPS Nyl. Aber Edw (43), Llanbedr and Harlech (*D. A. Jones*), Barmouth (48).

L. PRASINORUFA Nyl. On decomposing red sandstone, Delamere (58).

L. TEMPLETONI Tayl. (*Bilimbia Templetoni* Mudd). Over moss on Durness limestone, Assynt, v.c. 108 (*H. H. Knight*).

L. JURANA Schaer. Bwlch Gwyn, v.c, 50 (*D. A. Jones*).

*L. SOREDIZODES (Lamy) Lindau. This is similar to some states of *L. sorediza*, except that the medulla gives no reaction with iodine. The thallus is less developed and less determinate and the apothecia

(which are rarely formed) are smaller than in typical *L. sorediza*. On siliceous rocks with *Rhizocarpon confervoides*, Buckland St. Mary, and with *L. coarctata* and *L. sylvicola*, Staple hill. Both stations are at an altitude of 900 ft. and on the Blackdown hills in v.c. 5. It is sometimes given as a sorediate variety of *L. crustulata*.

L. PERCONTIGUA Nyl. is commoner than is generally supposed. The red coloration of the thallus with potassium hydroxide is so distinct that its restoration to specific rank (Mon. Br. Lich. pt. ii. 1926, p. 82) is justified. Clatworthy, Cheddon Fitzpaine, and Blagdon, v.c. 5; Craig-cerig Gleisiad, near Brecon, v.c. 42; Harlech, v.c. 48.

*BILIMBIA EFFUSA Auers. (*Lecidea Auerswaldii* Stiz.). On shaded and damper crevices of the bark of an old elm-tree, Norton Manor, Taunton, v.c. 5, associated with *Bacidia phacodes*, *B. rubella*, *Buellia myriocarpa*, *Opegrapha varia* var. *notha*, etc. As Zahlbruckner does not use *Bilimbia* as a generic name, he has given the name of *Bacidia effusella* to this species, since the specific name of *effusa* was already in use under *Bacidia*.

As this species has not been previously recorded for the British Isles the following diagnosis is given:—

Thallus darkish greenish-grey, minutely granulose, K−, C−. Apothecia small, 0·5–7 mm., dark with a reddish or brown tinge, subinnate or sessile, at first plane with a slightly paler proper margin, then becoming somewhat convex and immarginate. Paraphyses discrete with almost spherical heads which are usually dark brown. Hypothecium pale. Epithecium often more or less purplish with K. Spores 8 or fewer in the clavate ascus, blunt at ends, colourless, usually straight but sometimes slightly curved, 3–5-septate, 18–30 × 4–6 μ. Hymenial gelatine wine-red with iodine. The spores are given by Th. Fries in Lich. Scand. as 20–36 × 4–6 μ.

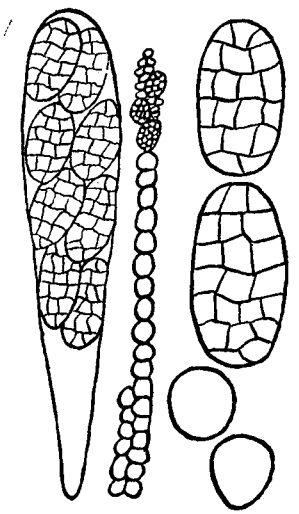
B. SUBVIRIDESCENS (Nyl.) A. L. Sm. In Mon. Br. Lich. p. 157 (1926) only two localities are given. The following are additional localities from other vice-counties:—On gorse bank in bare places, Madron (1); on heathy bank, Minehead (5); on ground, Harlech (48, *D. A. Jones*). A specimen collected over decaying vegetation on soil in Perriton Combe (5) belongs to var. *trisepta* (Naeg.) A. L. Sm. Mr. Hebden considers it to be the variety rather than the type, and I agree with his determination.

Staurothele innata, sp. nov. *Thallus* crustaceus, cinerascens, effusus vel subdeterminatus, rimoso-areolatus vel subsquamulosus, planus vel paullum inæqualis crassitudine mediocre, K−, C−; areolis irregulariter rotundatis vel angulatis; hypothallo plerumque nigro; gonidiis viridibus 4 μ latis interdum majoribus. *Perithecia* subglobosa interdum globosa 0·8 mm. lata innata leviter foveolata; tunica inferne nigra; ostiolo plerumque minuto, gonidiis hymenii plerumque gonidiis thalli similibus, interdum quadratis, raro in cellulas minores divisis (præsertim in superiore parte hymenii) plerumque globosis, rarissime cylindricis; paraphysibus mucilagineis; hymenio

I + purpureo-vinosa. *Asci* clavati circa 140 × 30 μ, *sporis* octonis hyalinis vel cinereo-brunneis haud nigro-brunneis muriformibus cum 6 ordinibus transversalibus cellularum quadratarum, demum irregulariter muriformibus, 28–38 μ × 17–19 μ.

Hab. On limestone wall and on mortar associated with *Lecanora galactina* and *Verrucaria nigrescens*, Bishop's Hull, near Taunton, Somerset, v.c. 5. Gonidia are usually present in the hymenium, but portions may be obtained in which they are absent.

Thallus grey, cracked-areolate or subsquamulose, moderately thick; hypothallus usually dark; algal cells green, 4 μ or more in diameter. Perithecia subglobose, sometimes globose, leaving shallow pits in the substratum; wall dark below, ostiole usually minute; hymenium



Staurothele innata, sp. nov.—Ascus and hymenial gonidia, × 450. Two spores (*s.*), × 750. Two perithecia (*p.*), × 13.

containing gonidia similar to those of the thallus, but sometimes cuboid, occasionally dividing up into smaller cells (especially in the upper part of the hymenium), which are usually globose, but may be cylindrical; paraphyses becoming mucilaginous and disappearing; hymenial gelatine purplish wine-red with iodine. Spores 8, colourless or brownish but not dark brown, 5-septate and muriform with cuboid cells, ultimately irregularly muriform.

S. rupifraga has a different thallus, the spores are dark, in fours, and somewhat larger. *S. cæsia* has a leaden or bluish-grey tartareous thallus. *S. immersa* has triseptate-muriform reddish-lilac spores and different thalline characters. *S. bacilligera* has the hymenial gonidia always long and the perithecia less immersed. *S. rugulosa* has a similar thallus, but the perithecium is less immersed and its hymenial gonidia long.

NOTES ON PAPERS OF INTEREST TO STUDENTS OF THE BRITISH FLORA.

Watson Botanical Exchange Club Report for 1926–7.—This Report, carefully compiled by the Hon. Secretary and Editor, Mr. H. S. Thompson, contains comments upon the plants contributed by the Members and distributed by Mr. D. G. Catcheside. The following notes seem of particular interest:—

Hieracium præcox Sch. Bip. (419) (p. 386). Railway-bank near Chipstead, Surrey, June 23, 1922. Phyllaries incumbent; ligule-tips glabrous; styles slightly livid (*H. W. Pugsley*). This plant has been identified by Rev. J. Roffey with *H. præcox* var. *castanetorum* Schultz-Bipontinus Cichoraceotheca, No. 22. The varietal name seems to be a *nomen nudum*. It grew in abundance near Chipstead in 1922, but only on the banks of the railway, where it appeared to have been recently introduced, probably during the great war. It seeds and spreads very rapidly in my garden. *H. præcox* is placed in the section *Oreadea* in the new London Catalogue, following the arrangement of Zahn; but, after cultivating the Chipstead plant for four years, I cannot agree to its position in that generic division. Its foliage-hairs at all times of the year are relatively soft and short, as in the *Vulgata*, and the clothing of its small heads resembles that of *H. serratifrons* Almq. and its allies, near which I think it should be placed. Gremli places the Swiss forms of *H. præcox*, which are much more Oreadean than our plant both in foliage and in flowers, among the *Vulgata* next to *H. murorum* (*H. W. Pugsley*).

Polygonum dumetorum L. (Ref. 1138) (p. 395). Hedgebank, south end of Thursley Common, Surrey, Aug. 22, 1926 (*E. C. Wallace*). I agree, but I have never seen *dumetorum* before with such small fruit and such weakly-developed perianth-wings. On looking through a series it is clear that in all *dumetorum* plants a *few* of the perianths are practically wingless; but the nut is unmistakeable (*C. E. Salmon*).

Populus canescens Sm. (672) (p. 397). "The Willows," Hitchin, Herts, v.c. 20, 1926 (*W. J. Housden, Comm. J. E. Little*). A belated catkin enabled me to ascertain that the colour of the stigmas was light purple. Moss (Camb. Brit. Flora) states that the colour of the stigmas in *P. canescens* is yellow, and I believe he would regard the purple stigmas as evidence of hybridity with *P. tremula*. But Babington makes the stigmas of *P. canescens* purple. Such enlarged figures of the stigmas as I have seen are in general very inaccurate, being drawn not from fresh but from shrivelled specimens (*J. E. Little*).

Chara crinita Wallr. f. *microsperma elongata* Syden (p. 404). Hungaria: Comitad. Pest. Gubaaspusta, pr. Kussuthfalva, Mai. Leg. Filarsky. Ex hb. Dr. K. Rechinger, Wien. A particularly interesting contribution; the specimen sent to me consisting of examples

of the male as well as the female plant. The male has apparently a very restricted distribution in the East of Europe, whereas the female occurs in scattered localities over most of Europe, in a band across Asia, in North Africa, and in North America. The male plant is not likely to have been overlooked by collectors, the large brightly coloured antheridia being so much more conspicuous than the oogonia. In England and elsewhere the female produces well-developed oospores, which germinate freely in the absence of the male plant. The name of *C. canescens* Loisel. (1810) antedates that of *C. crinita* Wallr. (1815) (*J. Groves*).—C. E. S.

Botanical Exchange Club of British Isles, Report, Vol. viii. (August 1927).—These are, as usual, full of much interest to British botanists, particularly Part 1, which is compiled by Dr. Druce; Part 2, by Mr. T. J. Wall, the Distributor for the year, deals with the plants sent in for exchange.

In Part 1, amongst the Plant Notes for 1926, we notice *Alchemilla colorata* Buser, from Antrim, *A. coriacea* Bus., from Forfarshire, *Rosa spinosissima* var. *Ciphiana* Druce, *Hieracium subimpressum* Dahlst., sp. nov., from Clova, *H. megopodium* Dahlst. (*H. diaphanoides* var. *apiculatum* Linton) with plate, *Taraxacum alienum*, *T. britannicum*, *T. orcadense*, *T. sublutescens*, *T. tanylepioides* (all new species and described by Dahlstedt).

The Notes on Publications, New Books, etc., occupy some 50 pages; amongst the Obituary Notices—under E. Hackel—are some interesting notes on various Grasses.

A fascinating account of the plants of Le Lautaret, near Grenoble, by Dr. Druce, occupies four pages; it is a district containing many interesting species. Mr. C. E. Britton contributes an article upon *Centaurea pratensis* Thuill., and *Thymus carniolicus* Borbas and *T. pseudo-lanuginosus* Ronniger are described; the latter is new (p. 168).

A Revision of the determinations of the *Festuca ovina-rubra* group sent to the Club in former years by Mr. W. O. Howarth, a note upon *Poa subcærulea* Sm. by Prof. C. Lindman, the Distribution of Pansies in England and Scotland by Dr. E. Drabble should be noted, and also Mr. J. Fraser's valuable Supplement to the Report (pp. 213–247), entitled "Menthæ Britannicæ," which enumerates and describes all the British forms and hybrids.

The Report also includes the following:—J. Parkin, "Evolution and Classification of Flowering Plants"; Dr. Druce, "Note on Nomenclature"; Messrs. A. E. Wade and R. L. Smith, "Adventive Flora of Cardiff"; Dr. E. Almquist, "Nature's way for producing Species"; Capt. C. D. Chase, "Botanising in the High Tatra, Carpathians"; Dr. A. Thellung, "Qu'est-ce que le *Solanum Dillenii* Schultes?"; Dr. Druce, "*Botrychium Matricariæ*" (with plate).

Part 2, the Distributor's report, is of interest chiefly to those who contributed specimens, but the following notes seem worth a special reference:—

Ornithopus perpusillus L. (Ref. x. 30) (p. 258). Lancresse Quarries, Guernsey, June 14, 1926 (*J. E. Lousley*). The plants of this gathering all have more or less glabrous leaves, which suggest a comparison with the French variety *glaber*.

Mercurialis perennis L. f. *monoica* (p. 276). Tidebrook, E. Sussex, May 1, 1926 (*A. H. Wolley-Dod*). All the specimens from this gathering have the lower spikes wholly male, and the upper wholly female or female towards their ends. In previous gatherings from other localities the sexes were more indiscriminately mixed or with a tendency to grow female flowers on the lower spikes or the lower portions of them.—C. E. S.

Flora of Orkney.—Col. H. H. Johnston (Trans. Bot. Soc. Edin. xxix. pp. 408–428, 1927) in this, his tenth paper, records his additions to the Flora of Orkney.

Amongst the plants enumerated are *Hieracium inuloides* Tausch subsp. *striatum* Tausch var. *pseudauratum* Zahn, *Taraxacum bipinnatifidum* Dahlst., *T. lætifrons* Dahlst., *T. serratilobum* Dahlst., *T. alienum* Dahlst., *T. perlaciniosum* Dahlst., *Euphrasia borealis* Towns. var. *pubescens* Towns., *E. atroviolacea* Druce & Lumb, *Potamogeton filiformis* f. *crinisimilis* Hagstr., *P. filiformis* × *pectinatus*.

Col. Johnston also discovered the following new Dandelions, which are carefully described by Dahlstedt:—*T. chloroleucophyllum*, *T. serratilobum*, *T. fulvicarpum*, and *T. perlaciniatum*.

In the same Journal, p. 429, Col. Johnston reports from Shetland: *Caltha palustris* var. *minor* DC., *Cerastium tetrandrum* var. *eglandulosum* C. E. S., and a new species of *Taraxacum*, *T. shetlandicum*, which is fully described by Dahlstedt.—C. E. S. & E. G. B.

Scirpus parvulus (*Irish Naturalist's Journal*, 1926, p. 75).—An interesting note, by A. W. Stelfox, giving a drawing of the plant and recording its re-discovery at Arklow, Co. Wicklow, where it had not been seen, apparently, since 1896.

In the same Journal, p. 78, *Allium oleraceum* is reported, by R. A. Phillips, from near New Ross, Co. Wexford, its second Irish station.—C. E. S. & E. G. B.

SHORT NOTES.

Erica Tetralix L. var. fissa Druce.—This is a form or state of the Cross-leaved Heath in which the corolla is divided to the base. Dr. Druce, in his description of the plant in the B. E. C. Report, 1913, p. 329, states "corollis profunde quadripartitis," but in the plants that I have observed the number of segments varies even in the flowers on the same head, and in some flowers there is only a single slit. Sometimes the segments are about equal in size, but frequently they are very irregular.

In June 1925 I transplanted to my garden a plant bearing its first head of flowers of the season, in which all the flowers had the corolla

cut to the base. This plant produced several subsequent heads later in the same year, all of which had the normal undivided corolla.

I have now found this plant in five different places on Studland Heath, Dorset, also in the Bourne Valley, Dorset (June 1st, 1927), near Hinton Admiral, Hants (June 16th, 1927), and near Christchurch, Hants (May 26th, 1925). All these were early in the season of flowering for this species, the earliest being May 20th, 1926, and the latest June 26th, 1925. Comparing this with the result obtained from the plant grown in my garden suggests that the divided corolla may be a condition associated particularly with the early flowers.

The behaviour of the plant I have grown proves that the abnormal corolla is not constant on the same plant.

The malformation suggests the work of mites (*Eriophyes*?), but hitherto I have been unable to find any on the plants examined.—L. B. Hall.

Erica cinerea L. var. **Rendlei** L. B. Hall, var. nov.—In the *Journal of Botany*, 1909, p. 437, Dr. A. B. Rendle described and figured a form of *Erica cinerea* L., found near Axminster, in which the flowers were replaced by compact heads of closely imbricated crimson bracts.

I have found two similar plants growing at Parkstone, Dorest, one of which, a good-sized bush, is in the uncultivated heathland forming part of my ground.

The plant was first noted in the county by Surg.-Capt. Borrett, who has found it in four other places, making a total of six widely separated localities in the Poole district of Dorset, all of which we are keeping under observation. In each of these places there is one plant only affected, the surrounding plants being quite normal.

Dr. Rendle mentions that in his specimen half the bush bore normal flowers, but these are entirely absent in the plants we have found.

This well-marked and attractive form is well worth naming, and as this does not appear to have been done, I suggest that it should be called var. *Rendlei*:—

E. cinerea L. var. *Rendlei* variat bracteis plerumque rubris anguste lanceolatis et arcte imbricatis capitula ovoidea in loco corollæ formantibus.—L. B. Hall.

Chærophyllum sylvestre L. var. angustisectum Druce.—In July 1925 Mr. C. E. Salmon and I found a small colony of this plant in the Cross Fell District of Cumberland, growing in full sunlight on wet limestone ledges where the roots were close to a constant trickle of water. I took a portion of one plant, part of which I dried and the remainder I divided into two pieces and planted them in my garden at Parkstone, Dorset, in soil consisting of peaty sand. One piece was put in full shade and the other in half shade. Both portions have developed into well-grown plants and have produced only the very finely-cut leaves of the original.

In 1926 they ripened a small quantity of seed, and from this I now (Nov. 1927) have eleven plants with well-developed radical leaves. Some of these seedlings have been grown in the shade, others in full sun, but they all retain the finely-cut leaves of the parent plant.

I am continuing the experiment, which, so far as it has gone, shows that this well-marked form keeps constant under conditions very different from those of the original habitat.—L. B. HALL.

EUPHRASIA MINIMA AND E. CONFUSA.—In my paper on *The Genus Euphrasia and E. minima* (Journ. Bot. 1919, p. 336) I said: "After ten years' scepticism on the subject of *E. minima* in Britain. . . . . I still believe with Pugsley that what he appropriately calls *E. confusa* cannot be regarded as conspecific with *E. minima* Jacq."

In July 1922, a very late season, I was shown by Mr. N. G. Hadden a few small pale yellow-flowered Eyebrights above Porlock in West Somerset, which proved to be a form of *E. Rostkoviana* Hayne; but last July, during a week's fishing at Simonsbath (1000 ft.), on Exmoor, an opportunity occurred of seeing and collecting ample specimens of two different species, many of which had yellow flowers in varying degrees. I sent fresh specimens of both to Mr. Pugsley, and he confirmed my opinion that one was his *E. confusa* and the other he considered a form of *E. Rostkoviana*. Both plants were first seen by me at about 1400 ft. altitude, close to the Devon border and the road to South Molton. Marshall and Pugsley had collected specimens there. The former sent specimens to the Exchange Clubs as *E. minima*, and in 1918 he sent to the Watson Botanical Exchange Club *E. Rostkoviana*, both from "grassy ground in the Barle Valley, Simonsbath, 1000 feet," and from "steep grassy slopes, Simonsbath, 1100 to 1200 feet, August 1918."

Subsequently, on July 17, 1927, I came across a profusion of yellow and other coloured Eyebrights on a grassy knoll close to the river Barle at about 1100 ft. Now that I have seen the yellow-flowered Exmoor Eyebright growing in quantity, the experience confirms the opinion held by me ever since "*E. minima*" was first reported from Exmoor, viz., that it is not *E. minima* Jacq. which I had known so long in the Alps. A series of both my Exmoor gatherings will be sent to the Watson Botanical Exchange Club.—H. S. THOMPSON.

CALAMAGROSTIS IN 'THE LONDON CATALOGUE'—ED. 11.—Mr. Sprague, in Rep. Bot. Ex. Club, vii. 930 (1926), gives *C. canescens* (Weber) Gmel. as the valid name of *C. lanceolata* Roth. Prahl, in Krit. Fl. Schl.-Holst. ii. 1890, 249, uses Roth's name and gives Weber's as var. *β. canescens*, adding "*pallida* Nolte Hansen Hb. 808"; the date of this is 1840.

Dr. Druce, in Rep. Bot. Ex. Club, v. 55 (1918), remarks that the Vienna Actes seem to demand that *Deyeuxia borealis* Laest. must bear the name of var. *elatior* (Hartm.) Druce if treated as a var. of *D. neglecta*. But they are kept separate by Hjelt, Consp. Fl. Fennicæ, i. 374 (1895).

In *Calamagrostis neglecta* var. *interrupta* (Wahlb.) the panicles are only 7·5 cm. long, the glumes 3 mm. long; the widest part of the panicles is only 1 cm. wide. Ruprecht, in his Fl. Samoj. Cisural. p. 67 (1845), has a var. *parviflora* which seems very similar to Wahlenberg's variety.—A. BENNETT.

REVIEWS.

Plant Ecology. By W. B. MCDOUGALL, Assistant Professor of Botany in the University of Illinois. 8vo. Pp. viii and 326. With 115 illustrations. Price 14*s.* net. Henry Kimpton: London, 1927.

THE present volume is an attempt to supply the need for a text-book of general ecology, a field in which the literature is all too meagre. The treatment is of an elementary character and not infrequently rather superficial, but this is to some extent redeemed by the bibliographical references appended to each chapter which guide the reader to an amplification of the information afforded.

One of the difficulties attendant upon the task of writing such a work is inevitable in the development of a new view-point—namely, the frequent inadequacy of our data and the marked inequality of our knowledge respecting the diverse aspects of ecology. Such shortcomings must, nevertheless, be recognized, and we cannot think that either the one or the other will tend to be diminished by the obscurantism which describes forest communities as examples of "social disjunctive symbiosis," or the relation of herbivors to pasture as "antagonistic disjunctive symbiosis." And such substitutions as the term "diphotophyll" for the familiar "dorsiventral leaf" enlarge an already overburdened nomenclature without any corresponding enlargement of our concepts.

In the more physiological aspects of the subject we should have welcomed a fuller treatment and recognition of recent work. It is, for example, rather surprising to find emphasis laid on the cooling effect of transpiration, since we owe chiefly to American investigators the recognition of the small part played by transpiration in this respect.

Nevertheless, the reader of these pages who has little knowledge of the biological relations of plants will find much of interest, whether it be regarding the mycological cauliflowers cultivated by the leaf-cutting ants or the curious and complex relations obtaining between the *Blastophaga* wasps and the figs which they both pollinate and parasitise.

The work is well illustrated, and, though some of the text-figures are rather crude, the photographic reproductions are mostly good both as to quality and subject.

E. J. SALISBURY.

Die Laubmoose Europas. W. MOENKEMEYER. Lieferung 2. 8vo, pp. 257–576, figs. 52–118. R.M. 25. Lieferung 3, pp. 577–960, figs. 119–226. R.M. 26. Akademische Verlagsges.: Leipzig, 1927.

THE second part of the work, the first part of which was noticed in this *Journal* for October 1927, includes the families Pottiaceæ (the greater part) to Aulacomniaceæ.

Among other points of interest, it may be mentioned that the

derivation of each generic name is given, for which many students will be grateful.

It is refreshing to find that the author has throughout exercised an independent judgment, refusing to follow slavishly the usual authorities. Perhaps not all his new positions will be accepted. It is doubtful whether that of placing *Trichostomum Ehrenbergii* Lor. under *Hyophila* will stand, in view of the fact that it is certainly nearly allied to the East Indian *Barbula inflexa*, which has long Barbuloid peristome.

It may be questioned whether the name *Barbula botelligera* Moenkem. (p. 289) will be allowed to stand, as against *B. ferruginascens* Stirt. The author's argument appears to be mainly that, as nearly all Stirton's published names proved to be synonyms, and since he did not detect the characteristic gemmæ of the plant, his name should be ignored. *B. ferruginascens*, however, was a validly published name; Stirton's specimen is undoubtedly identical with *B. botelligera*; and, appropriate as the latter name is, it can hardly, one thinks, displace the earlier name of Stirton's, without violating the rules of nomenclature.

Eucladium verbanum Dix. & Nicholson, is united, as suggested by Culmann, probably quite correctly, with *Didymodon glaucus* Ryan, which is treated as a variety of *Barbula rigidula*.

A considerable number of well-known and usually recognized species are treated as varieties or subspecies, a course which certainly often gives a truer view of their relationships. It is not, however, always easy to follow the principle on which the author has acted. Thus *Tortula norvegica* (Web.) is made a variety of *Syntrichia ruralis*, while *S. spuria* Amann is rather surprisingly retained as an independent species.

Whenever a new work on European mosses appears, the present reviewer always turns hopefully to *Rhacomitrium sudeticum*, in the desire of finding the differences (which have always eluded him, though they seem so clear to some!) between *R. sudeticum* and forms of *R. heterostichum*, viz., var. *gracilescens*. Alas! His hopes are once more dashed to the ground! On p. 377 the only separating character given is that *R. sudeticum* differs, "von *R. heterostichum* und *microcarpum* durch in der Spitze rundlich quadratische, nicht langgestreckte Zellen." Needless to say, the upper cells of *R. heterostichum* are themselves (as shown in the Key) subquadrate and *not* elongate, and we are still left guessing!

Students who have given up the European species of *Bryum* as hopeless, finding Limpricht's Keys not to cover all the ground, and no Keys at all in Roth's work, will be very grateful for the present treatment of that difficult genus. Although the author has, quite wisely, not ventured to give a Key for all the published European species of *Bryum*, he has done so for all the fairly well-established species, while the concise descriptions point out the most important characters. Rather curiously, both Roth's work and the present appear to have overlooked the very distinct and interesting Mediterranean *B. splachnoides* (Harv.).

Lieferung 3 finishes the work. The author and publishers are to be congratulated on completing the whole so soon after the issue of the first part.

As with the earlier parts, the author shows considerable independence of judgment in the grouping of the genera and species, on the whole steering a fairly middle course between the systems adopted in most works and the much altered arrangement employed by some of the most recent writers. Some old friends will be recognized with difficulty in their new names and places. Thus the moss almost universally known as *Eurhynchium striatulum* appears here as *Isothecium filescens* (Brid.), some 180 pages removed from the genus *Eurhynchium*.

On p. 685 the Siberian and Chinese *Anomodon subpilifer* Lindb. & Arn. finds a place with the other species of *Anomodon*, though no European localities are given. Is this a forecast of the "Yellow Peril"?

The Leskeaceæ have undergone considerable revision, both as regards grouping and nomenclature. *Pseudoleskea* is merged in *Lescuræa* (which has priority of place in the *Bryologia Europæa*). It seems rather strange to the present reviewer to reduce *Pseudoleskea patens* to a var. of *L. atrovirens*, while *L. radicosa* and *L. denudata* are retained as species. Are not the high central papillæ of *P. patens*, as compared with the apical prominences of *L. atrovirens*, of as great, if not greater, importance than the characters that separate these latter plants from that species?

On p. 698 in the Key (after *T. recognitum*) "eingerollten" appears to be a misprint for "umgerollten."

Coming to the Hypnoid mosses, *H. commutatum*, *H. decipiens*, and *H. filicinum* are separated as *Cratoneurum*. This will probably be felt to be a sound position (though whether the author is justified in making, as he does, a separate Family, Cratoneuraceæ, for the genus, may be much more open to question). If so, then that restless wayfarer, *H. filicinum* L., which has sought lodging in so many genera, may be hoped to have found its final home. It is certainly more naturally placed here than in *Amblystegium*.

The description and figure (fig. 166*f*) of *Hygrohypnum molle* (Dicks.) surely represent a not quite typical form; the figures of Dickson and Wilson, as well as the British plants I have examined, show a much wider, less tapering leaf, not greatly differing from that of *H. dilatatum*.

The "Harpidioid Hypna" seem to be treated in a very reasonable and lucid way. The author has refused to follow some recent bryologists in dividing the genus *Drepanocladus* into a number of small genera, or to accord specific rank to a number of recently described "species"; but he has given figures and clear descriptions of all the main varieties and forms. Fig. 172 shows an interesting form of *D. aduncus*, which at the lower part of the stem commenced its life as more or less typical *D. aduncus*, then for a considerable time spent its days as var. *pseudofluitans*, and, finally, on emerging from the water, reverted to normal *D. aduncus*.

One is glad to see that on p. 835 the author has given the correct spelling of *Eurhynchium Stokesii*, though unfortunately on the following page the legend to fig. 172 has perpetuated the erroneous spelling "*Stockesii*."

To sum up, it may be said that these two parts amply bear out the promise of the first to be an extremely useful contribution to bryological literature. The price of the complete work is R.M. 72.

H. N. D.

Latin Names of Common Plants: their Pronunciation and History. By F. Dawtrey Drewitt, M.A., M.D. 8vo, pp. 68. Witherbys: London, 1927. Price 3*s.* 6*d.*

To obviate the frequent mutilation of the names of flowers and trees in everyday conversation, Dr. Drewitt has made this attempt to get at a reasonable pronunciation of the Latin names of some of the more familiar species, and, when possible, their derivations and history. The subject has been complicated by the neglect in late Latin of the vowel-quantities of the classical age, and the fact that many English words derived from this later Latin have kept more or less to the prounciation of that time. The pronunciation indicated in Standard English dictionaries may vary according as the classic or later Latin is taken as the guide. Again, long usage cannot be ignored, and it would be pedantic to insist on the original pronunciation of Anemone (the *o* in the Greek is long), though the correct accent might be given when the Latin name is used. The popular pronunciation of Crocus departs from the original (Lat., *crŏcŭs*), following the practice that a short vowel in the first syllable of a word of only two syllables when followed by one consonant is treated as long—compare *hŭmus, gĕnus, bŏnus, ŏnus*. The common pronunciation of Dahlia, named after Andrew Dahl, a pupil of Linnæus, is the more to be regretted, as it conflicts with *Dalea*, commemorating Dr. Dale, a botanist of the old Chelsea Physic Garden. Camellia supplies another example of the change of pronunciation from the original form—the plant was named by Linnæus in honour of Camel, a Moravian priest, traveller, and botanist. Popular usage here follows the principle of late and modern Latin, that a vowel (except *i*) in the antepenultimate syllable of a word ending in two undivided vowels is pronounced long, although the vowel may be actually a short or silent one; compare Aquilēgia (Lat., *aquilĕgus*), and Lobēlia (after the herbalist Lobel).

Enough has been said to indicate that much that is interesting and helpful on points which are not infrequently subjects of discussion will be found in Dr. Drewitt's little volume. His use throughout of the word family for genus suggests lack of acquaintance with botanical phraseology. We note that the author refers to a copy of the photographic facsimile of the *Vienna Codex of Dioscorides* in the College of Physicians' Library; one perhaps more accessible is in the library of the Department of Botany at the Natural History Museum.

Common Hongkong Ferns. By L. Gibbs. Hongkong: Kelly & Walsh, Ltd., 1927. 8vo, pp. x and 85, 42 plates. Price $2.50.

It is to line-drawings far more than to verbal descriptions that the author trusts to convey to the public his account of the ferns commonly found in Hongkong. The flat frond of a fern is more easily drawn or traced than a flowering plant with its diverging branches, leaves, and flowers. Colour is not required in the illustration, but accuracy of outline is essential, and sori and trichomes must be given, and often venation should be indicated. These points the author has borne in mind; and the result is very pleasing and is certain to prove of great help to those who have any concern with the ferns of Hongkong. In the Introduction we are told that 124 species have been recorded for the Island; so in this book about one-third of the fern flora is presented.

A. G.

BOOK-NOTES, NEWS, ETC.

Linnean Society.—At the General Meeting on December 1, 1927, Mr. Wilson Crosfield Worsdell was elected an Associate, and eighteen new Fellows were elected.

A specimen of luminous wood, sent by Mr. J. F. Hosking, F.L.S., was exhibited. The specimen had been taken from a tree that had been lying for some time on leaf-mould in a wood at Ham Street. Mr. Hosking had noted that many other parts of the same tree were equally luminous.

Mr. J. Ramsbottom explained the luminosity as due to the invasion of the timber by the fungus *Armillaria mellea*, and, in reply to questions by the President and Mr. R. H. Burne, stated that luminosity in fungi was caused by the same reactions of luciferin and luciferase as occurred in animals; the luminosity was continuous if the temperature was above freezing-point and in the presence of oxygen.

Mr. Miller Christy referred to barn-owls sometimes appearing luminous on account of particles of luminous wood from the lining of their nest-holes adhering to their plumage.

At the meeting on December 15, Dr. K. Münster Störm read a paper on "Recent Advances in Limnology." The subject of limnology as a synthetic science is to investigate the reciprocal action of biotopes and biocenoses, and the cycle of organic substances within the microcosms represented primarily by the lakes. For the solution of those great, general questions in biology, fresh waters possess quite special advantages, not shared by any other biotopes.

When the different lakes are thus regarded as units, the question of establishing natural lake types is raised. In the last few years a large number of extensive and important researches have been made, which all confirm that the three biological lake types, *eutroph*, *oligotroph*, and *dystroph*, recognised by Naumann and Thienemann must be regarded as natural, and should form the basis for attempts to establish more detailed classification schemes.

The principal topic of the paper was the discussion of the researches mentioned, which have yielded numerous facts with regard to the circulation of substances, oxygen stratification, bottom fauna and deposits. The relative importance of those investigations in permitting conclusions towards the establishment of a detailed natural classification were discussed. A scheme embracing all lake types known at present was put forward; it is based upon the (N+P), Ca, and Humus "spectra" proposed by Naumann for expressing the position of an individual lake with regard to those essential factors.

ROYAL SOCIETY.—At the Anniversary Meeting on November 30, 1927, Professor A. C. Seward was elected a member of Council, replacing Prof. F. O. Bower as the botanical representative. Two hundred and fifty Fellows and guests attended the Annual Dinner on the same evening.

BRITISH ECOLOGICAL SOCIETY.—The Society is holding its Annual General Meeting in Birmingham, from January 5th to 8th, under the presidency of Dr. T. W. Woodhead. The meetings will be held in the new Botanical Department of the University, which, with the new Departments of Zoology and Brewing, was formally opened by the Prime Minister on October 20th last.

BRITISH ASSOCIATION, 1928.—Professor R. H. Yapp has been appointed President of the Botanical Section for this meeting, which will be held in Glasgow.

DEPARTMENT OF BOTANY, BRITISH MUSEUM.—Mr. John Ramsbottom, O.B.E., has been appointed by the Principal Trustees to the Deputy Keepership, which will become vacant in February next, when Dr. W. D. Lang, Deputy Keeper, succeeds Dr. F. A. Bather, F.R.S., as Keeper of the Department of Geology. Mr. Ramsbottom joined the Staff of the Department of Botany in 1910, since when he has specially devoted himself to the Fungi.

THE British Museum (Nat. Hist.) Calendar for 1928 bears a reproduction (in colour) of the portrait of Dr. Daniel Charles Solander, F.R.S., by John Zoffany, R.A., presented to the Linnean Society by R. A. Salisbury. Solander, the favourite pupil of Linnæus, came to England in 1759 with introductions from Linnæus to John Ellis and Peter Collinson. On the recommendation of the latter he was, in 1763, appointed Assistant Librarian in the British Museum to catalogue the natural history collections. He accompanied Banks in Captain Cook's first voyage, in the 'Endeavour,' 1768–1771, and on their return lived in Banks's house, Soho Square, as his Secretary and Librarian. In 1773 he was appointed Keeper of the Natural History Department of the British Museum. He died in 1782.

The Calendar also records the removal of the well-known statue of Charles Darwin from its dominating central position on the stairs in the Great Hall, to a side position facing the statue of Huxley. The bronze statue of Sir Richard Owen, the first Director of the Natural History Museum, now occupies the premier position.

CLASSIFICATION OF THE GENUS *OPHRYS*.

BY COLONEL M. J. GODFERY, F.L.S.

THE division of the genus *Ophrys* into sections is difficult because some species are monotypes, and will not fit into any section satisfactorily, e. g., *O. apifera*, *O. bombyliflora*, and to a less extent *O. Bertolonii* and *O. speculum*.

Lindley divided the genus into two sections: *Cornutæ*, with bosses or horns at the base of the lip, and *Muticæ*, without horns or bosses. There are, however, several species, e. g., *O. aranifera*, *O. arachnitiformis*, &c., in which the lip sometimes has marked bosses and sometimes none at all.

Reichenbach fil. (*Icones*, xiii. 90, 1851) divided the genus as follows:—

A. *Musciferæ*.—*O. fusca, lutea, muscifera, speculum.*
B. *Fucifloræ*.—*O. fuciflora (Arachnites), tenthredinifera, oxyrrhynchos.*
C. *Araniferæ*, comprising three subsections:—
  A^2. *Araniferæ genuinæ*.—*O. aranifera, ferrum-equinum, hiulca, Bertolonii.*
  B^2. *Bombyliflora*.—*O. bombyliflora.*
  C^2. *Apiferæ*.—*O. apifera, Scolopax.*

In the *Journal of Botany* (1917, 330), I suggested the division of the genus into the following sections:—

A. *Eu-sepalæ*.—Sepals green, herbaceous.
B. *Pseudo-petalæ*—Sepals rose or white, petaloid.

Dr. Schlechter has justly observed that these characters are not perceptible in dried material. Also, one or two species, e. g., *O. arachnitiformis*, with normally petaloid sepals, are exceptionally found with green ones. Whether this be due to crossing with a green-sepalled species, or to reversion to a more primitive type, it nevertheless obscures an otherwise clear-cut line of demarcation. Hybrids between the two groups usually have green sepals also.

The discovery that insects visit some species of *Ophrys* (and probably all) not for anything of an edible nature in the flower, but solely on account of the mimetic resemblance of the lip to the female of the visiting insect, lessens the value of the colour of the sepals, for, though this makes for easier visibility, it is the apparent presence of the female which alone counts. Though bees are evidently attracted to coloured flowers by the expectation of honey, it is doubtful whether they have sufficient intelligence to associate conspicuous flowers with the possible presence of a prospective mate. Coloured sepals thus no longer appear of sufficient value for the scientific division of the genus into sections.

Dr. R. Schlechter, in the latest work on European Orchids (Mon. Orch. i. 90, 1926), divides the genus into four sections :—

I. *Myodes* = *Muscifera* Rchb.
II. *Arachnites* = *Fuciflora* + *Araniferæ genuinæ* Rchb.
III. *Poicilophrys* = *Araniferæ Apiferæ* Rchb.
IV. *Bombylodes* = *Araniferæ-bombyliflora* Rchb.

The raising of *Bombyliflora* to the rank of a section is an admission of its isolated character. The inclusion of *Araniferæ* in Section II. above appears to unite two clear-cut and well-defined groups into one not very homogeneous whole.

The latest system is that of Dr. R. v. Soó, Keeper of Botany, Hungarian Biological Research Institute, Tihany, Hungary, who, in his Orchideæ nov. europ. et mediterr. (Fedde, Rep. Spec. Nov. 1927, p. 27), writes as follows :—

"Adn. Systema nostrum generis *Ophrydis* est (*cfr.* Godfery, J. of B. (1917) 322.—Schlecht. Mon. 1926, 87–90).

"1. § *Muscifera* Rchb. f. (*Eusepalæ planilabellæ* Godf. p.p.—*Myodes* Schlecht.). Sp. 1–4. *O. muscifera, speculum, lutea, fusca* (petalis fere semper papillosis!).

'2. § *Fuciflora* Rchb. f. (*Pseudopetalæ Porrectæ* Godf. p.p.—*Arachnites* Schlecht. p.p.). Sp. 5–7. *O. fuciflora, Bornmülleri, tenthredinifera.*

"3. § *Araneifera* Rchb. f. *genuina* (*Arachnites* Schlecht. p.p.).
§§ *Euaraneifera* Soó, subsectio n. 906 (*Eusepalæ convexilabellæ* + *Pseudopetalæ Porrectæ* + *Rudimentariæ* Godf. p.p.). Sp. 8–14. *O. exaltata, arachnitiformis, lunulata, Bertolonii, araneifera, Tommasinii, ferrum-equinum.*
§§ *Spruneriana* Soó, subsectio n. 907. Sp. 15–19 (et 19 *a*). *O. Spruneri, Reinholdii, Sintenisii, Straussii, Kotschii, Dörfleri* (?).

"4. § *Apifera* Rchb. f. (*Poicilophrys* Schlecht.).
§§ *Œstrifera* Soó, subsectio n. 908 (*Pseudopetalæ Porrectæ* Godf. p.p.). Sp. 20–27. *O. picta* (*Scolopax*), *cornuta, œstrifera, attica, Heldreichii, phrygia, Carmeli, Schulzei.*
§§ *Euapifera* Soó, subsectio n. 909 (*Pseudopetalæ Retroversæ* Godf. p.p.). Sp. 28. *O. apifera.*

"5. § *Bombyliflora* Rchb. f. (*Eusepalæ convexilabellæ* Godf. p.p.—*Araneifera* b.) (*Bombylodes* Schlecht.). Sp. 29. *O. bombylifera.*"

The following remarks arise on this elaborate and comprehensive system :—

1. *Muscifera*.—This section, mainly based on the relative flatness of the lip, is far from being homogeneous; *O. muscifera* and *O. speculum* are really isolated species differing widely from *O. fusca* and *lutea*, and considerably from each other. *O. speculum* is, perhaps, the most highly differentiated of all species of *Ophrys*, for its specialisation is so complete that it mimics one particular Hymenopteron only, *Dielis ciliata*, and the flowers are visited solely by the males of that insect. The lip represents a female of the same species with its head in the centre of the flower, as if sucking honey. The male (females never visit the flowers) places himself on the lip in the same position (which is, so far as is known, the normal one assumed by insects visiting the flowers of all species of the genus except *O. fusca* and *O. lutea*), and thus withdraws the pollinia on his head.

O. fusca and *O. lutea* form a group by themselves, more distinct from all the other sections than these are from each other. They are visited by species of *Andrena*, which carry off the pollinia, not on the head, as in probably all other species of *Ophrys*, but on the terminal segments of the abdomen. The presence of a female is suggested, not by the whole lip, as in *O. speculum*, but solely by the markings on its basal area, which simulate a female facing the tip of the labellum. The male alights in the normal position, but immediately reverses it, placing himself on the markings which he believes to be his intended mate, and facing in the same direction (Journ. Bot. 1925, 33, and 1927, 350).

To render this curious method of withdrawing the pollinia possible, considerable modification of the structure of the lip has been necessary. In typical *Ophrys* there is no cavity at the base of the labellum, on each side of which stands a glistening eye-like knob (staminode). In *O. fusca* and *O. lutea* there is a well-developed cavity or hypochile at the base of the lip, covered inside with copious erect hairs, and there are no eye-like knobs. There is a gradually deepening groove in the base of the lip leading into it. This cavity is not an accidental formation of the base of the lip, but fulfils a most important rôle in the pollination of the flower, as fully explained in the *Journal of Botany*, ll. c. The markings on the lip have also been modified. Instead of the geometrical patterns so frequent in *Ophrys*, there are two large parallel mottled loops differing in colour from the rest of the lip.

O. fusca and *lutea* thus exhibit a specialised structure of the lip and equally specialised markings, co-ordinated with a very strange method of insect-pollination, for the *Andrena* inserts the tip of his abdomen into the basal cavity and works it about vigorously, never failing to withdraw the pollinia. The shape of the lip and the markings differ from those of all other species of *Ophrys*, and can be recognised at a glance. These characters appear amply sufficient to divide the genus into two natural and clearly-defined sections, based on morphological and biological differences, amounting to a change in the plan of construction and mode of pollination of the flower.

Reichenbach fil. says of the lip of *O. fusca* : "*basi ima inferne levissime bigibbosum, æque inde bicalcaratum dicendum*," an attempt to explain its structure in terms of an incipient spur. Schulze and Ascherson & Graebner say the lip has two "Höckern" underneath. Rouy and Camus state that it is bigibbous, without specifying where. It was not until the discovery of its extraordinary function in connection with the pollination of the flower that the existence of the hispid cavity at the base of the lip appears to have been observed.

2. *Fuciflorœ.*—*O. Bertolonii* and *O. Scolopax* appear to find their affinities in this group rather than in *Araniferæ* and *Apiferæ*, to which they have been respectively assigned. The former, though an isolated species, there being nothing quite like it, resembles *Arachnites* by its flat undivided lip and appendix turned up in front, but appears to have little or nothing in common with *Araniferæ*.

It is true that *O. Scolopax* bears a certain resemblance to *O. apifera*, especially in profile (*vide* pl. i. figs. 14 *a* and 14 *b*, *Genetica*, ix. 1927). This is due partly to the curling back of the sides of the mid-lobe till it looks semi-cylindrical, but mainly to the conical bosses being cut out from the lip by a deep incision, forming distinct side-lobes. At Vence, above Nice, however, this curling back of the sides of the lip does not take place, and the flower so closely resembles that of *Arachnites* (*fuciflora*) in breadth, flatness, colour, markings, and appendix, that it is sometimes mistaken for that species, until the cut-out side-lobes typical of *O. Scolopax* are observed. I have, however, though very rarely, found *Arachnites* itself with the bosses partly separated from the lip by an incision, but not to the same extent as in *Scolopax*. In typical *Arachnites* the bosses arise from the surface of the lip (as if punched out from beneath) at a little distance from its entire edge. Ardoini (Fl. des Alpes marit. 2 ed. 358) says: "Je ne puis voir dans cette plante .... qu'une forme remarquable de la précédente" (*O. Arachnites*).

It is suggested that there are only two groups in the genus *Ophrys* which are separated by differences of structure (co-ordinated with known functions essential to the reproduction of the plant) of sufficient importance to constitute sections:—

Section I. *Eu-ophrys.*

Labellum without hypochile, with two shining knobs (staminodes); markings usually geometric, often metallic. Pollinia removed by *Hymenoptera* on the head.

Subsections.

(1) *Musciferæ.*—*O. muscifera* and *speculum.*
(2) *Fuciflorœ.*—*O. Arachnites*, *Scolopax*, *Bertolonii*, *tenthredinifera*, &c.
(3) *Araniferæ.*—*O. aranifera*, *exaltata*, &c.
(4) *Apiferæ.*—*O. apifera* *.
(5) *Bombyliflorœ.*—*O. bombyliflora.*

Section II. *Pseud-ophrys.*

Labellum with basal cavity (hypochile), without eye-like knobs, with two parallel leaden, bluish, or purplish mottled loops, differing in colour from the rest of the lip, without geometrical patterns. Pollinia removed by Hymenoptera on the terminal segments of the abdomen.—*O. fusca*, *O. lutea.*

* Although *O. apifera* is usually self-pollinated, the pollinia are, nevertheless, occasionally removed by insects (*cf.* Journ. Bot. 1921, 287).

NOTES ON CAPT. G. N. HUMPHREYS'S PLANTS FROM THE RUWENZORI MOUNTAINS.

By R. D'O. Good, M.A., F.L.S.

In 1926 an expedition under Captain G. N. Humphreys visited the Ruwenzori Mountains with the main objects of reclimbing the highest peaks, hitherto ascended only by the Duke of the Abruzzi's Expedition, climbing some minor virgin peaks, and crossing the largest unexplored area in the range. This area was shown on the most recent maps as "inaccessible country covered with dense forest." Within it were found three lakes, two of which are larger than others in the range. The centre of the region consists of a treeless plateau on which the only flowering plants are two species of *Alchemilla*. Collecting was much hampered by bad weather, only one day being entirely without rain. Two months were spent in the uppermost vegetation zone, and what is thought to be a complete collection of the flowering plants of this zone was made. A fairly extensive collection was also made in the second highest zone, and, in addition, a small number of specimens were obtained at lower levels. The collection contains three species not already described, although one of them has been collected before (see *infra*). I am indebted to Dr. Stapf and Mr. Hubbard for the description of the new grass and to Mr. Exell for the determinations of the two species of *Alchemilla.*

Vegetation of the highest Floral Zone.

This zone extends from about 12,800 ft. to the snow-line at about 14,800 ft., and contains the following plants. The numbers in brackets are the collector's numbers:—

Ranunculus oreophytus Diels (533), *Cardamine obliqua* Hochst. (531), *Arabis albida* Stev. (532), *Subularia monticola* R. Br. (517), *Cerastium viscosum* L. (530), *Sagina abyssinica* Hochst. (549), *Alchemilla microphylla* De Wild. (538), *A.* aff. *Roccatii* Cortesi (no flowers) (539), *Sedum ruwenzoriense* Bak. fil. (537), *Peucedanum dissectum* Dawe (528), *Torilis gracilis* Engl. (515), *Helichrysum Stuhlmannii* O. Hoffm. (507), *Senecio sycephyllus* S. Moore (540, 541, 542, 543), *S. Humphreysii*, sp. nov. (547, 548), *S. Schweinfurthii* O. Hoffm. (544, 545, 546), *S. adnivalis* Stapf (485), *Lobelia Wollastonii* Bak. fil. (550), *Carex runssorensis* K. Schum. (526), *Poa glacialis* Stapf (524).

Vegetation of the second-highest Floral Zone.

This zone extends from about 12,000 ft. to about 12,800 ft. The species are different from those of the highest zone, but for two or three hundred feet on either side of the dividing-line between the zones there is a little overlapping. For example, at about 12,800 ft. *Lobelia Deckenii* and *L. Wollastonii* are found growing together,

but the former is not found above c. 13,000 ft. The species collected are :—

Viola abyssinica Steud. (498), *Hypericum Bequaertii* De Wild. (512), *Epilobium fissipetalum* Steud. (510), *Rubus runssorensis* Engl. (534), *Pimpinella kilimandscharica* Engl. (516), *Helichrysum fruticosum* Vatke (518), *H. Wollastonii* S. Moore (508), *Carduus ruwenzoriensis* S. Moore (514), *Senecio gynuroides* S. Moore (506), *Lobelia Deckenii* Hemsl. (519), *Philippia longifolia* Engl. (495), *Bartsia similis* Hemsl. (511), *Hebenstreitia dentata* L. (529), *Parietaria ruwenzoriensis* Cortesi (504), *Disa Stairsii* Kraenzl. (502), *Luzula spicata* var. *simensis* Hochst. (525), *Luzula Johnstonii* Buchen. (521, 522), *Carpha Eminii* C. B. Cl. (527), *Festuca gelida* Chiov. (523), *Deschampsia angusta* Stapf et Hubbard (513), *Agrostis trachyphylla* Pilger (520).

Although only one species of *Hypericum* is listed here there is a second species in the zone, but specimens of it were not collected. Both species are trees, one with yellow flowers and one with true orange flowers. The former has a more distinct trunk with very few suckers, while the latter produces abundant suckers. The flowers of the first species are smaller and more open, those of the other larger and more globular in shape. There seems little doubt that these species are respectively *Hypericum ruwenzoriense* De Wild. and *H. Bequaertii* De Wild.

Among the other specimens collected was good material of a species of *Thunbergianthus* which, although found by Scott Elliot, has never been named. This plant and two other new species are described here :—

Thunbergianthus ruwenzoriensis R. Good, sp. nov.

Frutex scandens, caule volubile internodiis striatis subtetragonis bisulcatis præcipue in sulcis aculeolis hispidis retrorsis præditis, nodis parum complanatis pubescentibus; *foliis* longe petiolatis, petiolis gracilibus glabris, supra sulcatis, infra rotundatis aculeolis retrorsis numerosis præditis, laminis tenuibus integris anguste triangularibus acutis basi subhastato-cordatis, supra fusco-viridibus glabris, infra multo pallidioribus, vena media sparse retrorso-aculeolata, cetera glabris, venis secondariis obliquis pinnatis 4–5-paris arcuatis, infra conspicuis, venis tertiariis laxe reticulatis; *floribus* pedicellatis in axillis oppositis solitariis vel paucis, pedicellis quam petiolis multo crassioribus sparse minuteque hispidis bibracteolatis, bracteolis linearibus acutis quam pedicellis triplo brevioribus ; *calyce* persistente magno utrinque glabro patelliforme, lobis 5 late deltoideis acutis tubo æquantibus ; *corolla* roseo-violacea utrinque glabra, tubo basi cylindraceo supra infundibuliforme abaxiale ventricoso quam calyce triplo longiore, ore obliquo, lobis 5 suborbicularibus crenatis venis reticulatis quam tubo duplo brevioribus, æstivatione imbricatis; *staminibus* 4 didynamis, posticis longioribus tubo corollæ æquantibus, antico deficiente, filamentis complanatis leviter curvatis glabris, antheris basi affixis apice dehiscentibus thecis inæqualibus divaricatis, in staminibus longioribus theca sterile quam fertile multo angustiore

et multo breviore, in staminibus brevioribus theca sterile quam fertile multo angustiore et multo longiore ; *ovario* glabro suborbiculare basi disco annulato cincto ; *stylo* gracile leviter deflexo apice incrassato stigmate truncato; *capsula* glabra sphæroidea primo loculicide sero septicide in valvis quatuoribus dehiscente.

Hab. Ruwenzori Mts. ; covering and tying together a group of trees about 20 ft. high on a steep slope in rocky soil at an altitude of 7000 ft. Grows in the region of very heavy rainfall. The plant appeared to be very old and had thick stems 30 to 40 ft. long. The whole was a mass of rosy-mauve flowers obscuring the leaves. Captain G. N. Humphreys, 505. *Herb. Mus. Brit.*

A *climbing shrub* with internodes (on the flowering shoots) of from 6 to 10 cm. ; *leaf-blades* up to 6 by 3 cm., *lower leaves* probably larger, *petioles* 2·5 cm. ; *pedicels* about 3 cm. long ; *calyx-tube* 8 mm. long, lobes 7 mm. ; total length of *corolla-tube* 3·5 cm., cylindrical basal part 10 mm. by 5 mm. in diam., mouth 2·5 cm. across, lobes about 2 cm. long and broad ; *filaments* all inserted on the corolla about 1 cm. above the base, those of the longer stamens reaching 16 mm. and those of the shorter 11 mm. ; *anthers* 9 mm. by 2 mm., sterile theca of the long stamens 5 mm. and of the shorter stamens 12 mm. long ; *style* and *stigma* together nearly 50 mm. long, stigma 4–5 mm. in diam. ; *ripe capsule* 1 cm. in diam.

Forma **macrocalyx**, forma nov.

Calyce majore et bracteolis majoribus plerumque supra medium pedicellorum affixis a typo differt.

Hab. Ruwenzori Mts. ; Wimi Valley about 6000 ft. G. F. Scott Elliot, 7919. *Herb. Mus. Brit.*

A *climbing shrub*. *Calyx-tube* 15 mm. in diam., lobes 10 mm. long ; *bracteoles* up to nearly 20 mm. long. In this specimen also there is normally a pedicel but sometimes a peduncle bearing two or three flowers.

The genus *Thunbergianthus* was described by Engler (Bot. Jahrb. xxiii. 509, 1897) from specimens collected by Quintas on the island of St. Thomas nearly two hundred miles from the west coast of the continent. The type-species is *T. Quintasii* Engl., and from it *T. ruwenzoriensis* differs in the open calyx, the deltoid calyx-teeth, and, judging from the illustration of *T. Quintasii*, in the corolla-shape also. Another point is that in the species here described the *longer* sterile anther-thecæ are on the *shorter* stamens and not *vice versa* as in the type-species. On the other hand, the two species agree entirely in habit and have a facies which, so far as I am aware, is not found in any other members of the Scrophulariaceæ.

The genus *Thunbergianthus* as now known has a very remarkable distribution. The similarity between the alpine floras of the Cameroons Mt., Fernando Po, and the Central and East African mountains has often been commented upon, but the individual species concerned usually belong to fairly widespread temperate genera. *Thunbergianthus*, on the other hand, is of an entirely tropical affinity. Moreover it is found on St. Thomas, an island without

marked altitudes like the others near it. By analogy with other genera it is possible that further collecting will reveal the genus in Abyssinia. There is no widespread genus to which *Thunbergianthus* is very closely allied, and presumably its present range is the remnants of a former continuous one.

Senecio Humphreysii R. Good, sp. nov.

Herba erecta, caulibus teretibus sulcato-striatis laxissime araneoso-pubescentibus; *foliis* alternatis, radicalibus non visis, caulinis anguste triangulari-hastatis vel lineari-hastatis acutis basi amplexicaulibus, irregulariter undulato-dentatis, dentibus apiculatis, utrinque subglabris vel laxissime araneoso-lanatis; *capitulis* erectis longe pedunculatis corymbum laxum formantibus; *phyllariis* viridibus 13 lineari-lanceolatis acutis apice barbatis marginibus hyalinis, extus adpresse brunneo-pubescentibus, intus glabris, basi brunneo-lanatis, triveniis, venis brunneis; *floribus* c. 55–60, ligulatis 11–12, fœminiis, discoideis hermaphroditis; pappo albo barbellato; *corolla* ligulata tubo pappo æquante infra angustissime cylindraceo versus apicem gradatim expanso limbo lineari-lanceolato tubo æquante, 8-venato, apice 3-dentato; *corolla* discoidea tubo pappo æquante infra angustissime cylindraceo supra gradatim infundibuliforme apice 5-dentato, dentibus anguste triangularibus patentibus; *staminibus* inclusis, antheris acutis basi rotundatis; *stylo* et *stigmate* in flore discoideo tubo corollæ æquante in flore ligulato tubo corollæ paullo superante, ramis styli complanatis glabris apice truncatis papillosisque; *achenio* striato glabro.

Hab. Ruwenzori Mts.; perennial in very wet ground in the highest zone, 12,800–13,000 ft. It is peculiar to the lower part of the zone, and is found where snow is frequent but where the soil is not frozen. Occurs only on the Congo side of the main divide of the range. The colour of the flowers varies considerably, the commonest being the reddish yellow of ripe hothouse melon. Others are dull yellowish, buff, or brownish. Among these are others apparently conspecific but with deep purple-blue flowers. Capt. G. N. Humphreys, 547, 548. *Herb. Mus. Brit.*

Phyllaries 10 mm. by 1·5–2 mm.; *corolla* of ligulate flowers 13 mm. long, cylindrical part of tube 4 mm., ligule 6 by 2·5 mm.; *corolla* of disc flower 7mm. long, cylindrical part 4 mm.; *pappus* (in flower) 6–7 mm. long.

Nearest to *S. sycephyllus* S. Moore, but differs in the less cut leaves, the much more pubescent peduncles and phyllaries, and the more numerous shorter rays, which are never clear yellow. It also resembles *S. erubescens* Ait. and *S. Mattirolii* Chiov., but these are discoid species.

Deschampsia angusta Stapf et Hubbard, sp. nov., affinis *D. latifoliæ* Hochst., sed spiculis paulo longioribus hiantibus pallide viridibus vel purpureo-suffusis, glumis angustioribus ad carinas rectis ad margines anguste hyalinis, aristis inclusis differt.

Gramen perenne, cæspitosum, ad 48 cm. altum. *Culmi* erecti, graciles, simplices, 2-nodi, glabri lævesque. *Foliorum* vaginæ internodiis multo longiores, laxæ, striatæ, glabræ lævesque; ligulæ angustæ, acute acuminatæ, ad 10 mm. longæ, subchartaceæ, glabræ; laminæ lineares, acutæ, 9–24 cm. longæ, ad 4 mm. latæ, conduplicatæ vel laxiter involutæ, firmæ, glabræ, scaberulæ. *Panicula* laxa, 20 cm. longa, basi vagina summa inclusa; rhachis gracilis, flexuosa, compressa, minute scaberula; rami 2–5-nati, gracillimi, ad 9 cm. longi, leviter patentes, flexuosi, minute scaberuli; pedicelli 1–5 mm. longi. *Spiculæ* hiantes, 6–6·5 mm. longæ, glabræ, pallide virides vel superne purpureo-suffusæ. *Glumæ* subæquales, spiculam æquantes, membranaceæ, carinis rectis, ad margines et ad apicem anguste hyalinæ; inferior explanata anguste lanceolata, acuta, 1-nervia; superior explanata elliptico-lanceolata, acuta, 3-nervia. *Rhachilla* 1·5 mm. longa, laxe pilosula. *Anthœcia* duo, ☿, glumis inclusa; inferius 4–4·5 mm. longum; callus brevissimus, villosulus, pilis 1 mm. longis; lemma oblongum, brevissime bilobum, lobis obtusis minute lacerato-denticulatis, tenuissime hyalinum, glabrum, obscure 4-nervium, paulo supra basin aristatum, arista stricta tenui 4–5 mm. longa quam lemma paulo longiore sed glumis superata; palea linearis, 3–3·5 mm. longa, hyalina, bifida, apicibus laceratis, carinis ciliolatis; antheræ oblongæ, 1·3 mm. longæ; anthœcium superius inferiori simile, sed minor (3·5–4 mm. longum) et arista breviore.

Hab. Ruwenzori Mts. Capt. G. N. Humphreys, 513. *Herb. Mus. Brit., Herb. Kew.*—[O. S. & C. E. H.]

NOTES ON SOME MINOR VARIETIES OF BRITISH PLANTS.—II.

By C. E. Britton.

Myosotis versicolor Sm.—Plants with the corolla of a cold yellow colour, ultimately developing a faint suspicion of blue, from an arable field at Banstead, Surrey, appear identical with Corbière's slight var. *Lloydii*, described in the terms "Fleurs jaunes, passant au bleu très pale, sans autres nuances" (Nouv. Fl. Norm. 1893, 692). Continental authors describe the flowers of this species as passing from yellow to blue, and finally to violet. British authors, as a rule, do not indicate the final colour-stage.

Veronica persica Poir.—This exhibits a considerable range of variation. Ernst Lehmann, who made a careful study of it, came to the conclusion that it embraced two subspecies, named by him *Aschersoniana* and *Corrensiana*, each distinguished by characteristic features of foliage and flowers. Briefly, these forms may be diagnosed as follows, regarding both as varieties, rather than giving the higher grade assigned by the author:—

V. persica Poir. var. *Aschersoniana* (E. Lehmann as subsp. of *V. Tournefortii* Gmel. in Œsterr. Bot. Zeit. 1909, 249).—Leaves simply and sharply serrate, sepals oblong-lanceolate, gradually contracted from the middle to the apex; lower corolla-lobe paler than the upper and lateral segments, or even whitish, not or scarcely veined.

Var. *Corrensiana* (E. Lehmann as subsp. of *V. Tournefortii* Gmel. *l. c.*).—Leaves incised, obtusely serrate, serratures again toothed or notched; sepals oblong-lanceolate, suddenly contracted towards the apex; corolla blue, the lower lobe as deeply coloured and as conspicuously veined as the remaining lobes.

Lehmann's article is accompanied by figures representing both subspecies. In the account given, *Corrensiana* is said to have the lower corolla-lobe always of a dark colour; in *Aschersoniana*, on the contrary, the lower corolla-lobe is usually white, or only faintly tinged with blue. The veining of the corollas also differs. The first-mentioned form has, in general, darker, broader, and more prominent veins, and it is noteworthy that the veins on the lower lobe are as well marked as the veins on the remaining lobes. In *Aschersoniana* the lower lobe is either entirely without veins or only slightly veined. Engl. Bot., Supp. ii., tab. 2769, is cited as representing var. *Corrensiana*, chiefly by reason of the large dark blue corolla depicted. After a careful inspection of this plate, and of the drawing on which it is based, I am of the opinion that the serration of the leaves and the form of the sepals do not agree with Lehmann's description of *Corrensiana*. The plate cited represents, in fact, a not uncommon intermediate form. Cassell's *Familiar Wild Flowers* is not usually referred to in botanical literature, but the coloured figure therein of *V. Buxbaumii* so well represents var. *Aschersoniana* that attention is directed to it.

Lehmann regarded *Aschersoniana* as the common plant, a view followed by other authors. After giving special attention to *V. persica* in the field, the conclusion forced upon me is that native forms do not readily fall into either of these varieties. In any locality where *V. persica* is abundant plants agreeing with var. *Aschersoniana* may usually be found, but most frequently forms abound that differ from this in the deeper incised leaves or in the deep wholly blue corolla. In spring, wheat-fields may be seen coloured with the uniform blue flowers of plants that approach var. *Aschersoniana* in the shape of sepals, though having simple obtuse leaf-serrations. Var. *Corrensiana* appears to be quite rare in Britain, and in the field the writer has met with it, so far, only in one Surrey locality. Owing, however, to the wholly blue corolla and to the shape of the sepals this variety is liable to be mistaken for forms of related species, such as *V. polita* Fr., as the following indicates. In the British Herbarium at the British Museum (Natural History), a plant collected at Bosham, W. Sussex, by E. S. Marshall, identified as *V. polita* Fr. var. *grandiflora* Bab., is an excellent example of *V. persica* Poir. var. *Corrensiana*. Marshall's plant is numbered 2576, and is probably in other herbaria. *V. polita* Fr., from near Tintern, Mon., coll. W. A. Shoolbred, also in Herb. Mus. Brit., is again var. *Corrensiana*, to which also goes *V. agrestis* from St. Mary Cray, W. Kent, coll. A. O. Hume, in Herb. South London Bot. Institute. Specimens of *V. persica* from Cambs and Carnarvon, to be seen in the National Herbarium, much resemble var. *Corrensiana* in leaf-characters, but do not seem to be quite that var., and are much nearer a Surrey plant under observation.

Var. *Kochiana* Godr. Fl. Lorr., is a state probably, rather than a variety. Plants agreeing fairly well with Godron's description have been met with in stubble-fields in Surrey. They are distinguished by small slender stems, long filiform pedicels, and small leaves with low and shallow serrations.

VERONICA POLITA Fr.—In the paper before alluded to, Lehmann also described and illustrated, with a coloured plate, two subspecies of this, basing the characters on leaf-serration, corolla, and number of seeds in the chambers of the capsules. His two forms are subsp. *Thellungiana* and subsp. *Ludwigiana*. The leaves of the first are deeply dentate with rounded teeth and rounded sinuses, whilst *Ludwigiana* has shallower more acute teeth, and the lamina is less oblong and more conspicuously veined. On expansion and often later, the corolla of var. *Ludwigiana* shows the margins of the posterior lobe incurved, whilst var. *Thellungiana* exhibits the posterior lobes folded and the margins not inflexed. A difference in colour of corolla is said to characterise both varieties. The common British form of *V. polita* is readily recognised as var. *Thellungiana*, but as to var. *Ludwigiana* attempts to identify native forms with this have not produced satisfactory results.

VERONICA AGRESTIS L.—In this species the keel and upper part of the capsules are either clothed with erect glandular hairs (the lower surfaces of the capsules being glabrous or subglabrous) or the entire surfaces and keel are covered with erect glandular and curled eglandular hairs. The first condition has been called by Fournier var. *Garkiana*, the second has been named by him var. *Boreana* (Le Brev. Bot. 353). Most British forms of *V. agrestis* come under the first-named variety; var. *Boreana* appears much rarer and, so far, has been detected only in Surrey. A more important variety is that form described by Fries as *V. agrestis* (*versicolor*) Novit. ed. 1, p. 53, which Mathieu (Fl. gen. Belg. i. 391) named *V. agrestis* γ. *versicolor*. This is well marked by the oblong very obtuse sepals, the usual form of *V. agrestis* having tapering sepals. Var. *versicolor* appears to be uncommon in Britain, but is to be recognised in several gatherings included in the British Museum Herbarium.

VERONICA AQUATICA Bern.—The omission of this from the last edition of the *London Catalogue of British Plants* appears not easy to understand. This plant is so well marked and so easily distinguished from *V. Anagallis* that no good grounds appear to exist for its exclusion. The distinctions usually given are, in general, sufficient to identify both forms, but it would be a mistake to rely upon the colour-character of restricted *V. Anagallis*. Along the Thames, near Richmond, this plant occurs not with blue corollas, but with the corolla flesh-coloured, veined with deep red. Ernst Krösche, in his study of *V. Anagallis* and *V. aquatica* (Allg. Bot. Zeitsch. 1912), attributed a wide range of corolla-colour to the forms of the first-

named, blue, red-and-blue shades of lilac, pink, or even white, and to *V. aquatica* a more restricted range of colour, chiefly pale pink or lilac, though at times a distinct shade of blue occurs. Krösche found *V. Anagallis* a more variable species than *V. aquatica* and distinguished several subspecies and forms. As to *V. aquatica*, a common British form, with capsules broader than long, appears to agree well with Krösche's description of his var. *laticarpa*.

The distribution of the forms of the aggregate species in Britain deserves the attention of botanists. The view that has been expressed that *V. aquatica* is the more common form is, perhaps, not altogether in accordance with the facts.

GALEOPSIS TETRAHIT L. var. NIGRICANS Brébisson is a name used by collectors to denote a form with the calyx-tube developing a dark purplish tint. When this character is accompanied by a white corolla the form becomes very noticeable, especially in coppices, a favoured situation. Brébisson's description "cal. noirâtres, munis de très longues dents" (Fl. Norm. ed. 4, 246) does not indicate the colour of corolla, which may be either white or purple. It is doubtful whether this var. is worth keeping up, as the teeth of the purple-calyxed forms vary much in length, and plants raised from seed of this variety failed to develop the dark coloration of the calyx. It is, perhaps, advisable to ignore this form, and to place such plants, by reason of the rounded, or only slightly drawn-out, base of the lamina to var. *arvensis* Schlechtendal, Fl. Berol. 320. Another form, occasionally gathered by collectors but seldom recognised, is var. *silvestris* Schlecht. (*l. c.*), easily known by the long drawn-out base of the lamina. There are several such gatherings in the British Herbarium at the Natural History Museum.

POLYGONUM AMPHIBIUM L.—An unusual terrestrial form of this was seen at Pensarn, Denbigh, in July last, growing on the shingly shore above high-water mark. The stems and leaves were clothed with dense spreading hairs and abundant long-stalked glands, these latter existing on both surfaces and on the margins of the leaves. This form appears identical with var. *glandulosum* Schönh., a name which has not, I believe, appeared in British plant-lists, though the British Museum Herbarium contains a similar glandular form from Grantham, Lincs, collected by Miss Stow, and identified by Mr. A. Bennett as var. *glandulosum* N. Bryhn, a later authority.

GERANIUM ENDRESSII J. GAY IN CORNWALL.

By W. B. TURRILL, M.Sc., F.L.S.

IN Davey's *Flora of Cornwall*, 98 (1909), *Geranium nodosum* Linn. is recorded in the following terms:—"Denizen. Waste place. Local and rare. P. June–August. First record: E. Richards *teste* Davey in Journ. Roy. Inst. Corn. vol. xvii. 1907. 5. Hurling Barrow, St. Agnes, 1906, *E. Richards*." In Thurston and Vigurs's

Supplement, p. 36 (1922), the species is retained with the following remarks: "5. Hurling Barrow, St. Agnes (*Flora*). Patch on roadside near Goonbell Holt, 1911, et seq. Rilstone."

Some doubt was cast on the above identification when Dr. Thellung identified specimens from St. Agnes as *G. striatum* forma *Endressii* f. *glabra* [see Journ. Roy. Inst. Cornw. 1926, p. 101, and letter from E. Thurston, dated 10.iv.27; see also Bot. Soc. & Exch. Club Rep. 1924, 564 (1925)]. It seemed improbable that two alien species of *Geranium* had thoroughly established themselves in the one locality, and Mr. Edgar Thurston, at the request of Mr. Rilstone, asked me to investigate the matter. An excellent series of specimens from Cornwall, collected by Rilstone, were forwarded to Kew, and it is now quite clear that, though two kinds do occur together, neither is *G. nodosum* L.

R. Knuth, in his Monograph of the Geraniaceæ in the *Pflanzenreich*, iv. 129, p. 175 (1912), places *G. Endressii* in the section *Palustria* and *G. nodosum* in the section *Striata*. The former section is described as having the leaf-blades 5-partite and the lobes more or less rhomboid-ovate, and the latter the leaf-blades usually more or less 3-partite and the lobes more or less ovate. The distinction is not a particularly happy one, especially so far as concerns the two species involved here. The best diagnostic characters for distinguishing the two are:—

Endressii: stems spreadingly or slightly retrorsely pilose; leaves pilose, especially on the petioles and the nerves below, blades usually palmately 5-lobed, with the lobes broadly ovate, acute, often lobulate, and the lobules provided with acute teeth.

Nodosum: whole plant glabrous, glabrescent, or with inconspicuous very short retrorsely adpressed hairs; leaves with closely adpressed scattered hairs or glabrescent, blades 3–5-lobed, lobes ovate to elliptic or elliptic-lanceolate more or less acuminate, dentate, but not or rarely lobulate.

In spite of Knuth's arrangement, a careful examination of the material at Kew has led to the conclusion that *G. Endressii* and *G. striatum* are more nearly related morphologically than either is to *G. nodosum*. This is apparently the conclusion reached by Dr. Thellung, who has (according to Thurston) expressed it by placing both in one species. Without complete material it is not easy to separate them, but the elongated slender rhizomes and greater amount of lobing of the leaf in *G. Endressii* contrast with the shorter thick rhizomes and less lobed leaf of *G. striatum*. Since these characters separate plants of distinct geographical distribution, in the truly native state, I must consider there are two species involved.

Even when *G. Endressii* is limited in this narrow sense, we find it is not completely homogeneous, and two varieties, one with two forms, are distinguished as follows:—

Var. *Endressii*: petala obovata, emarginata, minutissime undulato-crenulata, 1·9 cm. longa, 9 mm. lata; stamina perfecta.

Forma *Endressii*: foliorum laminæ usque ad 4 cm. longæ, lobis

grosse lobulatis, petiolis longis gracilibusque. The three sheets from the Gay Herbarium at Kew belong here. Two are from Mt. Béhorléguy, Canton de St. Jean Pied de Port., Pyr. occid., and the third from Mt. Apanice in the same district. The two former are types of the original description published in Ann. Sci. Nat. ser. 1, xxvi. 228 (1832).

Forma *luxurians*: foliorum laminæ usque ad 6 cm. longæ, foliorum summorum petiolis sæpissime brevibus. Usually the whole plant is taller and more branched than in the type-sheets of Gay. Under this form are to be placed a specimen from Mt. Apanice, Herb. A. de Forestier, 1847, various plants cultivated at Kew and in other gardens, and all the garden-escapes from this country, of which I have seen specimens, including those from Cornwall, with the exception referred to below.

Var. *Thurstoniana*, var. nov.: petala anguste oblanceolata, apice irregulariter crenato-dentata, 1·6 cm. longa, 3 mm. lata; stamina abnormia, antheris plusminusve planis apice 2–3-dentatis. A colony growing in the middle of the large patch of *G. Endressii* var. *Endressii* forma *luxurians* at Goonbell, St. Agnes, Aug. 4, 1927 (*F. Rilstone*).

A few comments on the above-mentioned plants are desirable. Knuth (*l. c.*) describes the petals of *G. Endressii* as "integra"; if by this he means they are not emarginate he is wrong, for both buds and open flowers on the type-specimens show that the petals are emarginate as in the Cornish and other plants referred to the var. *Endressii*. The colour of the petals is apparently not always the same, since Rilstone's field-notes indicate that the range is from almost white to deep pink and bright red. Endress, in Herb. Kew., has noted "petala recentia intense carnea exsiccata purpureo-violacea." So far as can be judged from the evidence now available, the forma *Endressii* and the forma *luxurians* are habitat forms, owing their differences to the play of different environmental factors on the same gene-complex, while var. *Thurstoniana*, with its marked structural differences, is probably of mutational origin. Finally, it should be noted that no specimens written up by Dr. Thellung have been examined, and it has not been possible to account for his forma *glabra*, of which no published description has been traced.

THREE NEW MAGNOLIEÆ.

By J. E. Dandy, B.A., F.L.S.

Manglietia calophylla Dandy, sp. nov.

Arbor; ramuli glabri. *Folia* ovato- vel lanceolato-oblonga, basi obtusa vel subobtusa, apice sensim acuminata vel acuta, usque ad c. 14 cm. longa et 6 cm. lata, coriacea, supra glabra, subtus minute adpresseque rufo-tomentella indumento splendente interdum demum evanescente, nervis lateralibus utrinsecus c. 12–15 inconspicuis; petiolo usque ad c. 2·5 cm. longo glabro vel primo apicem versus minute adpresseque rufo-pubescente, tantum basi cicatrisato; stipulis [illegible] ad marginem apicemque versus minute adpresseque rufo-pubescentibus, petioli basi adnatis. *Alabastri* spatha glabra, intervallo brevi sub tepalis inserta; pedunculus satis gracilis, c. 2 cm. longus (usque ad 3 cm. in fructu), glaber. *Perianthii* folia 9, glabra, 3 exteriora obovato-oblonga c. 2·5 cm. longa. *Stamina* in axem c. 1·0 mm. longum inserta. *Gynæcium* ellipsoideum, carpellis glabris. *Fructus* ovoideus vel oblongo-ovoideus, c. 4–5 cm. longus, carpellis maturis ad suturam ventralem omnino et ad dorsalem partim dehiscentibus.

Hab. Sumatra. West Coast: Korinchi Peak, about 2200 m. alt., fl. and fr. May (*Robinson & Kloss*, 200) (type in Herb. Mus. Brit.).

This plant was originally determined as *M. glauca* Bl. (Ridl. in Journ. Fed. Mal. St. Mus. viii. pt. 4, 14 (1917)). It is certainly most nearly related to *M. glauca*, which also occurs in Sumatra, but differs from that species and from all the other members of the genus in the shining tomentellum of the lower surface of the leaves. The latter are smaller and more coriaceous than in *M. glauca*, and are different also in shape.

Talauma sclerophylla Dandy, sp. nov.

Ramuli glabri. *Folia* oblanceolata, basi attenuata, apice acuminata, usque ad c. 36 cm. longa et 9·5 cm. lata, rigide coriacea, glabra, subtus glaucescentia in sicco valde laxeque reticulata, nervis lateralibus utrinsecus c. 20 subtus valde prominentibus, petiolo usque ad c. 1·5 cm. longo glabro. *Pedunculus* crassus, inconspicue breviterque adpresso-pubescens, glaucescens. *Perianthii* folia 9, glabra, 3 exteriora elliptico-oblonga c. 5 cm. longa. *Stamina* c. 20–22 mm. longa. *Carpella* c. 10, glabra.

Hab. Borneo. Sarawak: Sarebas Paku, fl. Dec. (*Haviland*, 3148) (type in Herb. Mus. Brit.).

This species is apparently closely allied to *T. reticulata* Merr. from the Philippines, which is known only in fruit. In *T. reticulata*, however, the leaves are obtuse to acute or only subacuminate at the apex, and are not glaucescent beneath, while the reticulation is equally strong on both surfaces and not more prominent beneath, as in *T. sclerophylla*. The two species form a small and distinct group of the genus well characterized by the elongated rigid conspicuously reticulate leaves.

Michelia mediocris Dandy, sp. nov.

Arbor; ramuli juniores adpresse griseo- vel fulvo-tomentelli. *Folia* elliptica vel elliptico-oblonga, basi cuneata vel interdum obtusa, apice acuminata vel subacuminata, usque ad c. 10·5 cm. longa et 4·5 cm. lata, tenuiter coriacea, supra glabra vel primo adpresse pubescentia, subtus primo minute adpresseque griseo-pubescentia, nervis lateralibus utrinsecus c. 12–15 inconspicuis; petiolo usque ad c. 2 cm. longo primo adpresse griseo-tomentello glabrescente ecicatrisato; stipulis extus adpresse griseo- vel fulvo-tomentellis a petiolo liberis.

Flores pro genere parvi; alabastrum anguste oblongum vel lanceoloideo-oblongum, adpresse fulvo-tomentellum; pedunculus satis gracilis, c. 0·5–1 cm. longus, adpresse griseo- vel fulvo-tomentellus. *Perianthii* folia 9–10, subsimilia, glabra, 3 exteriora oblanceolato-linearia. *Staminum* connectivum in appendicem acutam longam productum. *Gynœcium* adpresse griseo-tomentellum, carpellis c. 7–14, ovulis 4–5. *Fructus* c. 2–3·5 cm. longus, carpellis maturis liberis dehiscentibus sessilibus usque ad c. 2 cm. longis.

Hab. China. Hainan: Five Finger Mt., fl.-buds and fr. Dec. (*McClure* in *Canton Christian College*, 8593) (type in Herb. Mus. Brit.).

Indo-China. Tongking: Sontay Prov., Mt. Bavi, about 1000 m. alt. (*Balansa*, 3195) (Herb. Mus. Paris). Cambodia: Kampot Prov., Mt. de l'Éléphant, 1000 m. alt. (*Poilane* in *Chevalier*, P297) (Herb. Mus. Paris).

The type-specimen from Hainan was originally identified with *M. Maudiæ* Dunn from Fukien and Kwangtung, but that species is glabrous throughout, has much bigger flowers and fruits, and leaves which are larger and glaucescent beneath. *M. mediocris* is most nearly related to *M. compressa* Sarg. from Japan and Formosa and *M. philippinensis* Dandy from the Philippines, both of which differ from it chiefly in the narrower oblanceolate to obovate-oblong leaves. All the species mentioned above belong to the group of the genus in which the stipules are free from the petiole, which is consequently unscarred.

A BIOLOGICAL FLORA OF BRITAIN.

By E. J. Salisbury, D.Sc., F.L.S.

In the preface to the first edition of the *Students' Flora*, published in 1870, Sir Joseph Hooker expressed the hope of being able to undertake a "companion volume," in which "the physiological and morphological observations" on British species should be recorded. Ever since that time this idea has been in the minds of botanists, but, apart from unpublished notes respecting certain species prepared by the late Sir I. Bailey Balfour, no serious attempt has been made to bring the project to fruition. Such aut-ecological data are of great value not only for their own sake, but the progress of the study of plant communities is greatly hampered by the lack of information respecting the life-histories and biotic relations of their constituent species. Further, until such data are available it is useless to attempt to unravel the complex tangle of factors involved in the phenomenon of competition.

The Council of the British Ecological Society has had the matter under consideration, and at the Annual Meeting held on January 7th, the Society decided to publish a British Biological Flora which should embody such data respecting the biology of the native and naturalised British species as have a bearing on their ecological relations.

The writer, who has been making observations and collecting data of this character with reference to British woodland species for some years past, has undertaken the preparation and editing of the work, but it is manifestly a task that can only be accomplished successfully by the active co-operation of botanists, both professional and amateur, throughout the country.

Much relevant information is to be found scattered through the multitude of botanical journals or is known to field-naturalists. The latter is liable to remain unpublished and lost, whilst the former is difficult of access. These published observations, together with the not inconsiderable mass of unpublished data which it is proposed to incorporate, will, it is felt, be of great scientific value, and at the same time provide the surest means of bringing to the notice of students the many lacunæ that require to be filled.

The accompanying schedule and specimen-example which have been prepared by the writer are intended to indicate the scope of the projected work and the nature of the data required, but the plan is naturally subject to modification as need arises, and any suggestions or criticisms will be welcomed. Those possessing original observations suitable for incorporation are asked to communicate with the writer at Willow Pool, Radlett, Herts.

Proposed Scheme for Biological Flora of Britain.

A. Species and synonymy:
  (*a*) Varieties and ecads.
B. Distribution and altitudinal range.
C. Fossil and sub-fossil record.
D. Soils:
  (*d*) Type; (*d'*) Water content; (*d''*) Reaction; (*d'''*) Carbonate content; (*d''''*) Organic content.
E. Climatic conditions:
  (*e*) Rainfall Range; (*e'*) Light demands.
F. Communities and status (Characteristic, constancy, etc.).
G. Biological type:
  (*g*) Perennial, biennial, winter or summer annual; (*g'*) mode of perennation; (*g''*) Assimilation type—evergreen, summer-green, prevernal, etc.
H. Phenology:
  (*h*) 1st leaf; (*h'*) 1st fl.; (*h''*) Seed ripens; (*h'''*) Leaf-fall.
I. Root-system:
  (*i*) Type; (*i'*) Volume occupied; (*i''*) Av. rooting depth; (*i'''*) Special features, *e. g.*, adventitious shoots, distribution of root-hairs, root-nodules, etc; (*i''''*) In the case of geophytes the depth of the rhizome or bulb etc. (contractile roots etc.).
J. Shoot-system:
  (*j*) Average height of the vegetative organs; (*j'*) Leaf-positions; (*j''*) Hydathodes or extrafloral nectaries; (*j'''*) Morphological transpiration checks or other features affecting transpiration; (*j''''*) Special anatomical features (Aerenchyma), any special features of the chlorenchyma.
K. Reproduction (sexual and asexual):
  (*k*) Fertility—whether self- or cross-pollinated, whether self-sterile or self-fertile, or apogamous; (*k'*) Pollinating mechanism—type of pollinating agent (if entomophilous, the type only of pollinating insect, unless specially restricted to particular species); (*k''*) Any special features regarding fertilisation (*e.g.*, chalazogamy); (*k*) Seed

output of normal plant (in the case of trees frequency of mast years; (k'''') Size and weight of seed; (k''''') Means of seed-dispersal (or fruit-dispersal); (k'''''') Percentage germination—duration of viability; (k''''''') Period of germination in nature.

L. Reproduction (vegetative):
(l) Means of vegetative propagation; (l') Rate of vegetative spread.

M. Physiological features (*e.g.*, sleep-movements or other special responses as movements of flower- and fruit-stalks):
Osmotic pressure or suction-force when known, and observed range; Special modes of nutrition (Mycorrhiza).

N. Parasites (only when of especial interest, or very common, or where confined to a particular species and of general interest):
Susceptibility to destruction (*i. e.*, Hardiness, Fires, Animals, etc.).

Sample Species treated on the Basis of the above Scheme.

SCILLA NUTANS Sm., *Scilla non-scripta* Link, *S. festalis* Salisb.
Wild Hyacinth.

B. Probably throughout Gt. Br. Unrecorded from 42, 74, 86, 97, 98, 103, 105, 108. An oceanic west European sp., extending from Denmark and the Hebrides to Italy and Spain.
From sea-level, in Ireland, to 528 M. In neolithic peats (*T. W.*).

D. Various, but especially on damper and not markedly acid types. W. C. 9·0 to 48 per cent. (*E. J. S.*). Reaction *p*H. 5 to *p*H. 7 . 6. Most frequent on soils with 0·07 per cent. carbonates; it may occur where no detectable amts. are present, or where the carb. content is high. In Ireland stated to exhibit a calcifuge tendency (*More*, Cybele Hibernica); most commonly where organic content is moderately high (6 to 18 per cent.).

E. Generally where the illumination during the light-phase is between 40 and 50 per cent., but may occur where the intensity during the shade-phase is under 1 per cent.

F. Woodlands and hedgerows; not infrequent as persisting species in grassland or under *Pteridium* in areas formerly woodland. Abundant and especially found in *Quercetum roburis* on clays and loams, and in damper societies of *Quercetum sessilifloræ*. Often associated with *Arum maculatum* and *Ficaria*, or forming a complementary society (cf. *Woodhead*, 'Naturalist,' 1904, 81–8).

G. Prevernal Geophyte. Perennial.

H. 1st lf. 41, fl. 100, ls. wither. 181 (cf. *Salisbury*, Q. J. R. Met. Soc. 1921, 252–62). Seeds ripe Aug.; permeable type (*Guppy*). Roots fibrous unbranched with few root-hairs; av. rooting-depth 12–14 cm. on clay (*E. J. S.*) and on sandy soils to 30 cm. Bulbs at 8–28 cm. Bulbs attain appropriate depth by means of elongation of the bulb (droppers) and contractile roots (cf. *Woodhead*, loc. cit.).

J. Av. height of leaves 25 cm. The leaves emerge as a spear-shoot, their tips being especially thickened and provided with a hydathode. Ls. with almost equal nos. of stomata on the two faces. Central tissue aqueous and lacunar. Slight palisade in sun.

K. Reproduction. Fls. very slightly protogynous. Chiefly pollinated by Syrphid Diptera. Insects are attracted by the strong scent. Nectar is secreted by the carpel. Average seed output 100–280 seeds per plant (*E. J. S.*); wt. 0·006 gm. Wind-dispersed; catapult mechanism. Germination usually over 90 per cent. (*E. J. S.*). Germ. in April.

L. Vegetative rep. by axillary bulbs.

M. The inflorescence becomes erect after pollination. The stamens are capable of dehiscence in saturated air (*E. J. S.*). The bulb-scales, which represent leaf-bases, contain copious mucilage. Starch is not formed, but the scales contain sugars, including inulin.

N. Not infrequently infested with *Uromyces Scillarum*.

OBITUARY.

WILLIAM CHARLES FRANK NEWTON (1895–1928).

THE death of W. C. F. Newton on December 22 last removes one of the most promising of the younger generation of botanical workers. Newton was a student at Birkbeck College, where he did Botany under Professor Dame Helen Gwynne-Vaughan. After taking his B.Sc. degree at London University in 1921, he continued work at the Birkbeck with the help of a scholarship from the Department of Scientific and Industrial Research; he was occupied with an investigation of the chromosomes in *Galtonia*. For a time he was a prospective candidate for a vacancy in the Department of Botany of the British Museum—his interests wavered between cytology and the systematic side of botany,—but an offer in 1922 from the late Dr. Bateson to join the Staff of the John Innes Horticultural Institution, decided him in favour of the former. His work on *Galtonia* (published in *Annals of Botany*, 1924, 197–206) was followed by "Some Chromosome Studies in *Tulipa* and some related Genera" read before the Linnean Society in April 1925 (Journ. Linn. Soc. xlvii. 339–54). Newton's aim was to extend the application of cytological methods to taxonomic study; he suggested, for instance, that the considerable cytological differences between *Calochortus* and other genera of the Tulipeæ emphasized the desirability of giving it separate tribal standing. He was elected F.L.S. in the same year.

Unfortunately, Newton's work was interrupted by a severe illness in the summer of 1926, which necessitated a long period of convalescence. He returned to his work at the John Innes in 1927, but a recurrence of illness ended fatally last December. Papers on the tetraploid hybrids, *Digitalis purpurea* × *D. ambigua* and *Primula kewensis*, were ready for publication, and other pieces of work were in progress at the time of his death.

It is interesting to note that his earliest paper appeared in the *Journal of Botany* (1913, 51), "Notes on South-west Norfolk Plants"—notes of observations during five or six years' study of the flora of the district around Walton, including a list of distinctive marsh-plants from the fen-areas.

Shortly before his illness Newton had married Dr. Lily Batten, and our sympathy is extended to his widow in her sad bereavement.

REVIEWS.

An Introduction to the Scientific Study of the Soil. By NORMAN M. COMBER. 8vo, pp. 192. Arnold: London, 1927. Price 7*s.* 6*d.*

ALTHOUGH this book is addressed primarily to agricultural students, it may be strongly recommended to botanists and ecologists as a concise account of the modern conceptions of the soil. In text-books and University curricula the study of the soil is generally

treated as a section of Agricultural Chemistry. Contributions from physics, bacteriology, and other biological sciences emphasized the inadequacy of this description of the subject, but failed to raise it to the dignity of a separate branch of science. It may now be claimed that the Russian investigations on the processes of soil-formation and the recognition of genetic soil-types have supplied the fundamental characteristic which was hitherto lacking, and justify the adoption of a term such as Pedology to describe the scientific study of soils. By reducing to a minimum his discussion of the more industrial side of soil-treatment and by omitting the details of laboratory methods, Professor Comber has been able to include the essential features of these new developments. The early soil-workers gave little attention to the soil below the normal depth of ploughing, but the pedologist studies the successive layers of the soil-profile down to the underlying rock. In studying the soils of any area it is important to have some knowledge of the genetics of the soil, and especially of the changes that have taken place and are still taking place in the chief soil-forming constituents—viz., strong bases, sesqui-oxides, silica and organic matter,—since these determine the more important properties of the soil.

Of the chapters dealing with the less novel branches of the subject, those of soil-water and absorptive properties of soils should be especially useful to botanists. The attempts of the soil-physicists to improve on the old classification of soil-water into hygroscopic, capillary, and gravitational have led to many soil-water "constants," of which Professor Comber describes at least nine. Special attention is given to the phenomena of base exchange, saturation, lime-status, and soil-sourness. The recent physico-chemical work on these questions is clearly summarized in diagrammatic form. The author emphasizes the impossibility at present of determining the relative importance of the soil-factors affecting the growth of plants on acid soils.

The last chapter contains a selected bibliography and hints to the agricultural student on the literature of soil-science which may prove useful on occasion to workers in other branches of science.

E. M. CROWTHER.

The Structure and Development of the Fungi. By H. C. I. GWYNNE-VAUGHAN and B. BARNES. Pp. xvi, 384, 1 pl., 285 figs. Cambridge Press. Price 15*s*.

UNIVERSITY students have long needed a text-book on mycology. The classical book of de Bary is much out-of-date from an examination point of view, and the only other text-book in English is the unsatisfactory one by Massee published about twenty years ago. Dame Helen Gwynne-Vaughan wrote one of the Cambridge Botanical Handbooks (1922), which, though costing 35*s*., dealt only with Ascomycetes, Rusts, and Smuts; this may be said to form the basis

of the treatment of the same groups here, for the figures are repeated and much of the text is lifted bodily.

The present book is well printed, handy, attractively got up, and cheap, and is sure of a ready sale. In it the whole of the fungi are treated, though it is "concerned primarily with the fungus, and only secondarily with its effect on other organisms." As the authors are both actively engaged in University teaching, they may be assumed to know what is wanted for students, but the title on the back—*The Fungi*—will lead many to expect more than the book contains.

An introduction of about forty pages deals shortly with the vegetative structures, saprophytism, parasitism, symbiosis, specialization of parasitism, reaction to stimuli, and, interpolated after a few words on classification, has a short account of "Forms resembling Fungi" (Myxomycetes and Plasmodiophorales), though nothing beyond the statement that they are not fungi is given to explain why the second group is separated from the Phycomycetes by nearly thirty pages of text.

The great groups are taken in the usual sequence: Phycomycetes (48 pages), Ascomycetes (117 pages), Basidiomycetes (73 pages), and Fungi Imperfecti (2 pages); the inadequate treatment of Fungi Imperfecti in all text-books is surprising, for, quite apart from the fact that they at least equal perfect forms in the number of described species and their tremendous importance in phytopathology, a vast amount of technical and genetical research on them is constantly being published. A final section of 18 pages deals with mycological technique, and supplies a useful summary of much that is necessary for laboratory work.

The account of each group has a general introduction followed by details of the families which, except in the Phycomycetes, does not appear always to be based on modern classification. The book is illustrated profusely and a few figures occupy whole pages. Many of the illustrations are excellent, but some appear to have suffered in reproduction (*e. g.*, the gill-section of *Coprinus lagopus*). Perhaps a few might have been spared in order to give fuller accounts of some of the more important groups—for instance, Dothideales with 14 lines and Microthyriaceæ with 10 lines seem inadequately treated compared with the fairly full account of Oomycetes.

In view of an almost certain second edition, some criticisms and suggestions may be made. A "bibliography" of 29 pages is too long in a book of this size. What students require is a guide to the principal books and papers. Some of the references made in the text do not appear to have had their results incorporated—*e. g.*, Burgeff's work on grafting in *Phycomyces* and his suggestion of the hybrid origin of *Parasitella* and other Mucorineæ. It is surprising that the classifications of Boudier and Patouillard are not mentioned, though these are followed by most British and French systematists. Some references, on the other hand, appear to have been dragged in—surely obligate parasitism and its consequences were a commonplace of all pathology long before 1923; and why five references to silver-leaf, when these take up more space than the description of the disease and the fungus believed to cause it?

Space thus saved might have been given to the facts and factors of distribution and ecology, to a summary of the uses of the physiological activities of fungi in industry, to a consideration of the basis of classification, and to a general discussion of the part played by fungi in symbiosis. It is only by regarding fungi in relation to the consequences of their special mode of life that students can gain a proper idea of the ramifications of mycology.—J. R.

BOOK-NOTES, NEWS, ETC.

THE following note received from Miss A. Lorrain Smith will be appreciated by other workers :—

"It has been my lot in recent years to have received botanical papers entirely in Russian or other Eastern European languages. Might an appeal be made to the writers that at least the title of the paper and some indication of its contents be added in some commonly understood language, for the sake of those whose linguistic acquirements are not universal. Many botanists already give such résumés. The request is that all should do the same and so give their colleagues the full benefit of their work."—A. L. S.

LINNEAN SOCIETY.—At the general meeting on January 5th, the President, Sir Sidney F. Harmer, K.B.E., read a letter from Sir Harry L. Verney, K.C.V.O., Private Secretary to the Queen, conveying Her Majesty's gracious acknowledgment to the Society for Her Honorary Membership.

Dr. D. H. Scott, F.R.S., communicated an account, illustrated with lantern-slides, of a paper by Dr. Suzanne Leclercq and M. Bellière on a new species of *Psygmophyllum* from the Middle Devonian (with Old Red Sandstone facies) of Malonne, Belgium.

The authors pointed out the importance of the discovery: as a new species of a little-known genus; as a plant with a strong, woody, and branched stem; and as derived from so old an horizon—the base of the Middle Devonian.

Prof. F. E. Weiss recalled the work of the late Dr. E. A. N. Arber on the group of plants to which *Psygmophyllum* was related, and was inclined to accept the suggestion of the authors of the paper that the present species was amongst the forerunners of the Gymnosperms.

Mr. H. W. Monckton remarked that the paper was of particular interest in that it recorded the occurrence of land-plants in the Couvinian of Belgium, which was largely a formation of shale and limestone with marine fossils and masses of coral, which Belgian geologists looked on as coral reefs. He drew attention to the occurrence of land-plants in the Devonian of much the same age in Britain and the Boulonnais.

Prof. S. H. Williams, of the University of Pittsburg, gave an interesting account, illustrated with a large series of beautifully-coloured lantern-slides, of his experiences in the jungles of British Guiana while he was in charge of the University of Pittsburg Investigations in that country.

The Tropical Research Station, which was acquired from the New York Zoological Society, is situated at the junction of the Mazaruni and Cuyuni rivers, in the heart of the largest and least-known jungle area in the world. In addition to spending some time at the permanent station, Professor Williams travelled into the highlands in the interior, beyond Kaieteur Falls, in order to make a study of zonal distribution of Coleopterous insects. He discussed, generally, the Natural History of the country, and showed over one hundred lantern-slides of the rivers, jungle, unusual water forms, jungle-animals, and natives.

At the general meeting on January 19th, Mr. C. V. B. Marquand gave an account of the botanical collection made by Capt. F. Kingdon Ward in the Eastern Himalaya and Tibet in 1924–25.

Captain Ward accompanied the last Mount Everest Expedition when it started from Darjeeling; travelling in an easterly direction from Gyantse to Tsetang over unexplored ground, and crossing the Temo La to Tumbatse, he entered the region in the neighbourhood of lat. 29° 40′ N., long. 95° E., where the most important part of the collection was made. A short distance east of Tumbatse a number of high passes over the eastern extremity of the Himalaya were traversed. On the highest of these passes, the Nam La, over a southern spur of the lofty Namcha Barwa at an altitude of 17,500 ft., a large number of alpines were collected. In August 1924 an extensive collection was made around the Trasum Lake, and the Banda La, a pass of over 18,000 ft., the most northerly point of the Expedition, was visited. On the return journey through Bhutan several species were found which had not been collected since they were discovered by Dr. Griffith nearly a century ago.

Excluding the three genera *Meconopsis*, *Rhododendron*, and *Primula*, which are dealt with elsewhere, the collection comprises 446 species, including 54 new species as well as 26 new varieties.

The genera most strongly represented, apart from the three mentioned above, are *Saxifraga*, 26 spp., nine being new; *Gentiana*, 16 spp., one new; and *Pedicularis*, 20 spp., three new. Four new species of *Lychnis*, three of *Corydalis*, two each of *Delphinium*, *Impatiens*, and *Buddleia*, and one each of 27 other genera are described as new.

Mr. F. W. Edwards gave an account of his expedition to the Southern Andes for the purpose of forming a general collection of insects from the southern beech (*Nothofagus*) forests. He showed a large series of lantern-slides illustrating the fine scenery and the vegetation around Lake Nahuel Huapi and other lakes on the western border of Argentina and thence to the Chilean coast.

The older generation of Fellows of the Society will hear with regret of the death on January 16, at the age of 86, of James Edmund Harting, who served as Librarian 1888–1897, and Assistant Secretary 1897–1902. Before taking service with the Linnean Society Harting had held the post of Librarian in the Department of Zoology at the Natural History Museum.

British Ecological Society.—The Annual General Meeting was held, by invitation of Prof. R. H. Yapp, in the recently opened building of the Department of Botany at Birmingham University. Members and their friends were entertained in the well-equipped laboratories, lecture- and work-rooms by the Staff of the Department in the regrettable absence of Prof. Yapp through illness. At the General Meeting on Jan. 7, Dr. E. J. Salisbury was elected President in place of Dr. T. W. Woodhead, resigned, and Mr. H. Boyd Watt, Vice-President. Dr. Salisbury and Mr. Watt will, however, also retain their posts as Secretary and Treasurer respectively.

The following communications were before the meeting:—Mr. C. S. Elton, "On Animal Communities of Spitsbergen"; Mr. W. Leach, "Some Observations on the Vegetation of Screes"; Prof. F. W. Oliver, "On the Early Stages of a Sand-dune"; Miss M. K. Bishop, "On the Ecological Relationship between some Species of *Juncus*"; Dr. E. L. Anderson, "Observations on the Root-Hair in the Soil"; and Dr. W. H. Pearsall, "Photographs of Michigan Sand-dunes."

Dr. Salisbury brought forward a scheme for the preparation of a Biological Flora of Britain, an account of which appears above (p. 48); and Mr. Turrill reported on the work done under the auspices of the Transplantation Experiments Sub-Committee.

Royal Horticultural Society.—Among the recent awards we note, for the Victoria Medal of Honour (V.M.H.), the names of Dr. O. Stapf, F.R.S., who is editing the new *Index Iconum* and the *Botanical Magazine* under the Society's auspices, and Mr. J. G. Millais, the author of books on Rhododendrons and Magnolias. The Society's Gold Medals are awarded to the veteran American botanist, Prof. L. H. Bailey, for his scientific work on behalf of horticulture, and to Mr. Frederick J. Hanbury for his work in the preservation and cultivation of the British Flora and in raising Orchids. Mr. E. H. Wilson of the Arnold Arboretum receives the Loder Rhododendron Cup in recognition of his work in introducing and describing Rhododendrons and Azaleas.

We tender congratulations to Dr. D. H. Scott, F.R.S., who will receive the Wollaston Medal, the premier award of the Geological Society, for his researches in Palæobotany, at the Annual Meeting of the Society on February 17.

We note with regret the announcement of the death, on January 9, of the Rev. E. F. Linton in his eightieth year: some account of his life and work will appear in the next number of the Journal.

Also, on January 20, that of Mr. E. Kay Robinson, the well-known naturalist and popular writer, and the founder of the British Empire Naturalists' Association and of its official organ, *Countryside*.

And, on January 25, that of Mr. Miller Christy, F.L.S., of Chignall St. James, Chelmsford, and Mr. W. A. Shoolbred, F.L.S., M.R.C.S., of Chepstow.

HUNGARIAN SPECIES OF *ONOSMA*.

By Dr. Alexander Jávorka.

(English translation by C. C. Lacaita.)

(Continued from p. 9.)

[Correction.—On p. 8, line 22, for *Heterotricha* read *Haplotricha*.]

Structure of the Axis.—The anatomical characters of the stem show the type general for the family. In this line also Schibler's and Jodin's researches have found full confirmation. The side and inner walls of the epidermis-cells of the stem are somewhat thick, isodiametric, and prolonged in the direction of the stem. The cortex consists, immediately below the epidermis, of one to three rows of cells, similar to the epidermis, and at first rich in chlorophyll; then follows a cortex-collenchyma, of one row of cells, oval, with thicker or thinner walls (in *O. Visianii* always with thin walls and large lumen) and very narrow intercellular passages; on the inside it is gradually transformed into cells with continually thinner walls; those cells are crushed flat in old stems. Beneath these there rests immediately on the vascular bundles the starch-sheaths composed of thin cells in one layer, with rich starch-content (Phlœoterma).

The vascular bundle-ring within the cortex develops, according to Schibler, from the procambium, which makes its appearance very early. The large tribe Boragineæ is characterised by the thick, continuous, and coherent vascular bundle, which is soon developed from this procambium, and later consists of secondary elements, principally of wood-fibre. The outer portion, the phloem, consists of a continuous bast of sieve-tubes and conducting cells which, on the outside towards the cortex, is surrounded by a thin sheath of bast-fibre that seems to be sometimes coherent, sometimes disconnected. Beneath the cambium follows the thick coherent stratum of woody fibre, consisting of very close, somewhat quadrilateral, and very thick (5–6 μ) woody fibres with narrow lumina, more or less arranged in radiate rows. These fibres have very oblique, interlacing cross-walls, and left-handed, fairly close, bordered pits. Older vascular bundle-rings may show a row of 10 to 20 such woody fibre-cells in a radiate direction. On the inner side towards the pith, the vascular vessels grow closer and closer, often arranged in radiate rows; in the outer of these simple pitting is characteristic, whilst the inner ones are spirally thickened. Where the ring of vascular bundles abuts on the pith, we may observe long cells of woody parenchyma with narrow lumina and either straight or oblique cross-walls (Schibler, *l. c.* p. 38).

The structure of the pith shows marked differences in our native species; it consists of approximately isodiametric, only slightly lengthened cells, which, contrariwise to the other genera of the family, are—at any rate, in the Hungarian species—more or less provided with bordered pits, and more or less woody. Both the pitting and the woodiness appear most characteristically in *O. stellulatum*, where, moreover, the roundness and the surprising thickness (7·2–7·4 μ) of

the pith-cells and their narrow lumina sharply separate this from the other Hungarian species, in which the thickness of the cell-wall varies between 2–4 μ only and the cells have broad lumina and are rather angular. It is only in the asterotrichous group (*O. echioides*, *O. viride*) that the thickness of the walls of the pith-cells approximates to that of *O. stellulatum*.

The inner structure of the rhizome of the perennial species of *Onosma* agrees in general with that of the stem. The bast and the wood are also present in the rhizome in the form of a coherent ring, but they differ from the woody part of the stem by the formation of annual rings. The rhizome, as well as the lower part of the overground stem, produces a thick corky rind (Phelloderma).

The primary wood and the pith of the root is developed on the diarch type (Jodin, *l. c.*). Here, too, a secondary growth in thickness begins very early; the cork-cambium developed from the pericycle produces a corky rind, for which reason the epidermis and the primary rind soon perish; within the corky rind there follows a secondary bundle-ring, whose woody portion consists of numerous vessels with broad lumina arranged in radiate rows in the thin-walled parenchyma.

In the underground stem and the root of the biennial species (with us, that is to say, in *O. Visianii*), and in a lesser degree in those of the perennial species, the young inner cells of the corky rind and the outer layer of the bast-parenchyma, contain droplets of violet, rapidly-drying, colouring-material, with which the cell-walls also are impregnated. This colouring-material is insoluble in water, but dissolves in alcohol, ether, or fat, and etherous oils yielding a red, but in alkalis a blue, colour. Its properties and method of formation are therefore closely related to the colouring-material of the root of *Alkanna*, for the adulteration of which it is used *.

In conclusion, therefore, there are but few among the anatomical characters of the Hungarian species of *Onosma* that are suitable for specific distinction. The sharpest distinctions I have found to lie in the form and disposition of the hairs—in the leaves I have hardly been able to trace any other anatomical differences. The thickness of the ring of woody fibre in an old stem in *O. Visianii* amounts in a radial direction to that of 25 to 30 woody fibres, in *O. arenarium*, *O. viride*, and *O. echioides* of 15 to 25, in *O. stellulatum* of 12 to 16. Moreover, in the last named the woody fibres show a narrower lumen and a thicker wall than in the other species. The pith-cells have the broadest lumen and the thinnest wall (1·5–2 μ) in *O. Visianii*; in *O. arenarium*, *O. viride*, and *O. echioides* the walls are of approximately equal thickness (2–3·5 μ), but in *O. stellulatum*, as already mentioned, the walls of the pith-cells are 7·2–7·5 μ thick, completely lignified, much extended and fairly closely provided with bordered pits, whilst in the remaining species this kind of thickening seldom or never occurs.

* Vogtherr, Pharmac. Centralhalle, xxxvii. (1896) p. 148; Czapek, *Biochemie der Pflanzen*, ii. p. 536; Wiesner, *Die Rohstoffe des Pflanzenreiches*, ii. p. 536; Holmes, Alkanna Roth, in Pharmac. Journ. ser. 4 (1897), no. 1413.

IV. Ecology and Distribution.

Both the Hungarian and the Mediterranean species of *Onosma* have been developed under the influence of the same—or, at any rate, very similar—ecological factors; this influence finds its expression in the fairly uniform biological and morphological structure of all the species. They belong to the xerophilous group of plants, and, indeed, in the sense of Warming *, especially to rock-vegetation. *O. arenarium* and *O. pseudoarenarium* appertain more to sand- and steppe-vegetation, while *O. echioides* and *O. Visianii* are also found in sandy meadow-land and woodland. The outer morphological form has been developed correspondingly, and the narrow leaves with revolute edges, mostly stiff and upright, and above all the thick-set hairiness, especially in the Mediterranean species, are very characteristic modifications for protection against excessive transpiration. The herbarium-material to which I have had access and the relative literature show that in this respect *O. echioides*, *O. erectum*, *O. angustifolium*, belonging to the asterotrichous type, have attained to a higher level than the haplotrichous kinds with their more or less distant bristles. This seems also to be confirmed by the circumstance that the typically-developed asterotrichous species are all found in the Mediterranean region, while the majority of the few species of *Onosma* of the central European floral region, which live on less dry soil and in a moister climate, all belong to the *Haplotricha* and *Heterotricha* †. The Mediterranean species belonging to these latter groups possess, as a rule, much closer-set hairs than those of Central Europe. The structure of the epidermis in all species, the thick cuticle, the straight side-walls, the approach of the mesophyll of the leaves to an equilateral structure, the thick palisade and spongy parenchyma-layers, and the thick and compressed ring of woody fibre, all point to the xerophytic character of the genus.

The distribution of the species of *Onosma* embraces the mid-European, the Mediterranean, and the mid-Asiatic floral regions, as well as the southern parts (the Altai) of subarctic Asia. The larger number of species falls within the Mediterranean region, especially in Asia Minor; the mid-European kinds are all, with the exception of *O. simplicissimum*, restricted to the southern portion of the region. The northernmost point reached by the haplotrichous group is, in Russia, the district of Perm, in 58° N. lat. (*O. simplicissimum*), in western Europe, the neighbourhood of Mainz and Hesse-Nassau, in 51° N. (*O. arenarium*); the same latitude is reached by *O. simplicissimum* and *O. Gmelini* in the Altai Mountains of Asia. The southern limit of distribution runs through the northern coast-region of Africa and across Palestine to the western part of India.

As to vertical distribution, the genus is restricted in mid-Europe to the lower hills and sandy fields, while farther south it ascends to

* *Œcology of Plants* (Engl. transl. 1909).

† Nevertheless, it must not be forgotten that none of the species of Spain and Northern Africa, the driest regions of the Mediterranean, excepting Egypt, are asterotrichous.—C. C. L.

1800 m. in the Pyrenees and to 1200 m. in the Abruzzi; in Asia Minor there are even certain species that are confined to the alpine region at elevations of 2000–3000 m.

Perhaps the similarity of ecological conditions may be the cause of the fact that—at any rate among those of the mid-European floral region—the nearly related species differ in small and unessential characters, and that the several groups pass into each other almost imperceptibly, with so many varieties that their sharp systematic definition seems to be almost impossible. Moreover, as only one or two species have a wide range of distribution, each forms a local geographical species, and at the limit of its area is commonly replaced by a very closely allied form. These are the conditions that have caused such confused and contradictory interpretations of nearly related species.

Among the Hungarian species, *O. arenarium* occupies the widest area, covering the great plain of Hungary, the surrounding low hills (Tokay, Gyöngyös, Nyitra, the Balaton district), and the right bank of the Danube; towards east it passes in a few places only beyond the line of the Tisza and lower Danube: northwards the Mátra and the valleys of the western rivers and the southern part of Moravia; westwards Lower Austria; in Germany, Mainz, Nassau, and Hessen, then the Rhone Valley and the southern slopes of the Alps; to the south, Serbia, Rumania, and some places in the Balkans. But in the west it is only the specimens from the Rhone valley and the country about Mainz that agree with our type in most characters; in lower Austria it has a special aberrant form, *O. austriacum* Beck., *O. vaudense*, and *O. helveticum* in Vaud; *O. tridentinum* on the southern slopes of the Alps in south Tyrol, and *O. fallax* in the Croatian coast-district certainly belong to the cycle of *O. arenarium*, but their systematic independence, with such sharply distinguished areas, cannot be disputed. From Transylvania I have only seen *O. arenarium* in its typical development from a few localities; it is there represented by *O. pseudarenarium*, which, however, shows forms of transition to the type. In the county of Abauj-Torna, on the Schlossberg of Torna, is an isolated species, *O. tornese*, near to *O. viride*. *O. viride* in the Banat usually appears in a more robust form, as subsp. *banaticum*, which also occurs in the neighbouring regions of Serbia and Rumania; in the Balkan Peninsula it passes into other Mediterranean species through the stages of *O. tubiflorum*, *O. balcanicum*, etc. *O. tauricum* is confined to the northern, western, and southern coastal regions of the Black Sea, and reaches its western limit in the Balkan Peninsula at the River Jalta, and in our territory in the Banat, although this last habitat has not been confirmed in recent times.

In the Adriatic coastal region *O. echioides*, which for long was taken for *O. stellulatum*, has a large area, whilst the true, hitherto little-known *O. stellulatum* is restricted to a few isolated spots in the Croatian and Dalmatian coastal territory and in Bosnia and Hercegovina.

The area of *O. Visianii* includes certain localities in Transdanubia,

and in the central Hungarian hill-country, extending to Moravia and Lower Austria in the north, and in the south as far as the Croatian and Dalmatian coast-region and Bulgaria.

PART II.

Systematic Description of the Species of *Onosma* that occur in Hungary.

Clavis Specierum *.

1 *a*.	Planta biennis, radix monocephala, caulis a basi ramosissimus, sæpissime atroviolaceus. Tubercula setarum patentium vel valde patentium asterosetulis semper destituta; setulæ minimæ setis interpositæ densissimæ. Folia radicalia supra dense, subtus ad costam tantum setosa. Calyx viridis, post anthesin valde accretus, usque 2 cm. longus. Corolla calyce vix vel tertia parte longior, primum alba, deinde ochroleuca, pubescens. Pars filamentorum libera quartam usque dimidiam antheræ partem æquans. Nuculæ 4·5–6 mm. longæ, sæpius minute tuberculatæ	[Clem. *O. Visianii*
1 *b*.	Planta perennis, sæpe suffruticosa (raro biennis), rhizoma plerumque polycephalum, caules plerumque superiore tantum parte ramosi, vel simplices. Tubercula setarum sæpe diminuta, asterosetulis 1–5 sæpe brevissimis ornata, rarius asterosetulis destituta; setulæ setis interpositæ pauciores, sæpius nullæ. Calyx fructifer 8–15 mm. longus. Corolla calyce saltem tertia parte longior. Nuculæ 2–3·5 mm. longæ, læves, nitidæ	2.
2 *a*.	Caules superne, rarius a basi ramosi. Folia subtus ubique setosa. Setæ plerumque (1·5–) 2 (–3) mm. longæ. Tubercula setarum patentium nuda, vel 1–10 asterosetulis ornata, asterosetulæ tuberculo vix vel duplo, rarius triplo longiores, seta multoties breviores. Calyx fructifer 1–2 cm. longus, laciniæ lineari-lanceolatæ vel lineares, usque 2 mm. latæ. Corolla ochroleuca, 13–18 mm. longa, glabra, vel raro sparse vel sub lobulis puberula. Pars filamentorum libera anthera dimidia vel tertia parte brevior. Folia 5–10 mm. lata, planiuscula. Nuculæ nitidæ, plus minus læves. Biennis vel perennis.....	[W. et K. *O. arenarium*
2 *b*.	Caules simplices, inflorescentia bifida vel trifida terminati, rarius superne 3–6-ramosi. Tubercula setarum sæpius adpressarum asterosetulis 5–20 ornata, asterosetulæ tuberculo multoties, seta duplo-quintuplo, rarius vix breviores. Pars filamentorum libera sæpius (except. *O. tornense*) antheram subæquans vel superans	3.
3 *a*.	Pedunculi longitudine calycem plus minus æquantes vel superantes. Corolla sæpissime glaberrima, vel sub lobulis puberula, citrina. Folia media 0·8–1·5 cm. lata, plana, setis crassis undique valde adpressis remotiusculis et asterosetulis 4–8 subulato-crassiusculis obtecta, plerumque dimidiam caulis partem æquantia	[W. et K. *O. stellulatum*

* I have embodied in this Clavis some alterations received in MS. from the author. The changes can be followed by comparison with the text in Ann. Mus. Nat. Hung. It should be noticed that in the description of *O. Visianii* it is said to be "at a glance distinguished from *O. arenarium* by its biennial root," but now the latter species is called "biennis vel perennis." I am unable to grasp the precise meaning of these words.—C. C. L.

3 *b*. Pedunculi calyce duplo, triplo vel multoties breviores. Setæ et asterosetulæ foliorum tenues, aciculares. Folia radicalia dimidiam caulis partem non attingentes ..... 4.

4 *a*. Bracteæ florum calycem æquantes vel superantes. Corolla glaberrima, citrina. Folia caulina inferiora et media in petiolum angustata, lineari- vel oblongo-spathulata. Setæ foliorum ca. 1 mm. longæ, undique adpressæ ..... [Pall. *O. tauricum*

4 *b*. Bracteæ florum calycis dimidiam partem æquantes vel ea breviores, sæpe calycis basin tantum attingentes. Folia media sæpiusque et inferiora basin versus æquilata vel dilatata, basi cuneata vel rotundata sessilia. Corolla pubescens vel glabrescens ..... 5.

5 *a*. Folia omnia apice longius acuminata, angusta (2–5 mm. lata), margine revoluta, caulina numerosissima (15–35). Corolla citrina, puberula, 14–17 mm. longa, calyce plerumque dimidia parte longior. Pars filamenti libera circa dimidiam antheræ partem æquans ..... [n. sp. *O. tornense*,

5 *b*. Folia apice acuta, obtusiuscula vel rotundata, caulina pauciora (5–20). Corolla 1·7–3 cm. longa. Pars filamenti libera longitudinem antheræ subæquans vel superans ... 6.

6 *a*. Folia canescentia vel albo-canescentia, angustiora, crassiuscula, margine plerumque parum incrassata, radicalia et sæpius caulina quoque margine revoluta. Setæ foliorum densæ vel densissimæ, tuberculo asterosetulis 1–10–20 seta 4–5-plo brevioribus ornato insidentes. Calyx setis densis longioribus, adpressis vel plus minus patulis hispidus, pallidus vel flavicans, rarius viridescens, laciniæ calycis nervo dorsali prominente instructæ. Corolla pallide citrina, calyce dimidia parte et ultra longior, puberula ..... *O. echioides* L.

6 *b*. Folia obscure viridia, rarius subcanescentia, latiora (5–10 mm. lata) et longiora, tenuia, margine non incrassata, margine non, vel vix revoluta. Setæ foliorum remotiores, tuberculo asterosetulis 5–12 ornato insidentes. Calyx saltem superiore parte obscure viridis, setis diminutis, adpressiusculis (rarius arcuato-patentibus), asterosetulis sæpe dense ornatis instructus, laciniæ calycis enerves, raro nervo dorsali vix prominente instructæ. Corolla albida (raro pallide citrina), calyce usque triplo, rarius quadruplo longior, sæpius dense pubescens. Pars filamenti libera antheram sæpe parum superans ..... (Borb.). *O. viride*

Clearly recognizable hybrids between the Hungarian species of *Onosma* I have not found. This may be explained by the fact that the different species seldom occur in the same locality.

Sectio I. EUONOSMA Clarke (Hook. f. Fl. Brit. Ind. iv. 178). Calyx usque ad basin 5-partitus. Corolla tubulosa, apicem versus sensim dilatata. Filamenta basin versus dilatata. Nuculæ rectæ.

A. *HAPLOTRICHA* Boiss. (Fl. Or. iv. 179). Tubercula setarum semper glabra, nempe asterosetulis destituta. Setulæ setis interpositæ (in speciebus patule setosis) plus minus densæ, nonnunquam pubem conspicuam formantes. Caulis plerumque ramosus.

1. ONOSMA VISIANII Clem. in Att. 3 Riun. Sc. Ital. 519 (1842). *Lithusa flore exalbido* Clus. (1583) p.p.*; *O. echioides* Jacq. (1773), Winterl (1788), Plenck (1788), Schultes (1794), M. B. (1808), Lehm. (1818) p.p., R. et S. (1819) p.p., Rchb. (1830), Koch (1837), Rochel (1838); *O. echioides* α var. *montana* Sadl. (1840) et Led. (1846–51); *O. calycinum* Stev. (1851); *O. echioides* ut *Visianii* Schlosser (1869); *O. setosum* Borb. (1876/7), non Led.

Biennial †, with a 1–2·5 cm. thick root, containing copious dark violet colouring-matter and a simple stem. Stem 1·5–5 dm. high, dark violet as well as the branches; with long spreading bristles to 0·6 mm. long. Radical leaves crowded on the annual sterile rosettes, but already withered when the plant is in bloom, their remains encircling the base of the stem with a thick sheath; narrow-linear or narrow-lanceolate, gradually tapering towards their base into a winged stalk; blade of even breadth or broader in the middle; 15–25 cm. long by 5–7–9 mm. wide, on its upper face and on the edge (as well as the stem-leaves) everywhere, but underneath only on the midrib, covered with spreading bristles 2–4 mm. long, their cushions consisting of 1–4 circles of cells with a diameter of 0·5–1·5 mm. on the upper leaf-face, whilst rather smaller on the under face; between the bristles the leaf is clothed with very thick-set, thin, diminutive hairs scarcely visible by the naked eye. Stem-leaves and bracts of the lateral branches up to 7 cm. long and at the base up to 1·5 cm. wide, gradually produced into a long point. The upper lateral branches mostly with 2–5 smaller leaves, but only in their upper portion beneath the inflorescence. Both branches of the boragoid inflorescence bear 5–10 flowers. Calyx-segments linear-lanceolate or lanceolate, hardly narrowed towards the apex, but suddenly acuminate; during bloom 11–15 mm. long, 2–3 mm. wide. Segments of fruiting-calyx 1·7–2 cm. long, 3–5 mm. wide. Corolla 1·5–1·7 cm. long, at first scarcely exceeding the calyx, but later projecting beyond it by at least one-third of its length. The anthers lie against the connective in the lower quarter of their length; their base is 9–10 mm. distant from the lower border of the corolla.

In grassy, rocky, sunny places, mostly on limestone, more rarely on sand. Flowering May to June.

In all its parts sharply differentiated from the other endemic species; and easily distinguished from the nearest, *O. arenarium*, by

* Clusius's figure, on account of the thick-headed root, the arrangement of the radical leaves, and the single stem, as well as the description, "numerosa sunt illi folia .... quorum medio caulis assurgit secundo anno pedatus .... multis alis brachiatus, flores albi, aut ex albo nonnihil pubescentes, radix minimi digiti crassitie," etc., and one of the localities cited (Baden), certainly refers to *O. Visianii*. Therefore, Reichenbach, Fl. Germ. exc. 1, p. 338, and Kerner, *loc. cit.*, were wrong in referring the plant of Clusius to *O. arenarium*. Nevertheless, the rest of Clusius's localities probably belong to *O. arenarium*.

† Visiani, Fl. Dalm. ii. p. 244, is surely wrong in describing it as perennial, as Kerner and Borbás have already pointed out.

its biennial root, by its solitary stem branching from the base and mostly dark violet, by its spreading bristles set upon cushions which are always naked, and by the very closely set smaller bristles, by its large calyx, by its pubescent corolla which is white when first opening, and by its large, 5–6 mm. long nucules.

Earlier Hungarian authors—Winterl, Kitaibel, Sadler, etc.—took *O. Visianii* to be the typical *O. echioides* L. The first rectification was made by Kerner, who proved that the *O. echioides* of Linnæus is referable to the species of *Onosma* most widely distributed in the Mediterranean region. The species which occurs in the hills of Buda, and elsewhere in the central Hungarian hills, that had been taken for *O. echioides* he united to *O. calycinum* Stev., which had been described from the neighbourhood of Baden near Vienna, and he rightly concluded that *O. calycinum* must be a synonym of *O. Visianii* of the Croatian-Dalmatian coast, in which case the latter name would have the priority. Borbás, on the other hand, held that *O. calycinum* from Baden differs from the Buda plant, on the one hand on account of the nuculæ of the latter, to which, according to him, the description of Steven's *O. calycinum* is not applicable, and on the other hand on account of Steven having identified our plant with the Podolian and Bessarabian plant, which he considered to be *O. Visianii*, and consequently dealt with the *O. calycinum* of Lower Austria as a separate species. But, so far as the form of the nuculæ is concerned, this varies to some extent, as does also their surface, in every individual of the Lower Austrian, Hungarian, and Croatian-Dalmatian plants, while their other parts show no difference. The Lower Austrian plant can therefore, in my opinion, be regarded at the most as a variety of *O. Visianii*. On the other hand, Steven's assertion that *O. echioides* Jacq. & Koch (*Visianii* Clem.) agrees with the Podolian and Bessarabian *O. Visianii* is based on the fact that he can hardly have seen specimens of the Dalmatian and Hungarian *O. Visianii*, whilst he was aware—probably from de Candolle's Prodr. x. 62—that Visiani did hold the Podolian and Bessarabian plant to be *O. Visianii*, and consequently de Candolle, too, drew up his diagnosis from specimens from that region. Steven therefore rightly distinguished *O. calycinum* from *O. Visianii* in de Candolle's sense. But since the Podolian and Bessarabian plant somewhat differs from that of Hungary, Dalmatia, and Lower Austria in respect of its smaller calyx with sharply tapering teeth, and of its greenish-grey, pointed, but not sinuously tapering nuculæ, which are only 3–4 mm. long, we must reject the opinion of both Visiani and Steven and call the Croatian-Dalmatian, Hungarian, and Lower Austrian plants *O. Visianii*, whilst the Podolian and Bessarabian can remain as *O. calycinum* of Lallemant, whose diagnosis, if account be taken of the habitat, probably refers to this plant. Boissier (Fl. Or. iv. 181) must surely have also been of this opinion, although he quotes *O. calycinum* Lallem. as a synonym of *O. setosum* Ledeb.

Borbás (*loc. cit.* 416–417), wrongly applying the above-mentioned passage of Boissier, adduces the Hungarian *O. Visianii* as a synonym of *O. setosum*. But the plant described by Ledebour can in no wise

be *O. Visianii*, nor can it be the Bessarabian *O. setosum*. According to Ledebour's original description (Fl. Alt. i. 181) the diagnosis of *O. setosum* runs as follows: "radix multiceps . . . caule inferne simplici, a medio ad apicem ramoso, calycis laciniis præsertim ad marginem et costam mediam hispidis, corolla flava calyce sesquilongiore, anthera . . longitudine filamentorum," which fits neither our plant nor the Bessarabian; the plant figured as *O. setosum* in Ledebour, Ic. pl. Fl. Ross. alt. t. 196, is also not identical with ours. Among the Caucasian and Caspian specimens of *O. setosum* in the herbarium material examined by me, I could find none that agree with *O. Visianii*. Ledebour, it is true, at a later time (Fl. Ross. iii. 127) brings under *setosum* the Taurian and Bessarabian *O. calycinum* Lallem. as well, but Steven (*loc. cit.* 587) showed that in Flor. Ross. Ledebour had assembled three species under *O. setosum*—to wit, the real *O. setosum* which is a native of the shores of the Caspian Sea alone, *O. hispidum* Mey. restricted to the Caucasus, and the Taurian and Bessarabian *O. calycinum* Lallem.

It follows that the *O. Visianii* taken for *O. setosum* by Borbás is a totally different plant from the true *O. setosum*. Borbás took up this identification from Boissier; only Boissier nowhere in the above-mentioned work (not even in the "Area geographica") maintains that *O. setosum* occurs with us in Dalmatia; he places the Bessarabian *O. Visianii* Stev. and *O. calycinum* Lallem. as synonyms of *O. setosum*, and accordingly has distinguished both the true *O. calycinum* Stev. and *O. Visianii* Clem. from *O. setosum*. So Borbás should have done, since, relying on Boissier, he took the Buda plant for *O. setosum*; but he misunderstood Boissier's citation of the synonyms.

Borbás has further referred the coast-dwelling *O. Visianii*, as a variety, to the Buda plant—that is to say, to his *O. setosum*. I found, however, in the herbarium material examined, that although the aforesaid differences are evident in certain Buda and Lower Austrian specimens, on the other hand many coastal specimens agree with the Buda plant, whilst in some others there is every transition between the differential characters.

Geographical Distribution. Hungary, Lower Austria, Carniola, Istria, Dalmatia, Bosnia, Hercegovina, Albania, Bulgaria.

B. *HETEROTRICHA* Boiss. (*Diplotricha* Borbás)*.

2. O. ARENARIUM W. K., Pl. Rar. Hung. iii. 308, tab. 279 (1812). *Anchusa flore exalbido* Clus. (1583) p.p. quoad locum natalem; *O. echioides* β Linn. (1762) p.p., Winterl, Ind. Hort. Bot. Univ. Hung. (1788), sub nomine "*Onosma nova*" descriptum; *O. echioides* Jacq. (1762) p.p.; *O. echioides* α M. B. (1808); *O. echioides* α p.p. et β *arenarium* Lehm. (1818); *O. echinatum* Rochel (1838)?; *O. tuberculatum* Kit. Add. ad Fl. Hung.; *O. echioides* β var.

* As neither of the designations *Heterotricha* and *Diplotricha* fully corresponds to the idea they are intended to express, I have thought it more to the purpose to retain Boissier's name as the older.

arenaria Sadler; *O. Heuffelii* Sándor in Herb. Univ. Budapest; *O. echioides* α p.p. et δ *arenaria* DC.; *O. simulans* Janka in Herb. Mus. Nat. Hung.; *O. stellulatum* Nendtvich (1863); *O. echioides* Boiss. Fl. Or. p.p.

Exsicc. Fl. exs. Austr.-Hung. 1412.

Perennial, seldom biennial; rhizome 2–30-cephalous, seldom monocephalous; stem 2–7 dec. high, greenish white, more rarely reddish on the surface, usually branching above the middle, more rarely from the base or only toward the summit. The whole plant is pale yellowish green. The indumentum of the stem and of the leaves is very variable; the setæ are white or yellowish, 1–5 mm. long, placed closer together or more sparingly, spreading or almost adpressed. The cells of the hair-cushions are in 1–3 rows; more rarely cushions are not developed, especially on the stem, on the lower face of the leaves and at their base, the cushion-cells being either without stellate hairs or more frequently with 1–5, and rarely as many as 10, which are from three to ten times shorter than the setæ, but on the upper leaf-face hardly longer, or at most twice as long as the radius of the hair-cushion; on the lower face, on the contrary, where the cushions are smaller, the stellate hairs are 2–3 times as long as that radius. Radical leaves 8–20, 5–18 cm. long, 6–13 mm. wide, broadest in the upper $\frac{1}{3}$ or $\frac{1}{4}$ of their length, gradually contracted into a petiole about $\frac{1}{3}$ as long as the leaf-blade. Lateral branches of the stem usually bearing leaves in all their length. Stem-leaves 1–3 cm. long, from ovate-oblong to narrow-lanceolate. Bracts from oblong-ovate to narrow-lanceolate, gradually tapering to a point, or of uniform width and rather blunt at the apex; during the flowering stage 6–11 mm. long, 1–1·5 mm. broad, reaching to $\frac{1}{2}$ or $\frac{3}{5}$ of the corolla. Segments of the fruiting calyx 13–18 mm. long, 1·5–3 mm. broad. Corolla 13–20 mm. long, pale yellow even at the commencement of the flowering stage, glabrous, or rarely a little downy below the reflexed teeth. Anthers 5–7 mm. long, their apex often protruding when the flower fades, their tails reaching halfway down the free portion of the filament, or even farther; the free part of the filament $\frac{1}{2}$ or $\frac{2}{3}$ the length of the anther; the lower end of the anther 6–10 mm. from the lower edge of the corolla.

Prevalent on poor sandy slopes, more rarely among stones in rocky places. Flowering June to September.

A very variable species in habit and indumentum, which, however, can easily be distinguished from *O. Visianii* on the one hand by its perennial polycephalous rhizome, broader radical but narrower stem-leaves, yellowish hairs, shorter calyx, glabrous and always yellowish corolla, smaller nuculæ, etc., and on the other hand from our indigenous species of the *Asterotricha* by its constantly ramified stem, its fewer and more or less spreading bristles, and much shorter stellate hairs; by the presence of dwarf bristles at any rate on the leaf-edges, by its medium-sized, glabrous, pale yellow corolla and shorter filaments.

The two subspecies dealt with below represent in respect of hairiness the two extremes of *O. arenarium*. *O. pseudarenarium* differs by its scarcer, shorter, more adpressed setæ, and *O. fallax* by the very thick, long, and spreading hairs from typical *O. arenarium*, which therefore comes between those two subspecies. Both *O. pseudarenarium*, however, and *O. fallax* are linked with typical *O. arenarium* by intermediates. This is especially the case with *O. pseudarenarium*, which in its own typical form only grows in Siebenbürgen (Transylvania), whilst to the west and north, and even at certain spots in Siebenbürgen, transitions towards typical *O. arenarium* are to be found. Such a transitional form is presented by *O. tuberculata* Kit., which Kitaibel described from the castle-hill of Tállya, in the county of Zemplén.

According to Kerner, Kitaibel must already, when describing the specimens collected on the Schlossberg of Tállya, have observed the small stellate hairs; but from his notices of the other species of *Onosma*, he presumably did not observe the stellate bristles, which get rubbed off to a great extent and in any case are invisible or scarcely visible to the naked eye, because he describes as "pilis tantum simplicibus stellulatis" even such species as *O. tauricum*, in which the stellate bristles are far more conspicuous than in his *O. tuberculatum*. Kitaibel, therefore, in all probability only recognized stellate hairs on the leaf of *O. stellulatum*, where they appear most characteristically, and are easily seen even by the naked eye. Most probably the stellate bristles on the hair-cushions of *O. arenarium* were discovered by Josef Sándor (an employée in the finance department at Pest, and Privaldsky's botanical assistant), who for his *O. arenarium* (called by him *O. Heuffelii*) from Szentendre (St. Andrä), in the herbarium of the University of Budapest, gives the following diagnosis: "foliis apice tantum pube obscure stellata, secus simpliciter setosis." Probably *O. echinatum* Desf. in Rochel, Bot. Reise in das Banat. 66, which he considers to be a synonym of *O. tuberculatum* Kit., should also be referred to typical *O. arenarium*.

While with us the forms belonging to the *O. arenarium* group mostly have a richly branching stem, we find with increasing frequency as we go westward a stem that ends in a simple boragoid. Such forms are represented by the Lower Austrian *O. austriacum* Beck, the Swiss *O. vaudense* Gremli and *O. helveticum* DC., and the South Tyrolese *O. tridentinum* Wettst., the last of which already forms a transition to *O. echioides* (α) L.

Geographical Distribution. Hungary; Lower Austria; the southern part of Moravia; Carniola; Istria; Germany, at Baden on the Rhine and near Mainz; France, in the Rhone valley and near Montpellier; Belgium (Tirlemont); Italy (Lake of Garda); Dalmatia, Bosnia, Hercegovina, Albania, Bulgaria, Serbia, Rumania, Bessarabia, Podolia, Crimea, neighbourhood of Moscow.

To the group of *O. arenarium* belong *O. pseudarenarium* Kohur and *O. fallax* Borb. Within their respective geographical limits they replace typical *O. arenarium*, to which, however, both show transitions. On this ground I regard them as subspecies of *O. arenarium*.

O. ARENARIUM W. & K. subsp. PSEUDO-ARENARIUM (Schur) Jávorka. *O. echioides* Baumg. (1826); *O. pseudo-arenarium* Schur, Verh. Sieb. Verein. Naturwiss. x. 76 (1859) et Enum. Pl. Trans. (1866); *O. transsilvanicum* et *O. pustulatum* Schur in Oëst. Bot. Zeit. (1860); *O. montanum* Schur (1866); *O. arenarium* var. *parviflorum* Janka in Linnæa, xxx. 592; *O. arenarium* p.p. et var *pustulatum* Simonk. (1886).

This differs from typical *O. arenarium* chiefly by its taller stem, that in the upper part bears long lanky branches; by its more scanty and shorter bristles, which moreover are spreading on the stem or only slightly adpressed. The hair-cushions mostly very prominent and whitish, with 3–7 stellate hairs once to twice as long as the diameter of the cushion. Radical and lower stem-leaves 10–18 cm. long, 8–13 mm. broad; the leaves beneath the inflorescence of the flowering stems only 0·5–1 cm. long; calyx smaller, usually only reaching to half the length of the corolla, with fine bristles spreading or adpressed; corolla much smaller, often only 13–14 mm. long.

In sunny grassy spots and on sandy slopes, more seldom in hill-meadows, and, according to Schur ascending to 1300 m. in the mountains. Flowering June to July.

Geographical Distribution. Transylvania.

O. ARENARIUM W. & K. subsp. FALLAX (Borb.) Jávorka differs from typical *O. arenarium* principally by its usually monocephalous rhizome, by its crowded bristles with longer stellate hairs, and by the almost complete absence of small bristles; the flowering branches very long—up to 30 cm.—the flowers farther apart from each other; the calyx very shaggy, 10–12 mm., but in fruit 13–15 mm. long; corolla 15–18 mm. long; the free part of the filament two to three times shorter than the anthers.

In stony places in vineyards.

Borbás remarks that *O. fallax* might also be regarded as a heterotrichous form of *O. Visianii*. In my opinion, however, *O. Visianii* possesses, as a typically haplotrichous species, sharply defined characters, which distinguish it from all heterotrichous species, including *O. fallax*, which in habit comes nearest.

Geographical Distribution. S. Matea on the island of Arbe; Croatia at Glanatz; Recina-Thal near Grohovo.

C. *ASTEROTRICHA* Boiss. Setæ et asterosetulæ caulis et foliorum adpressæ vel adpressiusculæ, rarius patentes. Tubercula setarum sæpius diminuta, asterosetulis 4–50, tuberculo triplo, usque multoties longioribus ornata. Setulæ setis interpositæ nullæ. Caulis sæpius simplex, racemo bifido terminatus, vel superne tantum ramosus.

3. O. TORNENSE, sp. nov. *O. stellulatum* Hazslinsky (1864), *non* W. K. Rhizoma valde crassum, obliquum, polycephalum, tinctorium; caulibus herbaceis erectis vel adscendentibus, supra inflorescentia simplici bifida terminatis. Folia prolum sterilium et radicalia sub anthesin jam emarcida spathulato-linearia, basi in petiolum longum

angustata, apicem versus sensim acuminata, margine non incrassato, plus minus revoluto. Folia caulina valde numerosa (20–30), inferiora angusto lineari-spathulata vel linearia, in petiolum alatum sensim angustata, superiora passim decrescentia, anguste lanceolata usque oblongo-lanceolata, in basin cuneatam vel cuneato-rotundatam angustata sessilia; omnia apicem versus sensim angustata et acuminata. Folia omnia obscure viridia, in pagina superiore setis 1–2 mm. longis adpressiusculis, margine et infra ad costam longioribus patentibus, tuberculo diminuto et obscuro insidentibus; asterosetulis tuberculo insidentibus 3–5–10, tenuibus, tuberculo duplo triplove longioribus, setis duplo quadruplove brevioribus, vix conspicuis; in pagina inferiore setæ, excepta in costa, abbreviatæ vel deficientes, tuberculis diminutis dumioribus vix conspicuis insidentes, tubercula asterosetulis 4–12 adpressis, tuberculo multoties longioribus ornata. Inflorescentia simplex, bifida (raro ramulo solitario vel ternato); rami inflorescentiæ floribus 10–16 instructi; bracteæ florum inferiores anguste lanceolatæ, superiores lanceolato-subulatæ, calycis dimidium æquantes vel breviores. Pedicelli breves, calyce duplo vel multoties breviores. Calyx cylindrico-campanulatus, 6–7–10, fructifer 10–12 mm. longus, laciniis læte viridibus, linearibus, a basi sensim longe angustatis, dorso posterius costa prominula præditis setis basi calycis patentibus, apicem versus adpressiusculis hispidis, tuberculo diminuto asterosetulis ornato insidentibus. Corolla tubulosa apicem versus dilatata, extus parce pubescens vel glabrescens, intense citrina, 14–17 mm. longa, calyce duplo, vel parum plus quam duplo longiora. Antheræ 5–7 mm. longæ, apex earum membranacea margine subintegra; pars filamenti libera 4–5 mm. longa, anthera usque dimidio brevior. Nuculæ cinereæ, triangulari-ovatæ, acutæ, nitidæ, 2·5–3 mm. longæ.

Rhizome woody, very thick (as much as 1–2 cm.), often splitting into fibres, oblique, seldom vertical, 4–18-cephalous; stem herbaceous or woody below the leaf-rosettes, 1·5–3 dm. long; radical leaves and those of the sterile rosettes much crowded, linear-spathulate, 3–6 cm. long by 3–5 mm. broad, gradually contracted into their stalks, acute or acuminate. Middle rib whitish. Stem-leaves closely approximate, from 15 to 20 or 30 in number; length 2–4 cm., width 3–4–6 mm., the upper ones generally tapering to a point from the base or else from the middle, contracted at the base, sessile. All the leaves covered with dark green bristles, 1–2 mm. long, but on the leaf-edge 3–5 mm. long and spreading; hairs of the stem very slender, hardly visible to the naked eye, two to four or even five times shorter than the bristles. Corolla always bright lemon-yellow, only 14–17 mm. long, the calyx reaching to $\frac{1}{2}$ or $\frac{2}{5}$ the length of the corolla; anthers distant 10–12 mm. from the lower edge of the corolla; free portion of the filament from $\frac{3}{5}$ to $\frac{1}{2}$ the length of the anthers.

On dry, sunny, calcareous rocks. Flowering end of July to August.

Distinguished from its nearest relative *O. viride* by its very thick rhizome, by its closely-leaved stem, by the smaller narrower leaves, always produced into a long point; by its more spreading covering of

hairs, by the narrower acute calyx-segments eventually showing a mid-rib on the back, by its much smaller bright lemon-yellow corolla, shorter filaments, and later flowering season.

Hab. Hungary, in the Kom, Abauj-Torna; on the rocks of the Schlossberg of Torna, and farther to the north-west on steep declivities of the ridge that stretches toward the Szádelli kö, where it is fairly plentiful at heights of from 150 to 300 m.

4. O. VIRIDE (Borbás) Jávorka. *O. tauricum* var. *viride* Borb. Math. Term. Közl. xiv. 409 (1876–77); *O. echioides* Baumg. (1816) p.p. et *O. stellulatum* ejusdem; *O. stellulatum* β *transsilvanicum* Sandor in Hb. Univ. Budapest; *O. stellulatum* Griseb. et Schenk (1852); *O. simplicissimum* Lerchenfeld ex Schur (1860); *O. stellulatum* Schur (1866); *O. cynoglossum* Janka in Hb. Mus. Nat. Transsilv.; *O. stellulatum* var. *longiflorum* Borb. *loc. cit.*; *O. tauricum* Kerner ex Borb. *loc. cit.*; Simonk. (1886) et auct. Transsilv. recentiorum.

Exsicc. Fl. Exs. Austr.-Hung. 1414 (sub *O. taurico*).

Perennial, with moderately thick, creeping, or obliquely descending polycephalous rhizome. Stem usually suffrutescent, 2–3–4 dm. long, ascending, terminated by a simple boragoid, less often with 3–6–12 branches in the upper part. Radical leaves and leaves of the sterile leaf-rosettes fairly numerous, 4–7–12 cm. long, 4–7–10 mm. broad, widest in the middle or in the upper $\frac{1}{3}$, suddenly contracted to an obtuse or rounded apex; flat, or with edges slightly revolute. Stem-leaves 2–4 cm. long, 5–7 mm. broad. Leaves dark green, occasionally passing into greyish green, thin; bristles 0·5–2·5 mm. long, usually spreading at the edge and on the lower face, elsewhere more or less adpressed. On the lower face of the leaves the bristles are much shorter or absent; the stellate bristles of the small hair-cushions very slender, smooth, hardly perceptible to the naked eye, from 4–9–12 in number, two to five times longer than the hair-cushion. Bracts mainly oval, less frequently lanceolate, dark green, usually covered with slender, but more rarely with longer and spreading bristles. The calyx-segments also, at any rate toward their apex, are dark green, with a rough pubescence of small bristles and stellate hairs, more rarely with longer and stiffer bristles, reaching $\frac{2}{5}$ to $\frac{1}{3}$, or more rarely to $\frac{1}{4}$, of the length of the corolla. Corolla whitish; rarely (in var. *citrinum*) pale yellow, 1·8–3 cm. long. Filaments 6–11 mm. long; the lower end of the anthers 1·2–2 cm. from the base of the corolla.

In rocky, sunny spots from 100 m. to 400 m.

Nearly related to *O. echioides* L., which differs in its thicker grey-green or whitish bristles and thicker leaves with thick edges; narrower radical leaves with strongly revolute margins; more pointed, pale green or whitish calyx-segments, usually with strong spreading bristles and distinctly prominent central ribs on the back; pale lemon-yellow, obscurely downy, corollas; the free portion of the filaments shorter than the anthers.

O. tauricum, which with us has only been collected in a single locality, now no longer known, in the Banat (specimens of Rochel and Mahott in the herbaria of the Hungarian National Museum and of the Botanical Museum of Berlin), has a lanky growth and much denser clothing of feeble greyish hairs; its lower leaves are long, linear-spathulate, broadest in the upper $\frac{1}{3}$ or just under their apex, also the middle stem-leaves, and often even the upper, are narrow, linear-spathulate like the lower, and contracted into the stalk; bracts oval-lanceolate or narrow-lanceolate, as long as or longer than the calyx, so that the still unexpanded portion of the inflorescence appears dense by reason of the bracts; calyx longer, its segments on their upper face with slender, weakly adpressed hairs without any cushions; corolla short, rapidly dilated from a wide throat; lemon-yellow, glabrous.

The *O. stellulatum* of all the earlier Transylvanian authors (Baumgarten, Grisebach, Füss, Schur, etc.) is referable to this *O. viride*. Kerner (ap. Borbás, *loc. cit.* 407), relying on certain specimens in Willdenow (no. 3367, f. 1, 2, 3, 5), took *O. viride* to be *O. tauricum* Pall. Nevertheless, these specimens of Willdenow's herbarium, as well as those which I have seen from the Crimea and from the Black Sea district in general, whether under the name of *O. stellulatum* or *O. tauricum**, represent a plant which is different from *O. viride*, and which Borbás, having already recognized it as distinct from the plant of Transylvania and the Banat, called "*O. tauricum* var. *viride*, an species distincta."

In my opinion there exist much more marked differences between our plant and the true *O. tauricum* than between ours and *O. echioides* L. The systematic independence of the Transylvanian plant from *O. tauricum*, which, moreover, inhabits a circumscribed geographical area, is therefore unquestionable.

Geographical Distribution. Transylvania, eight localities; Banat, two localities.

Var. BAUMGARTENII (Heuff.) Jávorka.

Hab. In the neighbourhood of the Schlossberg of Déva and at Szent-Erzsébet.

Var. CITRINUM Jávorka.

Hab. On the Schlossberg of Déva, plentifully.

In the Banat region typical *O. viride* is mostly represented by subsp. *banaticum*, a form that rather departs from the type:—

O. VIRIDE (Borb.) Jávorka subsp. BANATICUM (Sandor) Jávorka. Stem 1·5–4·5 dm. high, with 3–6 or very rarely as many as 12

* Viz. the specimen in Kitaibel's herbarium, fasc. xxi. no. 34, labelled "*O. taurica* W., Marschall pro varietate *O. stellulatæ*," and Boissier exsicc. in herb. Mus. Bot. Berol. from Cadmus above Denisleh (also quoted by Borbás), and Rohmann, exsicc. itin. Taur. ann. 1874 "in rupibus ad Batuktarra."

lateral branches in the upper part. Lower leaves 6–15 cm. long by 7–10–12 mm. broad, bright green or dark green, or verging toward grey on account of the denser and easily visible hair-cushions. Calyx-segments 8–10–13 mm. long, about 1 mm. broad, towards their apex usually dark green, reaching at least to $\frac{1}{3}$, or more rarely only to $\frac{1}{4}$ of the corolla. The lower part of the anther may be as far as 2 cm. from the base of the corolla.

This subspecies in its typical development differs pretty clearly from typical *viride* by its tall branched growth and its longer corolla, but here, too, intermediates occur.

Geographical Distribution. Hungary, 7 localities; Rumania and Serbia.

Subsp. BANÁTICUM var. SUBCANESCENS Jávorka. *Hab.* At Báziás and Grebenácz.

5. ONOSMA ECHIOIDES L. *Anchusa echioides lutea* Column. Ecphr. (1606)*; *Anchusa lutea minor* Bauh. (1671); *Cerinthe echioides* (α) L. (1753); *Onosma orientale* Host (1827), *non* L.; *O. stellulatum* Rchb.; Koch; DC. et auct. plur. pro pte., *non* W. K.†.

Exsicc. Fl. exs. Austr.-Hung. 1411.

Rhizome usually polycephalous; stem 1–3·5 dm. long; often with sterile leaf-rosettes at the end of elongated shoots; lower leaves 2–6 cm. long, 3–5–7 mm. broad, with strongly revolute margin; stem-leaves 2–4 cm. long, 4–6–8 mm. broad. Leaves thickish, stiff, with more or less thick margins, grey-green or quite whitish, with very close-set warty bristles on the upper surface, that are 1–3 mm. long with fairly large hair-cushions. Stellate bristles thickened toward the apex and often touching the next hair-cushions, or crossing each other, two to three times shorter than the bristles. Calyx usually thickly beset with strong spreading or adpressed bristles, on fairly conspicuous hair-cushions with scanty and weak stellate hairs; calyx-teeth pale, greenish or yellowish, with prominent dorsal rib, bristles mostly curved, but upright and strong. Corolla pale lemon-yellow‡, from 1·8–2·1 cm. long, *in sicco* often reddish. Anthers 6–7 mm. and the free portion of the filament 4–7 mm. long; the latter $\frac{2}{3}$ the length of the anthers, or more rarely equal in length. Lower end of anther is 8–12 mm. from the lower edge of the corolla.

In rocky stony spots, especially on limestone, but also on marl and clay, up to 700–800 m. Flowering May to July.

* *Anchusa echioides lutea* was published in the *Ecphrasis*, ed. 1, 1606. This edition is so rare that ed. 2, 1616, is usually quoted.—C. C. L.

† I have cancelled *O. montanum* S. & S. from the author's synonymy, for the reasons assigned in my paper on the *Onosmas* of Sibthorp in Journ. Linn. Soc. xlvi. 397.—C. C. L.

‡ The corollas of *echioides* are not correctly described as "lemon-yellow"; they are of a pale, rich creamy yellow.—C. C. L.

Very variable both in growth and size, as well as in breadth and hairy clothing of the leaves, bristles closely adpressed or spreading, etc.

Geographical Distribution. Hungary, between the monastery of Hodán and the cave Kolumbác (Rochel); western part of Upper Italy*; Istria; Veglia; Dalmatia; Bosnia; Hercegovina; Montenegro.

Var. DENSIFLORUM Borb. Math. és Term. Kozl. xiv. 407 (1876–77). "Folia paulo angustiora et magis canescentia," oblongo-lanceolata, caulis interdum humifusus, ramosissimus," setæ inflorescentiæ patentes vel maxime patentes, "floribus, præcipue corollis paulo minoribus, circa 15 mm. longis" (*Borb.* l. c.).

Hab. Island of Veglia and Dalmatia.

Var. LINEARE Borb. *loc. cit.* 421. Foliis duplo angustioribus, lineari-oblongis; caules sæpe humifusi, valde numerosi, calycibus sæpe brevioribus.

Hab. Istria and Dalmatia at Macarasca.

6. ONOSMA TAURICUM Pallas, Ind. Taur. et in Nov. Act. Petrop. 306 (1792). *O. stellulata* β *taurica* M. B. (1808), Lehm. (1818), R. et S. (1819), DC. Prodr. x. 59; *O. stellulatum* Ledeb. 1846–51) quoad pl. tauricum; *O. aurantiacum* Janka in Hb. Mus. Nat. Hung. est var. humilior, calyce breviore, corolla dilatata; *O. stellulatum* γ *angustifolium* Boiss. Fl. Or. iv. 201 (1879); *O. laconicum* et *O. Orphanideum* Boiss. (ex ipso sub *O. stellulato* γ *angustifolio*, loc. alt.); *O. bulgaricum* Velen. (1890) *Ic.* Loddiges. Bot. Cab. xv. no. 1405; Bot. Mag. tab. 889.

Exsicc. Rehmann, It. Taur. anno 1874; Siehe, Bot. Reise nach Cilicien, 1896, no. 447, p.p. (indeterminata); Callier, Herb. Ross. 1895, no. 81.

Perennial, with a 1–7-cephalous rhizome. Stem 1–2·5 cm. long. Radical leaves, and those of the sterile leaf-rosettes, 3–7. Leaves 5–10 cm. long, 3–8 mm. broad, often rather rapidly contracted into their stalk from the upper two-thirds or from the middle; the middle leaves, and often the uppermost also, narrow-spathulate and contracted into the stalk. Leaves with small, very dense bristles, 0·8–1 mm. long, and usually adpressed everywhere; the bristles of the lower leaf-surface hardly shorter than on the upper face; hair-cushions small, with 7–10 smooth thin stellate bristles several times as long as the hair-cushion, but only $\frac{1}{3}$–$\frac{1}{5}$ the length of the bristles. Inflorescence scanty; at first dense, the portion not yet in flower comose from the bracts overtopping the calyx. Calyx-segments narrow-linear, 1 mm.

* The limitation to the western part of Upper Italy is wrong. Columna's *locus classicus* is in the central Apennines and the different Italian forms of the species extend—with intervals—from Verona to Monte Gargano on the Adriatic, and to southern Calabria, passing over to Sicily under the form of *O. canescens* Presl. See my paper on the *Onosmas* of Linnæus, *loc. cit.* p. 393.—C. C. L.

broad, 1–1·3 cm. long; fruiting-calyx to 1·8 cm. long, tapering very gradually, if at all, toward the apex, clothed, as well as the bracts, with scanty, small, adpressed bristles, but appearing whitish on the margin, and often along the midrib as well, owing to the presence of dense, longer, stronger, adpressed, and rarely spreading bristles. Corolla always glabrous, bright lemon-yellow, 2·3–2·8 cm. long; anthers 7–9 mm. and filaments 6–8 mm. long; base of anthers 13–15 mm. from the lower edge of the corolla.

In rocky, grassy, or more rarely in woodland spots, especially on limestone. Flowering-season, April to June.

Different in all its parts from the rest of our species. Thus the lower leaves are rapidly contracted into their long stalks, so too are the middle, and frequently even the upper ones; this character, as well as the surprising length and shape of the bracts, the bright lemon-yellow, glabrous corolla, the very short bristles, hardly shorter on the lower than the upper leaf-face, and everywhere adpressed, the peculiar hairiness of the bracts and calyx-segments sharply distinguish it from all other species.

From Hungary I have seen three rather broad-leaved specimens, two collected by Rochel "e Banatu"—one in Herb. Haynald (in Hung. Nat. Mus.), the other in the Herb. Bot. Inst. Berlin. The third specimen (Berlin) is from Schott "Hungaria."

Geographical Distribution. Banat, Bulgaria, Rumelia, Peloponnesus, Laconia, Attica, Crimea, Caucasus, Bithynia, Anatolia, mountains of Pontus.

7. O. STELLULATUM W. K., Pl. Rar. Hung. ii. 189, tab. 173 (1804).

O. stellulatum Schultes (1814); Lehm. (1818); et auct. mult. quoad plantam a Kataibelio ex Croatia citatam tantum, Borbás, *loc. cit.* (1876–77).

Exsicc. Degen, It. Bosn. Herceg. 1886, no. 79.

Flowering stems slender, 1–2·5 dm. long. Radical leaves large and broad in proportion to the stem; 5–10–14 cm. long, 0·7–1·5 cm. broad, contracted into a short stalk, ¼–⅓ the length of the leaf. Stem-leaves 3–20, short; even the lowest far shorter than the radical leaves. Leaves flat and rather tender, with short usually thick bristles 0·5–1 mm. long, fairly far apart from each other and adpressed, even on the edge of the leaves and along the midrib of the lower face. Inflorescence few-flowered; 3–10–15 blooms, at intervals of about 1 cm. Pedicels thin, flexible, up to 1·4 cm. long, as long as the calyx or a little longer, more rarely rather shorter than it or, on the other hand, half as long again. Corolla bright lemon-yellow, always glabrous, with a wide throat, fissured above, in the dry state difficult to separate from the calyx. The anthers usually project a little beyond the corolla; the free portion of the filament is almost half as long again as the anther.

On dry sunny rocks and in crevices in May and June.

Distinguished from all the European *Asterotricha* by its far-creeping woody stems, its long, broad, flat leaves, that are tender to the touch, its short, thicker, more widely-spaced bristles and stellate pubescence, its densely hirsute inflorescence, but especially by its slender pedicels, as long as the calyx, and its broad calyx-teeth.

O. stellulatum was formerly the collective name for all European *Asterotricha*, till Kerner (*loc. cit.* 162) and Borbás (*loc. cit.* 407), having rediscovered the true plant described by Kitaibel, proved that the name *O. stellulatum* belongs solely to a plant till then hardly known, and even now only recorded from the Hungarian-Croatian-Dalmatian coast and from some localities in Bosnia and Hercegovina.

Geographical Distribution. The loc. class. cited by Kitaibel is "in fissuris rupium calcarearum vallis Vilena draga non procul a Koronicza in Croatia"; other herbarium-material examined is from Drobnik-feld, near Fiume, from Dalmatia: "in stony places along the coast of Dalmatia" (H. G. von Welden in Herb. Hort. Bot. Petrop.); (Maly ex herb. Schott in Herb. Mus. Nat. Hung.); eight localities in Bosnia; in Hercegovina at Orahovæ, near Trebinje, and in the Zlatar-Thal, near Konjica.

MESEMBRYANTHEMUM AND ALLIED GENERA.

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

Until September 1921, the genus *Mesembryanthemum*, as then understood, comprised some hundreds of species of exceeding diverse appearance, which no one had attempted to separate from it generically. In that year, however, I commenced a series of articles upon this genus in the *Gardeners' Chronicle* (lxx. 125), in which I separated a few groups of species from *Mesembryanthemum* and founded new genera for them. Then, after a further and prolonged study of the genus, in a later series of articles in the same periodical, commencing in September 1925 (lxxviii. 211) I further divided the genus into a large number of new genera, to which (pp. 412, 433) a key with diagnostic characters is given. In most cases the characters in that key suffice to indicate the genus to which most of the groups of species of the old genus may belong (although here and there a slight addition or modification is necessary), but there remained numerous species of which I had either inadequate material or no knowledge at all except from descriptions or figures, which are usually quite inadequate for founding genera upon, and therefore left this residue for examination when material should come to hand, intending to give a full description of each genus as I dealt with it, and a list or account of the species I have referred there in my MS. This has been done in the case of the genera already published, but, as the

publication of the series is proceeding much more slowly than I anticipated, it will be a long time before it can be completed. And as other authors are redescribing under new generic names some species belonging to genera I have already published, and have erroneously referred to their own genera several species of which they appear never to have examined (and possibly have never even seen) a correctly-named specimen, I propose to give an alphabetical list of the genera into which *Mesembryanthemum* has been divided and enumerate the species I refer to each genus. In doing this and to economise space, the name *Mesembryanthemum* in the synonymy will always be indicated by the letter M.

To make the list of more general use, I add references to all the published figures seen by myself or recorded of each species. In doing this, I take great pleasure in gratefully acknowledging my indebtedness to Dr. O. Stapf for permitting me to consult the MS. index of published figures prepared under his auspices for the new *Index Iconum botanicarum*.

At the present date the descriptions of species that, prior to my division of the genus, would have been referred to *Mesembryanthemum* amount (including some synonyms) to over a thousand; but, as in the older and most of the modern descriptions, the fruit (from which several of the most important generic characters is derived) is not described at all, and often some other important details are also omitted, there are a large number of species that it is not possible at present to refer with certainty to their proper genus, because, although the general appearance of a species may seem to indicate that it belongs to a certain genus, yet when its structure is completely known it may often happen that it is found to be quite different from that of the genus to which it was supposed to belong, and therefore, until fruit as well as flowers have been examined, many species cannot be definitely placed. Therefore, those of which I have any doubt will be indicated by a note under each genus to which I provisionally refer them.

In addition to the general list of published species, descriptions of new genera or species will be intercalated as they may come to hand.

ACAULON N. E. Br., gen. nov.

Perennis, acaulis, succulenta, glabra, *foliis* rosulatis planis petiolatis spathulatis ruguloso-pustulatis. *Flores* axillares, breviter pedicellati, in cymas paucifloras sessiles dispositi. *Calyx* subæqualiter 5-lobus. *Petala* numerosa, libera, 1-(vix 2-) seriata. *Stamina* numerosa, in conum conniventia, staminodia circumdata. *Stigmata* 11–13, subulata. *Ovarium* fere superum, hemisphericum. *Capsula* subæqualiter biconvexa, 11–13-valvis, quum expansa valvis arcte reflexis, carinis basi contiguis superne divergentibus membranaceo-marginatis, membranis acuminatis; loculis alis membranaceis convexe tectis, absque tuberculo ad orem posito.

Perennial, with a fleshy root-stock. *Leaves* thickly covered with

thickly-raised hard pustules. *Cymes* 1–3-flowered. *Calyx* 5-lobed [illegible] to its union with the ovary. *Petals* linear. *Stamens* very numerous, in 3–4 series, surrounded by some staminodes, all converging into a broad cone; filaments hairy at the basal part. *Stigmas* compressed laterally and fringed along the inner side. Ovary hemispheric above, 11–13-celled. Capsule flattened and about equally convex above and beneath, with 11–13 valves and cells; expanding-keels not half as long as the valves, closely contiguous at the base, diverging at the upper half, with membranous marginal wings that taper into slender points reaching nearly to the apex of the valves. Seeds numerous in a cell, globosely ovoid, with a point at one end, microscopically tuberculate.

A monotypic genus, a native of the eastern part of the Karoo in South Africa. The name is derived from the Greek, *akaulos*, stemless, as the plant has no stem.

A. ROSULATUM N. E. Br. *M. rosulatum* Kensit in Trans. Roy. Soc. S. Afr. i. 152, t. 21. f. B (1909).

Aloinopsis rosulata Schwantes in Zeitschr. f. Sukkulentenk. 1927, iii. 105.

As explained under *Aloinopsis* (see p. 78), Schwantes's name for this plant cannot be maintained on account of the entirely false characters he assigns to it. The description from which the above generic characters are extracted I made from a living plant that flowered at Kew in August 1910, and from material received from Prof. R. H. Compton. *Acaulon* is allied to *Titanopsis* Schwantes, but differs from that genus by the nearly superior ovary with 11–13 (instead of 6) stigmas and cells.

ACRODON N. E. Br. in Gard. Chron. lxxxi. 12 (1927).

It is difficult to decide if the forms of this genus are all distinct species or varieties of two species, for I have but three of the forms in cultivation and two of them have not flowered, the descriptions given of them by authors being quite insufficient to decide the question. Therefore, I group them for the present as follows, the synonymy being somewhat intricate:—

Leaves glaucous.

A. BELLIDIFLORUS N. E. Br. *M. bellidiflorum* L., Sp. Pl. 482; Dillen. Elth. 244, f. 233; Knorr, Thesaurus, i. t. G, 5 *a*, fig. II.; Salm Dyck, Mes. § 12, f. 1; Berger, Mes. & Port. 220, f. 45; not of Haworth. *M. bellidiflorum* var. *glaucescens* Haw. Rev. 106. The type of the genus.

A. SUBULATUS N. E. Br. *M. subulatum* Mill. Gard. Dict. ed. 8, no. 10. *M. bellidiflorum* DC. Pl. Grass. t. 41; Knorr, Thesaurus, i. t. G, 5 *a*, fig. I. *M. bellidiflorum* var. *subulatum* Salm Dyck, Mes. § 12, f. 1 γ, not of Haworth.

Miller does not state if the leaves are glaucous or not, but this is the plant generally understood as being his *M. subulatum*.

Leaves green.

A. BELLIDIFLORUS var. VIRIDIS N. E. Br. *M. bellidiflorum* var. *viride* Haw. Rev. 106; Salm Dyck, Mes. § 12, f. 1 *β*.

A. BELLIDIFLORUS var. STRIATUS N. E. Br. *M. bellidiflorum* [var.] *striatum* Haw. Obs. 143, 147. *M. bellidiflorum* Haw. Misc. Nat. 30, and Synop. 207, excluding synonymy; not of Linn. *M. bellidiflorum* var. *subulatum* Haw. Rev. 106, excluding synonymy.

ALOINOPSIS Schwantes.

Under this name in *Zeitschrift für Sukkulentenkunde*, ii. 177 (1926), Schwantes has proposed to found a genus upon eight plants, which he enumerates; but the genus is a myth, and cannot be maintained, for the following reasons:—(1) With one exception the plants enumerated belong to my previously-published genus *Nananthus* (*M. albinotum* Haw.=*N. albinotus* N. E. Br.; *M. albipunctum* Haw.=*N. albipunctus* N. E. Br.; *M. aloides* Haw.=*N. aloides* N. E. Br.; *M. cibdelum* N. E. Br.=*N. cibdelus* N. E. Br.; *M. rubrolineatum* N. E. Br.=*M. rubrolineatus* N. E. Br.; and *M. vittatum* N. E. Br., syn. *M. transvaalense* Rolfe=*N. vittatus* N. E. Br.). (2) Not one of the species he enumerates have all the characters he assigns to the genus, which is founded upon very unscientific principles. (3) When first published, the type of the genus is not mentioned, and it is obvious from the name, which means, like an Aloe, that it was intended to apply to *M. aloides* Haw. and its allies. However, at a later date (Zeitschr. f. Sukkulent. iii. 105 (1927) he states that *M. rosulatum* Kensit is the type of the genus *Aloinopsis*; but by no stretch of the imagination can this plant be termed Aloe-like, and it has evidently been chosen because it is the only species of those enumerated of which Schwantes supposes he has seen the capsule, which in this group generally supplies the most important generic characters. Yet, here again we find that this is only a supposition on the part of the author, for he states that he has seen the capsule of one species only, and under the genus *Titanopsis* (l. c. ii. 178) we learn from his statement there that this capsule was sent to him by a South African botanist as being the fruit of *M. Bolusii*, which he also states it much resembles. The identification of this detached capsule as being the fruit of *M. rosulatum* is therefore purely imaginary on the part of the author, for, if the description he gives of it is correct, it bears no resemblance to the fruit of *M. rosulatum*, and would appear to have been the fruit of some species of *Punctillaria*. Therefore, taking all these facts into consideration, the genus *Aloinopsis* can have no existence. *M. rosulatum* Kensit is generically distinct from all the other species mentioned (see *Acaulon*, supra, p. 76).

AMŒBOPHYLLUM N. E. Br. in Gard. Chron. lxxviii. 433 (1925); Phillips, Gen. S. Afr. Fl. Pl. 244.

This genus at present consists of the type (*A. angustum* N. E. Br.) and two imperfectly known species that may belong to it. The name is derived from the Greek, *amoibe*, alternation, and *phyllon*, a leaf, in allusion to the alternate leaves. Mrs. Bolus, without reference to my original description, gives a totally different derivation.

A. ANGUSTUM N. E. Br. in Phillips, Gen. S. Afr. Fl. Pl. 245. *Fruticulus* erectus, succulentus, *foliis* alternis persistentibus et spiniformibus patulis. *Flores* terminales, cymosi, pedicellati, imperfecti. *Calycis* lobi spiniformes.

A bush, probably about a foot high; branches stiffly erect, 5–7 in. (or more?) long and about 2 lin. thick in dried specimens, slightly shining, with internodes 3–4 lin. long, glabrous, all parts minutely papilloso. *Leaves* alternate, 8–15 lin. long, $\frac{1}{2}$–$\frac{3}{4}$ lin. broad and $\frac{1}{2}$ lin. thick at the base in dried specimens, slender, subulate, channelled above, persistent as stiff and very acute spines, with leaf-buds in their axils, very spreading, upcurved. *Cyme* terminal, lax, about $2\frac{1}{2}$ in across, 4–5-flowered. *Pedicels* about 6–9 lin. long, $1\frac{1}{4}$–$1\frac{1}{2}$ lin. thick below, gradually thickening upwards. *Calyx-tube* very short, apparently about 4–5 lin. in diameter; lobes with somewhat spine-like tips from a dilated base, the three longer 6–7 lin. long, and the shorter and one of the longer with broader membranous margins at the basal part. Petals, stamens, and ovary not seen, the specimen being in immature fruit. *Capsule* more than half superior, depressed globose, with 5 ridges on the top and 5 cells, otherwise as described for the genus.—*A. roseum* L. Bolus in S. Afr. Gardening and Country Life, 1927, 364, f. 15 A.

Little Namaqualand: near Silverfontein, 2500–3000 ft. alt. *Drege*, 2935, the type!; Copperberg, *Pillans*, 5741.

This plant is the type of the genus, and is quite unlike any known to me. It may be recognised at once by the alternate leaves persisting as stiff spines. I have seen only three specimens of it, and neither of them possessed perfect flowers, but since the above was written Mrs. Bolus has described and figured it as a new species, and from her description it would appear that the corolla is about 9 lin. in diameter, "with pale rose petals fading to a salmon-pink," and the stamens are "more or less collected into a cone and a few radiating staminodes with abortive anthers."

The following two species seem to belong to this genus, but their correct position cannot be definitely decided until living plants of all three species in flower and with ripe fruit have been examined and compared. *A. Guerichianum* is only known to me from the very imperfect description at the place quoted:—

A. Rangei N. E. Br., sp. nov. *Fruticulus* erectus, succulentus, *foliis* alternis sessilibus linearibus vel lineari-lanceolatis acutis, basi tantum persistentibus. *Flores* laxe cymosi, terminales, pedicellati. *Calycis* lobi ovati, acuminati, acuti vel subobtusi. *Corolla* circa

1 poll. diametro, petalis basi in tubum 1½ lin. longum connatis. *Stigmata* 5, circa ½ lin. longa. *Ovarium* semisuperum.

A perennial bushy succulent up to 1 ft. high, coarsely papulose on the green parts; branches erect, stout, about 2½ lin. thick when dried, apparently somewhat 3-angled at the upper part, glabrous. *Leaves* alternate, only a few of the uppermost seen, sessile, about 6–8 lin. long and 1½–2½ lin. broad, linear or linear-lanceolate, acute, apparently concave-channelled above, and slightly convex on the back; after withering apparently only the basal part persists as a stiff broken fragment. *Flowers* in lax terminal cymes about 3 in. in diameter. *Pedicels* about 2 lin. long. *Calyx-tube* obconic, produced above its union with the ovary into a short tube about ½ lin. long, unequally 5-lobed above; the three larger lobes 5–8 lin. long, 2½–3 lin. broad at the base (in dried flowers), ovate, tapering to an acute or subobtuse point, the two other lobes with broad membranous margins and a dorsal acute point 1–2 lin. long. *Corolla* apparently about 1 in. in diameter; petals numerous, in 2–3 series, about 5 lin. long and less than ¼ lin. broad, narrowly linear, united at the base into a tube 1½ lin. long, possibly white? *Stamens* in several series arising from the corolla-tube and not longer than it; filaments short, apparently incurved. *Stigmas* 5, about ½ lin. long, subulate. *Ovary* partly superior. Fruit not seen.

Great Namaqualand: Keis Flats near Letterkopp, about 2800 ft. alt. *Range* 1056!.

A. GURICHIANUM N. E. Br. *M. Gurichianum* Pax in Engl. Bot. Jahrb. xix. 133 (1894).

Great Namaqualand: near Anichab, by the River Ugab. *Gurich*, 75.

APATESIA N. E. Br., in Gard. Chron. lxxxi. 12 (1927).

I strongly suspect this remarkable South African genus to have originated by hybridisation between the genera *Hymenogyne* and *Conicosia*, because it has the habit and foliage of *Hymenogyne* and the remarkable globose seeds of a *Conicosia*, in combination with a dehiscent capsule that is like neither genus. Seen in flower, without fruit, the structure of the style and stigmas distinguish it from *Hymenogyne*, while the flat leaves readily separate it from *Conicosia*, and its fruit is quite different from that of either genus.

When I first saw living plants of *A. Pillansii*, upon which I found this genus, I believed that the long-lost *Mesembryanthemum helianthoides* Aiton had been discovered, as the plant, before flowering, seemed identical with a drawing of that species made in 1776 that is preserved in the British Museum, but when it flowered the base of the ovary was convex instead of flat and not conspicuously 5-angled as Aiton describes and the drawing represents it to be in that species. So that I have little doubt that *M. helianthoides* Ait. has still to be rediscovered, although I have no hesitation in placing it in this genus.

The name is derived from the Greek *apatesis*, deception, because of the resemblance of the plant to *Hymenogyne*.

(To be continued.)

Rev. E. F. LINTON, M.A.

REV. E. F. LINTON, M.A.

(With Portrait.)

Edward Francis Linton, who died at Southbourne, Hampshire, on the 9th of January last, was the fourth son of the late Rev. Henry Linton, Rector of St. Peter-le-Bailey, Oxford, and Hon. Canon of Christ Church. He was born at Diddington Vicarage, Huntingdon, on March 16th, 1848, and educated at Repton School, and later at University College, Oxford, where he took a 3rd Class in Moderations (Classics) in 1868, taking his B.A. Degree in 1871 and M.A. in 1874. He was ordained Deacon in September 1871 by Dr. John Fraser, Bishop of Manchester, and licensed to the Curacy of St. Paul's, Preston, where the late Bishop of Liverpool was Senior Curate; here he served four years.

Whilst at Oxford he was one of the Founders of the Oxford University Chess Club (winning a first prize in the Tournament), and played in the first Inter-University Chess Match in the spring of 1871.

In 1875 he was collated by Bishop Fraser to the Rectory of St. George's-in-the-Fields (1875–1878). It is stated in a Memoir in Vol. i. No. 4 of *Men of the Day* that "The Parish, with a population at that time of 15,000, was in a deplorable condition, the Church pulled down, the Church people divided into two factions led by rival Churchwardens, and the services held in the upper room of a jerry-built school. Within two years of his induction, Mr. Linton had built a new Church with 800 sittings and a Rectory; and a fine new block of schools was opened." "The severe work of bringing this large parish into a state of unity and organization, and still more the vitiated air of a district crowded with cotton mills and artizans' dwellings, affected Mr. Linton's health."

In 1878 he received offers simultaneously of St. Clement's, Oxford, and Sprowston, near Norwich. He decided to accept the latter, and moved there at the close of that year. Finding here a poor apology for a Vicarage and the Church in a state of disrepair and situated far from the bulk of the people, he secured a site of two acres in a central position, and, with the help of the Ecclesiastical Commissioners, built a substantial Vicarage. On an adjoining site a Chapel of Ease was planted; the National Schools were enlarged; and plans were prepared for the Restoration of the Parish Church, most of the funds required being raised and the works begun.

It was whilst at Sprowston that the writer first made his acquaintance, having known his brother, the Rev. W. R. Linton, for some time previously. A letter from Mr. E. F. Linton, dated Dec. 31st, 1885, and opening "My dear Sir," would seem to indicate the beginning of what proved to be a close and much valued friendship, which was never interrupted until his death.

During his residence in Norfolk he found more leisure to throw himself into his favourite pursuits of Natural History and Geology,

and especially interested himself in observing and writing about the flora of the County. It was here that the writer first made his personal acquaintance, and accompanied him in rambles to see some of the more interesting plants of the neighbourhood.

It was whilst at Sprowston that Mr. Linton was able to indulge the pleasure of cultivating interesting British plants in his garden, and this continued to be a favourite hobby until later years when he finally retired to Southbourne, where, having no garden of his own, he contented himself by visiting some of the interesting gardens in the neighbourhood, and always proved a welcome visitor.

In 1888, under medical advice, he resigned Sprowston, and late in 1900 removed to Bournemouth, buying "Crymlyn," a large house with a good garden, some distance from the sea. Here he had ample scope for developing his interest in the cultivation of native plants, and grew many species of *Hieracium*. The light sandy soil of this garden was perhaps its only drawback, as much watering had to be done to keep the plants in good health. The long days in the open air collecting and preserving plants completely restored his health. It was here that he made the acquaintance of the late Rev. W. Moyle Rogers, and, spurred by his knowledge and enthusiasm, became specially interested in the study of the British *Rubi*. Later, in conjunction with the Revs. W. M. Rogers, R. P. Murray, and his brother, W. R. Linton, he edited a *Set of British Rubi* (1892–1896) in 134 Nos. These sets were widely taken up, both at home and abroad, and may be found in most of our chief public and private Herbaria. With the aid of his brother, W. R. Linton, as co-editor, he followed this up with a *Set of British Willows* (112 Nos.), on which he wrote a Monograph. Next came a *Set of British Hawkweeds* (160 Nos.), among which were several new species or varieties described by himself or his brother. Part of his garden at Bournemouth was devoted to the cultivation of these and part to Willows. Among the latter he made many experiments in cross-fertilization, and these artificially-produced hybrids threw light on sundry plants that had been found in the wild state, which were evidently natural hybrids and that could not be placed under any of the known species. Soon after the writer bought "Brockhurst," East Grinstead, Mr. Linton sent him a large number of these hybrids, some of which remain to this day, although it is feared that most of them have lost the original labels of identification.

Mr. Linton was a prolific writer on botanical subjects, and constantly contributed papers to the *Journal of Botany*. His first contribution appeared in 1884, on plants gathered in Westerness, Loch Sunart, and Isle of Skye. As a bibliography is appended, it is unnecessary here to enumerate his long list of writings, which include papers in the *Dorset Field Club Transactions*, the *Annals of Scottish Natural History*, and the *Irish Naturalist*. During his residence at Bournemouth he established a Botanical Society, and lectured there and elsewhere on various scientific subjects. In 1900 he focussed the result of much of this work in the *Flora of*

Bournemouth, an account of the Phanerogams and Ferns found within twelve miles of the town. A second issue with appendix was published in 1919. The work was reviewed in this *Journal* (1900, 361).

During a large part of his life, Linton was an active and generous contributor to the Botanical Exchange Club, and also to the Watson Botanical Exchange Club, of which latter he and his brother were original members in 1884. In the 4th Report (1888) there is an entry "*Rubus Lintoni* Focke, Sprowston, Norfolk, July 20th, 1887. J. D. Gray. This is the same as what passed before under the names *R. lucens* and *R. lætus* Linton. These names, however, being already in use, had to give way to that which Dr. Focke recommended . E. F. Linton."

His botanical work became so well known that he was consulted by botanists in all parts of the kingdom. He gave invaluable assistance both in the identification and distribution of plants sent to the Exchange Clubs, many of his notes appearing in the Reports of these Societies, and there must be few Herbaria in the country, of any importance, that have not been enriched by the beautifully prepared specimens that he so liberally supplied.

In 1922, Messrs. Arthur Bennett and Linton were made the first Honorary Members of the Watson Club; Linton, from that date, was no longer a "Referee," to which post he was appointed in 1904.

During his residence at Bournemouth, he gave much valued help voluntarily to the clergy of his neighbourhood, by frequently preaching and helping in the services. During the latter part of his life there, he became Assistant curate at Longfleet, and here made the acquaintance and friendship of that great naturalist, the late Dr. A. R. Wallace.

In 1901 he left Bournemouth for the time being, and accepted the benefice of Edmondsham, in Dorset, where he rebuilt the Rectory at great personal cost. In his clerical work he acted as Commissary to an elder brother, Bishop Linton, who was the first Bishop of the Riverina Diocese of Australia (1884), and was also General Secretary to the Riverina Diocese Association. Thus the labours of his useful and active life were by no means confined to his botanical studies, and in his parochial work he proved himself a diligent and sympathetic friend to the poor.

He compiled the obituary notice of Mansel-Pleydell as well as that of his brother, W. R. Linton, for the *Journal of Botany*. He also wrote *The Hortons of Howroyde*, 1911, *The Lintons of Frenton*, 1911. "A Tentative Account of the Fungi of East Dorset" appeared in the *Proceedings of the Dorset Natural History and Antiquarian Field Club*, xxxv., xxxvi., Dorchester, 1914–15, and a paper on "Fungi of East Dorset" in the *Journal of Botany*, 1915.

At Edmondsham he again had a large garden, to which he brought many of his native plants from Bournemouth, and constantly added

fresh ones. It was during his first year here that he took up the study of Fungi, and during his incumbency instilled into the village children a love of Natural History. His Flower Class won three of the Bishop's prizes and a certificate on their first year's work.

In addition to his botanical work in the south of England, frequent excursions were made to nearly all parts of Scotland, Wales, and Ireland. He was usually accompanied by his brother, W. R. Linton, and frequently also by the late Rev. E. S. Marshall or the late Prebendary H. E. Fox, or the writer. These delightful trips, spread over many years, bring back pleasant memories of the past. Linton was a strong walker, and a quick and accurate observer. He was conscientious, painstaking, and exact in all his work. Though of somewhat stern appearance, he had a great sense of humour, and was blessed with an excellent memory replete with amusing stories, so that no one could feel dull in his company.

From early days he was interested in geology, and formed a collection of fossils found near Edmondsham. Amongst others, a cast of a Turtle (a *Chelone*), a genus known for Kent and the Isle of Thanet, but not for Dorset, and the claw of an *Iguanodon* found in Swanage Bay were presented to the Museum of the Bournemouth Natural Science Society. The bulk of his collection was accepted by the Oxford University Museum. On retiring from Edmondsham Rectory in 1920, he transferred the foreign plants of his large Herbarium to Cambridge, and the British Collection to the British Museum, and on parting with this was obliged to discontinne the writing of a British Flora, for which he had accumulated much material.

In *Proceedings of the Bournemouth Natural Science Society* (xv. 1922–23) is an account of the presentation to Mr. Linton of the Gold Medal, and a summary of his activities, by Sir Daniel Morris.

He was elected a Fellow of the Linnean Society in 1914.

Mr. Linton was twice married, first to Emily, daughter of the Rev. George Weight, Vicar of Wolverton, Bucks, who died Dec. 1878, by whom he had one son. He was married again on June 30th, 1881, to Mary Sophia, only surviving daughter of the Rev. John D. Gray, Rector of Market Weston, Suffolk, by whom he had one son and three daughters, all of whom, with Mrs. Linton, survive him.

During his last years he suffered considerable physical disability, and could only take a little gentle exercise. He died on January 9th, 1928, in his 80th year, and was buried in the beautiful cemetery at Boscombe, on January 12th. By his death, British Botany has lost one of its leading exponents, and his botanical friends a revered colleague.

The writer's thanks are due to Mrs. Linton, Mr. C. E. Salmon, Mr. H. S. Thompson, and others for useful notes, and to Mr. J. Ardagh, of the Dept. of Botany, British Museum (Natural History), for the compilation of the appended Bibliography.—FREDERICK J. HANBURY.

BIBLIOGRAPHY.

Additions to the Recorded Flora of Skye [with W. R. LINTON]. Journ. Bot. 1884, 367.
Plants recorded in Westerness additional to 'Topographical Botany' [with W. R. LINTON]. *Ibid.* 371.
Notes of a Botanical Tour in West Ireland [with W. R. LINTON]. *Ibid.* 1886, 18.
Asplenium flexilis Rostk. at Killarney. *Ibid.* 83.
Additions Botany. *Ibid.* 85.
Glamorgan Plants. *Ibid.* 112.
Rubus pallidus W. & N. in Britain. *Ibid.* 308.
A New British *Rubus*. *Ibid.* 1887, 82, 118.
Carex trinervis Degl. in Ireland. *Ibid.* 1888, 56.
Norfolk Plants. *Ibid.* 1889, 185.
New County Records for Skye [etc.] [with W. R. LINTON]. *Ibid.* 207.
Glamorgan Plants. *Ibid.* 1890, 157.
Aberdeen, Forfar, and Dumfries Plant-Notes [with W. R. LINTON]. *Ibid.* 167.
Carex montana Linn. in N. Somerset. *Ibid.* 350.
Notes on Dorset Plants. *Ibid.* 1891, 79.
Two Willow Hybrids. *Ibid.* 214.
Some British Hawkweeds. *Ibid.* 271.
Notes on some S.W. Surrey *Rubi*. *Ibid.* 299.
South Hants Plants. *Ibid.* 344.
Notes on Perthshire Plants. *Ibid.* 1892, 145.
Polygonum dumetorum in Wilts. *Ibid.* 153.
Propagation of *Rumex Acetosella* L. *Ibid.* 261.
Glamorgan Notes and Records. *Ibid.* 296.
Some Scottish Willows. *Ibid.* 358.
Shropshire *Rubi*. *Ibid.* 1893, 21.
Rubi of Woburn Sands. *Ibid.* 80.
Alchemilla. *Ibid.* 122.
Epilobium Lamyi F. Schultz. *Ibid.* 123.
Bedfordshire *Rubi*. *Ibid.* 218.
Utricularia intermedia flowering. *Ibid.* 218.
Rubus podophyllus P. J. Muell. *Ibid.* 1894, 24.
Rubus Gelerti and some of its English Forms. *Ibid.* 108.
Hypolimn Molinerii Balb. in W. Suffolk. *Ibid.* 115.
Potamogeton crispus L. var. *cornutus* mihi. *Ibid.* 186.
Two New Willow-hybrids. *Ibid.* 201.
A New British *Rubus*. *Ibid.* 213.
British Bladderworts. *Ibid.* 373.
Origin of *Salix Grahami*. Ann. Scott. Nat. Hist. 1894, 239.
Hieracium cerinthiforme (Backh., *in litt.*) F. J. Hanbury, Irish Nat. iii. (1894) 136.
Forms of *Alchemilla vulgaris*. Ann. Scott. Nat. Hist. 1895, 47.
The Genus *Rubus* in the Supplement to the Third Edition of 'English Botany.' *Ibid.* 182.
Rubus Rogersii Linton in Scotland. Journ. Bot. 1895, 86.
Alchemilla vulgaris and its Segregates. *Ibid.* 110.
Galeopsis Ladanum L. *Ibid.* 115; 1905, 129.
Dorset Plants. *Ibid.* 377; 1904, 236; 1909, 73; 1912, 27.
Westmoath Plants [with W. R. LINTON]. Journ. Bot. 1896, 119.
South Hants Plants. *Ibid.* 319, 367.
The *Salix* Lists in the 'London Catalogue.' *Ibid.* 461.
Varieties of *Hypochæris glabra* L. *Ibid.* 511.
Alchemilla vulgaris and its Segregates. Irish Nat. v. (1896) 296.
New Dorset Station for *Erica ciliaris* L. Journ. Bot. 1897, 22.
Scirpus Caricis Retz. *Ibid.* 146, 253.
Salix cernua Linton. *Ibid.* 362.
Hieracium Ogweni, sp. nov. *Ibid.* 407.

Leersia oryzoides Sw. in Dorset. *Ibid.* 450.
The British *Carex frigida*. *Ibid.* 1898, 41.
Experiments in Cross-fertilization of *Salices*. *Ibid.* 122.
Galium Vaillantii DC. in Oxon and Dorset. *Ibid.* 275.
Alchemilla vulgaris in Ireland. *Ibid.* 1900, 132.
Norfolk Notes. *Ibid.* 208, 263.
Salix hexandra. *Ibid.* 229.
Flora of Bournemouth, including the Isle of Purbeck. Bournemouth, 1900. Second issue, with Appendix. Bournemouth, 1919.
Distribution of the *Alchemilla vulgaris* Group in Ireland. Irish Nat. ix. (1900) 92.
A *Statice* Hybrid. Journ. Bot. 1902, 41.
New Hybrid Grass. *Ibid.* 41.
John Clavell Mansel-Pleydell. *Ibid.* 260.
An *Orchis* Hybrid. *Ibid.* 297.
Nomenclature [with W. R. LINTON]. *Ibid.* 326.
Erica Stuarti, nov. hybr. Ann. Scott. Nat. Hist. 1902, 176.
A New *Erica* Hybrid. Irish Nat. xi. (1902) 177.
South Hants Localities. Journ. Bot. 1903, 41, 104.
Kent *Rubi*. *Ibid.* 130.
Lolium temulentum L. *Ibid.* 407.
Viola calcarea Gregory. *Ibid.* 1904, 119.
Bromus interruptus Druce. *Ibid.* 120.
French and German Views of British *Rubi* [with W. MOYLE ROGERS]. *Ibid.* 198.
Plants of Pembrokeshire. *Ibid.* 357.
Dorset Plants. Proc. Dorset N. H. & Antiq. Field Club, xxvi. (1905) 75.
Spread of *Spartina Townsendi*. Journ. Bot. 1906, 392.
Parietaria officinalis L. *Ibid.* 429.
Alchemilla vulgaris L. Segregates. Ann. Scott. Nat. Hist. 1906, 122.
Topographical Notes on *Hieracium*. *Ibid.* 234.
Hybrids among British Phanerogams. Journ. Bot. 1907, 268, 296.
Orchis ericetorum Linton. *Ibid.* 344.
Spergula arvensis L. var. *nana*, nov. var. *Ibid.* 380.
Notes on the Dorset Flora. Proc. Dorset N. H. & Antiq. Field Club, xxix. (1908) 14; xxx. (1909) 116.
The late Rev. W. R. LINTON. Journ. Bot. 1908, 65.
A "Double" *Orchis*. *Ibid.* 1909, 228.
British Species and Varieties of *Thymus*. *Ibid.* 346.
Notes on the Flora of Dorset. *Ibid.* 378, 417.
A New *Thymus* from Ireland. Irish Nat. xviii. (1909) 215.
Some New Forms of *Hieracia*. Journ. Bot. 1911, 353.
Equisetum hyemale Linn. in Hants. *Ibid.* 1912, 201.
A Monograph of the British Willows. *Ibid.* 1913 (Suppl.).
The Botany of the Bournemouth District in 'A Natural History of Bournemouth and District. by the Members of the Bournemouth Nat. Hist. Soc.,' 1914, 150–181.
A Tentative Account of the Fungi of East Dorset. Proc. Dorset N. H. & Antiq. Field Club, xxxv. (1914) 143–180; xxxvi. (1915) 148–194.
The Fungi of East Dorset. Journ. Bot. 1915, 313, 345.
Ruscus aculeatus L. *Ibid.* 1916, 66.
Chelone sp. in Dorset. Proc. Dorset N. H. & Antiq. Field Club, xl. (1919) 21.
William Moyle Rogers. Journ. Bot. 1920, 161.
Intrusion of the Bee-Orchis. *Ibid.* 177.
John Durrin Grey. *Ibid.* 1925, 182.

J. ARDAGH.

A NEW HYBRID ROSE.

By R. Lloyd Praeger, D.Sc.

At Cushendun in Co. Antrim, a hundred yards south-west of the Episcopal Church, the Japanese *Rosa rugosa* Thunb. has been planted in wild ground, and has produced close by a hybrid, of which the other parent is a *canina* form, determined by Lt.-Col. A. H. Wolley-Dod as *R. canina* var. *insignis* Rouy (*R. insignis* Déségl. et Hip.). Both parents grow within a short distance of the hybrid, the only other rose observed in the vicinity being *R. tomentosa* aggr. The characters of the hybrid, in relation to those of its very different parents (as gathered at the same time and place), are shown in the following table, for the major portion of which I have to thank Col. Wolley-Dod:—

R. canina.	*R. canina* × *rugosa*.	*R. rugosa*.
Root without creeping soboles.	Root with creeping soboles.	Root with creeping soboles.
Stem glabrous and smooth, with rather few scattered falcate prickles from stout bases.	Stem with scattered rather slender straight horizontal prickles, with low moderately long bases, and here and there small aggregations of minute acicles which are sometimes gland-tipped.	Stem densely pubescent, with very numerous very unequal straight subulate and aciculate prickles which are pubescent in the lower portion, mixed with few short stipitate glands or glandular acicles.
Leaflets 7, smooth, rather dull, acutely irregularly or subbi-serrate, broadly ovate, acute or acuminate, bases somewhat rounded, glabrous beneath.	Leaflets 7–9, smooth, rather dull, elliptical, with obtuse or subacute apex and narrowed base, shallowly simply and subacutely serrate, edges of teeth often deflexed, midribs and primary veins finely pubescent.	Leaflets 7–9, large, rugose, shining, elliptical, obtuse at apex, narrowed at base, bluntly simply serrate, edges of teeth often deflexed, glabrous above, densely but finely pubescent beneath.
Petioles glabrous, eglandular, almost or quite without prickles.	Petioles pubescent or densely so, unarmed or with very few prickles.	Petioles densely pubescent, with rather many unequal subulate prickles, and very few short glandular acicles.
Stipules narrow, glabrous, the uppermost broader.	Stipules rather broad, with broad auricles, glabrous.	Stipules very broad, finely pubescent on back.
Peduncles in clusters of 3–5, rather short, smooth.	Peduncles 1–3, of moderate length, smooth or with 1 or 2 long acicles.	Peduncles 1–3, rather short, with glandular and eglandular acicles.
Sepals considerably pinnate, the tips somewhat flattened, but not foliaceous, pubescent on the backs, deciduous.	Sepals very long and narrow, entire or nearly so, with long foliaceous tips, subglabrous but rather densely glandular or even aciculate on the backs, ? persistent.	Sepals very long and narrow, entire, with long broad foliaceous points, densely shortly pubescent and with some stipitate glands and acicles on the backs, persistent.

R. canina.	*R. canina*×*rugosa.*	*R. rugosa.*
Petals (living) 2 cm. long, 1·7 cm. broad, pink.	Petals (living) 4 cm. long, 3·5 cm. broad, deep bright crimson.	Petals (living) 7 cm. long, 5·5 cm. broad, deep bright crimson.
Fruit not formed.	Fruit not formed *.	Fruit not formed.

It will be seen that, speaking roughly, the hybrid has the stem and leaves of *canina* and the root, sepals, and petal-colour of *rugosa*, while certain other characters, such as the size of the flower, are intermediate; while the *rugosa* influence is also seen in the scattered clusters of minute acicles on the stems, which may be absent from some specimens. The plant forms a small colony which has evidently increased by suckers from a singe seedling. It and its parents were all in flower in mid-July, 1927.

Col. Wolley-Dod, whom I have to thank for much assistance in connection with this remarkable plant, writes that there are about six or seven hybrids of *R. rugosa* known on the continent, but some of these are with other aliens and none with *R. canina*. He raises the nice question as to whether this *canina* hybrid should be included as a British rose. It is at least of native Irish birth!

The diagnosis follows:—

Rosa canina×**rugosa**, hybr. nov. *Frutex* soboliferus, *ramis* aculeis rectis horizontalibus paucis, et aciculorum minutorum glanduliferorum vel eglanduliferorum fasciculis parvis sparsis armatis. *Foliola* 7–9, glabra, sublenta, elliptica, apice obtusa vel subacuta, margine leviter et subacute serrata, in costa media et venis primariis minute pubescentibus. *Petioli* pubescentes vel dense pubescentes, exarmati vel aculeis paucissimis armati. *Stipulæ* sublatæ, glabræ, auriculis latis. *Pedunculi* 1–3, glabri vel aciculis longis 1–2 armati. *Sepala* longissima, angustissima, integra vel subintegra, supra subglabra, subtus subdense glandulosa vel etiam aciculata, (?) persistentia, apicibus longis foliaceis. *Petala* 4 cm. longa, 3·5 cm. lata, pulchre coccinea.

SHORT NOTES.

Geranium Endressii J. Gay in Cornwall.—Dr. Thellung, of Zurich, has written to say that the attribution to him of the combination *G. striatum* forma *Endressii* f. *glabra* was due to a misunderstanding, and that he considers *G. striatum* and *G. Endressii* as distinct species. The combination, as I correctly quoted it, is printed in the Journ. Roy. Instit. Cornw. 1926, 101, and, since I was definitely informed that the credit of so naming the St. Agnes plant belonged to Dr. Thellung, I could do no other than repeat the statement, with my authorities. I made it quite clear that I had seen no specimens so written up by Dr. Thellung. By f. *glabra*, Dr. Thellung says that if he did write it he merely meant that the specimen

* The young fruit is the shape of that of *rugosa*, broader than long (not longer than broad, as in *canina*), but is much smaller than in either parent.

submitted to him was "relativement peu poilue," but not a specific entity. The matter is of less importance than the fact that Dr. Thellung, as I understand him, agrees that the St. Agnes plant formerly recorded as *G. nodosum* is not that species, but *G. Endressii*. It is, of course, probable that both *G. striatum* and *G. nodosum* are in cultivation somewhere in Cornwall, and that they may occur, and have been collected, as garden escapes. I should be glad to examine any material of this group which readers can send to me at Kew.—W. B. Turrill.

Arnoseris minima Schw. & Koerte, near Pocklington, East Riding of Yorkshire: A New County Record.—On the excursion of the Yorkshire Naturalists' Union to Allerthorpe, East Riding of Yorkshire, on the 2nd July, 1927, Mr. F. A. Mason, F.R.M.S., of Leeds, Hon. Sec. of the Union, made the very important discovery of *Arnoseris minima* on a sandy stretch of land near the Common. The first specimen which Mr. Mason gathered was lost owing to misadventure, but in the early part of last September he visited the locality again, and noted the plant well established there. I received specimens on the 6th September in full flower, and also specimens of other plants associated with *Arnoseris*. The larger ones are *Cytisus scoparius* and *Ulex europæus*, while the ground flora consists of *Crepis virens*, *Calluna vulgaris*, *Gnaphalium sylvaticum*, and *Filago minima*.

Neither Baker's *Flora of North Yorkshire* nor Fraser Robinson's *Flora of the East Riding* makes any mention of this plant, but in Arnold Lee's *Flora of West Yorkshire* there is a very old and unconfirmed record of its occurrence "in some barren fields in Yorkshire." As this statement is so extremely indefinite, and has not been verified for nearly 300 years, we must consider that Mr. Mason's discovery establishes a new record, not only for the East Riding, but for the County.—R. J. Flintoff.

Kangaroo Island, South Australia.—In this *Journal* for February 1925 (p. 57), reference was made to the establishment of a nature reserve on this island. We owe to Dr. J. B. Cleland, of the University of Adelaide, a copy of "An Enumeration of the Vascular Plants of Kangaroo Island" (Trans. Roy. Soc. South Australia, li. (1927)), by himself and Mr. J. M. Black, including an account of the Orchids by Dr. R. S. Rogers. The late Professor Ralph Tate, Dr. Rogers, and the late J. G. O. Tepper have been the most extensive collectors on the island. The enumeration includes 653 native species and 72 introduced plants. It is suggested that further exploration will reveal a total of about 750. In an accompanying letter, Dr. Cleland refers to the special interest of the island as containing relics of the flora which probably extended at one time from Western Australia to Victoria, and perhaps Tasmania. Species survive on the island, sometimes in abundance, which have died out on the mainland.

A careful comparison of the island flora with that of the adjacent mainland is rendered possible by the present list.

REVIEWS.

An Illustrated Handbook of the British Sphagna (after Warnstorf). By WILLIAM ROBERT SHERRIN, with Foreword by H. N. DIXON. 8vo, pp. i–x, 1–74, 8 plates and figs. London: Taylor and Francis, 1927. Price 6*s.* in paper, 7*s.* 6*d.* cloth.

IT was in 1900 that Mr. E. C. Horrell published, as a Supplement to this *Journal*, "The European Sphagnaceæ (after Warnstorf)," and placed before British students the system of Sphagnology generally adopted on the Continent and founded on the researches of Warnstorf. The latter had been studying the genus for some thirty years, and had arrived at an elaborate discrimination of the plants into species, varieties, and forms, in accordance with microscopic details, of which little or nothing was known to earlier bryologists. Warnstorf attached great importance to (1) the position and form of the chlorophyllose cells as seen in transverse sections of the branch-leaves; (2) the form and distribution of the pores on the walls of the branch-leaves and, to a less extent, of the stem-leaves. A further twenty years of intensive study led him to modify his system of classification and his views as to the stability of certain characters, and his final conclusions were consolidated in his great monograph, the *Sphagnologia universalis* (1911).

It is from this monograph that Mr. Sherrin has selected the material applicable to our British Sphagna. Of these, 48 species are recorded as native to our Islands, and a careful description of each and of its varieties is given, together with figures that elucidate some important characters, and keys which facilitate access to sections, species, and varieties. Mr. Sherrin has examined thousands of Sphagnum plants in recent years, and knows well the difficulties of identifying these troublesome and variable hydrophytes, and the pitfalls that are likely to vex the inexperienced. He has set the British Sphagnaceæ in order of classification upon the lines of Warnstorf's scheme, and has discarded a few species which had no right to a place in our flora. His 'Handbook' is sure of a glad welcome by bryologists.

It is interesting to note that simultaneously a memoir on the "Flore des Sphaignes de France," by G. Dismier, has appeared in the *Archives de Botanique, Caen.* It records 36 species of *Sphagnum* for France, and resembles Mr. Sherrin's 'Handbook' in containing helpful keys and figures, but its descriptions are more concise, the varieties very few, and the distribution of the species in the many departments of France is worked out in detail with the help of 17 tables.

A. G.

Common British Wild Flowers easily named. By T. ERNEST WALTHAM. Illustrated by the Author. 8vo, pp. xvi, 194. With colour-chart frontispiece and numerous illustrations. Oxford Press, 1927. Price 3*s.* 6*d.*

MR. WALTHAM attempts to classify about one hundred and eighty of the commoner British species under the colour of their flowers—

whether white, purple, violet, blue, mauve, pink, yellow, light yellow, cream, greyish, green, scarlet, and light scarlet; the colour-chart supplies a standard for the shades ranging from purple to pink. The variation of colour in nature is an obvious difficulty, and in a very few cases plants appear under two headings—*e. g.*, Comfrey under purple and cream. Blackberry is found under mauve, but it is stated that at least thirty species may be found on one common, some with white flowers. Under each colour-heading the plants are arranged in the sequence of their families; the approximate size of each plant is noted at the top of each page—viz., dwarf, medium, tall, or a climber. The popular name of the plant forms the heading, the French and German names are also given in addition to the Latin binominal, and brief notes on growth, habitat, and properties are included, and an explanation of the trivial name.

The drawings are often somewhat crude, but will enable the amateur to recognise his plant, always provided it is included in the book—a difficulty which must needs arise in the case of a limited selection. Thus, none of the roses are included, there is no dock, common stitchwort is omitted, the dwarf furze is included, but not the gorse, and so on: the value of a guide which must so frequently lead to disappointment is questionable.

In his Preface the author gives some useful hints on the preservation of plants in the dried state, with special reference to the use of fuller's earth as a medium.

A British Garden Flora. A Classification and Description of the Genera of Plants, Trees, and Shrubs represented in the Gardens of Great Britain, with Keys for their Identification. By Lt.-Col. J. W. C. KIRK, D.S.O., B.A., F.R.H.S. 8vo, pp. xii, 584, with 223 text-figs. Arnold, London, 1927. Price 42*s.*

THIS latest addition to Garden literature is the work of a lover of plants with some knowledge both of Botany and Horticulture. The author describes his book as a reference manual which deals with the hardy, and many half-hardy, plants likely to be found in British gardens, and is compiled primarily for the use of gardeners and other lovers of gardens who have no botanical education; though some knowledge of botany will not be found to preclude its usefulness.

The book is a "Genera Plantarum" of the seed-plants within the prescribed limits. The arrangement is systematic: the families of Dicotyledons follow that of Bentham and Hooker, except that the section Monochlamydeæ has been abandoned and its members have been intercalated among Polypetalæ. The arrangement of the Monocotyledons is a modification of that adopted by Warming.

The systematic portion is preceded by an introductory chapter on the structure of plants in order to explain the necessary technical terms; this is indexed separately and thus serves as a glossary. This chapter also contains advice, based on first principles, on the subject of transplanting, pruning, etc. A key to the families precedes the descriptive portion, in which a description of the family is followed

by a key to the genera, each of which is then briefly described. The descriptions have been largely compiled from the *Genera Plantarum* and various Floras. A few notes of general information follow, including the geographical distribution of the genus, and brief cultural notes with occasional reference to individual species; and, finally, the derivation of the generic name. In some of the larger genera, such as *Saxifraga*, notes on the various sections are given.

The illustrations have been drawn by the author, mostly from living specimens, with the view of aiding identification by floral characters. They are helpful, though sometimes a little weak, and contrast somewhat with the very bold clear text.

It is difficult to avoid errors in a technical work of this magnitude, but one could have wished for greater care in proof-reading. The distribution of *Nothofagus* is given as South America and Australia, of *Cedrus Libani* Asia and Asia Minor; instances of misspelling are *Cyprepedium* (throughout), *Boykinia agonitifolia*, gymnon-spermon—naked seed; *Ehretia* is derived from "G. D. Ehret who assisted Jussien (*sic*) in Paris," a very inadequate reference to one of the greatest of botanical artists!

These and other similar errors may be remedied in another edition which may be called for, as the book should appeal to the large number of garden-lovers who wish to know the names of their plants and also something about them.

Die Alkaloide. A Monograph of the Natural Bases. 2nd, revised edition. By Dr. GEORG TRIER. Part I. 8vo, pp. 356. Borntraeger: Berlin, 1927. Price 18 M.

THE term "alkaloid" was first applied in 1818 by Meissner to a group of, at that time, little-known complex substances derived from the plant and having marked physiological action or strongly poisonous properties. The outstanding characteristic which gave rise to the name was the fact that these substances had an alkaline reaction, a property which had up till then only been associated with inorganic compounds. As the knowledge of the chemistry of these substances improved it became evident that they comprise a very heterogeneous group of widely different constitution, and, moreover, that a number of similar substances occur in the animal world. With the discovery of an increasing number of relatively simple organic bases, both natural and synthetic, and the disclosure of the fact that all these substances owe their basic properties to their nitrogen content, the term alkaloid began to lose its significance for the characterisation of a restricted group of substances. Attempts to confine the use of the term to complex derivatives of pyridine having a marked physiological action failed, owing to the fact that such a practice would exclude the whole group of purine bases, such as caffeine and theobromine and the more recently discovered histerine and its derivatives, to mention but a few outstanding examples. Seeing that a precise definition of the term alkaloid is not possible, it is open to each author to interpret the term as he thinks fit, and readers will

have reason to be grateful to Dr. Trier for the broad view he takes of his subject; practically the only limits he has set himself to his survey of the nitrogen bases is that they must be of natural origin; this limitation is necessitated by the ever-increasing number of synthetic compounds which are being produced as substitutes for the physiologically active bases; to include a consideration of all these would have greatly extended the size of the book. The volume under review is only the first part and, as such, contains neither index nor table of contents, a fact which somewhat restricts the convenience of the book for reference. The subject-matter so far presented has been divided under five heads, namely, aliphatic bases, aromatic bases, acid amides, urea derivatives, and heterocyclic bases derived from pyrrole and pyridine; these headings do not, of course, convey much information as to substances they cover, but their comprehensive nature may be gleaned from the fact that, for example, the aliphatic bases include, in addition to the amines, the aliphatic amino-acids; under the heading of aromatic bases are included descriptions of anthranilic acid and even cinnamic and truxillic acids which, though containing no nitrogen, are described on account of their occurrence in the plant in combination with the alkaloid cocaine. Again, the section entitled acid amides contains a description of glutathione and the mustard-oil glucosides. The description of the typical physiologically active compounds includes, in addition to their chemistry, a detailed account of their pharmacology which adds very greatly to the value of the book. Those familiar with the author's other published works are accustomed to expect comprehensive treatment of the subject and are once more indebted to him for providing a trustworthy and authoritative book of reference which brings our knowledge of this very wide field absolutely up to date.—P. HAAS.

THE fifth fascicle of *Die Pilze Mitteleuropas* by F. Kallenbach (Leipzig: W. Klinkhardt, 1927) contains four pages of text, two coloured plates and one uncoloured. The whole of the text is concerned with *Boletus regius*. It is a commentary on modern work that Kromholz's "*Boletus regius* pileo pulvinato, glabro, purpureo; tubulis adnatis, brevibus, minutis, aureis stipite bulboso, reticulato, aureo, basi purpurascente; pluribus conglomeratis" should expand to four large pages of text for its full definition. Naturally much is printed here that could not find place except in a work of such proportions, but it becomes increasingly obvious that Kallenbach's monograph on *Boletus* will be the standard work on European species and consequently there will be no need to repeat much of the details. The value of the work is that it is written by one who knows *Boletus* in the field and has a comprehensive knowledge of the necessary literature. The "Formenkreis" of *B. regius* is well seen in the ten figures of the first coloured plate; the second is a "Vergleichstafel" with two figures each of *B. regius*, *B. appendiculatus*, and *B. æstivalis*. The uncoloured plate gives microscopic details of *B. rimosus*, *B. erythropus*, and *B. regius*, and photographs of *B. variegatus* and *B. sanguineus* in their natural habitats.—J. R.

FIFTH INTERNATIONAL BOTANICAL CONGRESS, CAMBRIDGE, 1930.

THE Executive Committee is issuing a Preliminary Notice to botanists throughout the world, extending an invitation to the Congress, which will be held from August 16–18, with excursions in the following week.

The subscription for membership of the Congress will be One Pound, which should be paid to the Treasurer, Dr. A. B. Rendle, British Museum (Nat. Hist.), London, S.W. 7, before January 1, 1930, if possible. Early notification to the Treasurer of intention to attend the Congress is particularly requested.

A British Sub-committee has been appointed to arrange the programme for each of the sections in which the Congress will be organised. The Chairmen of these Sub-committees and their addresses are as follows:—

Palæobotany: Professor A. C. SEWARD, Botany School, Cambridge.

Morphology (including Anatomy): Professor F. E. FRITSCH, Danesmount, Tower Hill, Dorking, Surrey.

Taxonomy and Nomenclature: Dr. A. W. HILL, Royal Botanic Gardens, Kew, Surrey.

Plant Geography and Ecology: Professor A. G. TANSLEY, Department of Botany, the University, Oxford.

Genetics and Cytology: Professor Sir JOHN B. FARMER, Imperial College of Science and Technology, London, S.W. 7.

Plant Physiology: Dr. F. F. BLACKMAN, Botany School, Cambridge.

Mycology and Plant Pathology: Dr. E. J. BUTLER, Imperial Bureau of Mycology, 17 Kew Green, Kew, Surrey.

So far as possible, the programme for each Section will consist of papers given at the invitation of the Sectional Sub-committee; arrangements for general discussions will also probably be made by the Sectional Sub-committees.

Communications made to the Congress by means of papers or by participation in the general discussions will be permissible in English, French, or German.

Further information will be sent in due course. Correspondence of a general nature about the Congress should be addressed to one or other of the Secretaries—Mr. F. T. BROOKS, 31 Tenison Avenue, Cambridge, and Dr. T. F. CHIPP, Royal Botanic Gardens, Kew.

It is requested that recipients of the letter will extend the invitation to attend the Congress to any of their colleagues who may not receive a copy of the letter.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY OF LONDON.—At the General Meeting on February 2nd, the President declared five vacancies in the List of Foreign Members of the Society, caused by death, including two botanists, Professor Ludwig Radlkofer and Professor C. S. Sargent.

Major R. W. G. Hingston, I.M.S., who accompanied the Mount Everest Expedition of 1924 as Medical Officer and Naturalist, gave an account, illustrated with a fine series of lantern-slides, of his observations on animal life on Mount Everest and the surrounding country. Collections were made of the fauna and flora of the region traversed, and particular attention was given to the methods by which animals adapt themselves to the special conditions associated with high altitudes.

Mr. W. T. Saxton described the life-history of *Lunularia*, with special reference to the archegoniophore and sporophyte.

Fertile plants of *Lunularia* are very rarely met with, but Mr. Saxton had secured male plants once and female plants on various occasions, and had obtained a sufficiently close series of sporophytes to trace their development with reasonable accuracy.

Lantern-slides of photographs, photomicrographs, and drawings were shown, illustrating fertile plants with mature archegoniophores and sporophytes, and a number of stages in their development. It was shown that the course of development of the sporophyte was rather strikingly different from that of any other member of the Marchantiales. The structure of the sessile antheridiophore is similar to that of *Fimbriaria* and several other Marchantiaceæ. The first divisions in the sporophyte are quite normal, and the formation of foot and seta from the basal half proceeds as usual, but the divisions in the apical half are exceedingly regular and constant; and the formation of a single group of elongated sporogenous cells, dividing for some time by longitudinal walls only, is a unique feature. The only other Liverwort known to approximate to this arrangement is *Frullania*, one of the higher members of the Acrogynous Jungermanniales.

In reply to questions by Dr. E. J. Salisbury and Dr. E. J. Collins, Mr. Saxton stated that he had failed to detect fungal filaments in either fertile or sterile plants, and that he had no recollection of seeing gemmæ-cups on fertile plants.

Mr. A. G. Lowndes exhibited a fine fruiting specimen of *Conocephalum conicum* (L.) Dum.

Professor R. S. Adamson exhibited a series of lantern-slides illustrating the vegetation of the eastern part of Southern Rhodesia. The major divisions of the vegetation were described and correlated with climatic and physiographic features. The types of vegetation mentioned and pictured were:—(1) Savannah Forest; (2) Grassland; (3) Riverside Forest; (4) "Flap-top *Acacia*" Forest, on mountain-slopes; (5) Subtropical Rain-Forest; (6) Montane Grassland.

NATIONAL MUSEUM OF WALES, CARDIFF.—The Twentieth Annual Report contains an account of the formal opening of the Museum by the King in April last, and an excellent series of illustrations of the building and the interior. The Department of Botany records the donation of the herbarium of the late W. Ingham, of York, and the purchase of the herbarium of the late J. E. Griffith, of Bangor, and of a number of botanical books, formerly the property of Hugh Davies, the author of *Welsh Botanology* (1813).

MASTERS LECTURES, 1927.—*The Journal of the Royal Horticultural Society* (liii. pt. 1, Jan. 1928) contains a report of the Masters Lectures, given before the Society by Dr. C. H. Ostenfeld, of Copenhagen, in June 1927. The subject was "The Present State of Knowledge on Hybrids between Species and Flowering Plants."

RECENT LICHEN LITERATURE.—*The Transactions of the British Mycological Society*, xii. pt. 4 (Nov. 1927), contains a valuable *résumé*, by Miss A. Lorrain Smith, of recent literature on Lichens. The account of work done is arranged in sections with sub-headings, and can therefore be consulted with ease. A bibliography is appended, arranged alphabetically under the authors' names.

The Society now numbers 364 Ordinary Members, in addition to five Honorary Members.

UNIVERSITY OF CALIFORNIA, PUBLICATIONS IN BOTANY.—The continuation of N. L. Gardner's *New Rhodophyceæ from the Pacific Coast of North America*, vi. (vol. xiv. no. 4 of the series), calls for remark, owing to the excellent photographic illustrations by which the value of the descriptions of the new species is much enhanced. Seven new species (in one case including two varieties) are described, and seventeen full-page plates are devoted to their illustration.

THE Museo de Historia Natural of the Universidad Nacional de Tucuman (Argentina) sends two contributions to the study of the Argentine Flora by Léon Castillon, Chief of the Botanical Section. No. 11. "Las Dioscoréas Argentinas" is an enumeration of the species of *Dioscorea*, 32 in number, including a key to their determination. No. 7 enumerates the Juncaceæ, which are represented by six genera—four, namely, *Distichia*, *Patosia* (monotypic), *Oxychloe*, and *Andesia* (monotypic), with a restricted, almost exclusively Andine distribution, and the cosmopolitan *Luzula* with 4 species, mainly Andine, and *Juncus*, 16 species, including several cosmopolitan or widespread species, such as *J. bufonius*, *acutus*, *balticus*, and *tenuis*.

SOUTH EASTERN UNION OF SCIENTIFIC SOCIETIES.—The Thirty-third Annual Congress will be held at Rochester, June 6–9, under the presidency of Sir Martin Conway. Mr. C. E. Salmon will succeed Dr. E. J. Salisbury as President of the Botanical Section.

THE obituary notices of the late Mr. Miller Christy and Dr. W. A. Shoolbred are held over until the next number.

A. ORCHIS SESQUIPEDALIS var. AMBIGUA.
B. ORCHIS SESQUIPEDALIS (type form).
C. ORCHIS SESQUIPEDALIS var. IBERICA Stephens.

SOUTHERN MARSH ORCHIDS.

By Rev. T. Stephenson, D.D.

(Plate 583.)

In the *Journal of Botany* 1925 (p. 93), an account was given of *Orchis sesquipedalis* Willd., based on the study of very fine colonies of these plants in the Charente Valley. In 1926, by the help of a grant from the Royal Society, it was possible to see, *in situ*, great numbers of similar orchids in Asturias, assumed to be *O. Durandii* B. & R. These were referred to in a paper on "The Flora of Asturias" (Journ. Bot. 1927, 70), but not discussed. In the summer of 1927, we were able to study yet a third group of these orchids—namely, *O. ambigua* Martr.—in the Tarn region in Southern France. It is proposed here to discuss the relations of these three groups to one another and to the North African Marsh Orchids. When referring to the Asturian plants as belonging to *O. Durandii*, we were not acquainted with the work of Guimarães on the Orchids of Portugal*, to which Dr. Keller, of Aarau, has since kindly directed our attention. Following Reichenbach's arrangement, Guimarães gives, for Portugal, under *O. incarnata* L., *α sublatifolia brevicalcarata*, *β sesquipedalis genuina*, and *γ ambigua* Guimarães, giving a full description, with drawings, of his new subsp. or variety. In *β* the bracts much exceed the flowers, and the lip is obscurely trilobed, in *γ* the bracts are much shorter and more slender, and the lips deeply trilobed. The spur is described as curved and narrowing abruptly at the tip. The spike is rather dense. In all these features the Asturian plants agree with Guimarães's description. The one point of discrepancy is in the length of the spike, which Guimarães gives as 12–18 cm. In the Asturian plants the average is 12 cm.; but this is not of much account. We conclude that the Asturian plants come under Guimarães's description.

We are at once confronted by the difficulty that already in 1864 Martrin-Donos had named as *O. ambigua* a French orchis of the same group; so, as the name *ambigua* is pre-occupied, we propose, whilst accepting Guimarães's description, to call the form *O. sesquipedalis* var. *iberica*, referring to Martrin-Donos's plant as var. *ambigua*, regarding it as a variety, and not as a full species. As to the form *O. Durandii*, it will be discussed later; but it may be noted here that Guimarães says that, apart from the size of the bracts, it seems to agree with his var. *ambigua*.

We may now turn to *O. ambigua*, which was described in 1864 by Martrin-Donos in his *Florule du Tarn*, from specimens gathered at Lisle by the river-side. Last summer, in the course of an extensive tour made possible by the kindness of M. L. d'Albis, of Limoges, a visit was paid to the *locus classicus*, where the plants were found in good numbers. A larger and finer group was also found in a damp

* "Orchidographia Portugueza," Jose d'Ascensão Guimarães, Extr. do Bolet. Soc. Brot. v. 1887, Coimbra.

meadow a few miles south of Cahors. Rouy gives Tarn, Aveyron, and Herault as the distribution of this form. Going direct from the Charente region to the Tarn, we were able to compare living examples of the type-form with the Tarn variety. The question in our minds was whether there was any real difference between these two, and whether in the Asturian plants there was a third form. Our conclusion, which may be stated in advance, was that the forms certainly belong to one species, whatever name be given to it, but that there are differences just sufficient to justify varietal names for all three groups.

The best course, perhaps, is to set down the points in which the three forms all agree, and then to deal with differences. The tubers, of course, are palmate. The plants are tall and robust, most of them being 3–5 dm. in height. There are a very few slender plants of about 2 dm., and some tall and stout, reaching 9 dm. The leaves are, as a rule, narrow, rather short, bract-like above, and very rarely reaching the base of the spike. They are fairly fleshy, erect, broadest at the base, but not hooded, as in *O. incarnata*, and not spotted. In very large specimens the leaves are broader and less sword-like. The flower-spikes vary a good deal, in all cases they may exceed 2 dm., and even 3 dm. The flowers themselves are of one general type, with much larger lips and spurs than *O. latifolia* and *O. prætermissa*. The spurs are often very stout and fairly long. The lips are broader than long, with usually a very small centre-lobe, though this, in a certain number of cases, may be larger and prominent. The colour varies from a palish purple to a rich magenta. The lip-pattern is a series of double lines, with a few out-lying streaks.

Some differences may now be given. The measurement of 36 carefully-dried flowers of each group, taken from about 20 plants gathered quite at haphazard, gives the following results :—

	Length and breadth (lip).		Length and breadth (spur).	
O. sesquiped. (type) ...	9·3	13·3	12·2	4·3
Var. *iberica*	10·0	14·5	12·5	3·5
Var. *ambigua*	10·0	13·0	11·5	3·6

The measurements are in mm.

Thus var. *iberica* has a somewhat broader lip and the type a slightly stouter spur. These points are obvious at a glance when a fair number of plants are examined.

The average length of the spikes shows a somewhat greater variation. For the type it works out at about 1·5 dm., for var. *iberica* 1·2 dm., and for var. *ambigua* 2 dm.

The type has a moderately long spike, which may be very stout and dense, but more often is quite lax, as figured in Journ. Bot. 1925, 94.

The bracts are mostly long and broad at the base of the spike, but not divaricate. The side-lobes of the lip are generally recurved. The spurs are very stout, in many cases 5 mm. across when dried.

They may be long or short, and when short quite sac-like. The general habit of the most typical plants is fairly like that of *O. palustris*.

The plants of var. *iberica* are shorter on the average than those of the type. The spikes are also shorter and more densely flowered. The bracts are never as large as in the other two forms. They are quite inconspicuous and erect. The lips are flat and the spurs stout, though less so than in the type. They are usually more or less curved, and contracted at the tip.

The plants of var. *ambigua* are rather taller than those of the preceding forms, often reaching 9 dm. The bracts are large, as in the type, and very divaricate. The spikes are very long and narrow, and rather lax-flowered. The lips are flat, the spurs a little shorter than in the other forms, and moderately stout. They are often curved, and usually contracted at the tip.

It is thus perfectly easy to distinguish, by these characters, the majority of the plants of the three forms. At the same time, there are plants, especially those with very large and dense spikes, which, apart from their associates, no one could be very sure of. It seems, therefore, that we have here local races of one and the same species, and the most that can be accorded is that they may be allowed a varietal standing.

Some notes may be added in reference to crosses. The type-form certainly crosses with *O. incarnata*, and this hybrid has been named by Dr. Keller × *O. Delamainii*, after the naturalist to whom we owe the knowledge of the fine colonies of plants in the Charente region. It probably takes three or four different forms, the most frequent having small flowers of a dull lilac-purple colour. In the first paper above referred to, it was noted that plants occurred with spotted leaves, and these were assumed to be crosses with *O. maculata*. This is probably correct, for though *O. maculata* has not been found very near the marshes where *O. sesquipedalis* grows, it is plentiful in the whole region, and *O. latifolia* is not found at all. In Asturias a fair number of plants were found in which var. *iberica* crossed with *O. elodes*, where the two species were growing together. Here *O. incarnata* was never seen.

In the case of var. *ambigua*, in the two stations examined no form of *O. maculata* was seen ; but this cross probably occurs in other places. South of Cahors *O. incarnata* was present, and there were a few quite obvious hybrids.

One point should be referred to in passing. In the *Florule du Tarn* (p. 705), where he describes *O. ambigua*, Martrin-Donos has a note: "Peut-être est-ce une espèce hybride ? *inc.* × *mac.*" This suggestion may certainly be dismissed. The hybrid suggested is not at all common, and is unlike *O. ambigua*, whose relations with the other members of the *sesquipedalis*-group are beyond question, as the details already given have shown. It is true that Camus, in his *Iconographie des Orchidées de l'Europe*, has given a plant with spotted leaves (pl. 42), but this plant is quite untypical, and is probably a hybrid of var. *ambigua* and some form of *O. maculata* or *O. latifolia*.

The problem of nomenclature is one of considerable difficulty. The first of the Southern Marsh Orchids to be described was *O. elata* (Poiret, *Voyage en Barbarie*, 1789). This is said often to reach 2 ft. in height, with a very dense spike of violet flowers about eight inches long, bracts long, broad at the base, long spur, and undivided tubers. It is abundant in the plains of Mazoule.

In 1805 Willdenow (Sp. Pl. iv. 30) described *O. sesquipedalis*, giving Portugal as the habitat. This has a loose spike, lip with reflexed sides, not trilobate, large spurs and bracts, and, of course, palmate tubers.

H. G. L. Reichenbach (Icones Fl. Germ. xiii. & xiv. p. 59 (1851)) first put down *O. elata* under *Latifoliæ incarnatæ*. In the Supplement, however, he transfers it to the *sublatifolia* section of *O. incarnata*, under the form *algerica* of *O. sesquipedalis*. He has received a specimen from M. Tandon, which decides him, and he says, "Tandem, tandem illa prope semisæcularia dubia prorsus sunt soluta!"

But new complications arise at once, for in 1852 Boissier and Reuter (Pugillus Pl. Nov. &c.) describe *O. Durandii* and *O. Munbyana*. The former has a long lax spike, long spurs, lips flat or reflexed, and the habit of *O. palustris*. The latter has broad lower leaves, the upper narrower and exceeding the base of the spike, a short dense spike, lips flat, trilobed, slender spur, and very long bracts. Both are found in Algiers, *O. Durandii* also in Spain. In 1864 Martrin-Donos described *O. ambigua*, in 1887 Guimarães his var. *ambigua*, and, lastly, in 1910, Briquet still another form as *O. sesquipedalis* var. *corsica*. This last, as we have seen only a few dried specimens, we leave out of the discussion. From Briquet's description, it has narrower lips and a shorter spur than any of the three forms with which we are fully acquainted.

There is no doubt that Boissier and Reuter are describing two very distinct species. *O. Munbyana*, in habit, colour of flowers, size and shape of lip and spur, stands alone. It is a fine species, belonging exclusively to North Africa. On the other hand, *O. Durandii* comes into the South European group.

Setting aside var. *corsica*, we have now five forms which have been described, and it is highly improbable that they can all be valid. In fact, to anticipate, we think that neither of Boissier and Reuter's species can stand.

Boissier and Reuter distinguish *O. Munbyana* from *O. elata*, because the latter has too long a spike and undivided tubers. But Poiret describes a tall plant with a dense spike of violet flowers. In fact, some specimens of *O. Munbyana* have very large spikes indeed. What is most puzzling is Poiret's reference to undivided tubers, which, of course, seems impossible. Dr. Battandier, in a note in Bull. Soc. Bot. France, 1881, 230, suggests that Poiret somehow mixed up specimens of his orchis with those of *O. palustris*, which is present on the ground, but is not mentioned by Poiret. But how he could have confused a plant having a dense spike of violet flowers with *O. palustris*, one cannot understand. The true explanation may be that he had chanced to describe a plant with an (abnormally) undivided tuber. This happens occasionally in some species of dactylorchids. In any case, whatever be the explanation of the two words, "bulbis indivisis" cannot stand in a general description. Another curious explanation is given in Reichenbach (Icones Fl. Germ. *l. c.*). A letter is quoted from M. Durieu, who has been to Toulouse and examined the actual plant in Poiret's herbarium. He thinks the tuber may have been mutilated, and was originally palmate. Possibly this specimen is now in Paris, but we have so far not been able to trace it. In any case, we conclude that Boissier and Reuter have not sufficient grounds for separating *O. Munbyana* from *O. elata*.

Quite recently, Schlechter (*Monographie und Iconographie der Orchideen Europas*, &c.) supports this separation, on the ground that *O. Munbyana* is much larger and has broader leaves, a broader lip, and thicker spur. But, in the specimens we have seen, *O. Munbyana* has a definitely more slender spur than any other of these forms. As to the size, Poiret gives 2 ft., and says nothing about the leaves; but he describes the spikes as dense-flowered, whilst those of *O. Durandii* are lax-flowered.

On the other hand, Rolfe (*Orchid Review*, 1920, 103) gives the history of *O. elata*, which he considers to be the same as *O. Munbyana*. Klinge (*Dactylorchidis . . . . Prodromus*) takes all the names as synonyms, lumping them together as subsp. *africanus* of a sp. *orientalis*. Briquet (Prodr. Flore Corse) sets down *O. elata* (*O. Munbyana*) as var. *algerica* of *O. sesquipedalis*. As we suggested above, it is much preferable to assign specific rank to this form, in which case the name *O. elata* must take precedence over *O. Munbyana*.

Returning to *O. Durandii*, we find that Boissier and Reuter distinguish this from *O. sesquipedalis*, because the latter is described as having an undivided lip and reflexed side-lobes. As to the first point, Willdenow's description is at fault, as details given above have shown, and must be modified. As to the side-lobes, *O. Durandii* is said to have them flat or reflexed, and *O. sesquipedalis* may have them flat, though oftenest not. Moreover, *O. Durandii* is said to have the habit of *O. palustris*, which may also be said of the majority of specimens of *O. sesquipedalis*. Thus all differences practically disappear, and we believe *O. Durandii* is simply the typical *O. sesquipedalis*. This opinion is confirmed by the examination of a good number of dried specimens at Kew and South Kensington, also from the herbarium of Delessert, at Geneva, kindly lent by Dr. Briquet, also of some plants recently gathered in Andalusia by Mr. A. J. Wilmott and excellently preserved. These are plants both from Spain and Africa, variously named as *O. Durandii*, *O. sesquipedalis* var. *algerica*, and *O. elata*. We should assign them all either to *O. elata* or typical *O. sesquipedalis*. One sheet, from Portugal, named *O. Durandii*, is certainly our var. *iberica* of *O. sesquipedalis*.

Thus, finally, we are left with two main species—namely, *O. elata* (*O. Munbyana*) and *O. sesquipedalis* (*O. Durandii*) with its three varieties—namely, *ambigua*, *iberica*, and *corsica*. The former is of a broader-leaved and more massive type, with a splendid spike of violet-purple flowers, with rather slender spurs. The latter has a

proportion of plants with stout spikes, but its general habit is more slender, with strict narrow leaves, a rather lax spike, very stout spurs, and a somewhat duller range of purple shades.

A reference ought to be made, in this connection, to the work of Fuchs and Ziegenspeck. Following up a monograph on *O. Traunsteineri*, they have contributed several most interesting and comprehensive papers on Dactylorchids to the *Botanisches Archiv*, in which the anatomy, morphology, ecology—in fact, every part of the plant-life of various European orchids—are dealt with. In line with similar conclusions about the numerous forms of *O. Traunsteineri*, they consider that the various forms of Southern Marsh Orchids are comparatively recent local subspecies, of hybrid origin, arising in this case from an original cross between *O. incarnata* and either *O. palustris* or *O. laxiflora*. We hope that at some future time it may be possible to enter into a full discussion of this very important work.

NOTES ON *POTAMOGETON*.

By Arthur Bennett, A.L.S.

Potamogeton nerviger Wolfgang in R. & S. Syst. Pl. Mant. iii. 359 (1827).

P. nervigerus (Wolfg. herb.) Eichwald, Nat. Skiz. Lith. Volh. et Pod. iv. 256 (1830).

P. nervosus Besser in Herb. De Candolle!

P. rufescens Schrad. *β nerviger* (Wolfg.) Richter, Pl. Europ. i. 12 (1890); Kunth, Enum. iii. 180 (1841), as a subsp. of *rufescens*; Tscherniaeff, Consp. pl. Charcov. et Ucran. (1859); Ledebour, Fl. Ross. iv. 24 (1853); Asch. & Graebn. in Engler, Pflanzenreich, iv. 2 (1907), 73.

Lithuania, Ukraine.

Dr. Hagström (Crit. Res. Pot. 1916, 149) considers this to be a hybrid—*P. alpinus* × *prælongus*. It varies from a reddish brown to a dark blackish brown. To me the type-specimens at Kew, the British Museum, and Vienna, point to a subsp. of *alpinus*; the colour, the distribution of the veins in the leaves, and the habit all point to *alpinus*. When I first saw Dr. Hagström's verdict, I wrote to him denying its being a hybrid, as I had cultivated *P. Griffithii* Ar. Benn., *P. prælongus*, and *P. alpinus* for six years, and the growth of the three from spring to autumn denied the hybridity of *nervigerus* and *Griffithii* (Carnarvon, Wales). The latter, growing in Lake Aber (L. Anon-a-fon) at 1620 ft. alt., surrounded by mountains, and lying at the foot of Y Foel Fras, a mountain 3091 ft. alt., with remains of ancient glaciers around, is a case like that of *Salmo nigropinnis* (the black-finned trout), found only in these Welsh lakes. The only other *Potamogeton* recorded there is *P. polygonifolius* Pourr.; *P. prælongus* Wulf. is not on record for Carnarvon, while *P. alpinus* is only in one spot thirty miles away (see Journ. Bot. 1919, 15).

Camus, in Lecomte's Not. Syst. i. 85 (1909), describes two new varieties, "*attenuatus* and *subcordatus*," under *P. Tepperi* Ar. Benn.

that they must be transferred to *P. perversus* Ar. Benn. (Philippine Journ. Sci. ix. 448 (1914). I had placed Asiatic specimens to *P. Tepperi*, but this is confined to Australia and Mauritius.

Potamogeton perfoliatus L. var. Muelleri Ar. Benn. in Journ. Bot. 1887, 178.

P. prælongus Benth. Fl. Austral. vii. 172 (1878), *non* Wulf.

My specimen of this from Mueller is poor, but it seems that Hagström saw better specimens, and considers it should bear specific rank. Baagøe in "Potamogetons from Asia-Media" (Vidensk. Medd. Naturh. Fören. Kjobenhavn, 1903, p. 180) remarks that Mr. Bennett has lent him the original specimen of *Muelleri*, and records it thus: "No. 2077, Transcaspia, in a fountain by Artshman. Sept. 6, 1899." This is near the source of R. Oxus.

Asch. & Graebn. (in Engl. Pflanzenreich, iv. 2 (1907) 95) make it a subspecies, which, I think, may be its rank, and they cite it "Cent. Asia, Pamir, Paulsen, n. 1452, ex Baagøe (*l. c.*)."

In Bull. Soc. Bot. Fr. 193 (1899), Gandoger describes an Australian species as *P. odontocarpus*. Asch. & Graebn. (*l. c.*) refer it with doubt to *P. Tepperi* Ar. Benn. But I do not think it can be that species. Hagström (*l. c.*) calls it "Planta dubia." I have failed to see a specimen; but it may be either *P. sulcatus* Ar. Benn., *P. muricatus* Hagst., or *P. tricarinatus* Muell. et Benn.

Potamogeton Kupfferii mihi (=*P. longifolius* Gay × *perfoliatus* L.).

P. longifolius Gay × *perfoliatus* Kupffer in Korresp.-Bl. Nat. Ver. Riga, 171 (1906); Asch. & Graebn. in Engler, Pflanzenreich, iv. 2, 137; Hagström, Critical Res. Potamogeton, 245.

River Duna bei Jakobstadt, Courland, Baltic province, Russia, Kupffer, *l. c.*

Grand Junction Canal, near Bone Mill, Market Harboro, Leicestershire. Mr. Geo. Chester, May 1916.

This differs from *P. decipiens* Nolte (*P. lucens* × *perfoliatus*) by the greater length of the leaves and their tenuity, veining weaker and more immersed in the leaf-substance, and longer stipules. Leaves 1·1·5 dm. × 3–3·5 cm., semi-clasping the stem, not denticulate, apex subacute. Central nerve consisting of 6 compacted nerves, the two main of these with bast-bundles, secondary nerves ten; thus leaf-nervation nearer *lucens* than *perfoliatus*.

Dr. Hagström (p. 245, fig. 113) describes *P. decipiens* Nolte f. *memelanus*, forma nov. (*P. Heidenreichii* Asch. et Graebn. (1913) Syn. 327, p.p.). He remarks: "It is to be looked upon as a cross of *lucens* var. *longifolius* × *perfoliatus*." But the leaf-base tapers to the petiole, and I can see no *perfoliatus* in it, while the Leicester plant has the leaf-bases semi-clasping. Ascherson and Graebner considered their plant to be *P. lucens* × *gramineus*, but Dr. Hagström says: "It is impossible to discover anything of *P. gramineus* in this plant."

With regard to *longifolius* Gay, Dr. Hagström observes (p. 237): "According to the statement made in Grenier's *Flore de la Chaîne Jurassique*, ii. (1869), the form would belong to the rather high-situated mountain-brooks." But this can hardly be the case in Lithuania and Courland. Dr. Hagström accepts the Siberian plant gathered "in fluvio Lena Dr. Augustinowy," c. 1874, as Gay's *longifolius*, but I cannot agree. Placing it by the side of specimens from Wolfgang, Besser, and Gorski, and Gay's own specimens at Kew, it seems to me to be only a long-leaved form of *lucens*; just such occurs in Orkney and Sweden.

POTAMOGETON LANCEOLATUS Smith.

In the Kew Herbarium there is a specimen of the above plant from Mr. J. Ball's collection, labelled "Sussex, Coll. Borrer"; in pencil is added "Penrose," but I can find no such place in Sussex. But the specimen is certainly Smith's plant, and an additional county record. It is curious that Smith says "Communicated by Rev. H. Davies from the lakes of North Wales," while Davies in his *Welsh Botanology*, p. 18 (1813), has: "This (perhaps new) species I found in the rivulet between Bodafon and Lligwayn, Anglesea."

Prof. Fernald, of the Gray Herbarium, has been studying the flora of Labrador and Newfoundland, and has recorded species of Potamogeton far to the north of known records, e. g., *P. confervoides* Reich., *P. Hillii* Morong, *P. Oakesianus* Robbins, and *P. Friesii* Rupr.

Dr. Hagström, in Crit. Res. Potamogeton describes a large number of American hybrids—out of a supposed total of 25 in N. America, 15 are new. I had long hoped that some American botanist would write a critical review of the U.S.A. species, but it has not been done. The only review of any length is "A Critical Consideration of Hagström's Work on Potamogeton," by Mr. Harold St. John in Bull. Torr. Bot. Cl. 1925, 461. In this he shows that some at least of Hagström's hybrids are almost impossible, the reputed hybrids having their parents "1000 miles apart." And I certainly agree with St. John in many points. I am in hopes that Prof. Fernald will give us some remarks at least on the grass-leaved section.

NOTES FROM THE BRITISH MUSEUM HERBARIUM.

A NEW PAPUAN *FAGRÆA*.

BY S. MOORE.

WHEREAS at least a dozen species of *Fagræa* (*Loganiaceæ*) are known from N.E. New Guinea, only five or perhaps six have been described from the British or south-east part of the island. To these the following is here added: the specimen was placed by inadvertence in a packet of *Rubiaceæ*, sent for examination to the British Museum by Mr. C. T. White, Queensland Government Botanist; its remarkable resemblance to some *Rubiaceæ* explains the oversight:—

Fagræa aurantiodora, sp. nov. *Arbor* elata circa 25 m. alt.; *ramulis* crassis subteretibus brunneis politis cicatricibus approximatis foliorum delapsorum notatis; *foliis* obovatis vel obovato-oblongis subito-acuminatis apice obtusis basi in petiolum sat longum canaliculatum supra late canaliculatum gradatim angustatis pergamaceis nitidis costis lat. utrinque circa 15 pag. sup. uti reticulum modiocriter (pag. inf. male) visis, petiolis lamina stipuliforme coriacea instructis; *floribus* pro rata parvis suaveolentibus in cymam pluriramosam multifloram foliis ultimis subæquilongam e ramulis primo trichotomis tunc dichotomis constitutam dispositis; *bracteis* parvulis suborbicularibus quam pedicelli multo brevioribus; *calycis* tubo abbreviato lobis 5 suborbicularibus æquilongo; *corollæ* tubo stricte cylindrico calyce 5-plo longiore lobis oblongis obtusis tubum semiæquantibus; *staminibus* longe exsertis; *ovario* anguste oblongoideo glabro; *stylo* breviter exserto.

Hab. Sogere, foothill forest, *L. J. Brass*, 642. Type in Herb. Mus. Brit.

"Large handsome tree 80 ft." Branchlets 4–5 mm. thick. Leaves 10–13 × 4–5·5 cm.; petioles 1–1·5 cm. long. Inflorescence about 7–10 cm.; peduncle 1 cm. long; primary branches 3–4 cm., secondary 1–1·5 cm. long; lowest pair of bracts large and foliaceous, second pair 6 mm. long, the rest about 2–3 mm. Pedicels 1–4 mm. long. Calyx 2·5 mm. long. Flowers white, orange-scented. Corolla-tube 10 × barely 2 mm.; lobes 5 × 2 mm. Stamens exserted 12 mm. beyond the tube. Ovary 2·25 mm. long. Style 10 mm. long, glabrous.

Closely allied to *C. Ledermanni* and *C. jasminodora*, which have coriaceous leaves and flowers with a larger calyx and corolla wider in the tube and with obovate lobes. Moreover, the leaves of *Ledermanni* are described as rounded at base, while the corolla of *jasminodora* is longer.

Erlangea (§ *Bothriocline*) **incana** S. Moore, sp. nov. *Frutex* fere orgyalis; *ramulis* subteretibus subtiliter incano-tomentosis demum glabrescentibus; *foliis* perpaucis summis exemptis oppositis petiolatis oblongo-ovatis obtusis basi obtusis margine simpliciter duplicatove serrato-dentatis membranaceis supra puberulis læteque viridibus subtus tomento incano minuto indutis; *capitulis* parvis pedicellatis circa 25-flosculosis in inflorescentiam terminalem ramosam polycephalam sublaxam foliis circiter æquilongam digestis; *involucri* anguste campanulati phyllis 4-serialibus ext. incanis int. glabris ext. ovatis intermed. ovato-oblongis obtusis intimis oblongis acutiusculis anguste marginatis apice sæpe viridibus intimis sursum sæpe dilute purpureis; *corollæ* purpureæ tubo lato sursum levissime expanso; *achæniis* obovoideis prominenter umbonatis; *pappi setis* paucis, caducissimis, scabriusculis.

Cultivated specimen grown by the U.S. Department of Agriculture, and communicated by Dr. S. F. Blake to Herb. Mus. Brit.

Plant about 3 ft. high, but may reach 5 ft. Leaves mostly 4·7 × 1·5–2·5 cm. Inflorescence about 5 × 6 cm. Flowering heads

6 mm. across, on pedicels usually of 3–4 mm. Involucre 5 × 4 mm.; outer leaves 2 mm., intermediate 3 mm., inner 4 mm. long. Corolla-tube nearly 3 mm. long. Achenes 1 mm., pappus setæ 1·5 mm. long.

The affinity of this beautiful plant is with *E. tomentosa* and *E. fusca*; indeed, it has been figured in Bot. Mag. t. 8269 (1909) under the former name. The chief differences between the three species may be stated thus:—

	tomentosa.	*fusca.*	*incana.*
Tomentum	coarse.	rather coarse.	very fine.
Leaves	pergamaceous.	pergamaceous.	membranaceous.
Heads	crowded.	crowded.	rather openly arranged.
Florets per head	about 40.	about 25.	about 25.
Corolla-tube ...	narrow below, 4 mm. long.	narrow, 2 mm. long.	broad, nearly 3 mm. long.
Achenes	turbinate, 1·5 mm. long, with prominent umbo.	obovoid, barely 1 mm. long, umbo very small.	obovoid, 1 mm. long, umbo prominent.

The plant has been in cultivation at Kew for several years, seeds having been sent there from British East Africa (Kenya Colony) in 1907. So far as is known, wild specimens have not yet come to hand. Dimensions given for leaves are those of the Museum specimen; specimens at Kew may have them as much as 13 cm. long.—S. Moore.

Vernonia Yatesii S. Moore—a synonym of *Herderia truncata* Cass. In *Journal of Botany*, 1914, p. 97, I described as *Vernonia Yatesii*, with doubts relative to its generic claim, a specimen collected by Mr. C. C. Yates at Nupe, Nigeria. At that time we had no specimen in Herb. Mus. Brit. of *Herderia truncata* Cass., but plenty of the other species, *H. stellifera* Benth., which is now accepted, in accordance with Mr. Hutchinson's suggestion (Kew Bull. 1914, 353), as belonging to a distinct genus, *Triplotaxis* Hutchins. This plant is so different from Yates's, that the possibility of the two being congeners never suggested itself; and it was only recently when examining a specimen of *H. truncata* sent from the Gold Coast by Sir Albert Kitson that I noticed its identity with my *Vernonia Yatesii*, which therefore takes rank as a synonym.—S. Moore.

Hydrodea Hampdenii N. E. Br., sp. nov. *Herba* annua, crasse carnosa, aquosa, glabra, ramis prostratis. *Folia* opposita et alterna, subcylindrica vel subclavata vel ellipsoidea, obtusa, papulosa, superiora bracteiformia. *Flores* sessiles, alterni. *Calyx* obovoideus, papulosus, 5-lobus; lobi erecti, 2–3 lin. longi et lati, suborbiculares, apice obtuse rotundati, aliqui membranaceo-marginati. *Corolla* parva; petala numerosa, circa 5 lin. longa, filiformi-linearia, acuta, basi in tubum 1 lin. longum connata, alba. *Stamina* numerosa, 2–2½ lin. longa, collo tubo inserta; filamenta alba, glabra; antheræ luteæ. *Stigma* 5, erecta 2½–3 lin. longa, complanato-subulata, acuta, pallida, staminum superantia. *Ovarium* semisuperum, 5-loculare; placentæ 5 pilosæ.

Hab. Great Namaqualand: near Luderitz, *Rev. A. K. Hobart-Hampden*!, 1928. Type in Herb. Mus. Brit.

This is a very interesting discovery, because the only hitherto-known species of this genus, **H. cryptantha** N. E. Br. (*Mesembryanthemum cryptanthum* Hook. f.) is a native of the island of St. Helena, and it serves further to connect the flora of this island with that of South Africa.

H. Hampdenii is a very pulpy plant, but whether it is as full of water as the St. Helena plant or not I do not know, for the St. Helena species is stated (Mellis, *St. Helena*, p. 241) to be "so very succulent that it will not support its own weight when held up from the ground, and water is seen to drop from it when simply carried in the hand without any pressure."

With reference to *H. cryptantha* N. E. Br., it may be well to point out that in the figures of it in Hooker, *Icones Plantarum*, t. 1034, and in Mellis, *St. Helena*, t. 26, the floral structure as delineated by Fitch is inaccurate. I have carefully examined the material from which Fitch made his drawings and find that the calyx is not lobed down to its union with the ovary, nor are the lobes gibbous on the back. The petals are not free to the base as represented. The stamens do not arise around the top of the ovary as figured, but from the corolla-tube. There is no style, and the ovary is not inferior, but half-superior, and only 5-celled, not 8-celled as represented. I believe Mr. Fitch's drawings were partly concocted from descriptions in books of the structure of the genus *Mesembryanthemum*. They certainly do not represent the floral structure of *H. cryptantha*.—N. E. Brown.

BIBLIOGRAPHICAL NOTES.

LXXXIX. F. W. Schultz and C. Billot, 'Archives de la Flore de France et d'Allemagne, 1836–1855.'

In most of the important libraries in England, such as those at the British Museum, Natural History Museum, Linnean Society, Kew, Oxford, and Cambridge, the above work is incomplete. The book, issued in parts, contains lists and valuable critical notes—often original descriptions of new species—to accompany the sets of dried plants (Flora Galliæ et Germaniæ exsiccata) distributed by the authors.

The First Century of plants is dated 1836, the Second 1838, and the Third and Fourth 1840.

Most of the copies met with commence at the Fifth Century, dated 1842, and run to the Sixteenth in 1855, and this set contains a

Title-page, vol. i. 1842–1848, and is paged 1–350. Not long ago a copy of the work came into my possession which had formerly belonged to Ed. Bonnet, containing, in manuscript, the First Century (1836) and this note (dated Feb. 7, 1878) in his handwriting:—"Cette partie des Archives de Schultz est aujourd'hui absolument introuvable. Elle a paru en 1836 avec le premier fascicule de son Herbier; elle était composée de deux feuilles in-folio comprenant une page de titre et 6 pages de texte. Les inconvénients que présentait l'emploi d'un format aussi grand, déterminèrent Schultz à modifier sa publication; c'est alors qu'il fit paraître dans le format in-8°, sous le titre de 'Archives de la Flore de France et d'Allemagne,' les annotations qui accompagnaient chaque fascicule de son exsiccata."

The title-page of this rare portion runs:—

FLORA
GALLIAE ET GERMANIAE EXSICCATA

HERBIER

des plantes rares et critiques de la France
et de l'Allemagne recueillies
par la Société de la Flore de France et
d'Allemagne.
publié par le Docteur F. G. SCHULTZ
membre de la société botanique de Ratisbonne, de la
société d'histoire naturelle du dépt de la Moselle, etc.

Année 1836, ou 1ère centurie

Membres collaborateurs pour la première Centurie: MM. le professeur C. Billot; le docteur C. Grenier, médecin; R. Lenormand, avocat; le docteur C. H. Schultz, médecin.

Bitche et Deux-Ponts, Chez l'auteur.
1836.

From the valuable and interesting notes that follow, only a few extracts can be made; the more important appear to be the following:—

[p. 4] 7. VIOLA SCHULTZII Billot. Mon ami Billot qui a découvert cette espèce lui a donné mon nom.

On peut la décrire ainsi:

Viola Schultzii: Caulibus erectis, strictis glaberrimis, foliis infra glabris, supra pilis sparsis, brevissimis, tenuissime pubescentibus, e

[illegible] distincte cordata ovato-lanceolatis, stipulis caulinis lanceolatis, superioribus petiolum aequantibus sepalis acutis, calcare appendicibus [illegible] duplo triplove longiore, acuminato, apice sursum curvato, [illegible] furcato.

In pratis turfosis prope Haguenau, Alsatiae (Billot). Maio, junio.

Flores ante anthesin flavescentes, tum nivei, calcar ante anthesin [illegible] um, tum flavescens.

Differt ab omnibus *Violæ caninae* consanguineis calcare longo, [illegible] uminato, apice sursum curvato, bifurcato.

[p. 4.] VIOLA BILLOTII. J'ai découvert cette plante et je l'ai [illegible] d'abord pour le *V. stagnina* Kit. avec lequel elle a plus grande [illegible] semblance, mais plus tard j'ai trouvé quelques différences qui m'ont [illegible] do la séparer de cette espèce et je lui ai donné le nom d'un ami [illegible] versé dans la connaissance des violettes d'Alsace. M. Mutel, [illegible] apitaine d'artillerie, à Strasbourg, à qui je l'ai montrée cette année [illegible] la localité, la confond mal à propos avec le *Viola pumila* Villars, [illegible] le *V. pratensis* Albert et Koch, en prenant de petits échantillons pour le premier et de plus grands pour le second.

On peut décrire notre plante comme il suit:—

Viola Billotii: Caulibus erectis glaberrimis, foliis inferioribus ex [illegible] ovata, superioribus e cordata basi oblongo-lanceolatis, stipulisque [illegible] tenuissime pubescentibus, petiolo superne subalato, stipulis caulinis intermediis lanceolatis, foliaceis basi profunde serratis, petiolum [illegible] aequantibus, longioribusque, sepalis acutis, calcare subtili, appendices [illegible] alteis subaequante.

Viola alsatica Schultz exsicc. 1833. *Viola pumila* Mutel, Flore française, tab. suppl. 1. fig. 1, 1836, non Villars nec Chaix.

[p. 5.] Exemplaria minora. *Viola pratensis* Mutel, l. c. t. suppl. 1. fig. 2, 1836, non Mert. et Koch.

Exemplaria majora.

In pratis paludosis planitierum Alsatiae, prope Argentoratum! (Schultz) Maio, Junio.

Flores e lilacino pallide coerulei, calcar laete virens. Folia, uti tota planta, succulenta, nervis semipellucida. Differt a *Viola stagnina* Kit. stipulis caulinis intermediis multo majoribus; a *V. elatiori* Fries, caulibus glaberrimis; a *V. pratensi* M. et K. foliis superioribus basi cordatis; a *V. Ruppii* All. et *V. lancifolia* Thore, calcare breviore; a *V. pumila* Chaix et Villars, et a *V. canina* L. diversissima uti a *V. sylvestri* Lam., *V. Riviniana* Rchb., *V. arenaria* DC., etc.

[p. 6.] 16. CERASTIUM GRENIERI Schultz. Piloso-viscosum. Caule erecto vel adscendente, foliis oblongis vel ovato-lanceolatis, acutis, basi angustatis, inferioribus in petiolum angustatis, paniculae ramulis superioribus aggregatis, bracteis omnibus herbaceis, minime scariosis vel superioribus sepalisque margine angustissime scariosis, apice glabris, stria herbacea subexcurrente, pedicellis fructiferis erectis vel subpatentibus (nunquam reflexis), calice duplo longioribus, sepalis ovato-lanceolatis acutis, petalis subbifissis, calicem aequantibus vel vix superantibus.

Cerast. commutatum Schultz, Herbar. in exempl. amicis 1831 communicatis et in tentamine 1833 scripto et D. J. Gay in litteris 1834 communicat.

α. *obscurum*, atro-virens, bracteis omnibus herbaceis, minime scariosis. *C. obscurum* Chaub. in St. Am. Fl. Agen. 18, t. 4. f. 1 et in Arch. de bot. *C. viscosum* Dub. B. G.; DC. Prodr. 416, 14 ex parte.

β. *pallens*, pallide-virens, bracteis superioribus margine scariosis. *C. pallens* Schultz, Herb. et in exempl. amic. communic. 1830. Individua minora sistunt *C. pumilum* Curt. Lond. fasc. 6, t. 30; Mert. et Koch; Koch, Syn. 122; Reichenb.

C. semidecandrum Lois.; Link; Pers. Syn. *C. semidecandrum*, β. Smith. *C. ovale* Bess.

α. In apricis saxosis, pascuis et agris prope Metz! (Leo) Lotharingia prope Lutetiam! (avec le *C. litigiosum* dans le bois de Boulogne, Grenier) et aliis locis Galliae, inque Britannia (Chaubard).

β. In pascuis et agris arenosis prope Bitche! (Schultz) et Metz! (Leo) Lotharingiae, Galliae, Palatinatus, prope Bipontum: (Schultz), Guestphaliae, Silesiae, etc. Angliae (Curt.) etc. Maio—Ann.

[p. 6.] 21. ILEX AQUIFOLIUM L. var. NANA Schultz. Cette forme est si remarquable qu'elle a déjà été observée il y a trois siècles, per H. Bock (Tragus) sur la même localité où je l'ai aussi observée et où nos échantillons ont été recueillis par M. Billot (Conf. H. Hier. Bock Kreuterbuch, Strasburg MDLXV, p. CCCXCij. "Walddistel Stechpalmen." "Welcher baum an ettliche Walden, als im Ydar, naher dem berghausz Veldenz, gegen der Moselen, sehr hoch und gross auffwechstzt, an deren beurnen gleich, doch bleiben derselben auch zum theyl nidertrechtig, als im Hagenauer Forst, gleich vie andere Hecken"). Je l'ai aussi trouvé sur le grès vosgien dans les forêts montueuses entre Bitche, Sturzelbroun et Eppenbroun. Les botanistes modernes de l'Alsace ne connaissent que la grande variété, qu'ils n'indiquent que dans les montagnes.

[p. 7.] 47. Je dispose maintenant mon HIERACIUM MUTABILE, comme il suit:—

Hieracium mutabile Schultz, manusc. et in Mutel Fl. fr. II p. 225[1].

α. *glabratum.*

A. Astolonum. *H. praealtum* Villars. On peut distinguer de celui-ci deux formes: la forme ordinaire et le *H. obscurum*, Rchb.

B. Stoloniferum. *H. Bauhini* Schultes.

β. *intermedium.* *H. pratense* Tausch.

δ. *Villosum.*

A. Astolonum. *H. fallax* Willd. Je réunis à celui-ci les *H. cymigerum* Rchb. *H. setigerum* Tausch, etc., mais je ne sais encore si l'on peut y rapporter aussi le *H. cymosum* L. et le *H. piloselloides* Vill., la culture de ces deux derniers dans le jardin nous en instruira.

B. Stoloniferum. *H. collinum* Gochn.

[p. 8.] 63. OROBANCHE MINOR L. J'ai découvert en 1833 près de Dorlisheim, dans le dept. du Bas-Rhin, un *Orobanche* bien voisin de celui-ci et que j'ai reconnu de suite pour une nouvelle espèce. Un orage m'a empêché de chercher la plante-mère en me forçant à me retirer à la hâte de la montagne. Je lui ai donné le nom d'*Orobanche alsatica*, en attendant que je puisse revenir une autre fois sur place, et d'y renouveler mes recherches. C'est encore la raison pour laquelle je n'ai pas publié ma découverte. M. Kirschleger à qui je l'ai montré l'an dernier, en lui faisant part du nom que je lui avais donné, me disait qu'il avait trouvé dans le temps un *Orobanche* semblable au mien, mais qu'il ne l'avait encore ni déterminé, ni nommé, et que c'était sans doute le même. Je lui repliquai qu'il était libre de donner un autre nom à sa plante, fût-ce même mon *O. alsatica*, parceque je n'avais pas encore publié ce nom. Quelque temps après M. Kirschleger m'envoya un exemplaire de sa plante sous le nom d'*Orobanche alsatica* Schultz; mais l'année suivante, dans son Prodrome, il imprima *Orobanche alsatica* Nobis, par conséquent, Kirschleger. Je conserve la plante qu'il m'a envoyée avec l'étiquette écrite de sa propre main, afin de prouver qui a déterminée et nommé l'*Orobanche alsatica*. Le même jour et sur la même montagne où j'ai découvert l'*O. alsatica*, j'ai aussi trouvé une nouvelle localité de mon *O. Teucrii*, à propos duquel il est dit, par une faute d'écriture, dans la Bot. Zeit., *Stylus albus*, au lieu de *phoeniceus*. M. Mutel, dans sa Fl. fr., nouvelles additions au tom. II. 417, dit: "M. Schultz vient aussi de donner un nouveau détail de la fleur dans la Bot. Zeit., 1836." Est-ce une nouvelle faute d'impression comme pour les *Orcaea* (???). C'est dans la Bot. Zeit. du 7 avril 1835 et non 1836, que j'ai donné la figure et la nouvelle description de mon *O. Teucrii*.

[p. 8.] 83, 84, 85. Nous donnons trois espèces de la famille des Liliacées dont deux *Gagea*. J'ai eu le plaisir de déterminer deux espèces nouvelles pour la Flore française, dont une même n'a pas encore été décrite. C'est la *Gagea Soleirolii* Schultz, dont j'ai fait une figure; le manque de temps m'empêche de la donner dans cette première centurie, je la réserve pour la seconde. J'en donne ici cependant une petite description telle que celle que j'ai communiquée dans le temps à M. Mutel pour l'insérer dans sa Flore française.

Gagea Soleirolii Schultz. Bulb. 2; foliis radicalibus binis, erectis, filiformibus, subfistulosis, acuminatis, medio latioribus, caulinis binis alternis, erectis, apice scapo adpressis, lanceolatis, acuminatis, floro terminali, solitario, sepalis lanceolatis acuminatis, pedunculo (uti tota planta) glaberrimo.

Synon. et Icon. *Ornithogalum Soleirolii* Schultz in litteris et in "Flore française de Mutel."

Differt a *G. minima* et *fistulosa* fol. radicalibus 2; a *G. bohemica* fol. erectis et sepalis lanceolatis acuminatis; a *G. saxatili* iisdem caracteribus et pedunculis glaberrimis; a *G. arvensi*, floribus solitariis, foliis caulinis 3 alternis, pedunculis glaberrimis.

Habitat in montibus Corsicae, cum *G. fistulosa* et *saxatili*: "croît sur les rochers couvertes d'un peu de terre dans les hautes

montagnes, à 2200 metres d'élévation, c'est à dire, pas loin des neiges éternelles." (Soleirol in litter.)

Nomen dedi in honorem cl. Soleirol qui hanc speciem in Corsica invenit et mihi (cum *G. fistulosa* et *saxatili*, sub nomine *Ornith. fistulosi*) communicavit.

L'autre espèce nouvelle pour la Flore française est la *Gagea saxatilis* Koch, communiquée par M. Guépin, sous le nom d'*Ornithogalum bohemicum*, de l'Ouest de la France, et de M. Soleirol, sous le nom de *O. fistulosum* de la Corse. Elle est commune sur les collines pierreuses et sur les rochers exposés au soleil, à Durckheim, Kirchheimboland, Winnweiler, Kreutznach, Bingen, etc., dans les pays qui bordent le Rhin; et je pense que c'est aussi l'*Ornithogalum* qu'un botaniste alsacien, dont je possède un manuscrit, a trouvé en 1800 sur un rocher de la montagne Sainte-Odèle, près de Barr.

In the notes accompanying the Fifth Century of plants distributed in 1842, reference is made to the following plants which were noted in the First Century, so it may be well to add these :—

[p. 4.] 2. L'ANEMONE VERNALIS a été découvert par moi près de Bitche et de Pirmasens (voy. Botan. Zeitung, 1827, 667). Ces localités sont fort intéressantes pour la géographie botanique. Il ne s'y trouve que sur le grès vosgien et ne s'éloigne pas de plus de deux lieues de la crête de notre branche des Vosges. Je l'ai trouvé sur le versant occidental, dans les bruyères et les forêts (de la plaine et non sur les montagnes), à Bitche, très près de la ville (au pied des collines, plus rare sur le sommet), entre Egelshardt et Haspelscheid, près d'Eppenbroun, etc., et sur le versant oriental à Waldeck, Ludwigswinkel, Fischbach, etc. A Bitche, il se trouve presque toujours avec le *Daphne cneorum*, et il y mérite bien l'épithète de vernalis ; car c'est lui qui annonce le printemps ; il y fleurit en mars et avril dans les années ordinaires, et quelquefois même en février dans les années précoces. Il ne se trouve dans aucun endroit des Vosges autre que ces localités, et dans la même chaîne de montagnes, à quinze lieues plus au nord, dans les lieux déjà indiqués par Pollich et Koch, à Kaiserslautern et Hochspeier où je l'ai aussi recueilli autrefois. Il ne se trouve ni dans les autres parties des Vosges, ni dans la Forêt-Noire, ni dans aucun pays des bords du Rhin, depuis les frontières de la Suisse jusqu'en Hollande.

[p. 7.] 46. HIERACIUM FLAGELLARE Willd. J'ai observé en Alsace plusieurs formes de cette plante. Dans la plaine je l'ai toujours trouvée *flosculis omnibus tubulosis*, et dans les montagnes *flosculis ligulatis*. Du dernier j'ai fait la var. *α* et du premier la var. *β*. On trouve les deux variétés : *stolonibus floriferis et stolonibus sterilibus*. On les trouve même quelquefois sans aucune trace de stolon. Dans la *Flore française* de M. Mutel, le *H. Pilosello-auricula* Schultz est rapporté mal à propos à cette espèce (Conf. Mut. Fl. fr. II. 236). C'est une hybride bien différente, dont je donnerai une description et une figure dans notre seconde centurie. J'ai découvert cette plante intéressante en 1828 aux environs de Munich. Je donnerai également dans notre seconde centurie une description et une figure de *H. Pilosello-praealtum* Schultz, hybride entre les deux espèces dont il porte le nom. J'ai découvert cette belle plante à Illtalie, parmi ses congénères.

Another note by Ed. Bonnet, made in 1882, on the last page of his copy of the *Archives* seems to be worth putting on record :— "M. Schultz a publié : pages 1–76, 79–142, 167–186, 207–258, 283–286. J'ai publié : 77–79, 143–166, 187–206, 259–282, 287–350. C. Billot." "Copie d'une note autographe inscrite par Billot sur son exemplaire ; ce volume fait aujourd'hui partie de la bibliothèque de M. Cosson."—C. E. SALMON.

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

ERYTHRÆA SCILLOIDES.—The *Botanical Magazine*, cliii. pt. 2, tab. 9137 (1928), includes a plate by Miss Snelling and an account by Dr. Stapf of *Erythræa scilloides* Chaub. This plant was first noticed in Britain by Mr. I. B. Rhys, of Tenby, on cliffs in New Port Bay, Pembrokeshire, S. Wales, in 1918. Mr. Rhys, having called the attention of Mr. J. E. Arnett, a keen student of the South Wales flora, to it, the latter procured specimens which eventually led to the identification of the plant and to its inclusion in the British flora. This species has been involved in a redundant and conflicting literature. Its distribution is the littoral of N. Portugal and Spain, Galicia, Brittany, the Cherbourg peninsula, and, as just stated, S. Wales, where it was found in association with *Armeria*, *Thymus Serpyllum*, *Plantago Coronopus*, and other herbage covering a small piece of ground on the face of a cliff, partly slate and partly shale, about 30 m. from the sands, whilst above the cliff there were wide expanses of bracken, heather, and furze. The plant is a perennial glabrous herb, throwing up from a very slender rhizome small loose tufts of prostrate or ascending stems from a few to 30 cm. long. The calyx is tubular, 7–9 mm. or ultimately 10 mm. long, divided to or beyond the middle, the lobes linear-subulate, acute; corolla bright pink or in the Azores specimens commonly, in the continental rarely, snow-white ; tube cylindrical for 6–10 mm., then very shortly funnel-shaped with ovate-elliptic segments, blunt, 5–8 mm. × 2·5–5 mm. broad. Dr. Stapf carefully discusses the history of the plant. E. G. B.

FLORA OF GUERNSEY (La Société Guernesiaise, Report & Transactions, x. pt. 1 (1927) ; Report of the Botanical Section for 1926).—Several new additions were made to the Guernsey Flora during 1926, of which two were particularly interesting. One was a fungus, *Taphrina insititiæ*, found on the fruit of wild bullace, the other an aquatic plant, *Ceratophyllum demersum*, found growing in a muddy

pond at L'Ancresse. Although the latter is not absolutely a new record, it is the first authentic report of the existence of the plant on the island since 1865.

Many rare plants were also found. *Gymnogramme leptophylla* was discovered in March, growing in its old locality, St. Saviour's parish. *Scandix Pecten-Veneris* was found near Rocque Poisson in June by Mr. M. Torode. A rare fungus, *Clathrus cancellatus*, was found in July by Miss B. Reid. In August Mr. Rowswell and Mr. Torode sent specimens of the cream-coloured knapweed from the Corbière, determined later by Dr. Druce as *Centaurea nemoralis* var. *pallens* Koch. In September a large patch of *Cicendia pusilla*, one of the most cherished rarities of Guernsey, was found. Various other rare and interesting plants are recorded, and a list of the year's new records is set forth at the end of the botanical account.—E. G. B.

Contribution to the Study of *Asarum europæum* L.—Albert Leemann (Bull. Soc. Bot. Genève, xix. fasc. 1, pp. 92–173 (1927)) has made a careful study of the anatomy and development, especially the development of the secretory cells, of *Asarum europæum* L., which is illustrated with 4 plates and 129 figures.

Figs. 1–6 show the development of the plant from germination to the adult stage: figs. 7–13 the growing point and the development of the leaves.

The theory of Tschirch regarding the secretory cells is fully discussed; figs. 26 and 27 show a secretory cell in the living condition and after treatment with alcohol respectively. Figs. 28–34 show secretory cells from *Chimonanthus præcox*, *Laurus nobilis*, and *Cinnamomum Camphora*, and figs. 35–57 the development of these cells in these plants and also in *Asarum*. The author concludes that the hypothesis of Tschirch that the cell-wall is the seat of development of essential oils is untenable.

Figs. 58–63 show the development of the stomata and figs. 64–70 the stomata in section. Figs. 71–72 deal with the polymorphism in the leaf and nervation of *Asarum*. Figs. 78–81 are diagrams showing the successive appearance of the rudimentary petals, figs. 82–92 deal with the development of the flower, and figs. 93–97 that of the pollen. In fig. 105 the position of the stamens before anthesis is shown, and in fig. 106 the position after anthesis. Figs. 116–120 show the dehiscence of the fruit, figs. 121–124 the carpel and seeds, figs. 125–126 the development, and figs. 127–129 the structure, of the aril.—E. G. B.

The Service Tree.—In *Gard. Chron.* (Dec. 24, 1927, p. 504) is an interesting note by Mr. C. Nicholson on a fine specimen of the true Service Tree (*Pyrus domestica*) at Hale End, Chingford. Excellent photographs are given of the tree in summer and winter, and enlarged details of its bole, flowers, and fruit. The tree is about sixty-five feet high, with a trunk of three feet six in diameter, five

feet from the ground. Its leaves are very similar to those of the Mountain Ash, but their serrations are much more acute.—C. E. S.

Some Flowers and their Dipteran Visitors.—E. and H. Drabble (*New Phytologist*, xxvi. 115–123) make a valuable addition to our knowledge of insect-visitors to our British flora, recording personal observations. These are classed according to the type of flowers visited:—A. Flowers with nectaries freely exposed; B. Flowers with nectaries concealed by scales; C. Flowers with nectaries concealed by bases of stamens; D. Flowers with nectaries concealed within the corolla; E. Flowers without nectar.—C. E. S.

OBITUARIES.

Robert Miller Christy (1861–1928).

Mr. Robert Miller Christy, whose death took place on Wednesday, January 25, at the Middlesex Hospital, following a serious operation, was an original observer of great acuteness and intelligence, interested in many branches of Natural History and Archæology, and especially with everything connected with his home county of Essex. The eldest son of Mr. Robert Christy, of Chignal St. James, near Chelmsford, a prominent member of the Society of Friends, he was born on May 21, 1861, and was educated at the well known Friends' School at Bootham, York. We learn from one of his contemporaries that he was keenly interested in ornithology in those days. Bob Christy, as he was then called, was short-sighted, and, on one school-excursion, inadvertently left his spectacles behind, and was irate beyond measure with those who, having no defect in eyesight, would not observe and report to him all the birds which he was sure were to be seen.

In 1880, when only 19, he was chosen a member of the Tuke Government Emigration Commission in connection with the Irish famine to go out and establish Irish peasants in Canada. A collection of plants made by him in Manitoba was presented to the Natural History Museum.

Christy was an original member of the Essex Field Club and a frequent contributor to *The Essex Naturalist*. He was President of the Club from 1905–1907, and was afterwards elected a permanent Vice-President. In 1887 he compiled a valuable 'Handbook of Essex' in which every parish was carefully summarised. He is said to have visited personally every parish, and he had a practically complete collection of rubbings of Essex church-brasses. He was for many years a member of the Council of the Essex Archæological Society, and was also a founder (1910) and Secretary of the (now defunct) Morant Club, and only last year he superintended the

excavation of a Roman temple at Harlow. In 1890 he wrote an account of the Birds of Essex, and in 1910, in conjunction with Miss Thresh, he wrote an account of the Mineral Waters and Mineral Springs of the county.

In 1894 he edited for the Hakluyt Society the voyage of Capt. Foxe and Capt. T. James in search of a North-West Passage (1831–32).

He was elected F.L.S. in 1889, and was a frequent attendant at the meetings of the Society, to which he communicated (June 1897) what is probably his best-known and most important botanical paper—"*Primula elatior* in Britain; its Distribution, Peculiarities, Hybrids, and Allies." He showed that the Oxlip occupies a definite and sharply-defined area, within which it grows in great abundance. While the Primrose grows abundantly all round the area occupied by the Oxlip, it is entirely absent from that area, but along the mutual boundary-line which separates the two species they produce hybrid forms in great abundance; on the other hand, the Cowslip grows abundantly not only all round but throughout the area occupied by the Oxslip, and the two very rarely hybridize.

In 1921 he communicated a paper on "The Pollination of the British Primulas," in which he discusses the insect-visitors to our three Primulas, dividing them into four groups, based mainly on the length of their tongues. He states that about 57 in all have been recorded, but in his conclusion suggests that there seems no alternative but to fall back on Darwin's hypothesis that pollination is effected normally by night-flying moths, and he gives the various considerations supporting this view. In the same year he communicated to the Society an account of Wistman's Wood, that small and unique grove of ancient and diminutive oak-trees (*Quercus pedunculata*) about two miles north of Two Bridges, almost in the centre of Dartmoor.

In 1924 he contributed to the *Journal of Ecology* a detailed account of the Hornbeam (*Carpinus Betulus* L.) in Britain, and described a new variety, *parvifolia*.

He was for many years a partner in Messrs. Hayman, Lillie, Christy & Co., but retired some ten years ago. He was also an expert on the subject of tinder-boxes and bygone lighting expediences, and was recently called in by Messrs. Bryant & May to arrange and catalogue their museum of fire-making appliances.

From the foregoing remarks and from the Bibliography which we append it will be seen that Miller Christy led a very busy, active, and useful life; unfortunately, his outlook was latterly somewhat embittered by financial troubles.

It is given to few to write with such acuteness and intelligence on so many and varied subjects; and he will be much missed by his numerous friends.

He was buried on Saturday, January 28th, at Chignal St. James. —E. G. Baker.

Principal Botanical Bibliography.

1888. *Arum maculatum*. [With H. Corder.] Journ. Bot. 235, 263.
1891. Species of *Primula* in Essex. Trans. Essex Field Club, iii. 148.
1893. Heterostyled Plants. Journ. Bot. 49.
1895. Rate of Increase of Fairy Rings. Journ. Bot. 285.
1897. Botany of Manitoba. Journ. Bot. 271, 290.
1901. Bardfield Oxlip. Essex Nat. v. 123.
1906. Ancient Oak at Chignal St. James, with Observations on the Field-name of "Puttocks Lees." Essex Nat. ix. 108.
1907. *Primula elatior* in Britain—its Distribution, Peculiarities, Hybrids, and Allies, with map. Journ. Linn. Soc. xxxiii. 172.
1908. Observations on Seasonal Variations of Elevation in a Branch of a Horse-Chestnut. *Ibid.* 501.
Two Interesting *Primula* Plants. Essex Nat. x. 307.
Lathyrus Nissolia in Essex. *Ibid.* 336.
1909. Essex as a Wine-producing Country. Essex Nat. xi. 34.
1904. *Asplenium Ruta-muraria* in Essex. Essex Nat. xiii. 207.
1907. Presidential Address, Essex Field Club. Essex Nat. xv. 44.
1910. Abnormal Fruiting of the Common Elm. Essex Nat. xvi. 73.
Lathyrus tuberosus on Canvey Island. *Ibid.* 115.
Lathyrus tuberosus in Britain. Journ. Bot. 170.
1911. Dr. Benjamin Allen of Braintree, a forgotten Essex Naturalist. Essex Nat. xvi. 145.
Gregarious Fungus in Essex. *Ibid.* 287.
1912. More about Dr. B. Allen. Essex Nat. xvii. 1.
1913. Ray, Dale, and Allen. *Ibid.* 129.
Former Cultivation of Woad in Essex. *Ibid.* 144.
1914. The Indifferent Coiling of *Arum* Spathes. Journ. Bot. 258.
1915. Witches' Brooms on British Willows. Journ. Bot. 97.
1917-18. John Gibbs (1822–1903), an Essex Botanist. Essex Nat. xviii. 89, 203.
1919. *Carduus* (*Cnicus*) *palustris*. Journ. Bot. 20.
1919-20. Samuel Dale, of Braintree, and the Dale Family (with portraits). Essex Nat. xix. 49.
Fungus on Oak Stem. *Ibid.* 48.
1921. Æneas MacIntyre, a forgotten Essex Botanist. *Ibid.* 267.
Wistman's Wood. Proc. Linn. Soc. 1921, 9.
Flowers of *Tragopogon*, Times of Opening and Shutting. Journ. Bot. 253.
Hieracium aurantiacum L.—a Case of Protective Coloration. *Ibid.* 288.
1922. Flowering-times of some British Elms. Journ. Bot. 36.
An Early Hudson Bay Collector (Thomas Hutchins). *Ibid.* 336.
Pollination of the British Primulas. Journ. Linn. Soc. xlvi. 105.
Origin of the Hybrid *Primula elatior*×*vulgaris*, with Notes on other *Primula* Hybrids. New Phytol. xxi. 293.
Ancient Dwarfed Oak Woods of Dartmoor [with R. Hansford Worth]. Trans. Devon Assoc. liv. 291.
1923. The Common Teasel as a Carnivorous Plant. Journ. Bot. 33.
Primula vulgaris var. *caulescens*. New Phytol. xxii. 233.
1924. The Hornbeam in Britain. Journ. Ecol. xii. 39.
The Garden *Polyanthus*—its Origin and History. Journ. Roy. Hort. Soc. xlix. 10.
Stinkhorn Fungus at Grays. Essex Nat. xx. 110.
The Common Polypody in Essex—Why is it decreasing? *Ibid.* 287.
1925. *Arum italicum* in Essex. Essex Nat. xxi. 133.
1928. A remarkable Gall on the Osier. Essex Nat. xxii. 69. The same number of this journal (issued March 1928) contains an obituary notice with a photograph.

William Andrew Shoolbred, M.R.C.S.

(1852–1928).

William Andrew Shoolbred was born at Wolverhampton on March 11th, 1852, and was educated at Wolverhampton, Edinburgh University, and London University. He was House Surgeon at St. Bartholomew's Hospital, and thence he went to Chepstow in 1878–9 as Assistant to Dr. White, whom he succeeded in the practice and where he spent the remainder of his life. He was elected F.L.S. in 1902.

In 1920 he published a *Flora of Chepstow*, including the surrounding districts, and he was in correspondence with many botanists, particularly in regard to the habitat of rare plants which he had gathered; so much so that he used to warn us not to reveal the locality where some of them could be found, lest the greedy should extirpate them entirely.

Dr. Shoolbred was a great friend of my father, the Rev. E. S. Marshall, and they made botanical excursions together in Scotland and Ireland almost every year from 1894 till 1916. They used the same method of drying plants on newspaper trays between sheets of thick grey blotting-paper, ventilating their presses by means of wooden "grids" and changing the blotting-paper frequently. Whenever possible they commandeered the Hotel billiard room and table for this purpose, as it gave more room to change and dry their papers undisturbed. *Hieracium Shoolbredii* E. S. Marshall (Journ. Bot. 1913, 121) was dedicated "to my old friend W. A. Shoolbred, in whose company the whole series was collected."

Dr. Shoolbred was especially interested botanically in the trees and shrubs of the British Isles, and in Rubi and Hieracia, and horticulturally in Rock Plants and Primulas. At his home, St. Ann's, Chepstow, he had a wonderful garden, sloping steeply from west to east and bounded by the Castle Dell. The garden was full of rare plants and he added constantly to their number, and raised a great many rare Primulas and Lilies for his friends. He died at his house on January 25th, 1928.

Dr. Shoolbred's recognition of *Lathyrus tuberosus* in a bunch of wild flowers at a local flower-show in August 1926 led to the addition of another County (Monmouth) to those in which this species is known as an introduction (see *Gardeners' Chronicle*, lxxxiii. (1927) 73. Phyllis M. Marshall.

Laurence Athelstan Molesworth Riley

(1888–1928).

We regret to record the death, on March 13th, in his fortieth year, of Laurence Athelstan Molesworth Riley, known to readers of this *Journal* by papers on "Meristic Floral Variation in Galieæ" (Journ. Bot. 1922, 230; 1924, 20), "Variable Æstivation of *Ranunculus bulbosus* and *R. acer*" (Journ. Bot. 1923, 209), and "A Recension of *Lopezia*" (Journ. Bot. 1924, 7). Laurence Riley's botanical work was

concerned largely with the flora of Tropical America, his first important publication in this field being "Contributions to the Flora of Sinaloa" (Kew Bull. 1923, 103, 163, 333, 388; 1924, 206), a critical account of the Polypetalæ recorded from that Mexican State. As Botanist to the 'St. George' Pacific Expedition, 1924–5, he visited Madeira, Trinidad, and Panama, and described the botanical results of the Expedition in a series of papers on the collections formed in these places, and in the Galapagos Islands and Rapa (Kew Bull. 1925, 26, 183, 216; 1926, 51; 1927, 119). Riley was never robust, and from an early age had suffered from chronic asthma, but his death came as a shock to his many friends, who had not realized that it was only his indomitable spirit which enabled him to carry on. Additional details of his life and botanical work will be given in an early issue of the *Kew Bulletin*.—T. A. S.

Mr. John Weathers, a familiar figure in horticultural circles, who died at Isleworth on March 10, was born in Co. Cork (June 17, 1867), but migrated to Isleworth as a boy of eight. He came under the notice of the late Mr. James Britten, who was instrumental in starting him on the career to which his life was devoted. Beginning as a Kew Gardener, he was subsequently for some years Assistant-Secretary to the Royal Horticultural Society under the late Rev. W. Wilks. Later he took up market-gardening at Isleworth, where he spent the whole of his working life, taking an active part in local interests and institutions. He was for several years Horticultural Lecturer for Middlesex. He had a wide knowledge of horticulture and was the author of many works on practical gardening; one of his latest works, *My Garden Book*, was reviewed in this Journal in 1925 (p. 153). His *Practical Guide to Garden Plants* is described by a writer of an appreciation in the *Gardeners' Chronicle* (March 17) as "one of the most useful general works on gardening ever published, and a book that could only have been written by a trained observer who carefully indexed his notes."

George Flemwell, whose death at Lugano, on March 6, is reported, was a professional artist who at first specialized in figure subjects, exhibiting regularly at the Royal Academy, but devoted his later years to the Swiss Alps and their flora. He prepared the plates for H. S. Thompson's *Sub-Alpine Plants of the Swiss Woods and Meadows* (1912) and also wrote and illustrated two works of his own, *Alpine Flowers and Gardens* (1910) and *The Flower-fields of Alpine Switzerland* (1911). He was born at Mitcham, Surrey, May 29, 1865.

POLLINATION OF ORCHIDS.

In 1925 Col. M. J. Godfery gave an account in this *Journal* (p. 33) of the remarkable observations of M. Pouyanne on the method of pollination in three species of *Ophrys* in Algeria, which, in the case of *O. fusca*, had been confirmed and extended by himself at Hyères on the French Riviera (see also Journ. Bot. 1927, 350;

1928, 35). The behaviour of the visiting bee, a male, strikingly corresponded with its behaviour when visiting a female of its own species, to the form or coloration of which some resemblance can be traced in the flower of the Orchid.

Col. Godfery's reference to the matter in his paper on the classification of the genus in the February number of the *Journal* has brought a most interesting letter and a reprint of a communication to *The Victorian Naturalist* (xliv. 20, May 1927) from Mrs. Edith Coleman, of Blackburn, Victoria, Australia. In this communication Mrs. Coleman describes certain remarkable actions, first noticed by her daughter, early in January 1927, on the part of a wasp which she had observed visiting the flowers of a small ground-orchid, *Cryptostylis leptochila*. The wasp was identified as *Lissopimpla semipunctata* Kirby, an Ichneumon-fly.

We take the liberty of quoting freely from Mrs. Coleman's paper:—

"At Upwey and Belgrave, where *C. leptochila* is fairly numerous, we watched many of these insects visiting the flowers, and always they *backed* into them. They seemed to come from the trees, never from the ground, and each would dart instantly into a flower, *backwards*, without any attempt to locate a possible victim in the shape of a moth-lava and with no apparent interest in any flower than the one selected.

"After backing into the stigma, the end of the wasp's body took an inward falcate curve, and the base of the flower's labellum appeared to be gripped by the claspers. This curve of the end brought the abdomen just in position for the upper surface, at about the second last ring, to rest on the flower's prominent rostellum, with its dark-coloured disc. The insect quivered for a moment, and then became motionless. After a second or two it freed itself, with an apparent effort which shook the flower. Resistance could be plainly felt when we withdrew the insect with our fingers. In every instance, when we gave it time enough, the effort was sufficient to release the pollinia, which, with the viscid disc, were carried off by the insect on the tip of its abdomen, never on any other part of the body. Owing, no doubt, to this resistance, pollen was frequently deposited on the stigma of the same flower, and more was probably carried to the stigma of the next flower visited. Some of the insects bore pollen before they entered our flowers, while others took away more than they brought. It took at least a second to complete the act, and if we disturbed the wasp too soon, no pollen was abstracted.

"Though, to our senses, the perfume of the Small Tongue-Orchid is not very pronounced, I think it may, in the first instance, lure the insects to the flowers from quite a distance, for most of my experiments have been made on very hot days, when orchid-perfumes are usually more powerful, and when there has been a breeze. But I think it cannot be scent only, for the insect has no further interest in a flower once the dark brown disc has been removed, though the perfume has possibly not decreased with its removal. Can it be that the rostellum, with its dark disc, holds the key to the solution? Roughly, in shape and colouring, the labellum somewhat resembles the body of the insect visitor. As the flower matures, the curve taken by the labellum with its upright posterior margins so exactly meets the needs of the wasp that one is easily tempted to hazard a theory.

"From the shape and structure of its essential organs, the service of an agent is necessary in the pollination of this orchid, whether with pollen brought from another plant or pollen from the same flower. So far as the benefit to the orchid is concerned, I am satisfied, but I am not an entomologist. The only facts we feel that we have confidently established are:—

"(1) That *Lissopimpla semipunctata* visits the orchid purposely, and enters the flower *backwards*.

"(2) That it successfully effects pollination, and therefore can be regarded as the orchid's agent—possibly its only one. Though most of the insects were identified as males, we searched the flowers for trace of eggs or moth-larvæ, but the microscope revealed nothing.

"What, then, was the payment exacted by the insect for the service it undoubtedly rendered? The fact that it is not deterred by any slight discomfort from making subsequent visits, would suggest that it has in some way received payment for its former visits."

Mrs. Coleman's paper is illustrated by two photographs, showing the insect in the act of visiting the flower.

PRESERVATION OF WILD FLOWERS.

A VIGOROUS plea for the preservation of the native flora is made in the current number of the *Journal of the Botanical Society of South Africa* (part xiii. 1927), edited by Prof. R. H. Compton, Director of the National Botanic Gardens, Kirstenbosch. The senseless destruction of wild flowers by burning, uprooting, and in other ways—such, for instance, as the subjects of competitions—threatens the extinction of heaths, orchids, and other items characteristic of the Cape flora. Wild-flower Shows are held responsible for wholesale destruction, "on the pretext of producing a good show for the good of the town, collectors pillage the veldt in a way that they would not tolerate for a moment if the flowers were growing in their own gardens. The result is far from being a credit to the people of the district, however gorgeous a display may be produced for a few hours." Commerce in wild flowers is a constant factor in their destruction; many of these are protected, but while it is a legal offence to sell them, it is no offence to buy them, "and the chief effect of the Wild Flower Protection Ordinance seems to be to put up the market price of the flowers."

The London *Times* has during the past month opened its columns to correspondence on the same subject. Attention is again drawn to the extirpation of rarities by collectors, "Nature Students," and

others, as well as to the more or less wholesale extermination of foxgloves, primroses, and the like by hawkers and motorists. The General Secretaries of the British Association refer to action taken on the motion of the delegates of local societies in correspondence with it at the Leeds meeting last year. The Council "has issued a circular letter to 311 education authorities in England and Wales inviting their support in strengthening and extending the movement for the preservation of wild flora." Up to the present (March 9) replies have been received from 42 authorities, of which ten indicate that appropriate advice is, or has been, given to teachers and in schools, and 22 undertake to bring the matter to the notice of teachers. A committee of the botanical section was also appointed "to co-operate with other bodies in furthering the preservation of rare plants in Britain." We shall look forward with interest to the report of this committee at the next meeting of the Association.

Meanwhile, we learn from the *Gardeners' Chronicle* (Feb. 25, p. 130) that in Germany the Baden Minister of Education has placed under legal protection a number of wild plants which are becoming more rare and are in danger of extinction. The list includes about 40 species, in addition to all kinds of Orchids, all Ericas, and all species of *Gentiana*.

SHORT NOTES.

RUMEX GLOMERATUS Schreber.—As this name has been introduced into our Floras and the 'London Catalogue,' it may be well, in order to prevent further confusion, to show that it is invalid. In the 'Cambridge Flora' *glomeratus* was used and quoted from Schreber's Spicil. Fl. Lipsiæ of 1771, on the assumption that it preceded *R. conglomeratus* Murray, Prod. Stirp. Gott. 52, the date in the Camb. Flora being wrongly given as 1796. As a matter of fact, Murray's *Stirpium* was issued in 1770, and therefore precedes Schreber's name by one year. The new combinations of sub-var. *divaricatus*, *R. crispus* × *glomeratus*, *R. glomeratus* × *maritimus*, *R. glomeratus* × *obtusifolius*, and *R. glomeratus* × *pulcher* therefore sink into synonymy. As regards the sub-var. *divaricatus*, it is a question whether it deserves the full varietal rank which was given it by Wallroth (Sched. Crit. 157, 1822), who there named it var. *pycnocarpus*, characterised by branches and spikes more or less divaricate. Rouy gives it the same rank, but as var. *divaricatus* Bluff & Fingerhuth (Fl. Germ. 482, 1825), which is a later name. Moreover, it seems to be based on Thuillier's *divaricatus*, which itself is invalid, since there was an earlier Linnean species of that name. If retained as a var. or sub-var., Wallroth's *pycnocarpus* appears to have preference.

In the Cambridge Flora *R. limosus* Thuill. is used to represent our British plant, but Danser has shown that Thuillier's plant is a hybrid, and is not the same as our British plant, for which Smith's name *palustris* should be used. × *R. limosus* may also be British. Under *Rumex Hydrolapathum* Huds., var. *latifolius* (Borr.) Trimen, 1874, is given as equivalent to *R. maximus* Schreber. This is not the case: *latifolius* is a hybrid of *R. Hydrolapathum* × *obtusifolius* × *R. Weberi* Fischer-Benz. in Prahl, Krit. Fl. Prov. Schles.-Hols. ii. 186 (1889–90). If the earliest trivial is to be used, we should read *R. Hydrolapathum* × *obtusifolius* = × *latifolius* (Borr. ex Trimen).

G. CLARIDGE DRUCE.

PRESERVATION OF HERBARIUM SPECIMENS.—From *Le Monde des Plantes*, Nov.–Dec. 1927, we venture to take the following method, devised by M. H. Sietti, a chemist, of Beausset (Var). The plants are dried in the usual way and mounted. They are then sprayed with the following preparation:—

Corrosive Sublimate	10 gr.
Commercial Formaline.....	100 gr.
Glycerine	10 gr.
Methylated Spirit, to make.....	1 litre

The specimens are then replaced in porous paper and lightly pressed for 12 to 15 hours, and then may be put into the herbarium. There is an advantage in treating the mount as well as the plant, and rarely is any trace of the solution left on the paper.

The preparation is specially useful in preserving plants the leaves of which fall off in drying, such as heaths. In this case, the plants must be wholly immersed in the liquid, in a photographic dish, then covered by a piece of glass, on which is put a light weight, such as a pebble. After two or three hours the plants are removed and dried in the ordinary way.—T. STEPHENSON.

REVIEWS.

The Flora of Oxfordshire. A Topographical and Historical Account of the Flowering Plants and Ferns found in the County; with Biographical Notices of the Botanists who have contributed to Oxfordshire Botany during the last Four centuries. By GEORGE CLARIDGE DRUCE, F.R.S. Second Edition (rewritten). 8vo, pp. cxxxi, 538. Clarendon Press, Oxford, 1927. Price 30*s.* net.

THIS well-printed volume—such as one usually associates with the Press that produced it—is uniform with the same author's *Flora of Berkshire* (1897), but sadly lacks a map, which is nowadays almost essential to realize the various Districts into which the county is divided. Its 670 pages include a large amount of interesting material that has accumulated since the first edition in 1886, but it is sad to read that "many of our local species are now on the verge of extinction .... Not only ebullient youthful nature-students, but thoughtless people of maturer age, aided by motor-cycles and motor-cars, make most wasteful ravages on the conspicuous flowers of the field. The reckless gathering of the Oxford Fritillary affords an example."

The Introduction, numbering 132 pages, contains chapters upon Topography, Soils, Agricultural Returns, Elevation of Surface, Geology (13 pages), River Drainage, Botanical Districts (18 pages), Meteorology, Botanologia (61 pages), Plan of the Flora, Herbaria consulted, etc. For Bibliography one is referred to the author's *Flora of Berkshire* and *Flora of Oxford*, ed. 1; the former work is constantly referred to throughout the *Flora* for critical notes.

It would be an advantage if the species had been numbered throughout the *Flora* as one could ascertain then, at a glance, how many species of a genus occur in the county, etc.; also the first records—which we take to be the earliest printed notice of the plant—have been confused, apparently, with first *evidences*; the latter include herbarium specimens, MS. notes, etc.

The method of recording hybrids is not easy to understand: *Viola permixta* Jord. (*odorata* × *hirta*) is given type and importance of a species, whilst *Potentilla mixta* Nolte (*procumbens* × *reptans*) may be found in small type under *P. procumbens*. Nor is it always clear as to the authorities of varieties, etc.; under *Polygonum petecticale* (Stokes) Dr. (=*maculatum* Bab.) we find "both forms, *densum* and *gracile*, occur." Are they the author's?

Shepherd's Purse is well represented in the county by fifteen of Almquist's forms; *Rubus* is also well to the fore with seventy-eight species. *Thlaspi perfoliatum* seems dwindling; "sheep and slugs are very fond of the plant, and it cannot bear the competition of grasses, etc., which drive it to the barer portions of soil." These personal observations are valuable and one would wish for more, such as the following:—*Galeopsis Tetrahit* var. *bifida* (Boenn.): "it may be a distinct species, which by long culture among corn-crops has become annual under the stress of regular agricultural operations as has *Scleranthus*." *Lamium Galeobdolon*: "Our plant is not *Galeobdolon luteum* Reichb., but *G. montanum* Reichb., with small bracts." *Potamogeton crispus* var. *serratus* (Huds.): "This is by some botanists considered to be only a young state of *P. crispus*, but I have seen it fruiting."

Cerastium vulgatum × *semidecandrum* (*C. oxoniense* Dr.) appears to be an interesting new hybrid. *Cratægus* and *Taraxacum* have been specially studied by the author. The former is represented by *C. monogyna* with ten varieties and *C. oxyacanthoides* with two; of the latter genus no fewer than fifty-five species have been discovered in the county. A new variety, *denudata*, of *Tussilago Farfara*, with young leaves free from hairs is very interesting; it is said to keep true in cultivation. Three pages are occupied with a detailed account of *Senecio squalidus*, its origin at Oxford and its rapid spread into other counties; it varies considerably, hence, var. *leiocarpus* Dr., var. (or forma) *subinteger* Dr., var. *parviflorus* W. T. Dyer, and var. (or forma) *grandiflorus* Dr. The plant also hybridizes with *S. vulgaris*. *Pulmonaria officinalis*, discovered by Lady Margaret Watney in a small wood near Charlbury, is stated to have the appearance of being native there. *Chenopodium album*, another species of special interest to the author, has thirteen varieties.

Salix Smithiana Willd. (*viminalis* × *cinerea*) has, under it, a variety *rugosa* Leefe, which is a *viminalis* × *Caprea* hybrid; this is not easy to understand. The arrangement of placing var. *ædocarpa* And. under *Carex flava* L. does not seem to us a very happy one; *C. lepidocarpa* Tausch stands as a separate species, as in the 'London Catalogue.'

Plants credited with only one station in the county include *Teesdalia*, *Spergula sativa*, *Radiola*, *Rhamnus Frangula*, *Potentilla palustris*, *Epilobium Lamyi*, *Centunculus*, and *Scirpus Tabernæmontani*. Amongst the more interesting species found in Oxfordshire we note *Thlaspi perfoliatum*, *Iberis amara*, *Viola stagnina*, *Cerastium pumilum*, *Rosa villosa*, *Apium repens*, *Sonchus palustris*, *Gentiana germanica*, *Salvia pratensis*, *Stachys germanica*, *Teucrium Scordium*, *Epipogum*, various Orchids, *Muscari racemosum*, *Fritillaria*, *Gagea*, *Eleocharis uniglumis*, *Carex tomentosa*, *Phegopteris Robertiana*, and *Nitella mucronata*. Species credited with being very rare are *Jasione montana*, *Vaccinium Myrtillus*, *Erica cinerea*, *E. Tetralix*, *Centaurium pulchellum*, *Cuscuta epithymum*, *Scutellaria minor*, *Juncus squarrosus*, *Eleocharis multicaulis*, and *Scirpus fluitans*. *Solidago Virgaurea* and *Plantago Coronopus* are very local and rare; rare also are both *Betulas* and *Carex pendula*.

Species wanting in the county include *Hypericum Elodes*, *Linum angustifolium*, *Drosera rotundifolia* (now extinct), *Myriophyllum alterniflorum*, *Myosotis repens*, *M. sylvatica*, *Mentha rotundifolia*, *Polygonum dumetorum*, *Myrica Gale*, *Potamogeton obtusifolius*, *Narthecium ossifragum*, *Scirpus cæspitosa*, *Carex canescens*, *C. helodes*, *Pilularia*, and *Lycopodium inundatum*.

The summary compares the flora of Oxfordshire with those of the adjoining counties, with very interesting results. "Compared with Berkshire, which might be thought to have a closely identical flora, examination reveals that Oxfordshire shows considerable dissimilarity; the main factor in this is due to the presence in Berkshire of the Reading and Woolwich Beds and Bagshot sands, which give large tracts of heath-lands, with true bogs. Such are practically absent from the more basic soils of Oxfordshire." "Buckinghamshire has a flora which more closely compares with that of Oxfordshire than does that of either of the other bordering counties." "Northamptonshire differs greatly from Oxfordshire, is more highly cultivated, and has a less interesting flora." "Warwickshire is relatively poorer in species than Oxfordshire since it has not the characteristic calcareous species so well represented in our county." "East Gloucestershire shares with Oxfordshire many purely calcareous species." Oxfordshire apparently has no species absolutely peculiar to that county, but *Orchis Simia* and *Stachys germanica* are not nowadays found elsewhere.

Altogether, this is a most valuable addition to our County Floras, and we congratulate the author very heartily upon its completion and appearance.

C. E. Salmon.

Mushrooms and Toadstools. An Account of the more common Edible and Poisonous Fungi of Canada. By H. T. Güssow and W. S. Odell. Large 8vo, pp. 274, tt. 128. Division of Botany, Dominion Experimental Farms, Ottawa, 1927. Price $1.00.

The object of this work is to diffuse a more general knowledge of the Canadian edible and poisonous fungi. The text is written in simple language, so that the ordinary layman may understand it and be able to identify his specimens. One hundred and sixty species are dealt with, and a large proportion of these are accompanied by some excellent photographic plates. Two fine coloured plates represent the two most poisonous species (namely, *Amanita phalloides* and *A. muscaria*), and the tone of colour more nearly agrees with that which we noticed in the United States rather than the deeper shade generally met with in England. We agree with the authors that "a knowledge of fungi is the only safe means of distinguishing edible fungi from poisonous. All so-called 'tests' are myths and superstitious nonsense," but we consider that it is a good rough rule-of-thumb for the beginner to treat as poisonous all specimens having any trace of a volva at the base of the stem, and when this is well developed it is often termed the "poison-cup." This would cause the rejection of *Amanitopsis vaginata*, which is perhaps the most delicious of all esculents, but even fairly experienced mycologists have been known to confuse this species with the deadly *Amanita pantherina* when the ring had disappeared from the latter. Four-fifths of the species dealt with in this work are British, and the remaining one-fifth are endemic American species. This proportion exactly accords with our experience in the United States in 1926. We think the Canadian Department of Agriculture is to be heartily congratulated on the publication of this work, and its low price should ensure a ready sale. Carleton Rea.

Erblichkeitsforschung an Pflanzen. Ein Abriss ihrer Entwicklung in den letzten 15 Jahren. By Dr. Friedrich Oehlkers, Tübingen University, 8vo, pp. viii, 203. Steinkopff: Dresden, 1927. Price R.M. 13; bound 14.50.

Dr. Oehlkers has given a useful and careful summary of the modern work on heredity in plants, the development of plant genetics during the last fifteen years, with some references to animals, especially in the discussion of crossing-over. The work is divided into two parts, dealing respectively with hybridization and mutation. A surprising number of the primary discoveries have been made with a few forms, such as *Œnothera*, *Datura*, *Antirrhinum*, *Lathyrus*, and *Solanum*, but many other plants have contributed. A large amount of space is given to the evidence of the relation between chromosomes and heredity. Special chapters deal with sterility and lethal factors, and sexuality. The condition in Fungi is called multipolar sexuality.

The relation of hybridization to species-formation is discussed; and the last three chapters are concerned with mutations, which are classed as factor-mutations and genome-mutations, the latter term

including the various types of chromosome-aberrations which give rise to mutant types.

A few slips may be pointed out for the sake of historical accuracy. P. 68: The first paper which clearly showed telosynapsis and a chain of chromosomes in *Œnothera* was by Gates (1908). P. 184: The first comparative measurements of cells and nuclei in any tetraploid form were made on *Œ. gigas* (Gates, Arch. f. Zellforsch. 1909). Bartlett and Tupper also investigated *Œ. stenomeres* mut. *gigas* in 1916. The statement (p. 179) that 4-angled pollen grains are necessarily diploid was disproved in 1915. Again (p. 189), *Œ. lata* was shown to have 15 chromosomes independently by Gates and Lutz in 1912. These minor corrections do not detract from the value of this exposition of modern plant-genetics, which supplies a useful summary of the work in these fields. R. R. Gates.

BOOK-NOTES, NEWS, etc.

Linnean Society of London.—At the General Meeting on March 1st, Mr. A. M. Smith, M.A., gave an account, illustrated with a series of lantern-slides, of his investigations of the Algæ of a bog, continued over a period of five years.

Observations were taken at approximately monthly intervals of the algæ of a small *Sphagnum* bog near Bradford from March 1923 to August 1927. Observations of the temperature and of the p_H values of the water were also made. Two main algal associations were clearly distinguished: (1) the association of the *Sphagnum* pools, and (2) the association of the mud pools and deeper ditches. The association of the *Sphagnum* pools had *Zygogonium ericetorum* and *Microspora floccosa* as co-dominants, and *Cylindrocystis Brebissonii*, *Cosmarium punctulatum*, *Staurastrum punctulatum*, *Œdogonium rufescens*, *Sphærocystis Schroeteri*, *Merismopedia glauca*, *Oscillatoria tenuis*, and *Navicula* spp. as the characteristic subordinate species. The association of the mud pools and deeper ditches had *Mougeotia* sp., *M. viridis*, *Microspora tumidula*, and *M. stagnorum* as its dominants, and *Mougeotia parvula*, *Closterium striolatum*, *C. rostratum*, *Hormidium subtile*, and *Tabellaria floccosa* as its chief subordinate species. After the drainage of the bog in 1923 the *Sphagnum* association decreased, and the long slow choking of the bog channels which followed later was accompanied by the gradual extension of this characteristic association. The total quantity of alga varied with the quantity of water in the bog, and showed little evidence of any check due to low temperatures. The quantity of certain species, however, *e.g.* a sterile species of *Mougeotia*, showed signs of diminution due to low winter temperatures.

Mougeotia viridis, *Cylindrocystis Brebissonii*, and *Œdogonium rufescens* were frequently found in conjugation. *Mougeotia parvula* and *Closterium parvulum* conjugated rarely. The other species remained sterile.

Professor F. E. Fritsch referred to the work on the Algæ of *Sphagnum* pools that had been done on the continent. It had been

shown that, when the pool was completely separated by peat from the underlying rock, a very restricted Desmid-flora, and one of remarkable constancy, was to be found. Mr. Smith's list of *Sphagnum*-Algæ included only one of these Desmids, and it would be interesting to know whether he had obtained any data as to the depth of peat underlying the pools. Two of his commonest forms, viz. *Zygogonium ericetorum* and *Cylindrocystis Brebissonii*, were common soil-Algæ, and their abundance might be due to their occurrence on the surrounding surface. The violet granules in the sterile species of *Mougeotia* might be of the nature of Lagerheim's phycoporphyrin. The close correspondence between volume of water and quantity of Alga was striking, as this was by no means always the rule—in fact, in lowland pools algal growth was often at its lowest when the pool was fullest. *Chrysopyxis bipes* was a new record for Great Britain.

At the General Meeting on March 15th, the President, Sir Sidney Harmer, K.B.E., announced that, presuming the election of those proposed at the present meeting, the number of Fellows was within twenty-five of the limit of 800 which was determined in 1921. In his address at the Anniversary Meeting last May the retiring President, Dr. A. B. Rendle, stated that the roll then stood at 763. It seems evident, therefore, that some more stringent process of selection will shortly be required than is adopted at present.

We offer congratulations to Mr. H. N. Ridley, C.M.G., F.R.S., on the award of the Frank N. Meyer Medal "for distinguished services in plant-introduction." The medal was handed to Mr. Ridley, on March 14, by the American Consul-General on behalf of Dr. Fairchild, President of the American Genetics Association, to whom the award is entrusted by the Staff of the Office of Foreign Plant-Introduction, U.S. Department of Agriculture. Mr. Ridley was in charge of the Singapore Botanic Gardens from 1888 to 1912, and was responsible for the introduction of the Para Rubber (*Hevea brasiliensis*) into cultivation in the Oriental Tropics.

Dr. Walter Stiles, Professor of Botany at Reading University, has been nominated by the Council for election to the Fellowship of the Royal Society. Dr. Stiles is distinguished for his contributions to plant-physiology; his published work includes books on *Carbon Assimilation* and *Cell Permeability*.

Mr. Ronald D'Oyley Good, M.A., F.L.S., has been appointed Lecturer in Botany at the new University College at Hull. Mr. Good was appointed an Assistant in the Department of Botany, British Museum, on leaving Cambridge, in 1922, and has been a frequent contributor to the *Journal* during his time at the Museum. We wish him success in his new sphere of work.

Complaints are continually being received as to the increasing lack of punctuality in the issue of the *Journal*. This is deeply regretted by the Editor, but is due to circumstances beyond his control. Subscribers may rest assured that the Editor will do everything in his power to render possible the issue of the *Journal* punctually on the first day of each month.

NOTES ON THE BRITISH PANSIES.

Viola nana.

By Eric Drabble, D.Sc., F.L.S

Viola nana Corbière, Fl. Normandie, 81 (1893).

V. tricolor π *nana* DC. Prodr. i. 304 (1824); Lloyd & Foucaud, Fl. Ouest. Fr. 49 (1886).

V. tricolor β *humilis* Bertolini, Flora Italica, ii. 719 (1835).

Plant annual, very small, 1–4 inches in height. Stem usually unbranched (occasionally branched at the base); stem and leaves more or less hairy with short stiff hairs. *Basal leaves* rotundo-ovate very obtusely crenate, *upper leaves* oblong-lanceolate obtuse or subacute; *stipules* with oblong obtuse entire or very slightly crenulate mid-lobe, lateral lobes few, often only one on each side. Peduncle ascending or nearly upright in flower, divaricate in fruit. *Flower* very small, ¼ inch or less. *Sepals* oblong or oblong-lanceolate acute with very short entire appendages. *Corolla* small, usually shorter than the sepals, white or pale yellow, occasionally tinged with blue on the upper petals; spur very short.

Exsicc. Herb. Mus. Brit.:—*V. nana* DC., Sables d'Olonne, Vendée, 9 April, 1869, Herb. Gaston Genevier.

V. tricolor f. *nana* DC., Loire Inf., 28 mai, '77, Herb. J. Lloyd.

V. tricolor var., Sand Hills, St. Brelade's Bay, Jersey, 1st April, 1885, Augustin Ley.

V. nana is a plant of maritime sands and shingly beaches, readily recognized by its very small size, short sepals, small sepaline appendages and tiny corolla with short spur. It occurs on the Mediterranean and Atlantic coasts of France, and reaches its northern limit of distribution in the Channel Islands and Scilly. Rouy and Foucaud give "sables maritimes: Calvados, Manche, Vendée, Charante Inférieure et Gironde," and, as sub-var. *major* (merely a well-grown state of *nana*), "sables de l'Agly à Rivesaltes (*Le Grande*) et à Marseille," and de Candolle gives "in arenosis maritimis Neustriæ, Syriæ, Asiæ minoris." I possess specimens from the Channel Islands, Jersey:—St. Brelade's Bay, St. Ouen's Bay; Guernsey:—St. Martin's Point, Lancresse Common, and Grande Havre; and from the Scilly Islands:—St. Martin's.

V. nana clearly belongs to a group of plants, including *V. valesiaca* Thomas and *V. parvula* Tineo, which is quite distinct from the *arvensis* series and is only represented in England by *nana*. This group has been partly included by Rouy and Foucaud (Fl. de Fr. iii. 47-49)—excluding *V. parvula*—in their "forme" *V. Kitaibeliana* Roem. & Sch., and their arrangement calls for some consideration. It is as follows:—

I. *Kitaibeliana* R. & S.

II. *parviflora* Hayne.

Sub-var. *major* R. & F. (*V. tricolor* var. *cæspitosa* Deb. & Negr.).

Sub-var. *pygmæa* R. & F. (*V. parvula* Ten. *non* Tineo).
Sub-var. *cinerea* R. & F. (*V. minima* (Gaud.) Rion; *V. valesiaca* Thomas).
β. *derelicta* Jord.
γ. *nana* DC.
Sub-var. *major* R. & F. (*V. olonensis* Genev.).
δ. *pallescens* Gren. & Godr. (*V. pallescens* Jord.).

Of these I have previously shown (Journ. Bot. 1926, 271) that *derelicta* is an *Arvensis* pansy and that *pallescens* cannot be accepted as anything but an assemblage of small-flowered states of more than one *Arvensis* type. Both *derelicta* and *pallescens* are therefore wrongly placed with the relatives of *nana*.

Excluding these, we are left with *Kitaibeliana*, *parviflora*, and *nana*.

V. Kitaibeliana Roem. & Sch. Syst. v. 383 (1819) is thus described: Caule erecto simplicissimo, foliis grosse crenatis, inferioribus subrotundis glabris superioribus obovatis, stipulis similibus subintegratis, petalo cornuto calycem glabrum æquante reliquis brevioribus. *V. parviflora* Kitaib. in litt. ad Schult.—In Pannonia.

Judging from this description, the plant may well be a member of the *nana* section, and, if this be so, *Kitaibeliana* would be the first published name for a pansy of this group. I have not, however, been able to find an authentic specimen of *Kitaibeliana*. The only one so named that I possess is *V. Kitaibeliana* R. & S. var. *stepposa* W. Becker, from Russia (Becker, Viol. Exsicc. vi. 1905, no. 154). This is a tall plant with linear leaves and very small flowers, and probably belongs to the same series as *nana*. It may be mentioned that Pannonia, given by Roemer and Schultes as the locality for *Kitaibeliana*, in its most extended sense, previous to the First Century A.D., comprised Eastern Austria, Styria, Carniola, Carinthia, S.W. Hungary, Slavonia, and parts of Croatia and Bosnia, while, in its restricted sense in the Fifth Century, it consisted of S.W. Austria and Hungary*. At no time does it appear to have had a sea-board, and hence, however Roemer and Schultes may have regarded the territory, *Kitaibeliana* must have been founded on inland plants.

With *Kitaibeliana* Roem. & Schultes, Rouy and Foucaud make the following synonymous:—*V. micrantha* Presl, *V. nemausensis* Jord., *V. tricolor* β *humilis* Bert., *V. tricolor* γ *mediterranea* G. & G., *V. Foucaudi* Savatier, and *V. nana* Sauze & Maill.

V. micrantha Presl, Delic. Prag. i. 27 (1832), and *Flora Sicula*, 257 (1842), is, apparently rightly, made by Presl synonymous with *V. parvula* Tineo, which Rouy and Foucaud regard as quite distinct from *Kitaibeliana*.

V. nemausensis Jordan, Obs. ii. 18, t. i. f. C, is there described as having usually simple stems, 5–10 cm. in height, rather large flowers with petals as long as or a little longer than the sepals, the upper petals bluish, sometimes white, and stipules with 7–9 lobes. This

* B. D. Jackson, MS. Draft List of Latin Place-Names, 1891, in Herb. Mus. Brit. gives simply "Hungary."

plant Jordan compares carefully with *V. parvula* Tineo, but makes no reference to *nana*, which he must have known from de Candolle's *Prodromus*, as he mentions var. *bellioides*, which is there described on the same page, nor does he mention *Kitaibeliana*. Clearly, then, Jordan had no idea of any identity of *nemausensis* with these plants. I have not been able to find a specimen of *nemausensis* named by Jordan himself, but certainly his figure does not suggest that it is a member of the *nana* series. I possess, however, three specimens which strongly suggest such a relationship. These are *V. nemausensis* Jord., Platin d'Angoulin, Billot, Fl. Gall. et Germ. Exsicc. no. 1127 *ter*; *V. nemausensis* Jord., Castelnau, Hérault, dans les sables tertiaires, 2 mai 1899, E. Maudon; and *V. nemausensis* Jord., Canossols (Alpes Maritimes), 19 mai 1883, ex herb. C. Copineau.

The following specimens in Herb. Mus. Brit. are apparently the same plant:—(1) *V. nemausensis* Jord., Terraines du vieux Grès-rouge à Gonfaron (Var), *Billot*, no. 1127; and (2) Talus oriental d'une digue sur la rive gauche de l'Orb au dessous des Moulins-Neufs à Béziers, Hérault, *Billot*, no. 1127 *bis*.

It seems probable, then, that Jordan's figure is misleading, and that *nemausensis* is a relatively large-flowered inland member of the *nana* series. This would make the synonymy with *Kitaibeliana* not impossible. (*V. nemausensis* Jord. in Boreau, Fl. du Centre, ed. iii. 61, from "sables maritimes, St. Nazaire," is clearly *nana*.)

V. tricolor β *humilis* Bertolini, Fl. Ital. ii. 719 (1835), is given by him as synonymous with π *nana* DC., and hence cannot be accepted as *nemausensis*.

On the other hand, *V. tricolor* γ *mediterranea* Grenier & Godron, Fl. Fr. i. 183 (1847–48), from "Region des Olives," is founded on Jordan's *nemausensis*, and Debeaux, *Recherches sur la Flore des Pyrenées Orientales*, 156 (1878), makes *nemausensis* equivalent to var. *mediterranea* G. & G. In each case the description shows the attribution to be correct.

V. nana Sauzé et Maillard, Fl. du Département des Deux-Sèvres, 190, 1872 (*non* DC.), is *nemausensis*.

V. Foucaudi Savatier *ap.* Lloyd & Foucaud, Fl. Ouest. Fr. 50 (1886), is carefully distinguished from *nana*, but does not seem to be *nemausensis*. I have not seen specimens of this plant.

As a result of this examination it becomes clear that, for the most part (excluding the synonymy rejected above), Rouy and Foucaud are taking *V. Kitaibeliana* Roem. & Schultes as equivalent to *V. nemausensis* Jord. If they be correct, it is strange that neither Jordan nor any other author who has described *nemausensis* has made any reference to *Kitaibeliana*. Authentic specimens of *Kitaibeliana*, if such exist, must be studied before any such synonymy can be accepted.

Passing now to Rouy and Foucaud's "varieties" (after excluding *derelicta* and *pallescens* as explained above), we are left with only *parviflora* and *nana*. Of these apparently *parviflora* was regarded by them as *nemausensis* in the strict sense, as they describe it as having the petals as long as the sepals. But *V. parviflora* Hayne, in Nolltreich, *Flora von Nieder-Œsterreich*, 774 (1859), to which

Rouy and Foucaud refer, is an *Arvensis* pansy, and not a member of the *nana* series. Their sub-var. *pygmæa* is made by them equivalent to *V. parvula* Ten. (*non* Tineo), but Tenore, Sylloge Plantarum Vasc. Fl. Neopolitana, 118, makes his plant synonymous with *nana* DC. and Gay, Pl. exsicc., and also with *Kitaibeliana* R. & S., while Brébisson, Fl. de Normandie, ed. iv. 42 (1869), makes it equivalent to *nana* DC. and *nemausensis* Jord. Evidently both Tenore and Brébisson were on the track of the true relationships of this group of pansies, but they did not follow it up.

Rouy and Foucaud's sub-var. *cinerea* is given by them as synonymous with *V. minima* (Gaud.) Rion, *Guide du Botaniste en Valais*, 35, where nothing of diagnostic value is found, and also with *V. valesiaca* Thomas, Pl. exsicc. (*non* Hausskn.).

V. valesiaca Thomas, *legit* F. O. Wolf, Becker, Viol. exsicc. iv. (1902) no. 99, and *V. valesiaca* Thom., Sion, Valais, F. O. Wolf, Baenitz, Herb. Europ. (Fl. Helvetica), both in my own herbarium, are very small-flowered inland plants of the *nana* type.

Rouy and Foucaud's remaining "variety," *nana*, has been considered above. It may just be mentioned that their sub-var. *major* is a mere upgrown state which they say occurs here and there with the typical plant. In making this sub-variety equivalent to *V. olonensis* Genev., Mém. Soc. Acad. Angers, I am not able to follow them, for *V. olonensis* from Gaston Genevier in Herb. Kew, is a large narrow-leaved straggling plant, quite distinct from the large specimens of *nana*. A plant from Sables d'Olonne, Vendée, in Herb. Mus. Brit., is ordinary *nana*, and is so labelled by Genevier himself.

We find, then, that only a rather doubtful *Kitaibeliana*, Jordan's *nemausensis*, and de Candolle's *nana* remain to represent this group as constituted by Rouy and Foucaud. But to them should be added *V. demetria* Prolong. and *V. parvulo* Tineo.

V. demetria Prolong. is a Greek and Spanish plant, of which I possess the following specimens:—*V. demetria* Prol., Sierra de la Nieva, E. Reverchon, *Plantes de l'Andalousie*, 1889; and *M. Mercurii* Orph. (*V. tricolor* L. var. *demetria* Boiss.), M. Kyllene, Archana, Orphanidès, Fl. Græca exsicc., no. 401.

V. parvula Tineo, Pug. Pl. rar. Siculæ 5 (1817) (*V. micrantha* Presl, in Gussone, Fl. Siculæ Synopsis, i. 257, 1842), occurs in Asia Minor, Syria, Crete, Sicily (? Spain), Algeria, Morocco, Greece, and the Canaries. Its resemblance to *nemausensis* was recognized by Jordan (Obs. ii. 20).

This group of pansies seems to be quite distinct from *V. tricolor* L., even in its most extended sense. The centre of maximum distribution appears to be in South-Eastern Europe and the Orient. It extends, as *parvula*, into Sicily; as *demetria*, into Spain; as *nemausensis*, into Southern France (Alpes Maritimes, Var, Gard, and Hérault); as *valesiaca*, into Switzerland; and as a sea-coast plant, *nana*, into Western France and the extreme south-west of England.

It is evident that an examination of the Eastern forms may be expected to yield results of considerable interest.

ŒNOTHERA AGARI AND *Œ. ERIENSIS.*

By R. R. Gates, Ph.D., F.L.S.

(Plates 584, 585.)

This is a summary of a paper which has been published in full elsewhere *. It contained detailed descriptions and Latin diagnoses of two new species of *Œnothera*, together with certain data concerning their variation in flower-size and other features under conditions of cultivation. It was thought advisable to publish here a summary of this paper, and four of the blocks which have been kindly loaned by the Editor of the *Canadian Field-Naturalist* for this purpose are reproduced here.

Œ. Agari was grown from seeds sent to me by Professor Agar, of Melbourne. He collected the seeds in January 1924 at Burnie, Tasmania, where the plants were growing within a few yards of the shore. Whence or when it was introduced into Tasmania appears to be unknown. From the seeds four generations have been grown for genetical experiments, along with many other Œnotheras, in the Royal Botanic Gardens, Regent's Park. It remained uniform except for one mutant with much narrower linear leaves, which is illustrated in the original paper.

Œ. Agari belongs to the *Eu-Œnothera* section of the genus, and is not closely related to the species of the *Onagra* section, such as *Œ. biennis* and *Œ. Lamarckiana*. It is, in fact, largely sterile with pollen of the *Onagra* section. After many unsuccessful attempts, however, a few seeds were obtained from certain crosses last year, but it is not yet known whether they will germinate. The long straggling stems and small leaves of this species are characteristic, and the subterminal sepal-tips appear to be a feature of the *Eu-Œnothera* section. The description is as follows:—

Œ. Agari Gates (Plate 584, figs. 1, 2). *Leaves of mature rosette*: length 12–18 cm., width 10–18 mm. (mostly 13–16 mm.), nearly linear, slightly lanceolate, acute, glabrous, narrowing very gradually to a slightly-winged plano-convex petiole, midrib whitish above and below, margin distantly and evenly repand denticulate. From the rosette a central stem and a ring of 6–8 basal branches or side shoots arise simultaneously, which are as tall or taller than the central stem, 60–80 cm. high. *Stems* slender and wiry, at first upright, the basal branches later becoming long and straggling; stems diffuse pale red, finely pubescent, terete, redder towards the top. *Basal stem-leaves* sessile, resembling the rosette leaves, 13 cm. long, widest at base, linear, width 10–13 mm., finely pubescent only on margin, apex acute. *Bracts* pubescent below when young and slightly pubescent above, mid-ribs and lateral veins red below, green above, resembling in shape the cauline leaves, lowermost bracts 5–6 cm. long.

Flowers: the flowers are scented and fade quickly in hot sun; the

* *Canadian Field-Naturalist*, Ottawa, xli. (1927) pp. 23–27, figs. 7.

inflorescence is lax and elongated after flowering. *Petals* mostly 24–32 mm. long, 27–35 mm. wide, deeply obcordate, somewhat reduplicate and concave, deep yellow with a brownish spot at base, turning orange-red when faded and deep orange-red when dying. *Stigma* surrounded by the anthers, style 40–42 mm., stigma-lobes 9 mm., opening out flat. *Ovary* terete, 16–18 mm. by 2–2·5 mm., slightly quadrangular, hypanthium 28–30 mm. long, 1 mm. in diameter at base, broadening out above to 5–6 mm. *Bud-cone* 20 mm. long, 5–6 mm. broad at base, slightly quadrangular and conical. Sepals, hypanthium, and ovary reddish, especially along the veins, with long and short patent hairs intermixed with red papillæ bearing long hairs; sepal-tips subterminal, with small red glandular apex and red inner face. *Capsules* reaching 30 mm. in length, about 5 mm. diameter and gradually tapering to the base, green, glabrous, but with scattered patches of long hairs arising from light green papillæ. *Seeds* smaller, paler brown and less angular than in the *Onagra* section.

The species stands apart from the *Onagra* section in a number of features, notably the subterminal sepal-tips, the wilting and colour-changes of the petals, and the habit with numerous wiry lateral shoots equalling in length the central stem. Its most distinctive features are (1) the long and narrow rosette leaves gradually passing into cauline leaves and bracts of similar form; (2) the habit, with a ring of basal wiry reddish branches as long as the slender central stem; (3) the petals of medium size, deep yellow with a basal brownish-orange spot, fading quickly to orange-red; (4) the subterminal sepal-tips separated at base, arcuate and reddish on the inner face.

Œ. Agari resembles *Œ. argillicola* in certain respects, such as the nearly linear leaves and the more or less suppressed central stem and the somewhat decumbent branches. But the latter species has much larger leaves and flowers, while the buds differ conspicuously in being rounded (like *Œ. grandiflora*) and in having the usual terminal sepal-tips.

Œ. ERIENSIS Gates (Plate 585, figs. 3, 4). This species was grown from seeds collected by me on August 24th, 1924, at a place called Colchester, on the northern shore of Lake Erie, Ontario. The few plants observed here along the shore of the lake had strikingly small flowers and very narrow leaves. How wide the distribution of this species may be is unknown. It is a very distinct form with characteristic habit, and has shown no variations in the three generations which have since been grown from the original seeds. The description is as follows:—

Œ. eriensis. Leaves of mature rosette: Length 6–8 cm., greatest width 5–8 mm., very narrow oblanceolate tapering to a margined petiole, blade distinctly denticulate, both surfaces bearing fine pubescence. The evanescent rosette contains less than a dozen small leaves before elongation of the stem begins. *Mature plant*: Main stem 8–10 cm. high, no rosette, stem rather slender, terete

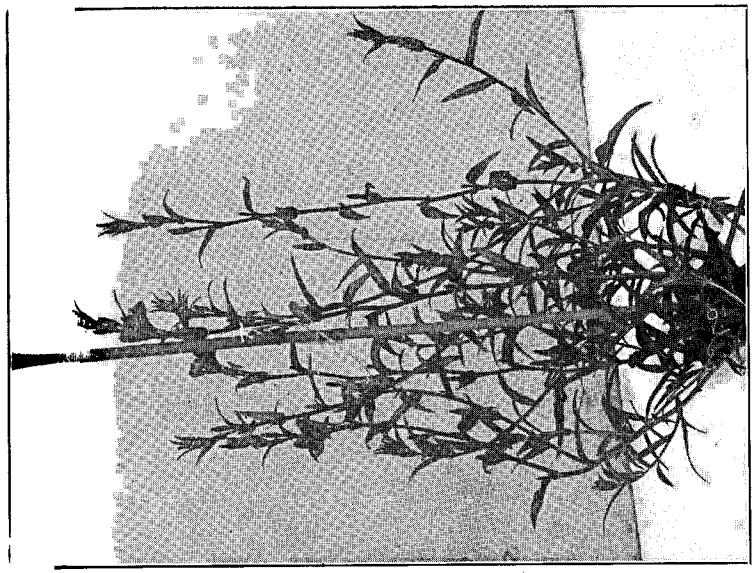


Fig. 2.—ŒNOTHERA AGARI GATES.
Showing plant in flower.

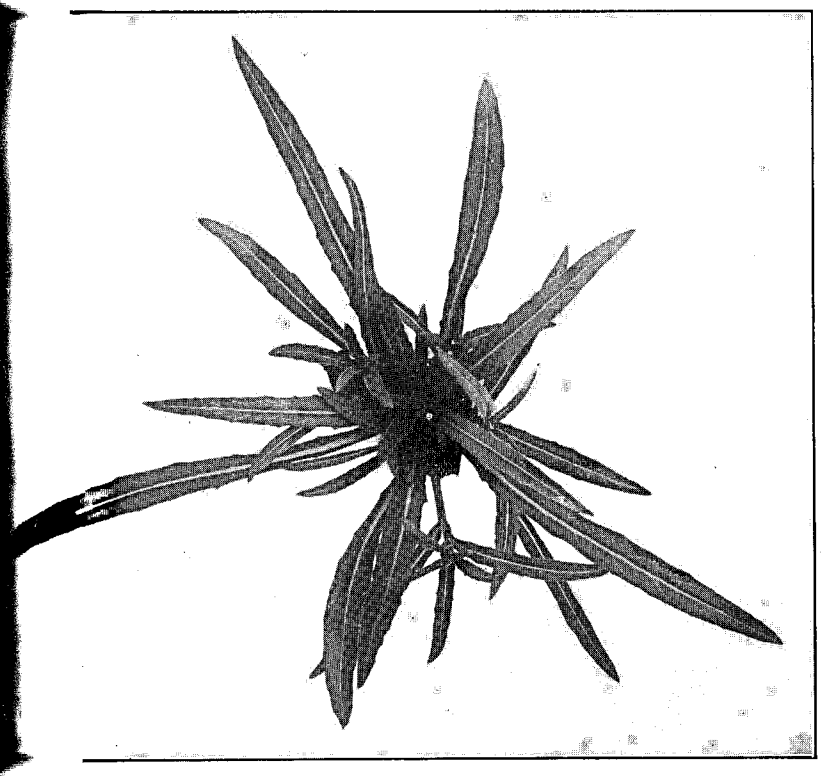


Fig. 1.—ŒNOTHERA AGARI GATES.
Showing leaf-rosette.

Fig. 3.—ŒNOTHERA ERIENSIS GATES.
Showing absence of rosette.

Fig. 4.—ŒNOTHERA ERIENSIS GATES.
Showing plant in flower.

except where a low ridge runs down from each leaf, green with a few patches of diffuse red near the base. The brownish bark exfoliates in strips near the base, but higher up the green stem has a harsh fine appressed pubescence. The upper part of the stem is bent over nearly horizontal: this appears to be a response to light and to be intermittent, resulting in a stem which is erect below but with various irregular bends in its upper part. Lateral branches arise some distance above the base and are also bent at the tips; they have no basal collar. The upper 15 cm. of stem and branch-tips bears scattered hairs arising from red papillæ.

Stem-leaves sessile, or with short, winged, plano-convex petiole, lanceolate, 9–13 cm. long, about 12 mm. wide, dark green above, paler below, without any red, margin distantly and irregularly repand-denticulate, scattered fine appressed pubescence on both surfaces, more closely grouped on whitish mid-rib below. *Lower bracts* 12 cm. long, 20 mm. broad, lanceolate, acuminate, narrower at the base, sessile, with distinctly glandular callosities at the margin, and short thin appressed pubescence on the surface.

Flowers: In the English climate at least, the early axillary buds (July) turn yellow and abort when very small. *Inflorescence* dense, elongating in fruit. *Petals* 9–15 mm. long, 8–12 mm. broad, obovate-cuneate with a wide shallow sinus, yellow, fading rapidly to a pale orange. *Style* short, 26–30 mm. long, stigma-lobes spreading only to 15°, 4–4·5 mm. long. *Ovary* with four grooves, somewhat quadrangular, about 15 mm. long, 3–3·5 mm. in diameter at the base and 2·5–3 mm. at the top. *Hypanthium* 24–27 mm. long, 2–2·5 mm. broad, slightly swollen at the base, quadrangular, broadening out to 5 mm. diameter above. *Bud-cone* 10–22 mm. long, distinctly pyramidal, 5 mm. diameter at base. *Sepal-tips* 4–4·5 mm. long, slightly subterminal, parallel, green except the apex, which is red and glandular; apex of sepals warted, yellowish. Ovary, hypanthium, and sepals green, with fine appressed pubescence, the long hairs of the ovary arising from red papillæ. *Capsules* reaching nearly 40 mm. in length, 8 mm. in diameter, considerably broader at base, tapering to the tip, green, nearly glabrous but with a few short scattered hairs arising from green papillæ.

The evanescent rosette of small narrow leaves, the irregularly undated stems and branches, the latter arising high above ground, the small flowers and nearly glabrous capsules are characteristic features of this species.

These two species are being used with others in combined genetical and cytological studies of *Œnothera*. In a recent paper * Miss Sheffield has shown that in *Œ. eriensis* the 14 chromosomes are regularly arranged end-to-end in a closed ring during diakinesis in the pollen-mother-cells. These linkages between the chromosomes moreover persist and control the arrangement and subsequent distribution on the heterotypic spindle. The linkage of the chromosomes is no

* F. M. L. Sheffield, "Cytological Studies of certain Meiotic Stages in *Œnothera*," *Annals of Botany*, xli. (1927) 779–816.

doubt the basis of the genetical linkage which is a well-known feature of many *Œnothera* crosses.

Œ. Agari differs from the other *Œnothera* species hitherto examined in that the chromosome arrangement in meiosis is an irregular and variable one. Nevertheless, Miss Sheffield found that it had a low percentage of seed sterility and the pollen sterility was not high in comparison with other species.

AN INSTRUCTIVE PYRENOMYCETE (*HENRIQUESIA*).

By W. B. Grove, M.A.

Henriquesia Pass. & Thüm., Contr. Myc. Lus. no. 278; Sacc. Syll. ii. 726. (Genus ex Hysteriaceis, diagnosi leviter emendata.)

Perithecia erumpent, rugulose, afterwards opening more or less labiately. Asci eight-spored, cylindraceo-clavate. Spores more or less fusoid, at first straight, distichous or tristichous, continuous, hyaline. Paraphyses filiform.

Henriquesia quercina, sp. nov.

Perithecia solitarie sparsa vel aliquando duo contigua, primo subepidermica, dein erumpentia, plus minus convexa, 1–1·5 mm. diametro, usque 150 μ alta, atra, radiato-rugulosa, tandem laciniis dehiscentia. *Asci* clavati, 100–120 μ longi, deorsum longe attenuati. *Sporæ* octonæ, subtristichæ, cylindrico-fusoideæ, 22–34 × 3–4 μ; paraphyses filiformes, asci longitudine.

Perithecia scattered or occasionally two together, subepidermal, then erumpent, conico-hemispherical or convex, on a rounded or angular base, 1–1·5 mm. diam., up to 150 μ thick, black, radiately rugulose, at length depressed and opening from the centre with a wide very irregular torn angular mouth, which is often surrounded by a few shapeless laciniæ or teeth. Upper part of perithecium of a thick layer of dark fuscous cells; flat basal part (hymenium) of a thinner layer of pallid cells, which are more or less parenchymatous and about 4–6 μ broad, but the uppermost cells of this layer are erect and clavate or ampulliform. *Asci* 100–120 μ long, rather thick-walled, clavate above, 8–10 μ broad at the widest part, somewhat narrowed and subacute at apex, but ending below in a long gently-tapering subcylindrical base. *Spores* eight, usually subtristichous, occupying the clavate part of the ascus (40–50 μ in length), cylindric-fusoid, rounded above, slightly more acute below, 3–5-guttulate, continuous, about 22–25 × 3 μ and nearly straight when in the ascus, but when older and set free becoming curvulous-arcuate and 34 × 4 μ or even 36 μ long. *Paraphyses* filiform, about as long as the asci.

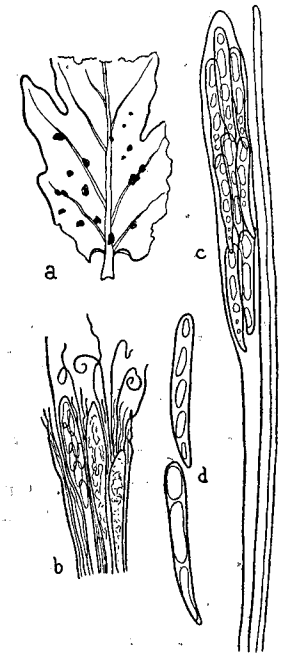
On the underside (rarely on the upper) of old dead leaves of the previous year of Oak (*Quercus pedunculata*), Monk Wood (Worcs), Oct. 11, 1927, with *Schizothyriella quercina* Thüm.

On the same leaves and intermingled with the ascophores was the pycnidial stage of the fungus:—

Schizothyriella quercina Thüm., Mycoth. Univ. no. 1684; Sacc. Syll. iii. 690; Migula, Krypt. Fl. iii. 501, t. 66.

Schizothyrium quercinum Lib. (from the Ardennes).

Pycnidia dimidiate, resembling in all respects the ascophorous perithecia, except that they were flatter and dome-shaped, while the upper layer is thinner, paler, and composed of many evident dark-fuscous flexuose prosenchymatous cells, almost plectenchymatous. The thick, nearly colourless or very pale reddish-yellow mass filling the pycnidium is made up of innumerable long, erect, parallel, filiform, hyaline hyphæ, about 1·5 μ broad, bearing at the apex a chain of what might be called cylindrical, septate spores, about 15 μ long, but these were hardly distinguishable from the hyphæ. The spores are said to



a. Portion of Oak-leaf, reduced, showing the fungus.

b. Section of hymenium with young asci, × 180.

c. Mature ascus and paraphysis, × 600.

d. Mature spores, × 600.

Henriquesia quercina W. B. Grove, sp. n.

break up into separate loculi, each like a *Cylindrium*-spore and about 1 × 1·5 μ, but nothing of this sort was seen.

In older specimens, the pycnidium bears, among its hyphæ, a number of young asci such as are described above. These asci (at first few, soon increasing in number) are much shorter than the hyphæ of the *Schizothyriella*, and contain immature spores. They push up between the hyphæ as do the asci of some Lichens among their paraphyses. But, when the fungus becomes older and

dehisces as before described, the asci seem to be accompanied by a few of their own paraphyses which are straight, while the remains of the pycnidial hyphæ tower far above them, becoming wonderfully flexuose and recurved, circinate, or hooked at the tips. One can thus see the two stages of the fungus simultaneously on the same hymenial bed.

The form-genus *Schizothyriella* evidently belongs, not to the Excipulaceæ, where Saccardo places it, but to the Leptostromataceæ. The European species of *Henriquesia* described by Thümen was on *Quercus coccifera* in Portugal.

On my first visit to Monk Wood I was accompanied by the Rev. P. G. M. Rhodes, D.D., who afterwards visited the wood again and brought back more advanced specimens. The fungus was not common, and was rather difficult to find, because the leaves upon which it was growing (having lain on the ground for about thirteen months) were very brittle and could be picked up only in fragments.

MESEMBRYANTHEMUM AND ALLIED GENERA.

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

(Continued from p. 80.)

Apatesia Pillansii N. E. Br. Annua, glabra. *Rami* procumbentes vel ascendentes. *Folia* opposita, petiolata; petioli canaliculati; laminæ ellipticæ vel lanceolatæ, acutæ vel subacutæ. *Pedicelli* 2–4 poll. longi. *Calyx* inæqualiter 5-lobus, basi hemisphericus, indistincte angulatus. *Corolla* 16–22 lin. diametro, lutea. *Staminodia* ciniformia vel basi petaloidea. *Stamina* conniventia, demum laxiora et suberecta. *Stylus* validus; stigmata 10, breviter radiata. *Ovarium* inferum, supra planum, 10-loculare, loculis 5–7-ovulatis; placentæ basales. *Capsula* 7 lin. diametro, subhemispherica, 10-valvis; valvæ carinis subcontiguis vel subparallelis exalatis; loculi exalati et etuberculati. *Semina* globosa, levia.

A glabrous annual 4–5 inches high. Central stem very short; branches axillary up to 6 or 8 inches long. *Leaves* spathulate; petiole 6–15 lines long, sheathing but not connate at the base; blade 1–2 inches long, 5–13 lines broad, tapering into the petiole, entire, flat or concave, green, not dotted. *Flowers* terminal. *Calyx*: ovary-part shallowly hemispherical and about $1\frac{1}{2}$ lin. deep, with 5 rather indistinct angles alternating with the lobes, smooth; lobes narrowly spathulate from a broad-ovate base, two of them 6–7 lin. long, the others shorter, and the three inner with broad membranous fuscous margins. *Corolla* expanding between 1 and 3 P.M. and closing between 5 and 6 P.M. in dull weather or full sunshine, slightly scented; petals very numerous, in about 5 series, the outermost strongly recurved, the others widely or recurved-spreading, rather loose and not closely

overlapping one another when fully expanded in bright sunshine, linear, very acute, bright lemon-yellow. *Staminodes* numerous; the outer narrowly petaloid at the basal part with curly hair-like tips, spreading and often gradually passing into petals; the inner hair-like, curly, whitish, and at first connivent over the stamens. *Stamens* at first connivent over or around the stigmas, afterwards becoming more erect and looser, about $1\frac{1}{4}$ lin. long, milk-white; filaments bearded at the base. *Style* nearly 1 lin. long; stigmas about $\frac{3}{4}$ lin. long, filiform, creamy-white. *Capsule* 6–7 lines in diameter when closed, shallow, circular in outline, slightly convex beneath; when expanded 9–10 lin. in diameter, uniformly pale brown inside; expanding-keels scarcely half as long as the valves, subparallel or more or less contiguous at the upper part and separated at the base, without wings or free tips; cells open, without cell-wings or tubercles. Seeds (in the only capsule seen) only one in each cell, $\frac{1}{2}$–$\frac{2}{3}$ lin. in diameter, without a nipple, glabrous, grey.

Cape Division: growing in white sand at Somerset Strand, near the shore of False Bay, *Pillans*!

This plant seems to be infertile to its own pollen, for I pollinated four flowers with pollen from other flowers upon the same plant, but no fruit resulted. Pollen is shed in abundance among the crowded filaments and on the top of the ovary.

A. helianthoides N. E. Br. Plant (according to a very fine coloured drawing at the British Museum, made in 1776) closely resembling *A. Pillansii* in all features, but the calyx is perfectly flat (not shallowly hemispherical) at the base, with five very distinct and rather prominent angles, and the lobes are longer and the corolla rather larger than in *A. Pillansii*. Other distinctions are not apparent from the drawing.—*M. helianthoides* Ait. Hort. Kew. ii. 178; Haw. Obs. 117; Misc. Nat. 45; Synop. 245, & Rev. 161; not of de Candolle.

South Africa: locality unknown. Cultivated at Kew, where it was introduced by Masson in 1774.

APTENIA N. E. Br. in Gard. Chron. lxxviii. 412 (1925).

A monotypic genus, native of South Africa, naturalised elsewhere. The name is derived from the Greek, *apten*, not winged, in allusion to the absence of marginal wings and cell-wings to the capsule.

A. cordifolia N. E. Br. (*M. cordifolium* Linn. f. Suppl. 260; Jacq. Ic. Rar. iii. 6, t. 487; Junghans, Ic. Pl. t. 37; Smith, Spicileg. Bot. t. 6; DC. Pl. Grass. t. 102; Salm Dyck, Mes. § 61, f. 1; Meigen, Deutschl. Fl. ii. t. 96; Ann. Sc. Nat. (Paris), ser. 3, xviii. 234, t. 10. ff. 17–24; Payer, Organog. Comp. Fl. t. 80; Flor. Mag. 1869, t. 460; Gartenfl. 1877, 153; Sauviago, Cult. Littor. Mediter. 86; Tr. S. Afr. Phil. Soc. ix. 36, t. 2. f. E; Rev. Hort. 1903, 525, f. 217; Berger, Mes. u. Port. 54, f. 8, iii.–iv. *Litocarpus cordifolius* L. Bolus in Fl. Pl. S. Afr. vii. under t. 261 (1927).

ARIDARIA N. E. Br. in Gard. Chron. lxxviii. 433 (1925).

The name of this genus is derived from the Latin, *aridus*, dry places, in allusion to the dry places in which these plants grow. The type of the genus is *A. noctiflora* N. E. Br., but it should be noted that I find South African botanists wrongly lump together several distinct species under this name.

I find that the fruit of this genus, and to a lesser extent that of the genera *Conicosia* and *Glottiphyllum*, is liable to be attacked by beetles, which pass their larval and pupal stages within the fruit, feeding upon the ovules and seeds. It would be interesting to know if the same species of beetle lives upon the fruit of only one species of a genus, or only upon fruits of different species of the same genus, or whether it feeds indiscriminately upon different genera.

A. ACUMINATA N. E. Br. (*M. acuminatum* Haw. in Phil. Mag. 1824, 426; N. E. Br. in Journ. Linn. Soc. (Bot.) xlv. 107; not of other authors. *M. sulcatum* Salm Dyck, Mesemb. § 44, f. 1; Sonder in Fl. Cap. ii. 432; Berger, Mes. u. Port. 119; not of Haworth. *M. flexuosum* Salm Dyck, *l. c.* f. 7; Sonder, *l. c.* 433; Berger, *l. c.* 122; not of Haworth.)

H. ALBICAULIS N. E. Br. (*M. albicaule* Haw. in Phil. Mag. 1826, 331; Salm Dyck, Mes. § 44, f. 5.)

A. AUSANA N. E. Br. (*M. ausanum* Dint. & Berger in Engl. Bot. Jahrb. l., Suppl. 586.)

Aridaria Bijliæ N. E. Br., sp. nov. *Fruticulus* erectus glaber. *Rami* oppositi, divergentes. *Folia* opposita, patula, 7–10 lin. longa, 2 lin. crassa, subteretia vel obscure trigona, obtusa. *Cymæ* laxæ, 3–5-floræ. *Pedicelli* 2–6 lin. longi. *Calyx* inæqualiter 5-lobus; lobi 4–6 lin. longi. *Corollæ* tubus 2½ lin. longus; petala 7–8 lin. longa, ⅙–¼ lin. lata, alba. *Stigmata* 5, filiformia, 2–2½ lin. longa. *Capsula* 5-valvis; valvæ patulæ carinis plus minusve contiguis et alis inflexis; loculi aperti, exalati et etuberculati.

A shrublet with rather widely diverging branches; internodes 6–18 lin. long and 1–2 lin. thick, glabrous, dull creamy-greyish, with faintly raised irregular longitudinal lines except on the youngest parts, which are green. *Leaves* spreading or ascending-spreading, slightly flattened on the upper side, soft, glabrous, smooth, slightly glaucous-green, with short leafy shoots in their axils. *Cymes* terminal, lax, with 3–5 (or more?) flowers, bracteate. *Calyx* 5-lobed down to its union with the ovary, with the ovary-part obconic; 3 of the lobes terete from a broad base and 2 suborbicular, with broad membranous white margins and a dorsal terete point. *Petals* narrowly linear. Stamens in about 4 series, arising from the corolla-tube and shortly exserted from it. *Ovary* partly superior, conical and with 5 ridges at the top, 5-celled; placentas axile. *Capsule* when closed about 4 lines in diameter, and with the valve-part 3 lines long; when expanded 7–7½ lines in diameter, entirely cream-coloured inside and

[illegible] valves horizontally spreading; expanding-keels acute-edged, contiguous throughout or slightly separated and parallel at the basal part and contiguous at the apical part, with their flaps or wings inflexed and meeting over the keels. *Seeds* 5–7 in a cell, nearly 1 line in diameter, much flattened, circular in outline, with a notch on one side, strongly tuberculate around the margin and with smaller tubercules on the sides, black.

Prince Albert Division: Karoo, near Abraham's Kraal, *Mrs. D. van der Bijl*, 11!

A. DEFOLIATA N. E. Br. (*M. defoliatum* Haw. Misc. Nat. 64, and Rev. Pl. Succ. 181.; Salm Dyck, Mesemb. § 43, f. 1. *M. clavatum* Jacq. Hort. Schoenbr. i. 56, t. 108 (1797), not of Haworth (1795).)

A. DELA L. Bolus in Fl. Pl. S. Afr. vii. t. 258. (*M. delum* L. Bolus, Ann. Bol. Herb. iv. 11.)

A. EBRACTEATA N. E. Br. (*M. ebracteatum* L. Bolus in Ann. Bolus Herb. i. 191, not of Pax. *Aridaria trichotoma* L. Bolus in Fl. Pl. of S. Afr. vii. under t. 258, and Journ. Bot. Soc. S. Afr. 1927, 12, t. 6, f. 3 E, not *M. trichotomum* Thunb.)

The above misidentification was made in the following manner. Under *Aridaria dela* L. Bolus in Fl. Pl. of S. Afr. t. 258, Mrs. Bolus states:—"Our species is closely allied to *Aridaria trichotoma* L. Bolus (*Mesembryanthemum trichotomum* Thunb., the type of which I have examined, thereby satisfying myself that my *M. ebracteatum*, in its rooting state, is identical with Thunberg's type)." This statement is erroneous, for Thunberg's type (which I also have carefully examined and compared with Kew material, and also possess a drawing of it) is not the same as *M. ebracteatum* L. Bolus, and does not even belong to the genus *Aridaria*. The figure of *A. trichotoma* L. Bolus, above quoted, represents half a capsule only of an *Aridaria*, which was doubtless taken from a specimen of *M. ebracteatum* L. Bolus, and certainly not from Thunberg's specimen, which has only flowers upon it that are quite different from those of the genus *Aridaria*.

[*M. trichotomum* Thunb. belongs to a new genus, which I name **Dicrocaulon**, from *dicros*, forked, and *kaulos*, a stem. The type of the genus is **D. Pearsoni** N. E. Br., and the generic characters are as follows:—

DICROCAULON N. E. Br. *Fruticuli* nani, foliis oppositis basi amplexicaulibus papulosis. *Flores* terminales, solitarii. *Calyx* inæqualiter 4–5-lobus. *Petala* numerosissima, libera, filiformia, interioribus in staminodia commutatis. *Stamina* erecta. *Stigmata* 4–7, minuta, subulata, acuta. *Ovarium* inferum, 4–7-loculare; placentæ parietales. *Capsula* infera, 4–7-valvis, valvarum carinis prominentibus contiguis vel parallelis late membranaceo-marginatis; loculi alis membranaceis subplanis tecti; ad orem absque tuberculo.

All are natives of Van Rhynsdorp Division and Little Namaqualand. The species will be characterised later, but the following key (made from dried specimens) will serve to indicate them :—

* Leaves 4–6 lin. long some shorter.
† Erect shrublets; internodes mostly 4–11 lin. long.
Pedicels 1 lin. or less long; branchlets without traces of dead papulæ upon them ..... *trichotomum.*
Pedicels 1½–2 lin. long; branchlets with inconspicuous remains of papulæ as white dots upon them ..... *nodosum.*
Pedicels 5–7 lin. long; branches conspicuously white-dotted from the remains of the papulæ ..... *Pearsoni.*
†† Shrublet with apparently decumbent branches; internodes ½–2 lin. long ..... *humile.*
** Leaves 1–2 lin. long, dwarf erect shrublets.
Branches irregularly diverging, giving a somewhat gnarled appearance to the plant, with internodes 2–5 lin. long, mingled with others much shorter. Pedicels 1½ lin. long ..... *brevifolium.*
Main branches stiffly erect and densely beset with very short lateral branchlets composed of numerous internodes ½ line or less long and 1½–2 lin. thick. Flowers not seen ..... *spissum.*]

A. ENGLISHIÆ N. E. Br. (*M. Englishiæ* L. Bolus in Ann. Bolus Herb. iii. 125.)

A. FASTIGIATA N. E. Br. (*M. fastigiatum* Haw. Obs. 210, Misc. 60; Synops. 256, and Rev. 173; Salm Dyck, Mes. § 44, f. 3; Berger, Mes. 120; not of Thunberg. The figure in Bradley, Hist. Succ. Pl., Dec. i. 7, t. 6, is quoted as being this species by Haworth. *M. plenifolium* N. E. Br. in Bothalia, i. 155. *M. splendens* DC. Pl. Grass. t. 35, not of Linn.)

As *M. fastigiatum* Thunb. now belongs to a different genus (*Opophytum fastigiatum* N. E. Br.), Haworth's name for this plant may be retained.

A. FLEXUOSA N. E. Br. (*M. flexuosum* Haw. Misc. 61; Synops. 257, and Rev. 172; N. E. Br. in Journ. Linn. Soc. (Bot.) xlv. 108; not of Salm Dyck or Berger, nor of Ecklon & Zeyher.)

This is an unknown plant, but Haworth seems to compare it with *A. fastigiata* and *A. splendens*, so that it probably belongs here.

A. GENICULIFLORA N. E. Br. (*M. geniculiflorum* L. Sp. Pl. 481, founded upon Dill. Hort. Elth. 271, t. 205. f. 261; Haw. Obs. 214; Misc. Nat. 59; Synops. 254, and Rev. 167; DC. Pl. Grass. t. 17; Salm Dyck, Mes. § 57, f. 1; Berger, Mes. 54, f. i.–ii. *M. brachiatum* Ait. Hort. Kew. ed. 2, ii. 191; Haw. Obs. 254; Misc. Nat. 58; Synops. 254, and Rev. 178; N. E. Br. in Bothalia, i. 152; not of de Candolle nor of Ecklon & Zeyher. *M. decussatum* Thunb. Prodr. 88, and Fl. Cap. ed. Schult. 414; Haw. Rev. 178; N. E. Br. *l. c.*)

A. HESPERANTHA N. E. Br. (*M. hesperanthum* L. Bolus in Ann. Bolus Herb. i. 190. *M. vigilans* L. Bolus in Journ. Linn. Soc. (Bot.) xlv. 121.)

Aridaria Muirii N. E. Br. *Fruticulus* erectus ad 16 poll. altus, *Nijliæ* N. E. Br. similis, sed gracilior ramis et cymæ ramulis edentibus, et pedicellis 7–12 lin. longis differt.

An erect much-branched shrublet up to 16 inches high, with opposite ascending virgate branches; internodes 6–12 lin. long, 1–1½ lin. thick, smooth, whitish. *Leaves* opposite, 7–10 lin. long, 1–1¾ lin. thick, subterete or obscurely and very obtusely 3-angled, obtuse, smooth, light green, glaucous. *Cymes* terminal, about 2½ in. in diameter, 5–9-flowered, with all the branchlets very ascending, smooth and whitish like the stems. Central pedicel of each main division of the cyme 9–15 lin. long, and the lateral 6–10 lin. long (*i. e.*, above the bracts and exclusive of their peduncles), slender. *Calyx* produced above its union with the ovary into a tube about 2 lin. long, subequally 4-lobed above, very minutely papulose; the tube part somewhat elongated pear-shaped; lobes 3–3½ lin. long, all with leaf-like points, the 2 inner being subcircular, with broad colourless membranous margins, and the point dorsal. *Corolla*, according to Dr. Muir, opening between 6 and 7 P.M. and apparently closing between 11 P.M. and 4 A.M., and having a strong and exquisite odour; tube 2 lin. long; petals 5½ lin. long, ¼–⅓ lin. broad, linear, acute "pale yellow with reddish-brown tips," according to Dr. Muir, but the reddish-brown colour is probably only on the back of the petals. *Stamens* in about 8 series. *Stigmas* 4, erect, 1½–2 lin. long, filiform; ovary half-superior, conical at the top, 4-celled; placentas axile. Young capsules globose, 3½ lin. in diameter, smooth, without sutural ridges.

Oudtshoorn Division: near Oudtshoorn, *Muir*, 3933!

This is one of several species called *M. noctiflorum* by South African botanists.

A. NITIDA N. E. Br. (*M. nitidum* Haw. Obs. 412; Misc. 57; Synops. 253, and Rev. 177; Salm Dyck, Mes. § 54, f. 1; Berger, Mes. 65. *M. brachiatum* DC. Pl. Grass. t. 129, not of Aiton.)

A. NOCTIFLORA N. E. Br. (*M. noctiflorum* L. Sp. Pl. 481, founded upon Dill. Hort. Elth. 273, t. 206. f. 262; Haw. Obs. 251; Misc. 63; Synops. 260, and Rev. 179; DC. Pl. Grass. t. 10; Pl. et Arb. D'Agrement, t. 14; Salm Dyck, Mes. § 43, f. 2; Berger, Mes. 124, f. 20. *M. Lindequistii* Engl. Bot. Jahrb. xliii. 196.)

A. NOTHA N. E. Br. (*M. nothum* N. E. Br. in Journ. Linn. Soc. (Bot.) xlv. 109. *M. acuminatum* Salm Dyck, Mes. § 44, f. 4, not of Haworth.)

A. REFLEXA N. E. Br. (*M. reflexum* Haw. Obs. 213; Misc. 60= *M. fastigiatum* var. *reflexum* Haw. Synops. 256, and Rev. 173. *M. pallens* Jacq. Hort. Schoenbr. iii. 16, t. 279, not of Aiton. *M. fastigiatum* var. *pallens* Haw. Synops. 256. *M. pallescens* Haw. Rev. 174. *M. longistylum* DC. Pl. Grass. t. 147; Haw. Rev. 174. *M. longistylum* and var. *purpurascens* and *M. fastigiatum* var. *reflexum* DC. Prodr. iii. 446.)

The above synonymy undoubtedly all refers to the same species, which varies in the colour of its flowers from white to pale pink, a variation that is not uncommon in this group of plants.

Aridaria rigida N. E. Br. *Fruticulus* nanus, glaber. *Rami* ascendentes vel erecti, internodiis 1½–7 lin. longis et ¾–1½ lin. crassis. *Folia* opposita, semiteretia, supra canaliculata, subobtusa. *Flores* cymosæ, terminales, bracteatæ. *Calyx* subæqualiter 5-lobus; lobi 2–3 lin. longi. *Corolla* ut videtur 9–10 lin. diametro, alba.

A rigid, erect, bushily branched shrublet 6–10 in. high, with straight dark brown branches somewhat thickened at the nodes. *Leaves* incurved-ascending, 5–11 lin. long, ¾–1 lin. thick (dried), channelled down the face, very convex on the back, not glaucous. *Cymes* 12–15 lin. in diameter, 3–5-flowered. *Bracts* 1–2 lin. long. *Pedicels* 1–2 lin. long. *Calyx* more coarsely papulose than the other parts of the plant, on which (in the dried specimen) papulæ are not or scarcely evident; ovary-part somewhat hemispherical. *Petals* apparently 4–5 lin. long and ⅛–⅛ lin. broad, linear, acute or obtuse, white. *Capsule* more than half superior, 2½ lin. in diameter, subglobose, 5-valved.

Riversdale Division: Klein Karoo, at Marthenus Kloof, 1200 ft. alt., flowering in December, *Muir*, 4231!

A. SPINULIFERA N. E. Br. (*M. spinuliferum* Haw. Obs. 206, 443; Misc. 57; Synops. 252, and Rev. 176; Salm Dyck, Mes. § 54, f. 2. *M. spinuliforme* Sonder, Fl. Cap. ii. 616, an error for *M. spinuliferum*.)

A. SPLENDENS N. E. Br. (*M. splendens* L. Sp. Pl. 486, founded upon Dillen. Hort. Elth. 270, t. 204, f. 260; Haw. Obs. 209; Misc. 61; Synops. 257, and Rev. 172; Salm Dyck, Mes. § 44, f. 2.)

A. STRAMINEA N. E. Br. (*M. stramineum* Haw. Obs. 252; Misc. 63, and Synops. 261. *M. fulvum* Haw. Rev. 180. *M. noctiflorum* var. β, L. Sp. Pl. 481, founded upon Dill. Hort. Elth. 274, t. 206. f. 263. *M. noctiflorum* var. *fulvum* Salm Dyck, Mes. § 43, f. 2 β.)

A. SUFFUSA L. Bolus in Ann. Bol. Herb. iv. 102.

A. SULCATA N. E. Br. (*M. sulcatum* Haw. Rev. 173; N. E. Br. in Journ. Linn. Soc. (Bot.) xlv. 135, t. 10. f. 45, and 107, under *M. acuminatum*; not of Salm Dyck nor of Berger.)

This plant is only known from the above references and a drawing at Kew, but it probably belongs to this genus.

A. TETRAGONA L. Bolus in Fl. Pl. S. Afr. vii., under t. 258. (*M. tetragonum* Thunb. Prodr. 91, and Fl. Cap. ed. Schult. 426; Haw. Misc. 83, and Rev. 149; N. E. Br. in Bothalia, i. 164.)

A. TETRAMERA L. Bol. in Ann. Bol. Herb. iv. 103.

A. TRICHOSANTHA N. E. Br. (*M. trichosanthum* Berger in Engl. Bot. Jahrb. lvii. 631.)

A. UMBELLIFLORA N. E. Br. (*M. umbelliflorum* Jacq. Hort. Schoenbr. iv. 39, t. 478; Haw. Rev. 174; Salm Dyck, Mes. § 44, f. 6; Berger, Mes. 120, f. 19, i.)

The following species are not figured and are unknown to me:—

A. anguinea L. Bolus in S. Afr. Gardening, 1927, 256.

A. decidua L. Bolus, *l. c.*

A. radicans L. Bolus in Ann. Bolus Herb. iv. 102.

(To be continued.)

EUPHORBIA LIGULATA CHAUBARD.

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

IN 1903, when in company with Mr. J. W. White and the late Cedric Bucknall, I gathered a remarkable *Euphorbia* in a wood near Vernet (Pyrenées-Orientales), which proved to come under the plant called *E. ligulata* by L. A. Chaubard.

This was described in a rare periodical, *Annales des Sciences d'Observation*, conducted by Saigey and Raspail, and as this is not easily accessible, I will give the diagnosis almost in full (vol. iv. p. 110, tab. 6, 1830):—*E. ligulata* N. (pl. 6). Umbella 5–7-fida, fulcris radiis pilosis; involucellis obovatis quasi lingulatis hispidis; foliis obversè lanceolatis, subcuneatis, obtusè acutis pubescentibus; petalis lunatis, capsulis glabris. ♄. *E. sylvatica* St. Am. Fl. agen. non Lin. Fl. luteoli; vere; in sylvaticis circa Aginum, à St. Vincent dos Corvs, à Combemingué. Rara.

Chaubard states that the root, stem, and leaves are identical with those of *E. amygdaloides*; general involucre of five leaflets exactly resembling the stem-leaves; rays of umbel hairy with long reddish hairs; partial involucres linguiform, hairy, intense green above, reddish brown beneath.

It differs from *E. amygdaloides* by its partial involucres being formed of two linguiform hairy leaflets, not orbicular and glabrous; by its umbel rays hairy with long hairs, not glabrous; and by the whole plant being uniform in colour and not yellowish green at the summit.

He concludes as follows:—"Dès qu'on suit cette plante dans ses singulières variations, il devient impossible de douter qu'elle ne soit une hybride provenant de l'*E. amygdaloides* et de l'*E. pilosa*. En effet il y a certains individus qui offrent des involucres ligulés et distincts à la base de la dichotomie, pendant que ceux des sommités sont connés et perfoliés. Cependant comme cette *Euphorbia* fructifie tous les ans, et qu'elle commence à se reproduire dans les environs d'Agen, on a cru devoir la mentionner ici sous un nom spécifique. D'ailleurs tout ce qui tend à jeter quelque jour sur la

multiplication des espèces par les races hybrides ne saurait qu'in téresser la science."

E. de Pommaret (in Billot, Annotations Fl. Fr. et d'Allemagn 1856, p. 42) has an interesting note upon this plant. He con firms the perfect seed-ripening of *E. ligulata*, its habits, leave inflorescence, and calycinal glands, capsules and seeds being exactl those of *E. amygdaloides*, and notes how the shape of bract vario enormously from oval to much elongated linguiform. He dis misses the hybrid theory (upheld by Mutel), seeing nothing in th plant to remind one of *E. pilosa*, and agrees with Godron in con sidering it an accidental state of *E. amygdaloides*. At the sam time, he draws attention to *two constant characters* absent from thi species—the lack of connate bracts, the hairy rays of umbel—and considers that they offer an extremely remarkable teratological pheno menon, producing a very marked alteration in the development of th individual plant.

Boissier (in DC. Prodr. xv. pt. 2, 170, 1862) enumerates th plant as follows:—*E. amygdaloides* L. γ. *ligulata*, monstrosa, folii floralibus minoribus aliis oblongis liberis aliis ovatis perfoliati Hinc inde in Gallia occid. et australi. *E. ligulata* Chaubard fragm bot. crit. tab. 6. Ex ipso auct. ad typum frequenter redit. (V. S.)

In my Vernet example the bracts are free and not connate, bu they are certainly not linguiform as described and figured by Chau bard, rather one would describe them as broadly ovate or orbicular The umbel rays are hairy, and the whole plant is certainly mor pubescent than is usual in *amygdaloides*.

Rouy (Fl. Fr. xii. 159, 1910) states that it occurs practically throughout France here and there with the type or sometimes replace it. It cannot be very common, as only two examples are found in the large collections at Herb. Mus. Brit. and at Kew, whil it was entirely unknown to such experienced Continental botanists a the late Cedric Bucknall and to Mr. J. W. White.

If this remarkable plant is a sport, mutation, or monstrosity o *E. amygdaloides*, it is not unlikely to be found in Britain, and thi note is to call the attention of field-botanists to its existence—so far, I have seen no British material.

THE "CONSERVATOIRE BOTANIQUE" OF GENEVA.

We have received from Dr. John Briquet, Director of the Con servatoire and Botanical Gardens of the City of Geneva, an interesting account of this historic botanical institution. It was founded in Geneva in 1824, shortly after Augustin Pyramus de Candolle had settled in the city; the building was erected at the expense of a munificent Genevese. The two first Directors were A. P. de Candolle and his son Alphonse, who however retained their private herbaria. Alphonse de Candolle resigned his position as Director in 1849, and was succeeded by Georges Reuter, who was also Curator of the

Delessert Herbarium. Until 1870 the botanical importance of the Conservatoire was inconsiderable and purely local. The gift of the Delessert Herbarium, containing numerous classical collections from all parts of the world and described by Dr. Briquet as "the greatest herbarium an individual had ever collected," raised it to an importance of the first rank. The collections in Herb. Delessert were enumerated by Lasègue in 1845 in an octavo volume of 588 pages, entitled *Musée botanique de M. Benjamin de Lessert. Notices sur les collections de plantes et la Bibliothèque qui le composent* (Paris, Jan 1845). De Lessert, who died in 1847 at Paris, was descended from a Vaudois (Swiss) family; the gift to Geneva was due to the generosity of his sister-in-law, Mme Françoise de Lessert and her two daughters. In 1871 the Delessert Herbarium was installed in the small building which was devoted in 1824 to the Botanical Conservatoire," and until 1896 was under the direction of J. Müller Arg. On the death of Müller in that year Dr. Briquet became Director, and ultimately prevailed upon the City to provide a new building; this necessitated also the transference of the Garden from the centre of the town, and it was not until September 1904 that the new building was officially opened. This was mainly due to the good offices of a generous botanist, Emile Burnat, who gave his herbarium and library to the city on condition that they were suitably housed. Thus it came about that, "apart from the Delessert Herbarium, the Botanical Conservatoire (enlarged in 1912 with the financial aid of E. Burnat) became the home of the most valuable herbarium ever collected in Europe." The library was also augmented by 3000 volumes dealing with the literature of the European flora almost in its entirety.

Other important acquisitions have been made from 1869 onwards which have been incorporated in the Delessert Herbarium. But these are surpassed by the magnificent gift of the de Candolle Herbarium, made to the City of Geneva in 1921 by Mme Augustin de Candolle, acting on behalf of her children. This collection, which is of incalculable value, is especially worthy of note by reason of the abundance of its original specimens. It includes a large percentage of the species described in the colossal work begun by A. P. de Candolle under the title of *Prodromus systematis regni vegetabilis*, continued by Alphonse and as the *Suites* by Alphonse and Casimir de Candolle. "Its founder, A. P. de Candolle, laid the foundation of it in his youth in Switzerland, and then continued to enlarge it at Paris, Montpelier, and Geneva. It would require a volume similar to that of Lasègue on the Delessert Herbarium to enumerate its treasures. Suffice it to recall that the great fame of the de Candolles and their world-wide publication of the *Prodromus* and its *Suites* (*Monographiæ Phanerogamarum*) had this effect, namely, that in the Old World, as well as in America, it was considered an honour to send to Geneva types of new species and plants gathered in countries which were being explored. Among the chief acquisitions of former times may be mentioned the herbarium of l'Héritier de Brutelle (bought in 1801), abounding in plants from French

colonies; the duplicates of the de Lamarck Herbarium, given as result of the intimacy of A. P. de Candolle with this illustrious write which makes the de Candolle Herbarium an additional source o information for Lamarck's types. . . . The herbarium also ow numerous contributions to the personal friendship between th de Candolles and Bentham, Burchell, the two Hookers, and other At the time of the distribution of the large collections made by th East India Company (Wallich), the de Candolle Herbarium receive the free gift of one of the first series." The inventory in 191 contained at least 400,000 sheets.

At the same time that they gave the de Candolle Herbarium, th heirs of Augustin de Candolle sold to the City of Geneva, on excep tionally favourable conditions, the library which is its necessary an inseparable complement, being, as it were, the commentary on th herbarium. As early as 1818, in the first volume of the *System* A. P. de Candolle gave, under the title of *Bibliotheca Botanica*, list (pp. 14–116) which is virtually a catalogue of his library. In 1851, Pritzel, in his *Thesaurus litteraturæ botanicæ*, refers to th de Candolle library as one of the *collectiones egregiæ* to which h had had recourse.

This classic collection of books has been incorporated in that o the Botanical Conservatoire, thus constituting it one of the largo botanical libraries in the world. At the end of 1924 it contain 19,000 volumes; and, including a number of large volumes of Miscel lanies, the total figures may be estimated at 25,000 volumes.

"It is not to be wondered at, therefore, that the Botanic Conservatory of Geneva has become a place of pilgrimage for botanis from every quarter of the globe. Europeans, Japanese, Americ come to Geneva year after year, spending, according to circumstanc days, weeks, or months at work in our galleries. Further, there is a ever-growing correspondence as a result of requests for informatio from all parts of the world."

The entire expense of the building of the Conservatoire and it successive enlargements has been borne by the City of Geneva, whic also provided nearly 250,000 francs for the installation of the de Can dolle Herbarium and the purchase of the library. It is upon th old Commune of Geneva, with barely 60,000 inhabitants, that th burden of the upkeep of Conservatoire and Gardens is laid. In addition, it maintains a Central Library, a Natural History Museu an Art and Historical Museum, an Ethnographical Museum, et hence, again to quote Dr. Briquet:—"It will be apparent that up 1924 the City of Geneva has done everything in its power to deser its reputation of an enlightened town, and a botanical centre international importance.

"Unfortunately, since 1924, circumstances have considerabl changed. Since the War, the economic position of the Canton Geneva has become worse and worse (*e.g.*, the closing of the Free Zon the trade depression, the reduction in manufactures and exports, an the serious unemployment crisis), and its financial situation is deplo able. This has had an inevitable effect on the finances of the City

Geneva, which was formerly flourishing. The Conservatory and Botanical Garden have suffered greatly as a result. It has been necessary to pay the proceeds from the sale of duplicates from the de Candolle Library, with which it was hoped to constitute a reserve fund, into the municipal funds, without hope of repayment. . . . The ordinary credits for the Library were reduced by nearly a quarter in 1925. Finally, what is more serious still than all the rest, the position of the Curator of the de Candolle Herbarium and that of Assistant Cryptogamist were abolished in 1925. The scientific staff of the Conservatory is thus reduced to three persons, at a time when a more numerous staff is urgently required for the classing of the de Candolle Herbarium (not including the *Prodromus* collection and the *Suites*). The remaining staff seem to themselves to be overwhelmed, and look round in vain for support.

"The foreign European botanists who have been informed of the situation share this fear, and, in addition, the prospect of the reduction in the scope, or even perhaps the failure of an institution the value of which to science is universal, has caused real concern among American botanists."

In order to place the Conservatoire upon a satisfactory financial basis and thus ensure the maintenance of these classic herbaria, for the use of botanists throughout the world, the present Director is making an effort to raise a capital fund of 200,000 Swiss francs. The income from this will, it is estimated, suffice for the upkeep of herbarium and library and for publications. The City of Geneva, when freed from the responsibilities of these expenses, will be willing to re-establish a post of Assistant, recently cancelled. The fund would be administered by a Committe of Trustees.

The International Education Board, founded by J. D. Rockefeller, Jnr., has generously promised a contribution of two-thirds of the amount as soon as the remaining third has been collected, and an appeal for the required sum, 66,666 francs, has been issued by the Council of the Fund, and is warmly recommended by a long list of botanists in all parts of the world.

Contributions should be sent to the Treasurer, Mr. Alfred Kern, c/o Société de Banque Suisse, Geneva; or to the Linnean Society of London (Burlington House, W. 1), which has undertaken to forward contributions.

OBITUARIES.

Johan Marcus Hulth.

Dr. Johan Marcus Hulth, whose death on March 29 is announced, was the Principal Librarian of the Royal University Library, Upsala. A writer in the *Times* of April 5, to whom we are indebted for some of the information here given, refers to him, from personal knowledge, as the foremost bibliographer of Linnæus, whose knowledge of the printed editions of the MSS. and of the correspondence of Linnæus was unrivalled. From 1906 to 1914 he had visited all the principal libraries of Europe in the pursuit of

Linnæana, including Linnæus's own library and collections at the Linnean Society in London (purchased by Dr. James Edward Smith not from Carl von Linné the younger, as stated by the writer in the *Times*, but from the widow of Linnæus after the death of her son in 1783). As the result of his effort, the Upsala University contains the finest collection of Linnæana in the world, and the University Library has come to be a great centre for students.

Hulth's *Bibliographia Linnæana*, vol. i. was published in 190 by the Royal Society of Sciences, Upsala, to commemorate the 200th anniversary of the birth of Linnæus; two volumes were to follow but have not yet appeared. Another unfinished work was the Swedish Government's edition (begun in 1907) of the correspondence of Linnæus, in which Hulth succeeded Theodor M. Fries as editor. He was also one of the founders of the Swedish Linnean Society at Upsala. Dr. Hulth was born at Sköfde, in Sweden, in 1865, and was educated at Upsala University, where he graduated as Doctor of Philosophy in 1899. He became Librarian in the University Library in 1891 and Principal Librarian in 1918. The library of the British Museum (Natural History) is indebted to him for the gift of many valuable Linnæana.

Caro Benigno Massalongo.

Students of cryptogamic botany and of plant galls will regret to hear of the death of Caro Benigno Massalongo, which occurred at his native place, Verona, on the 18th March. He was the son of Abramo Bartolommeo Massalongo [1824–1860], lichenologist and palæontologist. Caro was born in 1852, took the degree of Doctor in Natural Science at Padua, and became Professor of Botany and Prefect of the Botanic Garden in the University of Ferrara. His published papers are numerous, and are concerned not only with fungi and galls, but also with hepatics and phanerogams, especially those of the Venetian province, and sometimes with questions of plant morphology, biology, and physiology. On fungi alone he wrote at least 53 papers. He possessed a very rich collection of plant-galls, and his illustrated papers on cecidology are of high importance and the figures excellent. He published four fascicles of *Hepaticæ Italiæ-Venetæ exsiccatæ*, comprising 120 species. Spegazzini dedicated to him the genus *Massalongella*.—A. Gepp.

SHORT NOTES.

The Botanical Essay Society.—It has been suggested that a short *résumé* of the history of the above Society, which existed continuously from 1883 to 1926, might be put on record.

The inception of this small postal Society is interesting. It was founded by a youth intensely devoted to Botany, who, owing to spinal trouble, was condemned to inactivity from the age of 14 to 19 years. Later, restored to health, the Rev. H. Purefoy Fitzgerald became a master at Wellington College; also F.L.S. and M.B.E.

An advertisement in a magazine led to a few people joining with him to write essays on botanical subjects. Two subjects were given for each month, on all classes of the vegetable kingdom, mostly on flowering plants; intensive studies of species, genera, and families; and on topics dealing with plant-distribution, anatomy, and morphology. Writers were also encouraged to contribute holiday and phenological notes and essays on foreign travel descriptive of the flora met with, all of which added variety to the packets, vegetation in many parts of the world being illustrated by dried specimens. Some of the more talented of the amateur botanists added original drawings and microscopical studies.

The procedure was simple; the list was sent out at the beginning of the year, the Essays were sent to the Honorary Secretary and thence to the Critic, and then circulated among the members. A small subscription covered the cost of postage and provided annually small money prizes, each member voting for the papers. A Library List was circulated occasionally with names of books belonging to members for mutual lending.

Mr. Fitzgerald, first President and Founder, resigned in 1888, appointing the Rev. T. A. Preston, of Marlborough College, as President and Critic, with Miss E. S. Ward as Hon. Sec. Joining in that year myself, I can testify to the excellent, if somewhat severe, criticisms. Mr. Preston was succeeded in 1892 by Dr. O. V. Darbishire, an old member. The Society had only three Secretaries during its existence. Miss Ward resigned in 1893 on her marriage with another member, Mr. W. A. Clarke, F.L.S., author of *First Records of British Flowering Plants*, and was succeeded by Miss Sophia Armitt, a well-known Rydal botanist, who filled the office most capably for fourteen years, till 1907. She joined in 1890 and was an admirable essay writer. Failing in health, she asked the present writer to take up the work, which she did till the Society, from lack of members, ceased to exist at the end of 1926. The names of other Presidents and Critics are sufficient to show the advantages enjoyed by the writing members:—Messrs. J. C. Willis, I. H. Burkill, R. H. Yapp, A. Wallis, and A. A. Dallman; after which Dr. Darbishire returned to the Presidency and introduced a succession of his graduate students as Critics:—Misses Carson, Gilchrist, Bowen, and Bracher.

Upwards of forty persons belonged to the Society for longer or shorter periods; a few were non-writers, termed Associates, who were content to enjoy the results of the labours of others. The number in any one year varied from five to twenty. It speaks well for the care of members and the efficiency of the Post Office that, of the twelve packets circulated each year and many times readdressed, only one out of well over 500 packets was lost.

From the numerous expressions of appreciation which have reached me during many years and from my own experience, I can say that this little band of essay writers got much pleasure and help in their own amateur work through the kind encouragement of their Critics, who gave up valuable time in their interests, while the joy of

each ramble and piece of work was enhanced by sharing it with the other readers, and each learnt from the experience of the rest.—ELEONORA ARMITAGE.

ARABIS SCABRA All. IN SOMERSET.—It is desirable that the thorough establishment of *Arabis scabra* All. by artificial introduction in West Somerset (v.c. 5) should be put on record, and I have the authority of my friend, Mr. Henry Corder, of Bridgwater, for writing this note. At least fifteen years ago Mr. Corder distributed seeds from cultivated plants of the *Arabis* on the New Red Sandstone rocks and walls of Mount Radford (at the top of Wembdon Hill, on the road from Bridgwater to Cannington and Minehead), and on two walls of similar rock bordering Skimmerton Lane, which leads from Mount Radford to the road from Bridgwater to Spaxton. On the wall separating the lane from an arable field the plant is remarkably well established for about 100 yards or so. Last Christmas the numerous rosettes of leaves, together with remains of spikes, some of which still retained seed, were a conspicuous feature. More plants now survive there than anywhere in the Bristol district, where, particularly on the Somerset side of the Avon, *Arabis scabra* has become lamentably scarce of late; but it holds its own very well in the station near Shirehampton (Glos.). Seeds were also sown by Mr. Corder on the carboniferous limestone rocks near the quarry by Cannington Park, about 2½ miles away, but here it has increased very little. Evidently this scarce limestone plant will flourish well on red sandstone rock; and at Easter I saw a thousand or more in flower on the above-mentioned walls.—H. S. THOMPSON.

THE OCCURRENCE OF *FUCUS VESICULOSUS* ECAD *MUSCOIDES* ON THE DOVEY SALT MARSHES (CARDIGANSHIRE).—While making a study of the Fuci occurring on the Salt Marsh at Mochras (near Harlech, Carnarvonshire), it was thought that these plants might also be found in similar situations on the Dovey Salt Marshes. *Fucus vesiculosus* ecad *muscoides* Cotton occurs there. Cotton collected this form on the firm peaty salt-marshes at Roundstone and Clew Bay, Ireland, and at Loch Linnhe, W. Scotland, but as there seems to be no record of its being found previously in Wales, it seemed worth while to report it.

This very minute *Fucus* was found to the north of the railway-line between Ynyslas and Glandovey growing amongst the *Juncus maritimus*, which forms the outermost zone of the Salt Marsh. In this situation the sandy soil is wet but firm, and there is no standing water. The p^H value of the soil, about 7·5, is the same as that obtained from a similar habitat at Mochras, where *Fucus muscoides* was also found.

The *Fucus muscoides*, together with *Bostrychia scorpioides* and *Catenella opuntia*, form a frequently occurring feature of the undergrowth of the *Juncetum*, although, except for a rim of about three inches abutting on the *Juncetum*, they are absent from the sward. This is of interest, for Cotton found his *Fucus muscoides* growing in

a *Glyceria-Armeria* turf. At Dovey the protection afforded by the *Juncus* may explain the presence of the *Fucus* in this zone and its absence from the lower sward. Evaporation experiments conducted by Yapp showed that the average evaporating power of the air at the surface of the *Armerietum* was 2·26 times as great as in the *Juncetum* (at 3" above the ground). In general, both the size and the colour of the *Fucus* were found to vary with the closeness of the *Juncus*, the *Fucus* being smaller and of a yellow-brown instead of a brown colour in more open parts.

The following is a description of *Fucus vesiculosus* ecad *muscoides* as it occurs at Dovey:—

Habit turfy; plants very small and densely crowded. 5–10 mm. long generally, but rarely up to 35 mm. in length; fastigiately branched, the branches cylindrical ·2–1 mm. wide. No plants with cryptostomata were found at Dovey, although these occur on the somewhat larger plants at Mochras. No specimens with receptacles were found.—P. M. SKRINE, University College of Wales, Aberystwyth.

BONNEMAISONIA HAMIFERA Hariot IN SCOTLAND.—This remarkable and very distinct alga was brought for naming to the Department of Botany, British Museum, by Mr. E. J. H. Corner. He collected it at Bennane Head, near Ballantrae, Ayrshire, on September 30th, 1927. The plant was first described in 1891 from a Japanese specimen. The *Sylloge Algarum* gives the two localities, Yokoska, Japan, and Pacific Grove, California, only. In 1893 Bulfham collected it at Falmouth, and figured it in the *Journal of the Quekett Microscopical Club*, vi. ser. 2, 177–182, pl. vi (1896). There are specimens in Herb. Mus. Brit. from that place and also from Shanklin and Torquay. It was detected by Cotton in the marine flora of Clare Island. This find of Mr. Corner's is, so far as I can discover, the first record for Scotland. It may be pointed out that the specimen was closely attached by its characteristic hooks to a plant of *Cladostephus verticillatus*; this fact offers a clue to the means whereby the species has attained its noteworthy distribution.—GEOFFREY TANDY.

NEW RECORDS FOR SPHAGNA IN SCOTLAND.—Among a number of mosses collected by the late Mr. E. A. Richards, and since acquired by the Department of Botany, British Museum, are seven Sphagna which are new records for S. Aberdeenshire, v.c. 92, and one for Forfarshire, v.c. 90. Those from S. Aberdeenshire are as follows:—**S. fuscum* von Klinggr., Invercauld Forest; **S. Warnstorffii* Russ., Glen Quoich; **S. subtile* Warnst., Invercauld Forest (this is the second record for the British Isles); **S. quinquefarium* Warnst., Creag Choinnich; **S. inundatum* Warnst., Ballater; **S. auriculatum* Schimp., Glen Callater; *S. papillosum* var. **sublæve* Limpr., Corriemulzie. That from Forfarshire: *S. squarrosum* var. **subsquarrosum* Russ., Glen Isla.

An asterisk indicates whether it is the species or the variety that is new.—W. R. SHERRIN.

REVIEWS.

Plants of New Zealand. By R. M. Laing, B.Sc., and E. W. Blackwell. Third edit., revised and enlarged. 8vo, pp. xv, 468. With 175 original photographs by E. W. and F. Blackwell and others. Whitcombe & Tombs: Auckland &c. Oxford University Press: London, 1927. Price 18*s.* net.

The original edition of the *Plants of New Zealand*, published in 1906, has long been out of print; the present edition, for the preparation of which Mr. R. M. Laing is responsible, should therefore be the more welcome. It follows the same lines as the original book, but is somewhat larger and has been revised in order to reflect "the most recent views on the subjects of species, the evolution of plants, and the origin of the New Zealand Flora." The New Zealand botanist is fortunate to possess an excellent handbook to the flora of his country in the late Thomas Cheeseman's classic work; but the present account of the vegetation of the Islands will probably have a wider appeal among those who, while not seeking a critical examination of the flora, desire a readable and informative account of its more striking characteristics. This they will find in the subject of our review, the descriptive matter of which is enhanced by the numerous photographs illustrating the habit of the plant as a whole or of flowering or fruiting shoot; some of those illustrating tree-habit call for special mention. In an introductory chapter the authors give a general account of the vegetation, briefly describing the various types; the origin and affinities of the flora are then discussed, and this is followed by a short description of the plant and its principal parts, and a key to the classification adopted in the Systematic portion, which occupies the main position of the volume. In the latter, orders and families are arranged on the Englerian system, and the book can therefore readily be consulted along with the second edition of Cheeseman's 'Flora.' Mr. Laing points out that minor differences in nomenclature, number of species in a genus, &c., are due to the suggestions of Dr. L. Cockayne, whose generous help is acknowledged.

In the Systematic portion much interesting general information is included, sometimes under the heading of the family, as in the case of the Orchids, where a general account of the flower and methods of pollination are given, or under the genus or species where such happens to be of special interest, such as the Kauri pine.

Rather more than 50 families are included—Monocotyledons are represented by Screw-pines (*Freycinetia*), Palms (*Rhopalostylis*), Liliaceæ, Iridaceæ (*Libertia*), and Orchids; the Dicotyledons by about 46 families. Where several genera of one family are included a key is given to aid in identification. Individual genera and species are briefly described in botanical language in smaller type, with the addition of further descriptive matter where the plant is of special botanical interest or economic value; references are also made to

Maori uses and traditions. The book is clearly printed, but use of bond paper, to allow better production of the numerous photographs in the text, makes the volume rather heavy.

Handbuch der Paläobotanik. By Max Hirmer, Professor of Botany and Palæobotany at the University of Munich. Vol. I. Large 8vo, pp. 724; 817 figs. Oldenbourg: Munich, 1927. Price (Bound) 48 Marks.

The work of the palæobotanists during the last fifty years has so greatly extended our knowledge of fossil plants that it would seem almost impossible to produce a work covering the whole of the history of plant-life on the earth. Several works of this kind have appeared in the past from the pens of men who have spent many years of study on the subject, but the present volume is mainly the work of a young professor whose age is only 35. At the outset it challenges our interest. Will it be fresh, virile, and original?

There can be no doubt that this first volume, dealing with the Thallophyta, Bryophyta, and Pteridophyta, is a most noteworthy achievement. In its plan, its scope, and especially its illustrations it is excellent. Each group of fossil plants is orientated with modern forms, its structural features are described, the chief species found as impressions are briefly enumerated and characterised, anatomical features of other species are summarised, and all the important forms are fully illustrated. It may seem scarcely credible, but it is true, that many of the reproductions of photographs from previously published papers are clearer than the original figures. Almost every difficult point of structure or morphology is well explained by figures or diagrams, many of them new; and these alone would make the book valuable. The illustrations of the primitive ferns are especially worthy of mention.

Summaries of literature are given for each genus, and at the end of the description of a group we find a section dealing with its distribution in time, and another dealing with its general morphology. An extensive use is made of different founts of type, a smaller type being used for the descriptions of the less important species and for the general discussions; the printing and setting up of the pages is very clear, and it is easy to find the description of any species in a moment. The great mass of material involved has undoubtedly been organised in a masterly manner.

The section dealing with the Thallophyta has been written by Dr. Julius Pia, of Vienna: this is certainly the most complete summary yet published, and most botanists will be surprised to find how many of the modern group have their fossil representatives. Dr. W. Troll contributes the small section on the Bryophyta.

It is inevitable that a book of this kind will be open to criticism on some points. The most serious type of fault is that due to a misquotation of fact—for instance, we notice that the description of fig. 369 differs in an important point from the description given by the

author of that figure. Some workers are bound to disagree with the classification of some of the forms mentioned; and here we may notice a considerable discrepancy between Prof. Hirmer's treatment of the Palæozoic ferns and the views expressed in the last work of the late Dr. Kidston. This experienced author thought it impossible to include *Oligocarpia* in the Gleicheniaceæ, and thought that there was insufficient evidence to place the pecopterid fronds with the *Scolecopteris* type of sorus among the Marattiaceæ.

The general outlook of the book strikes one as being a little too dogmatic; the student who reads it may take for granted many points which are still debatable and far from being settled; but in spite of this it is a very valuable work, and we shall await with interest the appearance of the second volume, which is to deal with the Gymnosperms and Angiosperms.—H. H. THOMAS.

The Gardener's Year Book, 1928. Edited by D. H. MONTRAY READ. 8vo, pp. 325; 8 plates. Philip Alan: London, 1928. Price 5*s*. net.

THIS is the second year of issue of this handy compendium, the main object of which is to supply a book of reference to the vast annual output of horticultural information and literature. The editor has brought together a large amount of useful information in a small compass, and has also included a number of short articles of interest to the garden-lover. Among the latter are "Economic Botany: its Value to the Community," by Dr. J. B. Hurry; "The History of Garden Design in England," by T. W. Mawson; an account of his Burma–Tibet–Assam Expedition, by Kingdon Ward. Lists, with details of staff and activities, of horticultural institutions, colleges, &c., botanic gardens, and societies, are given, also of new and noteworthy plants and horticultural periodicals; and there are numerous small articles or notes on various phases of gardening and the hundred-and-one subjects of interest to the practical gardener. The book is of handy form and well-printed. Proof-reading presents considerable difficulties in a work of this nature—misprints, especially in names of individuals, are not infrequent.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY OF LONDON.—At the General Meeting on March 29th, Dr. A. B. Rendle exhibited a specimen of a rhizome of *Piper methysticum* Forster, the source of "Kava." The species is a native of many of the Pacific Islands, where a stimulating and intoxicating drink is made from it.

Dr. Malcolm Wilson read a paper, by himself and Miss M. J. F. Wilson, on the "Dutch Elm Disease and its Occurrence in England," illustrated with lantern-slides.

The Dutch Elm Disease was discovered in Holland in 1919, and during the same year in the north of France. The following year it was reported from all parts of Holland, and in 1921 was stated to be present throughout Belgium. In the same year it was recorded from western Germany, and since that date has spread over the greater part of that country.

It has recently been reported from Norway, and according to verbal statements is present in Spain and Italy. An outbreak of the disease was discovered near London last July.

The most recent experimental evidence supports the explanation that the disease is due to the fungus *Graphium Ulmi* Schwarz.

Trees suffering from the disease may be readily recognized by the yellow discoloration of the leaves in the crown of the tree or at the tips of the side branches. This condition usually spreads rapidly over the tree, and is followed by leaf-fall and, subsequently, by the death of the tree. Defoliation may be complete within a week, but sometimes extends over a much longer period. Infected branches, when cut across, show one or more rings of small brown spots in the most recently formed wood. These internal symptoms are sometimes, but not invariably, found in the roots.

The disease is present in epidemic form throughout most of western Europe, and shows no sign of becoming less virulent. No species of *Ulmus* grown in Holland appears to be immune, and the situation is so serious that the Dutch authorities have now discontinued the planting of elms. No adequate method of control has yet been discovered, but removal and destruction of trees in the early stage of infection may check the spread of the disease.

Mr. R. W. Butcher and Mr. F. T. K. Pentelow gave an account, illustrated with lantern-slides, of their investigations into "The Effect of Pollution on the Ecology of a small Stream."

An ecological study has been made during the past two years of the River Lark in West Suffolk. This is a small river, which was made navigable about 1700, but is not now used by boats, save in the very lowest portion. As a result, in its upper reaches, the bed of the stream is too large for the volume of water, and much silt has been deposited. This is very much overgrown with plants, such as *Sparganium erectum* and *Glyceria aquatica*, usually associated in the littoral zone of ponds and lakes.

The other river-plants may be easily divided according to the velocity of the current, and therefore to the nature of the river-bed. In non-silted reaches *Ranunculus fluitans* and *Œnanthe fluviatilis* are dominant. In silted portions *Potamogeton lucens* and *Sparganium simplex* are the commonest plants. The sessile or bottom-living diatoms are very abundant in the spring, and *Enteromorpha* and *Cladophora* occur in the slow stretches in the summer.

From September to February a beet-sugar factory empties into the river about four million gallons of waste waters a day. This water contains much organic matter, and so deoxygenates the river-water. There is also an increase in the ammoniacal nitrogen.

The effect of these waste waters on the flora is to increase the

number of bacteria and cause very large growths of "sewage fungus," of which *Sphærotilus natans* is by far the commonest.

The effect of pollution, due to the reduction of oxygen, has also a marked effect on the fauna of the river.

Dr. E. S. Russell commented on our scanty knowledge of the ecology—both plant and animal—of small streams. He drew attention to the fact that there was a small laboratory at Alresford for freshwater ecological investigations, and invited assistance in the work being carried on there.

At the General Meeting on April 19th, Mr. R. D'O. Good gave an account of "The Geography of the Sino-Himalayan Genus *Cremanthodium* (Compositæ)." The genus consists of about fifty species, and is probably the largest genus strictly confined to the Himalayas and western Chinese mountains. It is mainly an ecological and geographical genus, comprising the high-alpine derivatives of the genus *Ligularia*, itself almost entirely an eastern Asiatic genus and very closely related to *Senecio*.

The area of the range of *Cremanthodium* is divisible into three topographic regions—the western or Himalayan mountains, the eastern or western Chinese mountains, and the plateau of Tibet.

A statistical study of the distribution of the species shows that:—

(1) 14 species are found in both western and eastern mountains.
(2) 4 species are found only in the Himalayan mountains (all in the eastern half of the range).
(3) 30 species are found only in the Chinese mountains (almost all in the southern half).
(4) The greatest concentration of species is in Yunnan.
(5) Only two or three species extend on to the Tibetan plateaux.

Considerations of present distribution, geology, and climate suggest that the history of the genus *Cremanthodium* has been somewhat as follows:—The genus originated from *Ligularia* in the southern part of the western Chinese mountains, at some period not more recent than the early Miocene, and spread northwards along the mountains until a number of the wider species reached Kansu. The elevation of the Himalayan mountains then began, and resulted in the interruption of the source of the rainfall in the northern Chinese mountains, the Himalayas themselves becoming a zone of very high rainfall along which the genus spread rapidly as far as the Indus valley. The changed climatic conditions checked, and perhaps even diminished, the range of the genus in the northern part of the Chinese mountains, but the southern part was unaffected and continued to produce numerous new species.

Professor F. O. Bower, F.R.S., read a paper on the Size-Factor in Plant Morphology, with special reference to the Stele; with lantern-slide illustrations.

The Principle of Similarity has been applied freely to the structure of the animal body. Botanists have been slower in

applying it to plants. Nevertheless, the practicable limit of size of trees has long ago been discussed by mathematicians, and it is recognized that a change either of material composing the woody trunk or of the method of its construction would be necessary for effective growth beyond the limits already reached by some of them. About 300 feet is approximately the level of the highest canopy in tropical forests.

The mechanical application is, however, only one of the ways in which the Principle of Similarity affects organic structure. Its relation to physiological interchange commands a greater interest, since with increasing size, if the form be unchanged, the surface will increase as the square, while the bulk will increase as the cube of the linear dimensions. Physiological interchange is conducted through limiting surfaces, external or internal. It may be assumed that, provided the surface be unbroken, such interchange will be proportional to the area of the surface involved. Accordingly, in an enlarging body, if the original form be retained, a practicable size-limit will ultimately be reached. But any change from a simple form which makes the surface more complicated increases the proportion of surface to bulk—for instance, corrugation, or plating, or branching, and segregation into parts. Increasing morphological complexity, which involves such progressive changes, may be held as a concession to physiological requirement in a growing organism.

The size-factor which favours such results is only one among many that have influenced form. Nevertheless, a recognition of morphological results which do, in point of fact, accord with the demands of increasing size should help to make comparative morphology a rational study.

In the construction of any ordinary vascular plant, there are three important limiting tissue-surfaces:—(i.) the outer contour, complicated though it usually is in subaerial plants by the added cell-surfaces lining the ventilating channels; (ii.) the endodermal sheath, which delimits the primary conducting tracts from the enveloping tissues; (iii.) the collective surface by which the dead tracheal system faces upon the living tissues that embed it. This is apt to be complicated by intrusion of living cells into the dead tracts. Each of these is a surface of physiological transit; each independently of the others will be a suitable subject of observation from the point of view of the proportion of surface to bulk as the size increases.

The present discussion deals only with (ii.) and (iii.). In order to make it precise, it will be well at the outset to rule out of consideration all secondary or cambial developments, and to deal only with primary structure as it is seen in relatively primitive plants. Later on, secondary developments will be considered, but at first they would only confuse the question. The common form of axis in primitive plants is conical, enlarging upwards; and the conducting system enlarges with the axis. Thus it will constantly be called upon to meet a diminishing proportion of surface to bulk. The

demonstration consists in tracing through numerous examples how this is actually carried out. The chief changes are these :—

(*a*) Penetration of the primitively solid tracheidal tract by living cells, or replacement of those that are central by parenchyma.

(*b*) Its enlargement of surface by fluting, or segregation into parts.

(*c*) The involution of the endodermis, which is apt to follow the changes in the tracheidal tract, but does not always do so.

Illustrations are taken from the Psilotales and Psilophytales; the Lycopodiales and the Filicales, &c., but also from the roots of these, and from Angiosperms.

One of the leading results that follows from the comparison of the conducting tissue in these plants is, that the stele may react to the size-factor independently of the insertion of appendages. This is seen in marked degree in roots; it is also evident in aphyllous and microphyllous forms, but where the appendages are large these exercise a correspondingly great influence upon the stelar development. Thus the stele appears to have an adaptive morphology of its own, and the evidence of its independence varies with the relative insignificance or dominance of its appendages.

Department of Botany, British Museum.—An interesting exhibit illustrating the vegetation of Africa has recently been completed in the Botanical Gallery. A large relief-map, painted in different colours, demonstrates the distribution of the different kinds of vegetation as determined by geographical position, geology, and climatic conditions. The important relation between rainfall and the character of the vegetation is apparent. Where rainfall is highest forests are general, and where it is low or absent deserts occur; grasslands and open woods occur in intermediate conditions. The vegetative zones indicated on the map are illustrated by a series of photographs showing rain and dry forest, temperate bush, mountain, grassland, and desert respectively. Specimens and pictures of native African plants conspicuous for their beauty or of economic importance are also shown.

A series of coloured transparencies illustrating British fungi in their natural habitats has also been placed in the Botanical Gallery.

Viola nana DC., Addition.—Since correcting the proof of my paper on *Viola nana* (p. 129), I have received from Bro. Louis Arsène specimens gathered in a sandy field at St. Ouen's Bay, Jersey. These are much more extensively developed than the sand-dune plants. The tap-root extends to a depth of 10 inches, and, in addition to the upright main stem, there are several widely-spreading basal flowering branches reaching a length of as much as four inches. In all other respects the plants are typical *nana*. They come under Rouy and Foucaud's subvar. *major*, which is a mere state of *nana* (see above, p. 132).—E. Drabble.

NOTES ON JAMAICA PLANTS.

By S. Moore.

(Continued from Journ. Bot. 1927, p. 221.)

Vernonia.

The great genus *Vernonia*, already known to comprise upwards of a thousand species, mostly Tropical American and African, is represented, excluding the one here proposed as new, by only seven species in Jamaica, of which all but one are endemic. Some confusion has arisen with regard to one of them, the plant Swartz originally named *Conyza rigida* *, but afterwards † removed to *Vernonia*. De Candolle ‡, who saw a specimen, considered it a valid species; but Grisebach § confused the plant with *V. Sagræana* DC., a Cuban species. In 1906 Gleason || published a valuable memoir on the North American *Vernonieæ*, in which (p. 182) he made *V. rigida* a synonym of *V. fruticosa* Sw., though he would scarcely have done this had he been able to examine the type. He says of *V. rigida*: "Authentic specimens have not been seen. It is closely related to *V. leptoclada*, but was regarded as distinct by Scholtz and also by Dr Britton, who examined Jamaica specimens at the Kew Herbarium." Inasmuch as there is no specimen at Kew, this reference to the Kew Herbarium must be a mistake for the British Museum, where, in the Banksian Herbarium, there is one of the few specimens of this rare plant, of which Swartz so far has been the only collector. Schultz-Bipontinus ¶ writes *à propos* of *V. leptoclada*: "*Vernonia rigida* Sw., cujus specimen auctoris in herbario Schreberiano ** vidi, planta rigidissima, ab omnibus differt· ramis flexuosis, involucro turbinato, imbricatissimo, ½ poll. longo, cum pedunculo brevi pariter squamis obsito obtusis."

The fullest account we have of West Indian Vernonias is given in Ekman's elaborate memoir published in 1914 ††. Here (p. 67) *V. rigida* reassumes its status as a distinct species. Having had access to authentic material, the author writes: "*V. rigida* as described by Swartz is a woody winding shrub having flexuose densely tomentose branches, rounded, rigidly coriaceous leaves 3–4·5 cm. long by 1·5–3 cm. wide, somewhat shining above, glandulose and finely pubescent beneath, especially on the veins.—The cymes are leafy, freely flexuose, the heads distant, sometimes two or three in the axils. The involucres are elongated up to 15 mm. high ‡‡, infundibular, long-attenuate at the base; the scales are imbricated in numerous series, the outer ones deltoid, carinate, nearly glabrous §§, erect-appressed, the inner ones elongated, spreading, the dry and open involucres thus resembling stars."

* Prod. 113 (1788) † Fl. Ind. Occ. iii. 1322 (1806). ‡ Prod. v. 49.
§ Fl. Br. W. Ind. 354, and Cat. Cub. 144. || Bull. N. York Bot. Gard. iv.
¶ Journ. Bot. i. 233. ** At Munich. †† Arkiv f. Bot. xiii. Band 13.
‡‡ 12 mm. would be a closer equivalent to Schultz's "½ poll." Swartz himself put on no measurement.
§§ Neither Swartz nor Schultz mentions the indumentum of the involucres.

Ekman goes on to speak of a specimen in the Stockholm Herbarium, presented by Swartz to Montin, which, to a certain extent, is off type and shows some approximation to *V. acuminata* Less. The leaves of this differ from those of *V. rigida* in their thinner texture and shape (4× only 2·2 cm. wide); "however, the involucres are very differently shaped. They are only 6–7 mm. high, broadly obconic, shortly attenuate at base, the scales are shorter and more densely pubescent. Probably this is the normal form of *V. rigida*, the type-specimens belonging to a form with abnormally elongated involucres."

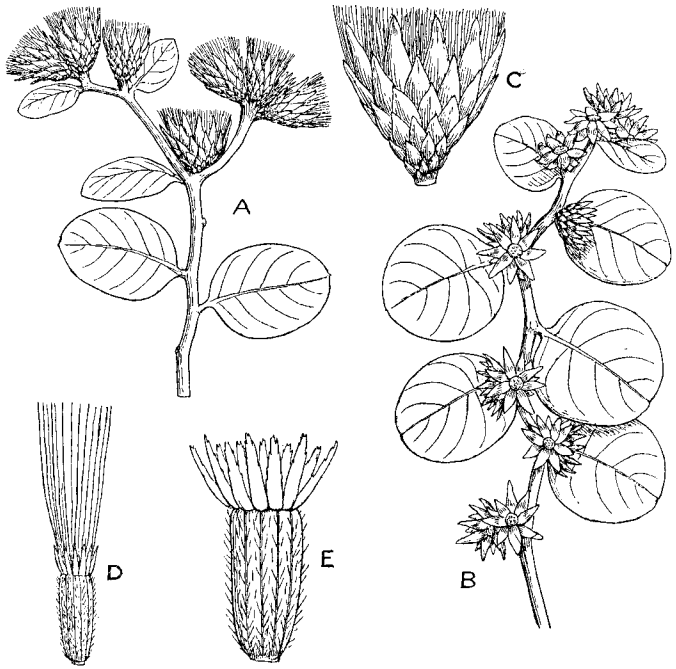


Fig. 1.—*Vernonia rigida* Sw. A. Branch with inflorescence. B. The same, fully grown out. C. Capitulum, × 3. D. Achene and pappus, × 6. E. Achene, × 10. (A, B, slightly reduced.)

The specimen in the British Museum (fig. 1) is somewhat different from both the above. Its leaves, although in shape etc. agreeing with those of the first mentioned, are smaller (2–2·8 × 1·8–2·7 cm.), and the tomentose involucres would also seem to be a little smaller, never reaching ½ inch high, their maximum height being barely 10 mm., though the heads after flowering measure 11–12 mm., owing to the setæ of the pappus projecting a little beyond the involucre. One point left unmentioned by the writers relates to the leaves, which, in the case of the Museum specimen, are

densely though evanescently tomentose in their earliest stage. This species, known, as already mentioned, only from Swartz's specimens, is found on limestone hills in the north of the Island.

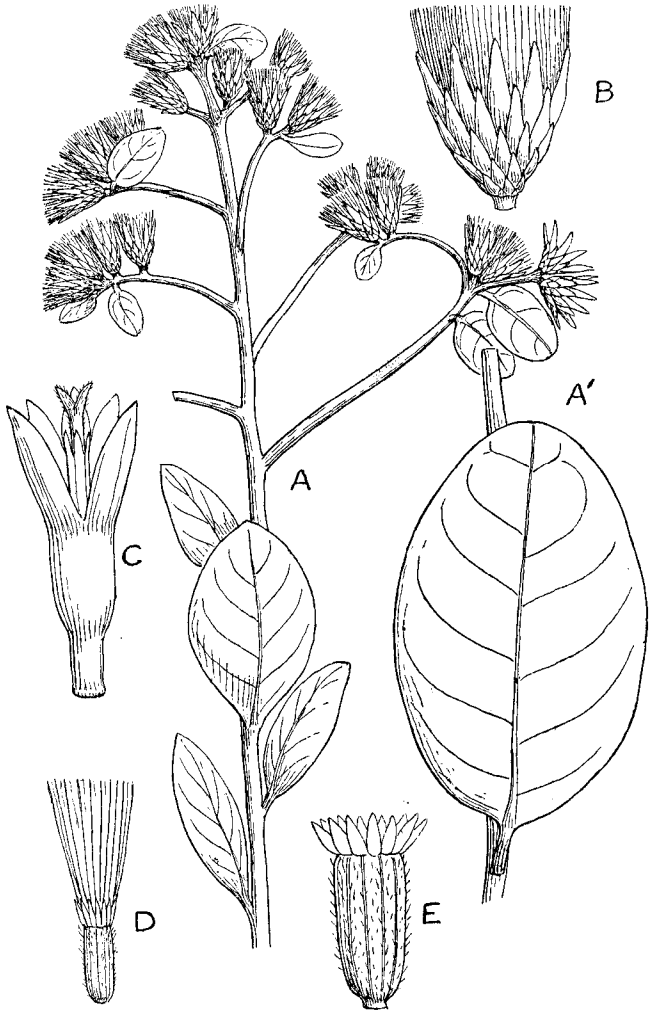


Fig. 2.—*Vernonia Harrisii*, sp. nov. A. Flowering branch. A′. A fully-grown leaf. B. Capitulum, × 3. C. Young corolla, × 10. D. Achene and pappus, × 6. E. Achene, × 10. (A, A′ slightly reduced.)

Among the Compositæ in the Jamaica Herbarium is a *Vernonia* (*Harris*, 12776), which has been named "*V. rigida* Sw.," but is evidently different from Swartz's plant and represents a new species:—

Vernonia (§ *Lepidaploa*) **Harrisii**, sp. nov. (Fig. 2.) *Frutex*, ramis elongatis rectis sat tenuibus omnimodo foliosis tomento fusco-brunneo gaudentibus; *foliis* petiolatis ovatis raro late obovato-oblongis utrinque rotundatis pergamaceis costis puberulis exemptis glabris pag. sup. nitidis prominenterque nervosis (reticulo laxo) pag. inf. opacis necnon paullo pallidioribus pag. utravis glandulis immersis instructis; *cymis* abbreviatis pedunculatis incurvis unilateraliter oligocephalis bracteis foliaceis onustis; *capitulis* approximatis subcylindricis mox anguste campanulatis 9–10-flosculosis; *involucri* phyllis 4–5-serialibus oblongo-lanceolatis acutis vel obtusiusculis brunneis apice sæpe fuscis coriaceis microscropice puberulis vel fere omnino glabris; *receptaculo* breviter foveolato; *achæniis* cylindricis basi callosis 10-costatis setulosis; *pappi squamis* anguste oblongis pallide brunneis setis caducis scabriusculis fusco-brunneis.

Hab. Jamaica, Peckham Woods, Upper Clarendon, 2500 ft. *Harris*, Fl. Jam., 12776. Herb. Jamaica, Mus. Brit., and Kew.

"Shrubby with weak stems up to 9 ft. long." Leaves up to 5·5 × nearly 4 cm. on tomentose petioles 7 mm. long, but most of them smaller, the upper ones greatly reduced and passing into the bracts of the cymes; lateral nerves 5–6 pairs, prominent on both sides, dichotomising usually about $\frac{2}{3}$ of their course to form bold loops with neighbouring nerves; reticulum very open, best seen on the upper face. Cymes few-headed on tomentose peduncles reaching 2 cm. long, but usually shorter, the heads crowded and cernuous (sometimes erect or nearly so). Involucres 6 × 5 mm.; outermost leaves 1·5–2 mm., intermediate 3–4 mm., innermost 5 to nearly 6 mm. long. Corollas, according to the collector, rosy-violet. Achenes barely 2 mm. long. Pappus squamæ 1 mm., setæ 4 mm. long.

The following are the chief differences between this and *V. rigida* as represented at the British Museum:—

V. RIGIDA.	V. HARRISII.
Flowering branches rigid, elongated, flexuous.	Flowering branches weak, straight.
Leaves at first densely tomentose, afterwards almost opaque above.	Leaves always nearly glabrous, shining above.
Cymes elongated; heads scattered, 12-flowered.	Cymes short, congested; heads 9–10-flowered.
Involucres tomentose, 9–10 × 7 mm.; outer leaves deltoid-ovate, inner 2 mm. wide or a trifle less.	Involucres nearly glabrous, 6·5 × 5 mm.; leaves oblong-lanceolate, inner 1 mm. wide or a trifle over.
Achenes 2·5 mm. long; scales of pappus 1·5 mm. long, setæ 5–6 mm. long.	Achenes barely 2 mm. long; scales of pappus 1 mm. long, setæ 4 mm. long.

The British Museum specimen of *V. rigida* is markedly different from Montin's specimen in its foliage, which, except for size, is exactly as described by Swartz. Perhaps we have to do here with a third species; but this cannot be determined until better material comes to hand.

EUPATORIUM.

The following new species has recently been received in a small collection sent by Miss Iris Maxwell:—

Eupatorium (§ *Praxelis*) **Maxwelliæ**, sp. nov. Verisimiliter *suffrutex*; *ramulis* omnimodo foliosis hispidulis cito scabridis eleganter striatis; *foliis* omnibus oppositis petiolatis ovato-lanceolatis obtusis basi truncatis sed subito in petiolum angustatis margine (basi integra exclusa) serratis triplinervibus chartaceis pag. utravis (præsertim inf.) scabrido-hispidulis glandulis immersis lucentibusque copiose indutis; *capitulis* circa 50-flosculosis pedunculatis ad apicem ramulorum ternis; *receptaculo* anguste oblongo-ovoideo; *involucri* anguste oblongo-obovoidei phyllis arcte imbricatis 7-serialibus inferioribus ovato-rotundatis intermediis oblongo-obovatis rotundatis intimis lineari-oblongis obtusis necnon apice pubescentibus crustaceis omnibus (præter intima 3-striata) 5–7-striatis; *corollis* exsertis, anguste infundibularibus; *achæniis* inferne leviter attenuatis in costis obscure scabriusculis fuscis; pappi setis scabriusculis, dilutissime badiis.

Hab. Jamaica, Flamstead; *Miss I. Maxwell.*

Leaves usually 2–4 × 1–2·5 cm., drying greyish-brown; petioles slender, hispidulous, 5–15 mm. long. Flowering capitula 12 × 7 mm.; hispidulous peduncles 5–10 mm. long, enlarged above. Receptacle white, 1–1·5 mm. long. Involucre 8 × 5·5 mm.; outer leaves 2–3 mm., intermediate 2·5–5 mm., innermost up to 7 mm. long, very pale green and shining, the striation very strong. Corolla probably purple, 4 mm. long. Anthers 1·5 mm., appendages ·2 mm. long. Achenes 4–5 mm., pappus 4 mm. long.

Differs from *E. heteroclinium* Griseb. in the following points:—(1) The hispidulous indumentum; (2) the leaf-base suddenly narrowed into the petiole, and the triplinerved (not 3-nerved from the base) condition of the somewhat larger leaves; (3) the shorter and broader capitula with broader, rotundate, pale green, very strongly striated scales. As Grisebach gives only 20–25 florets per head for his plant, this might be thought another difference: as a fact, the heads of both species have about 50 florets, but these are liable to stick together, and some may thus escape numbering, which explains the error into which Grisebach fell.

MIKANIA.

M. scandens Willd. is said by authors to occur in Jamaica, but Robinson, our chief authority on the genus, doubts some at least of these determinations. He surmises* that much of the tropical American and West Indian material referred to *M. scandens* may prove to be *M. micrantha* H. B. K. *M. scandens*, he points out, is a North American species with larger heads, larger and narrower pointed involucral scales, larger lavender-purple (not white) corollas, and longer achenes than those of tropical specimens he considers

* Contrib. Gray Herb. lxiv. 24.

wrongly referred to *M. scandens*. All the available Jamaica material bears out this view, except that occasionally the involucral scales are somewhat larger and agree with those of *M. orinocensis* H. B. K., now regarded as conspecific with *micrantha*. It is worth noting that Grisebach also rejected *scandens* as a West Indian species in favour of *orinocensis*. Robinson * makes *M. congesta* DC. (*scandens* var. *congesta* Bak.) a variety (var. *congesta*) of *micrantha*, giving as the distribution Brazil, Bolivia, Columbia, and Porto Rico. It is not without interest to note that the Museum has an old Jamaica specimen of this variety collected by Masson.

M. Swartziana Griseb. was founded on Swartz's *Eupatorium Houstonis* from Jamaica, a plant, as is evident from the Wright specimen in the British Museum, which would appear to have been that seen by Swartz, so like the Mexican *E. Houstonis* L. that he concluded the two to be the same. Grisebach, who seems to have overlooked a Jamaica specimen of Purdie's at Kew and to have relied on Swartz's description alone, enlarged the range of the species by including it among the plants of Cuba. But besides its quite different leaves, the Cuban plant has smaller flowers with narrower involucral leaves, corollas with a narrower tube and smaller limb, shorter and thinner style-arms, and shorter, smooth (instead of rough) achenes. Much nearer to the Cuban species, described below as *M. Lindenii*, is *M. alba* Taylor (*Torreya*, iii. 185); this, apart from some minor characters, can easily be distinguished from *M. Lindenii* by its bracteoles, which "much exceed the pedicels."

The three species can be distinguished on sight thus:—

Leaves membranaceous	*M. Swartziana.*
Leaves rigidly coriaceous.	
Bracts much longer than the pedicels	*M. alba.*
Bracts shorter than the pedicels	*M. Lindenii.*

A description of the proposed new species follows:—

Mikania (§ *Racemosæ*) **Lindenii**, sp. nov. *Frutex* scandens, glaber; *foliis* brevipetiolatis ovatis vel ovato-lanceolatis obtusis basi obtusis rotundatisve margine integris vel undulatis nonnunquam subobsolete denticulatis trinervibus coriaceis nervis pag. sup. impressis pag. inf. optime eminentibus; *paniculis* axillaribus vel terminalibus e racemis pleiocephalis patulis constitutis; *bracteis* racemorum parvulis subulatis; *bracteolis* basipedicellatis quam pedicelli plane brevioribus rarissime eos subæquantibus; *involucri* anguste campanulati phyllis linearibus obtusis margine angustissime membranaceis obscure striolatis; *corollæ* parte tubulosa partem anguste campanulatam adæquante; *achæniis* linearibus glabris; *pappi setis* corollæ vix æquilongis scabriusculis dilute fulvis. *M. Swartziana* Griseb. Fl. Br. W. Ind. 363 (in part.), Pl. Wright. 512 & Cat. Cub. 147; Urb. Symb. Ant. v. 216 (in part.).

Hab. Cuba; *Linden*, 2141, Herb. Mus. Brit., Herb. Kew. Also *Wright*, 303, in Herb. Kew.

* Contrib. Gray Herb. lxiv. 43 & 111.

Branches subterete, strongly striate. Leaves mostly 2·5–5 × 1·2–3 cm., drying greenish-brown; reticulum on both faces rather close; petioles 2–4 mm. long. Racemes 2·5–4·5 cm. long, the terminal one somewhat longer; bracts ±4 mm. long; bracteoles 1 mm. long or a trifle more. Pedicels mostly 2 mm. long. Heads in flower 3 × 2 mm. Involucral leaves 2·5 mm. long, dark brown except for the very narrow margins. Corolla-tube 1 mm., lobes of limb barely ·5 mm. long. Achenes 1 mm., pappus setæ 1·75 mm. long.

NOTES ON *OROBANCHE*.

By Arthur Bennett, A.L.S.

Orobanche caryophyllacea Smith. I have a specimen of this from between Dover and Folkestone, E. Kent, gathered May 25, 1874, by myself. I managed to get it out of the ground attached to *Galium*, with abundance of *Galium* roots. On these the *Orobanche* had commenced to form small round discs of 4 mm. diameter; from these arose stems of 2–4 cm., 8 cm., and thence to the perfect plant in full flower. It was the life-history of it, and very interesting. Another specimen of the *Galium* with tap-root descending 10 cm. into the ground had thrown out lateral roots, on which the *Orobanche* was seated with its suckers spread out to 3 × 3 cm. with specimen in full flower. This was June 1876, and the flowers beginning to fade.

In November 1892, I sent to Professor G. Beck two very interesting flowers of *caryophyllacea*; on this he commented:—

"The corolla appears from the fragments to have been normal. The pistil is joined to the stamens by a large cylinder which has on the outside the pubescence of the stamens (in the upper part gland-hairs, in the lower part hairs). The anthers are in part normally constructed, and show but few pollen-cells, whilst others are crippled. The lips appear to be depressed. One flower showed a normal ovary formed of two lobes, whilst the other is 3-lobed and ridged, and has six placentas. These are my observations on the flowers which you sent me, all of which I return. I also add my sketch. It being a monstrosity, the species cannot be determined with certainty, but I think I may take it for granted it was *O. caryophyllacea*. I must, however, mention that I never observed a monstrosity of this kind in any species of *Orobanche*." The sketch named is a beautiful drawing of the open flower. I do not find the monstrosity mentioned in Beck's monograph or elsewhere.

F. N. Williams (Prod. Fl. Brit. 333, 1909) wrote that "he considered that *O. vulgaris* Poir. in Lam. Enc. Meth. Bot. iv. 621 (1796) was the valid name for Smith's plant." Wallroth (Sch. Crit. 309 (1822)) also quotes "*O. vulgaris* Lam." under *O. caryophyllacea* Sm.

A specimen of *Orobanche* from "Oban, Scotland, *Miss E. Harvey*," named *O. elatior* Sutt., was named "*O. caryophyllacea*" by Prof. G. Beck. This lady's records were not accepted by H. C. Watson.

OROBANCHE RETICULATA Wallr. var. PALLIDIFLORA Beck.
O. pallidiflora Wimm. et Grab. Fl. Siles. ii. pt. 1, 233 (1829). Germany (Silesia), Austria (Styria, Tyrol), Transylvania. "On *Carduus arvensis*." Near Llandovey, Brecon; June 1905; *Mr. H. Knight*.

This is a variety with yellow flowers tinged with brown, very different from the var. *procera* Beck, of Yorkshire.

Mr. Knight also gathered near Llandovey specimens of *O. major* L. with very long bracts answering to the var. *bracteosa* Reuter. Named by Prof. G. Beck.

OROBANCHE HEDERÆ Duby forma STENANTHA (Lojacono as a subsp.) G. Beck Mon. 260. Betchworth, Surrey; 18.7.1899; on Foxglove; *C. E. Salmon*.

The same species and form from Les Ruelles Brayes, Guernsey, 1888; *Miss M. Dawber*. Named by Prof. Beck.

OROBANCHE MINOR Sutt. In July 1873, I gathered in a chalky pit at the foot of Reigate Hill, Surrey, a specimen of this, growing on and over a large flint, and sending its suckers down to the roots of *Carduus crispus* L. It had 22 stems, ranging from 7–11 cm. high, all attached to the *Carduus*. I managed to dig it up with 11 stems attached, and so dried it.

A specimen of *O. minor* from the Isle of Wight (1884; *F. Millar*) breaks off into two flowering stems at 10 cm. from the apex of the flowering stem; the same occurs in one from Oxford (*G. C. Druce*), 1880.

OROBANCHE PICRIDIS F. Schultz. I am inclined to agree with Mr. Pugsley that some of the later-gathered specimens so named are doubtful. The *Picris* is the only plant I have seen it growing on, and I have a beautiful one on a fine specimen of the *Picris*. I have now to record it from E. Norfolk, Thorpe, near Norwich, 1894; *Mr. Geldart*: and N. Somerset, Burrington, 4.7.1894; *Mr. D. Fry*. Both named by Prof. Beck.

OROBANCHE AMETHYSTEA Thuill. With regard to the E. Kent specimens there is no doubt as to the name.

From 1871 to 1878 near Dover, at the foot of the Shrimpers' steps to beyond the base of Abbott's Cliff, hundreds of specimens occurred in June. It was easy to take half-a-dozen specimens for comparison with *O. minor* and *O. Picridis*.

OROBANCHE ELATIOR Sutton is now on record for 35 vice-counties. Of these H. C. Watson only had specimens from three. I have five, a remarkably low record from so many. In July 1876 *O. lucorum* A. Braun was suggested as the name of specimens from Epsom, Surrey. I gathered a series of this and sent a living specimen to Dr. Boswell Syme. He wrote: "Certainly *O. elatior* Sutton." One fine plant was 4 dm. high, with only the lower flowers expanded. On an average, the length of the flowering part is 2 dm., but I have a specimen (Saffron Walden, Essex) with a flower-spike over 3 dm. long; at the base of the stem it is 3 cm. in diameter, and with bracts 2 cm. long and 10 mm. broad.

MINUTE STELLATE HAIRS ON THE UPPER FACE OF BRAMBLE-LEAVES.

By William Watson.

In his *Reform der deutschen Brombeeren* (1867) Kuntze states repeatedly that tiny stellate hairs occur on the upper surface of the leaves of *Rubus Idæus* and *R. tomentosus* and their hybrids, but not on any other bramble. It is plain that he is not referring to the beautiful large fascicled hairs on the upper surface of the leaves of *R. tomentosus*—which are, indeed, peculiar to it and its hybrids,—inasmuch as he says (p. 30) that the tiny stellate hairs in question are 30–40 times smaller than the simple or tufted hairs that are situated on the under surface of leaves and on stems, and, further (p. 52), that to see them requires a 30–60-fold, but preferably a 50–80-fold, magnification. Those on *R. tomentosus* are, he says, slightly smaller than those on *R. Idæus*, and being, according to him, confined to these two species, he employs the character in the determination of their hybrids (pp. 81–90).

In the year following the publication of the *Reform*, Focke, in his *Beiträge zur Kentniss der deutschen Brombeeren*, says (p. 19) that he can see these minute stellate hairs on *R. tomentosus* and (pp. 49–50) its hybrids, but on *R. Idæus* and its hybrids (p. 55) only minute simple hairs (Härchen). In his admirable *Synopsis Ruborum Germaniæ* (1877), however, he comes in line with Kuntze, and describes the stellate hairs as present on *R. Idæus* (p. 98) as well as on *R. tomentosus*. He fully approves Kuntze's statements. So convinced is Focke that, except for *R. Idæus*, *R. tomentosus* is the only species in Germany and adjacent countries to have these hairs, that he expresses himself (pp. 234–5) as predisposed to regard any new bramble that has them as probably of hybrid origin from *R. tomentosus*. *R. obtusangulus* Gremli, *R. tumidus* Gremli, and *R. mœstus* Holuby, which possess these hairs and in other respects resemble *R. tomentosus*, he assumes to be of such derivation; but he has observed the hairs also on forms belonging to the group of *R. thyrsoideus*, and especially on *R. elatior* Focke, and these forms, although nearly related to *R. tomentosus*, he cannot, he says, suppose can have come from a recent cross with *R. tomentosus*. Here, then, he has discovered one notable exception to Kuntze's

statement—in a bramble, moreover, known to and described by Kuntze. This is really the second exception, as Focke had detected "Sternhärchen" on the upper surface of the leaves of *R. ulmifolius* and its subspecies *anatolicus*—see his descriptions in *Beiträge zur Kenntniss der deutschen Brombeeren* (p. 26) under *Rubus amœnus* Portenslag, and under *R. sanctus* Schreb. on pp. 179, 181, and 182 of his *Batographische Abhandlungen* (1874).

Another famous German batologist, E. H. L. Krause, approves Kuntze's statements. He claims in his *Nova Synopsis Ruborum Germaniæ et Virginiæ* (1899) (p. 24) that *R. tomentosus* and *R. sanctus* Focke (*R. ulmifolius* subsp. *anatolicus* Focke) are distinguishable by their leaflets having on their upper surface a quite short but sometimes deciduous felt of stellate hairs.

In his *Species Ruborum* (1910–14), Focke says (p. 371) that he has now found these minute stellate hairs on the upper surface of the leaves of some species of bramble that seem altogether different from *R. tomentosus* and *R. Idæus*. He gives the names of eight of these besides *R. tomentosus* and *R. Idæus*. The same eight species (and no others) he quotes again (pp. 187–91) in *Die Sternhärchen auf den Blattoberflächen der europaischen Brombeeren* (in Abh. Nat. Ver. Brem. xx. Heft. 1). He no longer maintains that "Sternhärchen" on the upper surface of leaves necessarily betoken connection with *R. tomentosus*, but asserts, however, that, with the reservations he has made, Kuntze's pronouncement holds good.

My own experience does not, however, agree with Focke's. I have looked for these minute stellate hairs and have found them present on the upper surface of the leaves of every bramble (*Eubatus*) described in Rogers's *Handbook of British Rubi*, and likewise on every other bramble that I have examined coming from Great Britain or Western Europe, using a magnification of 30 to 60 diameters respectively on a compound microscope. It results, therefore, that so far from Kuntze's dictum—with the reservations made by Focke—holding good, as the latter suggests, it turns out to be quite valueless. The point is one likely to be of more interest to Continental than to British botanists, as *R. tomentosus* Borkh. and its hybrids do not occur in Britain, being restricted to the vine-producing area of the Continent. It is true that *R. fasciculatus* P. J. Muell. (which by Mueller's description in *Flora*, 1858, p. 182, is certainly *R. cæsius* × *tomentosus*) is both in Rogers's *Handbook* and in the *London Catalogue* shown as having a considerable distribution in Britain; but the name is applied erroneously to our British bramble, which clearly differs considerably from Mueller's bramble and has nothing to do with *R. tomentosus*.

CEROCHLAMYS: A NEW GENUS OF MESEMBRYANTHEMEÆ.

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

Perennis, acaulis vel subacaulis, succulenta. *Folia* opposita, basi connata, trigono-clavata, oblique carinata, epunctata, brunnea, pellicula cerosa tecta. *Flores* terminales 1–3-nati, breviter pedicellati. *Calyx* subæqualiter 5-lobus. *Petala* numerosa, libera, 2–3-seriata. *Staminodia* filiformia, staminibus circumdata, conniventia. *Stigmata* 5, perminuta. *Ovarium* inferum, 5-loculare; placentæ parietales. *Capsula* breviter obconica, 5-valvis; valvæ quum expansæ erectæ, carinis divergentibus apice aristatis exalatis; loculis alis leviter rigidis acute tectis, absque tuberculo ad orem posito.

A monotypic genus, native of South Africa. The name is derived from the Greek, *keros*, wax, and *chlamys*, a cloak, in allusion to the waxy film that covers the leaves, a feature I have not seen in any other member of this group. Its position is near to *Punctillaria* N. E. Br., from which it differs by the capsule having only 5 valves and being without a tubercle at the opening of the cells, and also by the leaves being without dots.

Plant stemless or with age becoming tufted and with short branching stems. Leaves shortly united at the base, 1–3 pairs to a growth, erect to ascending-spreading, trigonously clavate, with the keel very oblique and so much turned to one side that one side is flat and makes nearly a right-angle with the flat face or upper side of the leaf, while the other side is convex and much broader, or rarely the keel is nearly central and the two sides convex, very firm in substance, and covered with a waxy secretion, not dotted. *Flowers* 1–3 from the same growth; pedicels short, with the bracts at their base nearly concealed between the united bases of the leaves. *Calyx* subequally 5-lobed down to its union with the ovary, some of the lobes with narrow membranous edges. *Petals* linear. *Staminodes* surrounding the numerous stamens, and all apparently connivent in a cone (only dried flowers seen); filaments not bearded. *Stigmas* papilla-like, acute. *Ovary* obconic, flattish on the top; placentas on the outer wall of the cells. *Capsule* very shortly obconic, flattish, or slightly convex, and with raised sutures on the top, with 5 valves and cells, somewhat hard; valves erect when expanded, their expanding keels diverging from the base, with free awn-like and incurved tips, entirely without marginal wings; cells acutely roofed with slightly stiff cell-wings, without a tubercle, but with a dense mass of funicles at the opening in empty cells. *Seeds* ovoid, pointed at one end, microscopically tuberculate.

Cerochlamys trigona N. E. Br., sp. unica. *Folia* ascendenti-patula, 9–15 lin. longa, basi 3–5 lin. lata, superne 4–10 lin. lata et crassa, glabra, brunnea, epunctata, pellicula cerosa tecta. *Pedicelli* 2–4 lin. longi. *Corolla* circa 15 lin. diametro, rosea. *Stamina* 2 lin. longa. *Stigmata* ¼ lin. longa.

Hab. Cape Colony, Swellendam Division: in crevices of the Bokkeveld shales, at about 1800 ft. alt. in the Klein Karoo. Muir, 4047.

Plant 1½–2 in. high, stemless or with age having short branching stems ½–1 in. long and 3–4 lin. thick, with remains of old leaves upon them. *Leaves* 3–5 lin. broad at the base and 4–10 lin. broad and as much in thickness above the middle; somewhat spathulately clavate in outline, obtuse or rounded at the apex, and obtusely 3-angled; surface smooth and glabrous when young, but soon becoming covered with a greyish or brownish secretion, beneath which the skin is of a peculiar brownish-red or greenish-brown and usually of a duller red at the base, very striking in the young leaves, not dotted. *Calyx* glabrous; lobes reflexed, about 2–2½ lin. long and 1–1½ lin. broad, ovate, obtuse. *Corolla* as seen in dried flowers apparently 1–1¼ in. in diameter; petals apparently about 4–6 lin. long and ½ lin. broad, linear, obtuse, pink according to Dr. Muir. *Staminodes* 2–3 lin. long, recurved at the tips, white. The longer stamens about 2 lin. long; filaments white, anthers yellow. *Stigmas* ¼ lin. long. *Capsule* when closed 3–4 lin. in diameter, dark brown; valves pale brown within, and the expanding keels orange-brown; cell-wings pale brown. *Seeds* less than ½ lin. long, brown, with a darker brown point. Otherwise as described for the genus.

For living specimens and dried flowers of this interesting plant I am indebted to its discoverer, Dr. J. Muir, who informs me that in its natural habitat "the leaves appear pale brown," and remarks that he finds it "unsatisfactory to cultivate, as it gets black from some fungoid growth and gradually dies." He also adds that no other plant of this group that he cultivates "gets infested like this." One of the plants sent to me was well covered with the fungus above mentioned, causing it to appear as if coated with a deposit of soot! The fungus was examined by a mycologist, but as it was not in fruit could not be determined. It is, however, purely epiphytic upon the waxy secretion covering the leaves, and does not appear to penetrate the plant, which it probably kills by covering up the stomata.

PHYLOGENY OF THE CARYOPHYLLACEÆ *.

THE following abstract of Dr. Pax's article has been prepared by Mr. A. W. Exell and approved by Dr. Pax. [ED. JOURN. BOT.]

Since the first edition of the *Pflanzenfamilien* several important works on the Caryophyllaceæ have been published, and this, together with work on the other families of the Centrospermæ, makes important modifications of opinion on the systematic position of the family necessary.

In all groups of the family the petals are considered to have been evolved from metamorphosed stamens. The evidence for this lies in

* F. Pax, "Zur Phylogenie der Caryophyllaceæ" in Engl. Jahrb. lxi. 223–241 (1927).

a comparative study of the staminodes. In the Paronychieæ, Pollichieæ, etc., they are subulate or filiform as in *Gymnocarpos*, *Herniaria*, *Illecebrum*, *Siphonychia*. In *Philippiella* the 4 sepals are followed by 4 staminodes with sterile anthers. In *Habrosia* these are linear, in *Pollichia* squamate; in *Cardionema* and *Drymaria* they are cleft. By various authors they are sometimes referred to as staminodes, sometimes as petals. Whatever holds for the primitive groups can readily be accepted for the Alsineæ, Sperguleæ, and, lastly, for the Silenoideæ, where the staminodes are quite petaloid. In the Silenoideæ they consist of a blade and a claw, the former representing the anthers and the latter the filament. The position of the paracorolla furnishes additional evidence, as its segments make the petals appear in some measure 4-winged, and Čelakovsky has shown that the stamens have the same form in many viridescent flowers. These stamens bear sterile anthers at the edge, and Masters has noted an analogous case of the teratological presence of anthers on the paracorolla-scales of *Saponaria officinalis* L. It is, moreover, generally recognized that in double flowers the stamens are changed into petals. This is also accepted for the Aizoaceæ, Ranunculaceæ, and Cactaceæ. The Caryophyllaceæ must also be included. In practice it is most convenient to use the name staminodes in the primitive Alsinoideæ, and petals in the more highly-developed Alsinoideæ and in Silenoideæ.

The problem of obdiplostemony has not yet received a satisfactory solution. The theory of St. Hilaire, that the petals and stamens form one phyllom which has divided serially, was rejected by Eichler: the idea that one of the whorls has disappeared, the petals according to A. Braun, the stamens according to Nägeli, now finds no supporters. Čelakovsky accepts, on the grounds of von Payer's researches, a displacement of the separate whorls; Eichler, Pax, Velenovsky, and others have accepted this theory, whilst K. Schumann opposes it vigorously. Lüders, through his investigations of *Habrosia*, holds with the earlier theory of St. Hilaire.

The flowers of the Silenoideæ and Alsinoideæ have a very different aspect, particularly when the degree of petalody is considered. But the difference is purely biological.

The flowers of the Alsinoideæ are generally inconspicuous with exposed or scarcely concealed honey. The Silenoideæ have concealed honey and are distinctly showy.

The concealment of the honey is brought about by the development of a tubular calyx; hence the difference between the two subfamilies, free and connate sepals.

There are two possibilities—according to whether one places the Silenoideæ at the beginning and derives the Alsinoideæ from them through reduction, as Eichler and Pax have done; or whether, on the contrary, the Silenoideæ are derived from the primitive Alsinoideæ, according to the view first propounded by Lüders.

In Naturl. Pflanzenfam. I. Aufl. iii. 1 *b* (1889) the family was derived from the Phytolaccaceæ, in which occur tricyclic forms (one whorl of tepals, one of stamens, and one of carpels, the stamens being

epitepalous). The Chenopodiaceæ and Amarantaceæ were considered to be derived from here, their floral diagrams being identical. Other Phytolaccaceæ are pentacyclic (one whorl of tepals, two whorls each of stamens and carpels). From this type three groups were considered to have developed:—1. The Nyctaginaceæ and Aizoaceæ, which have lost one whorl of stamens and one of carpels. 2. The tetracyclic Portulacaceæ, in which a carpel whorl has been lost and in which one stamen-whorl is sometimes aborted. 3. The Caryophyllaceæ with pentacyclic flowers, in which, however, the five phyllom-whorls are arranged differently: calyx, corolla, two stamen-whorls, one carpel-whorl. This hypothesis is based on the diagrams and on the number of phyllom-whorls in the flower.

The Centrospermæ can be arranged in a more natural manner by following H. Walter (Phytolaccaceæ in *Pflanzenreich*, Heft 39 (1909)). The Chenopodiaceæ and the scarcely different Amarantaceæ are recognized as the primitive type of the Centrospermæ. These have 5 tepals, 5 epitepalous stamens, and a simple ovary composed of two carpels. The Phytolaccaceæ are derived from the Chenopodiaceæ, and around them the Aizoaceæ, Nyctaginaceæ, Cynocrambaceæ, and Batidaceæ are grouped. The andrœcium consists of two alternating whorls, doubling tending to occur in the inner one. A second branch derived from the Chenopodiaceæ ends in the Caryophyllaceæ, to which the Portulacaceæ and Basellaceæ are extremely close. Here there are two whorls of stamens of which the outer is often doubled, producing petals through petalody.

The Phytolaccaceæ and the Caryophyllaceæ have a dissimilar organisation. In the former the ovary is either apocarpous or with axile placentation, the kind of syncarpy nearest to apocarpy. In the Caryophyllaceæ the union of the carpels is much more intimate; if chambered ovaries with axile placentation still occur they are in a very small minority. The placentation is basal or free-central.

The anomalous genus *Dysphania*, which should perhaps be considered as a separate family, the Disphaniaceæ, is a link between the Caryophyllaceæ and the Chenopodiaceæ.

The author includes at the end of his paper a synopsis of a new classification of the Caryophyllaceæ, and observations on the geographical distribution and development of the family.

BIBLIOGRAPHICAL NOTES.

XC. Louisa Lane Clarke and her Writings.

It seems desirable to record the few available details about this writer, as she is not included in the *Dictionary of National Biography*, and in at least one library catalogue she is "disguised" as "Louisa Jane Clarke." I shall be grateful for any further particulars about her.

The eldest daughter of Major-General Ambrose Lane, formerly of Woodlands, Castel, Guernsey, and widow of the Rev. Thomas Clarke, Rector of Woodeaton, Oxon., she seems to have devoted herself from

an early age to the study of natural history, and to literary pursuits, taking also an active interest in the studies of the young people, and encouraging them to take up natural science, and sometimes wood-carving, an art in which she was proficient. Mrs. Clarke died on 9th Nov., 1883, at L'Hyoreuse, Cambridge Park, Guernsey, after a long illness. She was buried at Le Foulon Cemetery, St. Peter Port, on 13th November.

Mrs. Clarke contributed papers on natural history to *Hardwicke's Science Gossip*, *Intellectual Observer*, *Recreative Science Magazine*, and *The Star* (Guernsey). Through the kind services of Miss Lilian Lyle and Mr. B. T. Rowswell, of the Guille-allès Library, Guernsey, I am indebted to the last-named paper for the above details. Mrs. Clarke's other writings are:—(1) *Contributions to Redstone's Guernsey Guide*, 2nd edition, Guernsey and London, 1884; (2) *The New Parish Church of St. Ann*, Guernsey and London, 1850; (3) *The Island of Alderney, its Early History &c.*, Guernsey, 1851; (4) *The Microscope, a Popular Description*, London, 1858: subsequent editions (1861 and 1870) are entitled *Objects for the Microscope*; (5) *The Common Seaweeds of the British Coast &c.*, London [1865]. In reference to this work, Miss Isabella Gifford complains (*Athenæum*, ii. 1866, 180) that Mrs. Clarke has taken without acknowledgment her descriptions of the classes, tribes, and genera from the third edition of *The Marine Botanist*; Mrs. Clarke replies (on p. 338) that the only book on algæ used by her was *Landesborough*, and that she has been brought into this scrape through leaving the making of the index and the systematic arrangement to a young friend, and promises that "in the next edition I will take out Miss Gifford's, and give Landesborough's synopsis. . . I am not likely, as she seems to fear, to write any more on the subject"; (6) *Folk Lore of Guernsey*, Mark, 1880.—J. Ardagh.

XCI. William Epps Cormack.

In the autumn of 1822 an enterprising young explorer conceived and carried out the bold project of walking right across Newfoundland, accompanied by a single Micmac Indian. The interior of the island, which is even now largely unexplored, was at that time a *terra incognita*. Five years later he made a second expedition, again with an earnest desire to establish friendly relations with the aborigines, known as the Beothucks, in whose interests he had just succeeded in founding the "Beothuck Institution."

The Educational Bureau of Newfoundland is this year celebrating the centenary of these exploits by issuing to the schools of the island, as a class-book, the explorer's graphic account of his earlier expedition, which first saw the light, in an abbreviated form, with a map of his route, in 1824 in the *Edinburgh Philosophical Journal* (x. 156–162), appearing as a letter addressed to the Colonial Secretary, Earl Bathurst. As the author was one of the first to draw up a list of the plants of Newfoundland, a brief note of his career may be of interest.

William Epps Cormack was born on May 5, 1796, at St. John's, Newfoundland, where his father was a prosperous merchant. He was educated in Scotland, where he came under the influence of Professor Robert Jameson, the mineralogist, who seems to have inspired him with a lifelong enthusiasm for various branches of Natural History. As editor of the journal just mentioned, Jameson refers to Cormack as "my enterprising young friend," and states that the Report has the "sanction and approbation of Lord Bathurst."

The map of Newfoundland with which Cormack illustrates his paper is freely scored with details of the geology and mineralogy of the district he traversed, and these details formed the sole basis (so far as the interior of the island is concerned) for the first geological map of Newfoundland, drawn by Jukes, the official geologist, about the year 1840.

Sir Joseph Banks's list of over two hundred Newfoundland plants in the Department of Botany, British Museum (which it is hoped may shortly be published), was drawn up, and the specimens were brought to England about half a century before Cormack accomplished his journey. Cormack's list of Newfoundland plants—there are about 170—has been in print for many years (*Narrative of a Journey across the Island of Newfoundland in* 1822; St. John's, 1824). Though not classified, it has hitherto been the earliest published account of the vegetation of the island; and is, indeed, for so short a list, fairly representative. It was reprinted from the original MSS. in 1873 by Dr. Moses Harvey, of St. John's, and again, in 1915, in the monograph entitled *Beothucks or Red Indians*, published by the Cambridge University Press.

In the *New Edinburgh Philosophical Journal* for 1826 (i. p. 32) a paper by Cormack on the Natural History and Uses of the Cod, Capelin, Cuttle-fish, and Seal of the Newfoundland Seas appears, and vol. iv. of the same journal (1825) contains a report on his second expedition (p. 408).

Cormack was a great wanderer. He is said to have had some hand in the founding of New Glasgow about 1818. Between 1819 and 1834 he is quoted as adding to the knowledge of the North American flora, "frequently sending specimens of plants to the Linnean Society" *. He cultivated tobacco in Australia, whence he migrated to New Zealand, from which colony he sent forest-seeds to Kew. We next find him in California, where he formed a small herbarium of the native plants. His last move was to British Columbia, where he founded an agricultural society. From that country he sent grass-seeds to the Agricultural Society of Scotland.

He was passionately fond of skating, and in the British Museum Library I have recently seen a copy of a small treatise on scientific skating, which he himself elaborated from that of Lieut. Jones on the same subject.

He died at New Westminster, British Columbia, at the beginning of May 1868, and the tributes of respect paid to his memory showed the esteem in which he was held.—F. A. Bruton.

* [We have been unable to trace these.—Ed.]

SHORT NOTES.

Arabis scabra All. in Somerset.—It is desirable that the thorough establishment of *Arabis scabra* All. by artificial introduction in West Somerset, v.c. 5, should be put on record, and I have the authority of my friend Mr. Henry Corder, of Bridgwater, for writing this note. At least fifteen years ago, Mr. Corder distributed seeds from cultivated plants of the *Arabis* on the New Red Sandstone rocks of Mount Radford (at the top of Wembdon Hill, on the road from Bridgwater to Cannington and Minehead), and on a wall of similar rock bordering Skimmerton Lane, which leads from Mount Radford to the road from Bridgwater to Spaxton. On this wall, separating the lane from an arable field, the plant is remarkably well established over 150 yards or so. Last Christmas the numerous rosettes of leaves, together with the remains of spikes, some of which still retained seed, were a conspicuous feature. More plants now thrive there than anywhere in the Bristol district, where, particularly on the Somerset side of the Avon, *Arabis scabra* has become lamentably scarce of late; but it holds its own very well in the station near Shirehampton, Glos. Seeds were also sown by Mr. Corder on the Carboniferous Limestone rocks near the quarry by Cannington Park, about 2½ miles away; but here it has increased very little, and is probably gathered more.—H. S. Thompson.

Vicia bithynica L. in Perthshire.—In a school-girl's collection of dried plants made in 1895, which has recently come under my notice, occurs a specimen of *Vicia bithynica* L. The collection is on the pages of a small bound book, dated August 1925. The collector—now Dr. D. Heynemann, of Bradford—tells me that she is sure that all the plants were collected in the Aberfoyle district during the period mentioned. Although the occurrence of such a confirmed casual as *V. bithynica* is not perhaps of much significance, yet, as I believe there are no other records for Scotland, possibly the above facts are worth putting into print.—A. Malins Smith.

REVIEWS.

A Garden Book for Malaya. By Kathleen Gough. 8vo, pp. 422; with 16 photo-plates. Witherby: London, 1928. Price 16*s*.

To make a beautiful garden in the Malay Peninsula is a much quicker and less expensive work than in England, mainly on account of the rapidity of growth of the plants; and from early years of the colony there have been many delightful gardens, whose owners took a great delight in introducing and experimenting with plants. A good many papers have been published in Singapore and elsewhere on horticulture, but hitherto there has been no compact work like this on local gardening. The work deals with all branches of the subject tolerably completely, and is illustrated by a number of good photo-

graphs. The author's account of plants worth cultivating is good, but she omits many worthy of being included in the Malay garden. Among palms, for instance, the most important plants for landscape work, she includes *Borassus*, which will only grow in very sandy spots and is of very slow growth, and omits the *Kentia Macarthuri* with its masses of brilliant red fruits, *Archontophœnix*, *Licuala*, *Phœnix*, and many others. She mentions at some length *Plumbago capensis*, which is never a success in this wet climate, and hardly alludes to *P. rosea*, which properly pruned is a superb bedding-plant. Perhaps, in a future edition, the author will give a fuller list of the best plants for a Malay garden, such as was given in the horticultural papers by C. Curtis in the *Agricultural Bulletin of the Straits*, which papers she does not appear to have seen. The best photograph in the work is that of *Bœckia frutescens*, a mountain and dry sand plant which was impossible to grow in the wet lowlands of the south of the peninsula. The photograph shows a tree as fine as or finer than any one I have seen on the high mountains of Malaya.

The book fills a blank in the literature of Malaya, and may perhaps stimulate more of the residents to undertake horticulture. There are comparatively few misprints or incorrect statements, but *Peppermonia* (p. 405) for *Peperomia* looks odd; and *Axonopus compressus* was not recently introduced from South America by the Department of Agriculture, but from Singapore, where it had been for nearly half a century. These little mis-writings, however, do not detract from the usefulness of the book. H. N. RIDLEY.

THE sixth part of Kallenbach's *Die Rohrlinge* (Boletaceæ) in *Die Pilze Mitteleuropas* is devoted to *Boletus luridus*; there are four pages of text and two coloured plates. The twenty-seven drawings of this species show its extraordinarily wide range, despite the fact that the dark form so common in this country is not figured—"C'est un vrai Camelon parmi le Règne végétale." Most of the forms illustrated occur with us, but some of them I do not recall. The species is one which has given considerable difficulty to continental workers in the past, but Kallenbach stresses the one unfailing character, the network markings on the stem, which separate it at once in the field from the similar *B. erythropus* Pers. and *B. miniatoporus* Seer. (*B. erythropus* Fr.). Again, the difficulty of applying the International Rules is pointed out. *B. luridus* was first described and figured by Schaeffer in 1767. Fries adopted the name in 1821 and added several synonyms; according to Kallenbach he never saw *B. luridus* Schaeff., and later confused it with Secretan's *B. miniatoporus*. It certainly is appalling to have to precise a fungus by calling it *Boletus luridus* Schaeff.—Fr. 1822 syn. pro parte excl. vars.

It is pleasing to see that the author does not include any English popular names in his list. Such absurdities as the "lurid Bolet" which figure in some of the continental books give a misleading idea about the mycological knowledge amongst us. They are merely book-names coined by misguided writers of the "plain and easy" type. The English folk-name for all the species of *Boletus* and with very few exceptions for any form resembling them is *toadstool*.

The high standard of the work is maintained: the price is five marks per part. J. R.

Two booklets on mycology issued by the Librairie E. Le François, Paris, are well worth their small cost. The first, *La spore des champignons supérieurs* by E. J. Gilbert (20 frs.) is an essay of a little over 200 pages, dealing with the colour, form, ornamentation, terminology, and taxonomic value of spores in Basidiomycetes. Dr. Gilbert belongs to that remarkable group of French pharmacists who have done so much to advance our knowledge of the higher fungi. The essay is one which will be enjoyed by all who are interested in mycology, for the author obviously took delight in writing it.

The second booklet is *Clef dichotomique pour la détermination des levures* by A. Guilliermond (14 frs.). It is abundantly illustrated, though the drawings are useful rather than attractive. In its 124 pages it gives a summary of the characters of yeasts, and, as one would expect from Prof. Guilliermond, it is much more satisfying than its title suggests. The dichotomous key which occupies a little more than half the book is concerned only with genera—that is, as far as one can here go by this procedure. J. R.

Annales Bryologici. A Year-book devoted to the Study of Mosses and Hepatics. Edited by FR. VERDOORN. Volume I. 8vo, pp. viii, 158. The Hague: Martinus Nijhoff, 1928. Price 10*s*.

IN this work we have a new international annual devoted to the study of Bryophyta, containing papers on the taxonomy, morphology, biology, genetics, etc., of mosses and hepatics. It is proposed to publish a volume in April of each year. The present volume contains twenty-one articles, about half of which treat of the description and classification of mosses and hepatics. Thus there are descriptions of twenty-five new mosses from Japan and Formosa, by V. F. Brotherus; and a list by the same author of over one hundred mosses collected on the Himalaya of Cashmere by Dr. M. Piasenza's expedition in 1913, including four species new to science and thirty-five new records for the Himalaya. *Homaliopsis* is a new genus of mosses described by H. N. Dixon in collaboration with Potier de la Varde, and founded on *Homalia Targioniana* Gough. A synopsis of the Cephaloziellaceæ of Europe, with keys to the genera, subgenera, and species, is provided by Ch. Douin, who has closely studied this difficult group of hepatics for several years. Th. Herzog revises the species related to *Scapania portoricensis*, and in view of their

close anatomical affinity reduces them to one species with three varieties. A. J. M. Garjeanne discusses some morphological characters of *Odontoschisma Sphagni*, and adds some notes on gemmæ-formation and variegation in hepatics. R. v. d. Wijk passes in review the opinions of Goebel, Schiffner, and others, as to the nature of the marginal lobes of the thallus of *Treubia*; he refuses to accept these as leaves, for it is the two rows of obliquely placed dorsal scales which must be regarded as the rudiments of true leaves. J. P. Lotsy contributes a paper "On Hybrid Gones and Homozygous Hybrids," with diagrammatic tables to show the kind of results which may be expected when the genetics of mosses come to be investigated methodically. L. Loeske discusses the variability of mosses under the influence of changes in the local environment, leading to the production of such puzzling forms as *Philonotis mollis*, and, among other aquatic mosses, such as *Drepanocladus*. He appeals to bryologists to study in nature the relationship between such pairs of bryophytes as *Dicranum scoparium* and *D. Bonjeanii*, *Brachythecium salebrosum* and *B. Mildeanum*, *Lophocolea heterophylla* and *L. minor*, &c. H. Gams investigates the causes and the climatic and ecological conditions which may account for the occurrence of the rare moss *Brotherella Lorentziana* (Mol.) Loeske, and of the still more rare *Distichophyllum carinatum* on the chain of the Eastern Alps. The latter moss was discovered by H. N. Dixon and W. E. Nicholson in 1908 in a secluded ravine in the Salzkammergut, and is of kin with mosses remotely situated in the southern hemisphere. Both *Brotherella* and *Distichophyllum* occur in the mountain zone preferred by the more widely distributed *Hookeria lucens*, and it is a matter of speculation how they first came to the Alps and why their distribution is so restricted. Another problem, attacked by R. v. d. Wijk, is the discovery of the Montane moss, *Oligotrichum incurvum*, in hollows among the sand-dunes of Friesland; it appears to be a relic of the Glacial period.

These examples show that Herr Verdoorn's new annual contains a varied feast of interesting matter. It is well printed and tastefully produced. The articles are in one or other of three languages—English, French, German. The editor is much to be congratulated upon his welcome publication.

A. G.

British Plant List, containing the Spermophytes, Pteridophytes, and Charophytes found either as Native or growing in a Wild State in Britain, Ireland, and the Channel Isles. By George Claridge Druce, F.R.S. Second Edit. 8vo, pp. xlii, 154. Buncle, Arbroath. Price 3*s.* 6*d.*

The first edition of the *British Plant List* was issued by the Clarendon Press in 1908; the present edition is produced by the Botanical Society and Exchange Club, of which the compiler is the honorary Secretary.

The "British Flora," as envisaged by Dr. Druce, has increased by more than 40 per cent. in the twenty years which have intervened between the issue of the two editions. This substantial increase, due in the main, we are reminded, to the efforts of the members of the Society, is analysed in a chapter on the "Constitution of the British Flora." The number of native species and subspecies has increased approximately by 350 (2141 as compared with 1791). Colonists and denizens show an increase from 89 to 106, established aliens from 144 to 293, and adventives from 940 to 1706, in all a total of 4246 as compared with 2964. The list of adventives is swollen to an extent which seems almost meaningless by the inclusion of many garden plants which in the nature of things can find no permanent place in our "Flora"; the height of absurdity is reached in the citation of the date-palm!

A useful but somewhat unequal index to monographs and systematic papers occupies 15 pages of the Introduction; these are classified under the name of the genus concerned.

The arrangement of families and genera follows in the main the sequence of Bentham and Hooker's *Genera Plantarum*; that of species the sequence of Nyman's *Conspectus*. The help of numerous experts on various genera is acknowledged.

The list itself is very clearly printed, names of native genera and species being indicated in black type; denizens, aliens, and adventives are also typographically distinguished. The explanation of the somewhat numerous typographical variants at the foot of every page removes all difficulty in their use. The census number of distribution in the vice-counties of Britain and Ireland is indicated. *Hieracium*, in which Dr. Zahn's arrangement is followed, boasts the greatest number of "species" in a genus, namely 257; *Taraxacum* counts only 95, vouched for by Dr. Dahlstedt, while *Rubi* number 159, following Moyle Rogers's arrangement with more recent help from Messrs. Riddelsdell and Watson.

Dr. Druce has never whole-heartedly accepted the Code of Nomenclature as drawn up at Vienna and Brussels. He uses the duplicated binominal and introduces to a British list the tautonym, e. g., *Coronopus Coronopus*. This use saves trouble in deciding on the earliest trivial, and may possibly be adopted at the coming International Congress. It is a small matter. Dr. Druce does not love the list of *nomina conservanda*, and compromises by citing both the authorised generic name and the earliest. But it seems likely that botanists generally will prefer to enlarge rather than reject this list.

The *List* bears the impress of the individuality of its compiler; and the views adopted on nomenclature, and limitations of species and varieties may sometimes provoke criticism. But members of the Exchange Club will gratefully accept this latest effort of their indefatigable secretary, which will also command interest among botanists outside the Club.—A. B. R.

BOOK-NOTES, NEWS, ETC.

Biographical Notes.—The *Gardeners' Chronicle* of May 12 gives a biographical sketch, with portrait, of Mr. H. N. Ridley, C.M.G., F.R.S., whose contributions to the *Journal* date back to his time as an Assistant in the Department of Botany before leaving to take up the Directorship of the Botanic Gardens at Singapore in 1888. Mr. Ridley is still vigorous and hard at work, and we look forward to the appearance of his book on methods of distribution of fruit and seeds.

Professor A. J. Sampao sends, in the form of a reprint from the Boletim do Museu Nacional, Rio de Janeiro (vol. iv. no. 1), an appreciation, with an excellent portrait, of the work of the veteran botanist, Prof. Ignatius Urban. During his long association with the Botanic Gardens and Museum, Berlin, of which he was for many years Sub-director, Prof. Urban devoted much attention to the botany of the New World, especially as a contributor to the great *Flora Brasiliensis* of Martius, and more recently to that of the West Indies in his *Symbolæ Antillanæ*. We are glad to know that he also is still vigorous and working. The printing in parallel columns, the second in German, renders the work more generally available to botanical readers.

Editors of botanical journals will warmly commend the practice of Prof. J. W. Harshberger, of the Univeisity of Pennsylvania, who, in response to the wishes of many friends, has issued an extensive autobiography entitled *Life and Work of J. W. Harshberger, Ph.D.*, a copy of which we gratefully acknowledge. This practice, if generally followed, will simplify the work of the writer of the inevitable obituary notice at some future date. The autobiography is exhaustive, including, besides a chronological list of the various activities of its author year by year, lists of societies with which he has been associated, of his pupils who have made good, of the auspices under which and the places at which he has lectured, &c., &c. Dr. Harshberger was appointed Assistant-Professor of Botany at Philadelphia in 1907, and full Professor in 1911. Born in 1868, he is still quite young for a botanist (they are notoriously long-lived) and should be able to look forward to many more years of useful work.

While on the subject of botanical biography, we may refer to a new edition of the *Biographical Index of British and Irish Botanists*, which is now going through the press. Owing to an unfortunate accident, the original edition has long been out of print. The compilers, the late G. S. Boulger and James Britten, had accumulated material for a new edition, but the final revision was never completed. This revision has involved considerable labour, but the work should shortly be available.

Linnean Society of London.—The last General Meeting of the present session was held on May 3rd. Five Foreign Members were elected, two of whom are botanists:—Thore Gustafsson Halle, Chief of the Palæobotanical Department, Naturhistoriska Riksmuseum, Stockholm; and Robert Almer Harper, Professor of Botany, Columbia University, New York.

The President announced that the Council had awarded the Linnean Gold Medal to the eminent cytologist Professor Edmund Beecher Wilson, Columbia University, New York, U.S.A. Professor Wilson is a Foreign Member of the Society.

Dr. A. B. Rendle called attention to an appeal by Dr. John Briquet, Director of the 'Conservatoire Botanique' of Geneva (see *Journal of Botany*, May).

Mr. T. A. Sprague exhibited plants in flower of *Pinguicula caudata* and *P. Bakeriana* from the Royal Botanic Gardens, Kew. The orchid-flowered Butterworts (*Pinguicula*, Sect. *Orcheosanthus*), to which the specimens belonged, have a flat corolla-limb with hardly any tube and with a long spur. Their flowers recall those of some Balsams or Orchids. All the species of the section *Orcheosanthus* show seasonal dimorphism of the leaves, winter-rosettes of numerous small non-carnivorous leaves alternating with summer-rosettes of relatively few large carnivorous ones. Flowering occurs in either winter or summer states. The species may be propagated by means of adventitious buds formed on the winter-leaves when the latter are detached.

Dr. Agnes Arber exhibited flowers of the rare orange-brown variety of the Cowslip. A single plant of this variety had been found in a copse at Whittlesford, Cambridgeshire, and had been planted in a garden, where it had always come true to colour.

Dr. G. S. Carter gave an account, illustrated with a fine series of lantern-slides, of the investigations made by Mr. L. C. Beadle and himself into the bionomics of the swamps of the Paraguayan Chaco, a plain stretching westwards from the Rio Paraguay towards the Andes. A belt within 100 miles of the river consists partly of grassland, in many places covered with large numbers of the Wax-palm, *Copernicia cerifera*, and partly of a dry and thorny woodland. In the more open parts of the grassland are large areas of shallow swamps. To the west the country becomes much drier and the swamps and palms cease.

Dr. Carter and Mr. Beadle investigated the bionomics of these swamps during a visit to the country in 1926–7. Analyses were made of the water with the object of studying several of its physical characteristics. For comparison with these, other fresh waters in the district were also analysed.

During the summer months the climate is distinctly tropical, and the nature of the water most largely influenced by the amount of the rainfall. The most striking result of the analyses was the evidence that they gave of the small amount of oxygen present in the water at all times. It appeared that the co-operation of several conditions, such as the absence of disturbance and the large amount of decay in the water, produced this result. The oxygen-content was so low as certainly to play a determining part in the control of the fauna, investigation of which showed that many forms were adapted in various ways to life in a medium poor in oxygen.

Miss Lilian Lyle related her experiences in investigating the marine algæ of some of the German warships sunk in Scapa Flow, and of the neighbouring shores, her remarks being illustrated with lantern-slides of some of the ships and of some of the algæ. The specimens were gathered at low tide and from varying depths down to 72 feet. The flora of the wrecks was mostly Orcadian, but some algæ hitherto known only from the Baltic were also found. Submergence for eight years greatly militated against the chance of finding many foreign specimens, and possibly specimens of other species had arrived with the vessels but had died off under the changed conditions.

Mr. A. D. Cotton congratulated the author on the success of her investigations and on the discovery of additions to the British and Orkney flora. One of the most interesting algæ from the point of view of distribution was *Codium mucronatum* var. *atlanticum*, a conspicuous species which could not easily be overlooked. This plant occurs apparently only on the north and west coasts of Scotland and the north and west coasts of Ireland. *C. mucronatum* in other forms is widely distributed on the Pacific coast of America and in Australia and New Zealand. Whether the British form be regarded as a distinct and endemic species, or as an alien introduced many years ago, its strictly limited distribution in Europe, confined to the western part of the British Isles, was remarkable and unique among algæ.

Dr. Helena Bandulska described, with the aid of lantern-slides, a Cinnamon from the Bournemouth Eocene.

Dr. D. H. Scott recalled that many Laurineæ flourished in past ages in this country, and expressed his appreciation of the excellent results gained by the most recent methods of investigation.

The Anniversary Meeting of the Society was held on Thursday, the 24th May. In the evening the Fellows and their friends dined together at the Criterion Restaurant.

Benjamin Maund.—We learn from the *Gardeners' Chronicle* (April 28) that on April 14 a marble tablet was unveiled and dedicated in the chancel of Bromsgrove Parish Church, to commemorate Benjamin Maund (1790–1864). Maund, who combined the businesses of a chemist, bookseller, printer, and publisher, at Bromsgrove (Worcs), had a great love for flowers and gardening, and with a view of spreading a taste for these subjects issued *The Botanic Garden*, an illustrated monthly publication, "consisting of highly finished representations of hardy ornamental flowering plants cultivated in Great Britain" with descriptive text. Thirteen volumes were issued (1825–1851). The original drawings for the plates, of a charming delicacy, by Edwin Dalton Smith, are in the Department of Botany, British Museum, to which they were presented by Benjamin Maund's daughter in 1882. A more ambitious publication was *The Botanist*, in which he received the co-operation of various eminent botanists. This forms the subject of Bibliographical Notes, No. LXXIII., in this Journal (1918), by the late James Britten.

BIBLIOGRAPHICAL NOTES.

XCII. Ballard's "Catalogue of Islington Plants."

This interesting MS. list has been kindly lent to the Department of Botany by the Stoke Newington Public Libraries Committee, through their Librarian, Mr. George Preece, O.B.E. It consists of eleven folio pages, written by Edward Ballard (1820–1897), son of the miscellaneous writer Edward George Ballard (1791–1860). The list is of interest, as most of the localities referred to have long been built over. With the kind help of Mr. W. J. Harris, Chief Librarian at Islington, I have added notes on some of these in brackets [ ]. The species now marked (*) appear to be in another hand.

Edward Ballard was born in Islington in 1820, and received his early education at Islington School. At seventeen he commenced his medical career, as apprentice, and at nineteen entered the Medical School of University College, where John Lindley held the Professorship of Botany. After a distinguished career there and at the University of London, he graduated M.B. in 1843 and M.D. in 1844, winning at his several examinations honours in the form of scholarships, exhibitions, and gold medals, and becoming Medical Tutor to, and Fellow of, University College. For about twelve years Ballard practised as a physician in Islington, becoming L.R.C.P. (1853) and Fellow (1872); he was also Vice-President of the Medico-Chirurgical Society.

In 1856 he became Medical Officer of Health for Islington, and entered on his real life-work. As a pioneer sanitarian, he had to educate himself in matters which are now taught as regular subjects. He had an aptitude for exact observations and exceptional industry in the accumulation of facts. As an important dairy centre Islington was very prominent in the outbreak of "milk-enteric fever" in 1870, and Ballard was fully employed in investigations, carried through in his thorough manner, of milk-conveyed infection. In after days he did important work in respect to food-poisoning and epidemics under the Local Government Board, continuing his researches after his retirement. He was elected F.R.S. in 1889.

He died on 19 Jan., 1897. "W. H. P.," in Proc. Roy. Soc. lxii., says: "Ballard was destitute of personal ambition. He sought neither honours nor emolument. From Government he obtained no honours at all; and such recognition as his work brought him from Medicine and from Science was but tardily bestowed." I am indebted to Mr. W. J. Bishop, Assistant Librarian at the Royal College of Physicians, for directing my attention to this and other obituary notices of Ballard.

The observations of which the Catalogue is a record cover the period of Ballard's life as a medical student. His herbarium has not been traced.

The Catalogue has a short Preface as follows:—

"The following 'Catalogue of Plants' indigenous to Islington and its immediate vicinity has been drawn up from personal obser-

vations made by the writer during the last five years [1837–184
Many of the specimens in his own Herbarium were derived from t
Localities mentioned below. Since their Collection, however,
obvious reasons, some of them are no longer to be found in the sit
tions here assigned them.

"The arrangement adopted is that most consonant with t
Present state of Science and that now almost universally received."

Ranunculaceæ.

Ranunculus Flammula. Ponds beyond Hornsey Wood [portion
the Forest of Middlesex, next part of Hornsey Park; part
now Finsbury Park, but is mostly built over].

—— *bulbosus.* Meadows everywhere.

—— *aquatilis.* Ponds everywhere.

—— *sceleratus.* Ditches and stagnant pools.

—— *repens.* Hedge-sides about Is[lington], &c.

—— *acris.* Meadows everywhere.

—— *arvensis.* Brickfield opp. the New Market [Islington Cat
Market, opened 18 April, 1836, on the road leading from Low
road to Balls-pond, was soon afterwards closed].

—— *Ficaria.* Meadows.

Anemone nemorosa. Hornsey Wood.

Cruciferæ.

Capsella Bursa-pastoris. Very common.

Cardamine pratensis. Damp meadows.

—— *hirsuta.* Lane bet. Highgate and Hornsey Road.

Erysimum Alliaria. Hedges—common.

—— *cheiranthoides.* Lane bet. Highgate and Hampstead.

Sisymbrium officinale. Common about Highbury.

—— *Irio.* Rare, but found in the Lanes beyond Hornsey Wood.

—— *Sophia.* Behind St. Paul's terr., Balls-pond.

Cheiranthus Cheiri. Old walls at Canonbury and Newington.

Senebiera Coronopus. Very common.

Lepidium campestre. Behind St. Paul's terr., Balls-pond.

Sinapis arvensis. About Balls-pond and Newington.

Nasturtium officinale. Ditches in Canonbury Field [mostly b
over, portion of it is now Canonbury Square].

Barbarea vulgaris. Fields and hedge-sides about Is. &c.

—— *præcox.* Lanes beyond Hornsey Wood.

Brassica Rapa. Fields about Newington.

Diplotaxis tenuifolia. Brickfield N. of New Market [built over]

Raphanus Raphanistrum. Behind St. Paul's terr.

Papaveraceæ.

Papaver Rhœas. Waste ground nr. Highbury.

Tiliaceæ.

Tilia europæa. Planted in var. places.

Malvaceæ.

Malva sylvestris. N. s[ide] of New Market and lanes bey. Hornsey Wood.

rotundifolia. Common about Is.

Aceraceæ.

Acer campestre. About Hornsey Wood &c.

Pseudoplatanus. Planted.

Fumariaceæ.

Fumaria officinalis. About Newington.

Violaceæ.

Viola canina. Hornsey Wood.

tricolor. Road-side just beyond Ditto.

Caryophylleæ.

Spergula procumbens. Lanes beyond Hornsey Wood. Wall at Highbury &c.

Stellaria media. Very common.

Holostea. Common beside hedges.

Lychnis dioica. Ditto.

Agrostemma Githago. Behind St. Paul's terr., indig.?

Cerastium viscosum. Fields about Is. &c.

vulgatum. Ditto.

aquaticum. Lane bet. Highgate and Hampstead.

Silene inflata. Newington.

Geraniaceæ.

Geranium Robertianum. Fields bet. Hag-bush lane and Highgate and Lanes beyond Hornsey Wood. [Hag-bush or Hawthorn-bush lane was probably an old Roman way, its precise course is not clear, but appears to have run from London to the City-road; and then wound through Islington in the neighbourhood of Ring Cross, now Liverpool-road.]

molle. About Newington.

dissectum. Ditto.

LINACEÆ.

Linum usitatissimum. About Balls-pond.

ROSACEÆ.

Rosa canina. Lanes beyd. Hornsey Wood &c.
Rubus fruticosus. About Is. &c.
Agrimonia Eupatoria. Lanes beyd. Hornsey Wood.
Geum urbanum. Ditto.
Potentilla Anserina. Ditto.
—— *reptans.* Canonbury Field, Highbury, &c.
—— *Fragariastrum.* Various places ab. Is.
Mespilus oxyacantha. Hedges everywhere.
Pyrus Malus. Hedges ab. Hornsey Wood.
Prunus spinosa. Ditto.

LEGUMINOSÆ.

Orobus tuberosus. Hornsey Wood.
Vicia Cracca. Road-side near Ditto.
—— *angustifolia.* Lanes beyond Ditto.
Lathyrus pratensis. Under Hedges about Is. and Hornsey.
Ervum tetraspermum. Weed in gardens—N. side of the New Market.
Melilotus officinalis. Banks of the New River near Newington [This artificial stream is thirty-six miles long, twenty-four of which are in Middlesex; it enters the county near Waltham Cross.]
Trifolium pratense. Fields about Is. &c.
—— *repens.* Ditto.
—— *filiforme* var. *a. major.* Lanes beyond Hornsey Wood &c.
Medicago lupulina. Rubbish and waste places about Isn.
Vicia sepium. About Hornsey Wood &c.

SAXIFRAGACEÆ.

Saxifraga tridactylites. Old walls at Canonbury &c.

CRASSULACEÆ.

Sedum acre. Old walls about Is., Newington, &c.

RESEDACEÆ.

Reseda Luteola. Waste land near Highbury College [corner of Aubert Park and Avenell Road, opened Sept. 1826, and transferred to New College, St. John's Wood, 1850; building still in existence, but not used for original purpose].

ARALIACEÆ.

Hedera Helix. On old trees &c.

UMBELLIFERÆ.

Sison Amomum. Road-side about Newington and Hornsey.
Daucus Anthriscus. Hedge-sides about Is. &c.
Anthriscus vulgaris. Newington.
Scandix Pecten-Veneris. About Balls-pond and Newington.
Ægopodium Podagraria. Lanes beyond Hornsey Wood.
Sium nodiflorum. Road-side near Ditto.
· *angustifolium.* Ditto.
Conium maculatum. Various localities about Is. &c.
Anethum fœniculum. Bet. Dalston and Shacklewell, indig.?
Heracleum Sphondylium. Road-side near Hornsey Wood.

ONAGRACEÆ.

Epilobium hirsutum. Near Newington—common.
tetragonum. Lanes beyond Hornsey Wood.
Circæa lutetiana. About Is. &c.

HALORAGEÆ.

Myriophyllum verticillatum. Near Newington.
Callitriche verna. Lanes beyond Hornsey Wood.

GROSSULACEÆ.

Ribes alpina. Lane bet. Highgate and Hampstead, r. h. side of the road.

CUCURBITACEÆ.

Bryonia dioica. About Is. &c.

CORNACEÆ.

Cornus sanguinea. Lanes beyond Hornsey Wood and Newington.

STELLATÆ.

Asperula odorata. Hornsey Wood.
Galium Aparine. Common.
· *palustre.* Road-side by Hornsey Wood &c.

CAPRIFOLIACEÆ.

Viburnum Lantana. Hornsey Wood.
Opulus. Ditto.
Lonicera Periclymenum. Ditto.
Sambucus nigra. Ab. Is., Newington, &c.

COMPOSITÆ.

Bidens tripartita. Low damp places about Is. and Newington.
Inula dysenterica. Road-side near Hornsey Wood.
Gnaphalium uliginosum. Road-side near Newington.
Artemisia vulgaris. Behind St. Paul's Terrace, Balls-pond.
Senecio vulgaris. Common weed.
—— *aquaticus.* About Newington, Hornsey Wood, &c.
Bellis perennis. Everywhere in the Fields.
Tussilago Farfara. N. s. of the New Market.
Pyrethrum inodorum. Newington.
Matricaria Chamomilla. Common ab. Is. &c.
Anthemis arvensis. N. s. of New Market.
Achillea Millefolium. Is. and beyond Hornsey Wood.
Arctium Lappa. Common in waste places.
Serratula tinctoria. Hornsey Wood.
Carduus nutans. Behind St. Paul's terr.
—— *tenuiflorus.* About Is. &c.
Cnicus palustris. About Newington and Hornsey Wood.
—— *arvensis.* Ab. Is.
Onopordum Acanthium. S. side of New Market.
Hypochæris radicata. Various locals. about Is. and Newington.
Leontodon Taraxacum. Common.
**Lactuca Scariola.* Site whereupon the Model Prison now stands (Wm. P. P.) [now called Pentonville Prison, although in Islington; built 1840–42].
**Apargia autumnalis.* Bank along the Holloway Road (Wm. P. P.).
**Cnicus lanceolatus.* Common everywhere (Wm. P. P.).
Hieracium Pilosella. Canonbury Field.
Tragopogon pratensis. Burial ground of the Chapel-of-Ease, Is., and Newington. [St. Mary's Chapel-of-Ease, built in the fields on the south side of Holloway Road, "near the second milestone"; the burial-ground is now a public garden of four acres.]
Sonchus arvensis. Road-sides and lanes ab. Is.
—— *oleraceus.* Ditto.
Picris echioides. Road-side bet. Newington and Hornsey Wood.
Lapsana communis. Holloway Road &c.
Crepis virens. Newington.
Chrysanthemum Leucanthemum. Waste land near Highbury College.

DIPSACEÆ.

Dipsacus sylvestris. Road-side near and beyond Hornsey Wood.

LABIATÆ.

Nepeta hederacea. About Hornsey Wood and lanes ab. Is.
Mentha hirsuta. Road-side near Hornsey Wood.
Lamium Scorodonia. Fields and hedges ab. Is.
Betonica officinalis. Hornsey Wood.
Galeopsis Tetrahit. Lane bet. Highgate and Hampstead.
Lamium album. Common ab. Is.
- *purpureum.* Ditto.
Galeobdolon luteum. Fields and lanes bet. Hag-bush lane and Highgate and about Hornsey Wood.
Stachys sylvatica. Brickfield N. s. of New Market.
Ballota nigra. Under walls and hedges ab. Is. &c.
Ajuga reptans. Not very common ab. Is.
Lycopus europæus. Road-side beside Hornsey Wood.

SCROPHULARIACEÆ.

Scrophularia nodosa. Road-side bey. Hornsey Wood and Lane between Copenhagen House and Highgate [probably now Junction-road. Copenhagen House was, in turn, inn, tea-garden, &c.; the clock-tower of the Metropolitan Cattle Market (opened in 1855) marks its site].
- *aquatica.* Ditto.
Bartsia Odontites. About Is. in var. places (W. P. Preed [?]).
Linaria vulgaris. Lanes beyond Hornsey Wood.
Cymbalaria. Opp. Islington Lit. and Scientific Institn. [Wellington (now Almeida) Street; building now a Salvation Army centre].
Veronica Beccabunga. Near the Pump at Stoke Newington &c.
- *Chamædrys.* About Stoke Newington.
serpyllifolia. Ditto.
Melampyrum pratense. Hornsey Wood.

BORAGINACEÆ.

Symphytum officinale. (Three var.) Road-side near Newington.
Myosotis palustris. Road-side about and beyond Hornsey Wood.
Lithospermum arvense. Newington (a spot since built upon).

PRIMULACEÆ.

Anagallis arvensis. Common weed in gardens and elsewhere.
Lysimachia Nummularia. Field bet. Hagbush Lane and Highgate.

SOLANACEÆ.

Solanum nigrum. Common.
Dulcamara. Ditto.

Hyoscyamus niger. Behind St. Paul's terr., Balls-pond.
Atropa Belladonna. Behind Barnsbury Park, indig.? [site built over].

CONVOLVULACEÆ.

Convolvulus sepium. Hedges ab. Is. &c.
—— *arvensis.* Under walls and hedges.

PLANTAGINACEÆ.

Plantago major. Common ab. Is.
—— *lanceolata.* Ditto.

SANGUISORBEÆ.

Alchemilla arvensis. Behind St. Paul's terr., Balls-pond.

POLYGONACEÆ.

Polygonum Hydropiper. Lane bet. Highgate and Hampstead &c.
—— *Aviculare.* Common.
—— *Persicaria.* Ab. Is. and Newington.
—— *lapathifolium.* Dung heap near the entrance to the Hornsey Road.
—— *Convolvulus.* Wood especially in gardens.
—— *Fagopyrum.* Ditto.
Rumex acutus. Common.
—— *obtusifolius.* Ditto.
—— *crispus.* About Is. and Newington.
—— *Acetosa.* Newington &c.
—— *Acetosella.* Canonbury field, Newington, &c.

URTICACEÆ.

Urtica dioica. Very common.
—— *urens.* Not quite so common.
Parietaria officinalis. Old wall just at the top of Highgate Hill, near the Toll-gate [the old wall may have been that surrounding the original Chapel of Highgate, since rebuilt; the toll-gate was removed about 1860].

EUPHORBIACEÆ.

Euphorbia Peplus. Waste places ab. Is.
—— *amygdaloides.* Hornsey Wood.
—— *Helioscopia.* By Highbury College and Newington.
Mercurialis annua. Waste places and rubbish ab. Is.
—— *perennis.* Hornsey Wood.

CHENOPODIACEÆ.

Chenopodium album. Common in waste places ab. Is.
— *murale.* Ditto.
— *acutifolium.* Not so common.
Atriplex patula. Common.
— *angustifolia.* Ditto.

ULMACEÆ.

Ulmus campestris. Var. places ab. Is.
— *montana.* Ditto.

CUPULIFERÆ.

Corylus Avellana. Hornsey Wood.

It will be observed that the Larger trees are in great measure omitted. No doubt there are many, especially of the Genus *Salix*, truly indigenous, but the writer has not sufficient grounds on which to introduce them here.

ALISMACEÆ.

Alisma Plantago. About Copenhagen House, Hornsey Wood, &c.

ARACEÆ.

Arum maculatum. In and about Hornsey Wood.

TYPHACEÆ.

Sparganium ramosum. Ponds ab. Copenhagen House and Hornsey Wood.

NAIADACEÆ.

Potamogeton natans. Ponds beside Hornsey Wood House and Copenhagen House.
– *crispum.* In the New River.

SMILACEÆ.

Tamus communis. About Hornsey Wood.

JUNCACEÆ.

Juncus conglomeratus. Hornsey Wood.
Luzula sylvatica. Ditto.

LILIACEÆ.

Scilla nutans. Hornsey Wood.
Allium ursinum. Field bet. Hagbush Lane and Highgate.

GRAMINACEÆ.

Anthoxanthum odoratum. Common ab. Is. &c.
Alopecurus pratensis. Ditto.

Alopecurus geniculatus. Canonbury field &c.
—— *agrestis.* Hornsey Wood.
Phleum pratense. Newington.
Agrostis Spica-venti. Hornsey Wood &c.
Aira cæspitosa. Hornsey Wood.
Avena flavescens. Road-side a mile or two beyond Hornsey Wood.
Holcus lanatus. In var. places, not very common.
—— *avenascens.* Common.
Glyceria fluitans. About Is. and Hornsey Wood.
Poa trivialis. Common.
—— *pratensis.* Ditto.
—— *annua.* Ditto.
—— *rigida.* Lanes beyond Hornsey Wood and old walls ab. Is.
Dactylis glomerata. Ab. Is., Hornsey Wood, &c.
Festuca duriuscula. Newington.
—— *Myuros.* Old wall, Newington.
Bromis mollis. Ab. Is. and Newington.
—— *arvensis.* Ditto.
Lolium perenne. Ditto.
—— *temulentum.* Highbury Vale (T. Y. Gowan, Esq., H.E.I.C.S.) [the district from Highbury to Finsbury Park, now built over].
Triticum repens. Ab. Is.
Hordeum murinum. Ditto.
Arundo Epigeios. Road-side nr. Hornsey Wood, opp. the Tile Kilns.

CYPERACEÆ.

Scirpus sylvaticus. Road-side pond a mile or two beyd. Hornsey Wood.
Carex pendula. Road-side r. h. a mile or two beyd. Ditto.
—— *Pseudocyperus.* Pond. Ditto.
—— *stellulata.* Near ponds about Copenhagen House.

[Signed] EDWARD BALLARD, Oct. 29th, 1842.

The plants from the botanic garden of Dr. William Pitcairn (1711–91) in Upper Street, Islington (gardener, Walter Wilson), are now in Herb. Banks, in the Department of Botany; a MS. list (1777–80) is contained in Day-Book, Herb. Banks, pp. 61–67.

J. ARDAGH,
Department of Botany, British Museum.

NOVITATES AFRICANÆ.

(Continued from p. 15.)

Hermas Pillansii C. Norman (*Umbelliferæ*). *Herba* robusta perennis, circa 2–3 ped. alta; *caule* erecto superne ramoso indumento densissimo niveo-villoso omnino vestito; *foliis radicalibus* congestis numerosis petiolis longis crassis dense niveo-villosis usque ad 28 cm. longis, suffultis; laminis ambitu et basi cordatis, circa 10–17 cm. longis et medio 8–13 cm. latis attingentibus; supra sparse villosis, infra densissime niveo-tomentosis, nervis sericeo-villosis, margine irregulariter dentatis; *foliis caulinis* perpaucis ad bracteas oblongas obtusas reductis; *umbellis* pluribus, terminali quam laterales multo majore: radiis numerosissimis sub-æquilongibus, sparse villosis circa ¾ cm. longis; pedicellis glabris circa ·5 cm. longis; involucri phyllis numerosis conspicuis, anguste oblongis acutis ad 2 cm. longis, extus dense intus sparse villosis lineatisque; involucellorum angustis acutis basi longe attenuatis supra medium villosis; *floribus*, in umbellis lateralibus præsertim, polygamis; calycis lobis petaloideis anguste oblongis persistentibus; *petalis* minutissimis filiformibus caducis; *mericarpiis* a dorso valde compressis glabris, 3 mm. longis, basi truncatis apice parum angustatis: jugis vix visibilibus medio excepto; stylopodio conico parvulo; stylis longis erectis. (Fig., p. 197.)

Hab. Cape Peninsula: "Rare, in slightly damp and exposed clefts in rocky cliffs facing S., upper slopes between middle and eastern end of Nord Hoek Mountain; about 1500 ft. Roots strongly scented of carrots." *Pillans*, 4171! in Herb. Bolus (type). From same locality; *Norman*, 293! in Herb. Mus. Brit. Also on Table Mountain (fide *N. S. Pillans*).

Allied to *H. gigantea* Linn. fil., but readily distinguished by the deeply cordate leaves.

Named after Mr. N. S. Pillans, of the Bolus Herbarium, who has long recognized that it was an undescribed species, and through whose kindness I was myself able to see the plant in its natural surroundings.

Portulacaria pygmæa Pillans (*Portulacaceæ*). *Fruticulus* compactus glaber, copiose ramosus, ad 2 dm. altus, 3 dm. diam., caule erecto, basi robusto lignosoque. *Rami* teretes subcarnosi rigidi, subdichotome divisi, inferiores patentes, sæpe declinati, superiores patenti-decurvati, ramulis ultimis circa 2 mm. diam. *Folia* 1–1·4 cm. longa, 7–9 mm. lata, matura 3–4 mm. crassa, patentia sessilia cuneato-obovata, rotundata minuteque apiculata, carnosa sed tamen dura, aspera propter cellas elevatas rotundatas, glauco-viridia, demum lutescenti-viridia. *Cymæ* terminales sessiles, 2–6-fl., bracteis rotundatis, ca. 1 mm. longis, pedicellis 2–2·5 mm. longis, teretibus, leviter curvatis, gracilibus, parum supra basin articulatis, apice dilatatis concavisque. *Calyx* cum pedicello articulatus; sepala 0·75 mm. longa, orbicularia vel apice breviter acuta, submembranacea, pallide purpurea (pale beetroot-red), opposita, corollæ basin amplectentia. *Corolla* 4 mm. diam.; petala 2 mm. longa, erecto-patentia, elliptica

vel obovato-elliptica, obtusa, basi plana, superne concava, apice cucullata, tenuiter carnosa, marginibus submembranacea, nervo medio leviter prominente, alba more aquæ (water-white), externe pallido roseo-suffusa. *Stamina* basi petalorum adnata; filamenta erecta obclavata, dorsaliter leviter compressa, pallida, 1 mm. longa; antheræ omnes fertiles, medio affixæ, versatiles oblongæ. *Ovarium* 0·5 mm. longum, ovatum trigonum; stylum 0·25 mm. longum, teres, apice complanatum stigmatiferum minuteque papillatum.

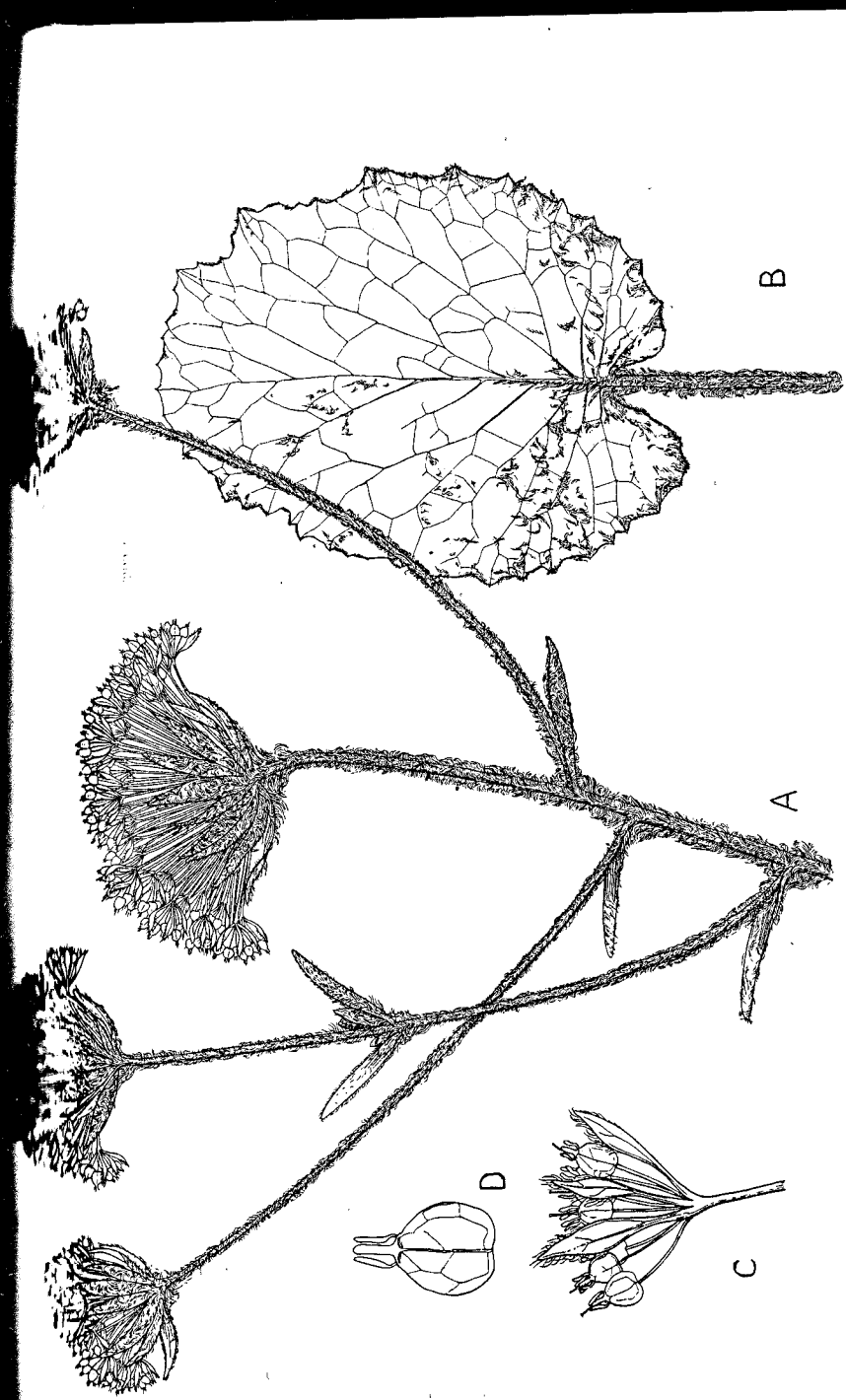
Hab. Little Namaqualand: hills at Grootderm, *Pillans*, 5849. Described from a living plant flowering in my garden, February 1928. A very distinct species, remarkable for its dwarf habit and broad leaves.

Mesembryanthemum longifolium L. Bolus (*Aizoaceæ–Mesembrieæ*). *Planta* erecta, 24 cm. alta, caule basi 7 mm. diam. *Rami* ramulique erecti vel fere adscendentes, apice 4–5 mm. diam., internodiis 0·5–3 cm. longis. *Folia* demum late patentia, juniora subfalcata vel inferne falcata superne erecta, carina marginibusque obscuris, lateraliter subcompressa, latere altero convexo, altero plano, lateraliter visa sat variabilia, sæpius superne angustata, acuta vel rarius sat abrupte acuta, supra plana vel leviter convexa, minutissime velutina, glauco-viridia, ad 9 cm. longa, medio 7–8 mm., rarius ad 1 cm., lata, ad 1·6 cm. diam., vagina ad 4 mm. longa. *Flos* unicus visus speciosus, 5·3 cm. diam., diurnus, ramum longissimum (16 cm. longum) terminans. *Bracteæ* receptaculum globose turbinatum amplectentes, petala excedentes, 4·5 cm. longæ. *Sepala* 6, 2 longiora 1·4 cm. longa, 4 breviora membranaceo-marginata, ad 1·1 cm. longa. *Petala* 3-seriata apice 2-dentata vel rarius subacuta, coccinea, basin versus aurea vel albida, 2·3 cm. longa, 2 mm. lata vel parum ultra. *Stamina* conico-collecta, apice 1 cm. diam., staminodiis rubro-aureis, inferne pallidis, circumdata, filamentis luteis papillatis, ad 1·2 cm. longis, antheris aureis. *Ovarium* supra planum, medium versus profunde 6-lobatum. *Stigmata* 6, subulata acuminata, 6 mm. longa. *Capsula* non visa.

Hab. Little Namaqualand: between Sendling's Drift and Doornpoort, Oct. 1926, *Pillans*, 5830.

Described from one specimen which flowered for the first time in in Mr. Pillans's garden, March 1928.

Aridaria serotina L. Bolus (*Aizoaceæ–Mesembrieæ*). *Planta* diffusa; rami sæpius decumbentes, sat rigidi, 20–40 cm. longi vel ultra, inferne 3–4 mm. diam., cortice griseo-brunneo, internodiis 1·7–3 cm. longis; ramuli nunc 5–7 mm. longi, apice 2-foliati, nunc elongati, 6–10-foliati. *Folia* patentia vel adscendentia, vel juniora erecta subincurvata, subcylindrica farcta, carina marginibusque sæpissime obscuris, lateraliter visa obtusa vel abrupte acuta, juniora sublente minute crystallino-papillata, glauco-viridia, seniora polita brunnea vel rubescentia. *Flores* 1–3-ternati, vespertini, vix odorati, ad 3 cm. diam.; pedunculi laterales leviter incurvata 1·5–3 cm. longi; recep-



Hermas Pillansii C. Norman, sp. nov.
A, Inflorescence, × ¾. B, Leaf, × ⅔. C, Umbellule, × 2½. D, Fruit, × 5.

taculum clavatum, apice 7–8 mm. diam., tubo 3 mm. longo. *Sepala* 4 fere æquilonga, exteriora multo crassiora, interiora membranacea marginata, 4–5 mm. longa. *Petala* numerosa, 3–4-seriata, sæpius obtusa, externe rubro-purpurea, superne fere coccinea, intus purpureo-rosea, ad 1·7 cm. longa, connata per 4 mm., tubo albo, 1 mm. lato, vel parum ultra. *Stamina* pluri-seriata, filamentis albis, ad. 9 mm. longis, antheris aureis, staminodiis subnullis. *Ovarium* supra pyramidali-elevatum, angulis valde acutis. *Stigmata* gracilia, superne vix attenuata, apice subobtusa, 7 mm. longa. *Capsula* profunde 4-angulata, expansa 1·3 cm. diam., carinis 1·5 mm. altis, alis erectis, seminibus brunneis.

Hab. Little Namaqualand: between Doornpoort and Brakfontein, Oct. 1926, *Pillans*, 5716.

Described from a living plant flowering in Mr. Pillans's garden, January–February 1928. Differs from *A. vespertina* in the more slender and diffuse habit of growth, larger leaves, broader and obtuse petals, and less unequal sepals.

Cephalophyllum rigidum L. Bolus (*Aizoaceæ–Mesembrieæ*). *Rami* prostrati elongati, ad 30 cm. longi vel ultra, ad 3 mm. diam., rigidi angulati pallidi, internodiis ad 6 cm. longis. *Folia* erecta, longiora 6–8, conferta, axillis gemmiferis, ad 6 cm. longa, 5 mm. lata, 6 mm. diam., cetera breviora, ad 4 cm. longa, fere semi-teretia, lateraliter visa acuta apiculata vel juniora carinata, glauco-viridia, leviter aspera, vagina tumida, 3–5 mm. longa. *Flores* 1–3-nati vel rarius 2-ternati, laterales tardissime evoluti, diurni, 3·4 cm. diam. *Pedunculi* teretes, apice leviter constricti, 8–9 mm., vel fructiferi ad 2 cm. longi, prope basin bracteati. *Receptaculum* crateriforme, 9 mm. diam. *Sepala* 5 inæquilonga acuta, 6–9 mm. longa. *Petala* 2-seriata, fere æquilonga, sat pauca, inferne angustata, acuta vel obtusa, ad 1·3 cm. longa, fere ad 2 mm. lata, aurea, apicem versus rubicunda. *Stamina* erecta subdiffusa, filamentis luteis ad 4 mm. longis, basi papillatis, antheris pallidis. *Discus* annularis crenulatus inconspicuus. *Ovarium* supra convexum 10-lobatum, lobis subcompressis. *Stigmata* 10, sat gracilia, superne attenuata, inferne longe papillata, mox late patentia, 2·5 mm. longa. *Capsula* expansa 1·9 cm. diam., valvis 10, apice uncatis, carinis inferne parallelis distantibus, superne divergentibus, vix ad dimidium valvæ attingentibus, ala membranacea ampla, alis loculi medio acute compressis, marginibus apice recurvatis, tuberculo obovato pallido magno.

Hab. Little Namaqualand: West base of Fifteen Mile Mt., East of Port Nolloth, Oct. 1926, *Pillans*, 5699.

Described from a living plant flowering in Mr. Pillans's garden, March 1928.

Hereroa fimbriata L. Bolus (*Aizoaceæ–Mesembrieæ*). *Planta* compacta glabra, 18 cm. alta vel ultra, 17 cm. diam. *Rami* conferti, sæpius 6-foliati, internodiis inclusis, vel floriferi elongati 10–12-foliati, internodiis ad 2·2 cm. longis. *Folia* erecta vel adscendentia, falcata, inferne semi-teretia, superne carinata, lateraliter visa superne ampliata, apice oblique rotundata vel subtruncata, supra plana, lateribus leviter convexa, glauco-viridia aspera, medio 6–8 mm. lata ad 1·4 cm. diam., duo paris simillima, vagina 3 mm. longa. *Flores* 1–3-nati vel bis 3-nati, vespertini vel subnocturni, odorati, 4·4 cm. diam. *Pedunculi* laterales 2 cm. longi, medio bracteati, bracteis amplectentibus receptaculum turbinatum attingentibus, pedunculus intermedius brevior, ebracteatus. *Sepala* 5, in flore aperto recurvata, apicem versus angustata, 1·3–1·6 cm. longa. *Petala* 3-seriata, exteriora recurvata, interiora patentia, apicem versus incurvata, aurea, externe rubescentia, ad 1·9 cm. longa, vix 0·5 mm. lata. *Stamina* erecta conferta vel apicem versus divergentia et 1·6 cm. diam., filamentis glabris luteis, ad 1·5 cm. longis, polline aureo. *Discus* e 5 glandulis viridibus inconspicuis, fere contiguis, compositus. *Ovarium* supra profunde 5-lobatum, lobis obtusis. *Stigmata* 5 gracilia, superne late divergentia, per stamina protrudentia, inferne longe fimbriata, 1·1 cm. longa. *Capsula* non visa.

Hab. Cape Province: Prince Albert Div., Abraham's Kraal, near Prince Albert, *Mrs. van der Byl* (Bolus Herbarium, No. 18799).

Described from plants flowering in Mr. Pillans's garden, March 1928. Plants collected at Beaufort West by J. W. Mathews (National Botanic Gardens, No. 2398/17) and by N. S. Pillans at Matjesfontein seem to be this species.

Hereroa latipetala L. Bolus. *Planta* compacta, 9 cm. alta, ca. 13 cm. diam., caule basi 1 cm. diam. *Rami* conferti, sæpius 10–12-foliati, internodiis 5–9 mm. longis. *Folia* falcato-erecta vel inferiora fere patentia, inferne semi-teretia, superne obtuse carinata dilatataque, lateraliter visa apice latissima, subtruncata, ad 1·1 cm. lata, glauco-viridia aspera, duo paris simillima, ad 3·5 cm. longa, vagina vix 2 mm. longa. *Flores* 1–3-ternati, vespertini nocturnique, inodorati, ad 3·2 cm. diam. *Pedunculi* 5–9 mm., vel fructiferi ad 2 cm., longi. *Sepala* 5, in flore aperto recurvata, fere æquilonga, ad 1 cm. longa, basi ad 7 mm. lata. *Petala* 2–3-seriata fere æquilonga, inferne angustata, aurea, externe rubicunda, ad 1·3 cm. longa, 1 mm. lata. *Stamina* erecta filamentis aureis, inferne albis, interioribus longe papillatis, ad 1 cm. longis, polline aureo. *Glandulæ* magnæ viridi-brunneæ inter se distantes. *Ovarium* supra planum, profunde 5-lobatum, lobis compressis. *Stigmata* 5 gracilia lutea, basi conspicue aureo-papillata, 1 cm. longa. *Capsula* generis, expansa 1·4 cm. diam., tuberculo inconspicuo.

Hab. Cape Province: Prince Albert Div., Abraham's Kraal, *Mrs. van der Byl* (Bolus Herbarium, No. 18800).

Allied to *H. Muirii*, *H. granulata*, and *H. dolabriformis* in having broad petals. But our species differs from the first in having longer internodes and broader leaves; from the second in having longer internodes, sepals, and stamens, and the two leaves of a pair exactly similar; and from the last in having entire leaves, longer sepals, and longer stamens.

Described from a living specimen which flowered in Mr. Pillans's garden, March 1928.

Hereroa calycina L. Bolus. *Caudex* apice 2 cm. diam. vel ultra, ramulos dense confertos, 4–8-foliatos, emittens, ramulis floriferis 4–6-foliatis, internodiis invisis. *Folia* demum patentia, duo paria præcipue inter immatura, dissimilia, alterum carina superne levitor dilatatum, alterum superne attenuatum, carina adulta eccentrica supra visa sæpe subfalcato-curvata itaque margine altero longiore subglauca, conspicuissime viridi-punctata, punctis leviter prominentibus, ad 4 cm. longa, ad 8 mm. lata diametroque. *Flores* 1–3-nati vespertini, sine sepalis 2·8 cm. diam., pedunculo foliis æquilongo, receptaculo turbinato. *Sepala* 5, subæquilonga, superne angustata, ad 1·8 cm. longa. *Petala* 2–3-seriata acuta lutea, subtus sæpe rubicunda, ad 1·2 cm. longa, sæpius ad 0·5 mm. lata. *Stamina* erecto conferta, filamentis inferne pallidis, interioribus basi dense papillatis, ad 1 cm. longis, antheris luteis. *Glandulæ* 5, permagnæ, fere contiguæ, luteo-virides. *Ovarium* supra valde concavum, leviter lobatum. *Stigmata* 1·2 cm. longa, stamina attingentia vel parum superantia. *Capsula* generis, expansa 1·5 cm. diam., carinis in aristam, ad apicem valvæ attingentem, desinentibus, alis dimidium cellæ tegentibus.

Hab. Cape Province: Queenstown Div., exact locality uncertain, *Dr. Adèle Grant* and *Miss Blenkiron* (National Botanic Gardens, No. 165/27).

Nearest *H. Rehneltianum* (Berger) Schwantes, from which it differs by its lower growth, shorter and thicker leaves frequently falcately curved when viewed from above, and by the stamens being shorter than the petals.

Hereroa concava L. Bolus. *Planta* cæspitosa humilis, 7 cm. alta. *Folia* fere erecta vel patenti-incurvata, in genere gracilia, lateraliter visa acuta vel acuminata, alterum paris superne leviter ampliatum, 4 mm., vel rarius ad 5 mm., diam., alterum 2–3 mm., sat aspera punctis subprominentibus, glauco-viridia, sæpe fere cœrulescentia, 3–4 cm. longa. *Flores* folia vix superantes vespertini nocturnique, 3 cm. diam.; receptaculum turbinatum, apice 1 cm. diam. *Sepala* 5, subæquilonga, ad 1·5 cm. longa, exteriora basi 6–7 mm. lata. *Petala* numerosa, 3–4-seriata, adscendentia vel patentia, apice incurvata et rubra, aliter aurea, acuta sepalis parum breviora, 8–13 mm. longa, sæpius ad 1 mm., rarius ad 1·5 mm., lata. *Stamina* mox subdiffusa, filamentis luteis, inferne albis, papillatis, ad 1 cm. longis, antheris luteis. *Glandulæ* conspicuæ crenulatæ. *Ovarium* supra profunde concavum, in medio vero 5-lobatum, lobis brevissimis, ad se arcte appressis. *Stigmata* gracilia, superne attenuata, setaceo-acuminata, ad 1 cm. longa.

Hab. Cape Province: Beaufort West Div., on stony hills near Beaufort West, June 1923, *L. Bolus* (Bolus Herbarium, No. 17514).

The slender leaves, deeply concave ovary with its lobes extremely short, closely pressed together, and confined to the very centre of the ovary distinguish this species.

(To be continued.)

WINTERL'S SPECIES "NOVÆ."

By A. Becherer, Ph.D.

(Basle, Switzerland).

In his *Index horti botanici universitatis hungaricæ quæ Pestini* (Pestini, 1788, without pagination) J. J. Winterl has given descriptions of numerous new species bearing the epithet "*novus*" (nova, novum), and has illustrated some of them *.

Most of these species can be identified with those described by later authors †. In these cases, so far as Winterl's "combinations" are mentioned at all, botanists have generally accepted the later name as being valid, and not the first "combination" as formed by Winterl.

Borbás (*A Balaton Flórája*, Budapest, 1900), however, uses in various instances the combinations of Winterl, regarding them as valid, and treats the later names as synonyms.

The examples given in the table on p. 202 may illustrate the different treatment accorded to Winterl's "combinations" by Borbás and other authors.

Are Winterl's "combinations" *Ægilops* "nova," *Geranium* "novum," *Onosma* "nova," etc., which Borbás recognises as valid, to be accepted under the International Rules?

The question is to be answered in the negative for the following reason:—The epithet "novus" (nova, novum) is *not* the name of a species (as it is, for instance, in *Arabis nova* Vill., *Carex nova* Bailey), but merely indicates that the species is *new*; *actual names of species are missing in all the respective cases.* This is clearly shown by the fact that Winterl in several instances uses the epithet repeatedly within *one and the same genus.* Thus he includes under *Atriplex* four species as *A. nova—A. rosea*, nova, *hortensis*, nova, *laciniata, littoralis*, nova, nova; under *Silene* there are three—*S. quinquevulnera, gallica, nocturna*, nova, *nutans, paradoxa, gigantea, conoidea, conica, bellidifolia, Behen*, nova, nova, *noctiflora, inaperta, muscipula, Armeria*; under *Crepis* two—*C. barbata, alpina, fœtida, aspera*, nova, *tectorum, biennis, Dioscoridis*, nova; under *Epilobium* two again—*E. angustifolium, hirsutum grandifl., montanum, tetragonum*, novum, novum; etc.

Winterl's species are therefore, although described, to be considered as being published without names. The only valid new names in Winterl's *Index* are a few bearing a real *nomen specificum* (as *Hora biennis* Winterl = *Althæa biennis* Borbás, 1900, p. 401 non

* In the copy at Kew of Winterl's Index the illustrations are missing, with the exception of fig. 11 (*Trifolium*); the text is incomplete, ending with *Tordylium*. The copy in the Department of Botany (British Museum) contains 13 plates, viz. 18, 20–23, 47, 48; the text is also incomplete, finishing at *Tordylium*. The copy at the Linnean Society (also incomplete) has 14 plates, similar to those at the Museum, except for the addition of no. 27. Pritzel cites 26 plates.—Ed. Journ. Bot.]

† Compare with regard to synonyms of Winterl's species: Aug. Kanitz in *Linnæa*, xxxiii. 452 (1864–65).

Winterl, 1788; Borbás, 1900.	Synonyms.	Authors who cite but reject Winterl's Combinations.
Ægilops nova Winterl; Borbás, p. 319.	*Ægilops cylindrica* Host, 1802; *Triticum cylindricum* Ces., Pass. et Gib., 1869.	Ascherson et Graebner, Syn. mitteleurop. Flora ii. 1, p. [illegible] (1902); Jávorka, Schedæ fl. hung. exsicc. Cent. iii. 45 (1914).
Iris nova Winterl; Borbás, p. 326.	*Iris arenaria* Waldst. et Kit., 1800.	——
Cucubalus novus Winterl; *Silene nova* Borbás, 400.	*Silene parviflora* Pers., 1805; *S. Otites* var. *parviflora* Rohrb., 1868.	——
Brassica nova Winterl; Borbás, p. 391.	*Brassica elongata* Ehrh., 1792.	Ehrhart, Beiträge, vii. 160 (1[illegible] Waldstein et Kitaibel, Descr. [illegible] rar. Hung. i. 27 (1802); O. Schulz, in Engler's Pflanzenreich iv. 105. p. 52 (1919) (cites Winterl erroneously under *Br. elongata*).
Geranium novum Winterl; Borbás, p. 407.	*Geranium divaricatum* Ehrh., 1792; *G. Winterli* Roth, 1800.	Roth, Catalecta Bot. ii. 78 (1[illegible] Waldstein et Kataibel, Descr. [illegible] rar. Hung. ii. 130 (1805); Knuth in Engler's Pflanzenreich, iv. 1[illegible] p. 57 (1912); Ascherson et Graebner, Syn. d. mitteleurop. Flora [illegible] 50 (1913); Grande, in Bull. Orto Bot. Univ. Napoli, v. 213 (1918).
Epilobium novum Winterl (alterum).	? *Epilobium lanceolatum* Seb. et Mauri, 1818.	Haussknecht, Monogr. Gatt. Epilobium 92 (1884).
Pastinaca nova Winterl.	*Peucedanum arenarium* Waldst. et Kit., 1802.	Thellung, in Hegi, Ill. Fl. v. Mitt. Europa, v. 2, p. 1370, Fussn. 1 (1926).
Onosma nova Winterl; Borbás, p. 372.	*Onosma arenaria* Waldst. et Kit., 1811.	Jávorka, in Ann. Mus. Nat. Hung. iv. 425 (1906); et in Journ. Bot. 1928, 65.
Achillea nova fl. rubro Winterl; *A. nova* Borbás, p. 347.	*Achillea aspleniifolia* Vent., 1800.	Jávorka, in Schedæ fl. hung. exsicc. Cent. vi. 47 (1923).
Crepis nova Winterl (altera); Borbás, p. 353.	*Crepis setosa* Haller f., 1797; *C. hispida* Waldst. et Kit., 1802.	——

O. Kuntze, 1891 = *Althæa pallida* Waldst. et Kit., 1801), as well as some varieties, so far as a description has been added to these.

Borbás (Balaton Fl. 341, 1900) and Jávorka (Magyar Fl. i. 278, 1924) cite also a "*Polygonum floridum*" Winterl (*P. arenarium* Waldst. et Kit., 1799), and Jávorka accepts this name as valid. Winterl, however, did not publish *floridum* as the name of a new species, but as a new *variety* (*Polygonum aviculare floridum*; with a fairly long description [*cf.* Ascherson et Graebner, Syn. iv. 865, 1913]), which under Art. 49 of the International Rules does not replace the later *specific* combination *P. arenarium* W. K. (1799). The name *Polygonum floridum* (Winterl) Borbás (1900), Jávorka (1924) falls into synonymy.

THE LONGEVITY OF SEEDS.

By H. W. Pugsley, B.A., F.L.S.

The question of the length of time during which heavy, hard-coated seeds may retain their vitality when buried in the ground is one which requires considerable investigation and a mass of detailed evidence, and the following facts are put on record for the possible use of future workers.

The first concerns the common Fumitory (*Fumaria officinalis* L.). In September last I visited a new house under construction near Surbiton, the site of which was a meadow (with knapweed, mixed grasses, &c.) that had previously formed part of a farm. In preparing the foundations the turf had been removed and stacked in the garden, and the earth below it, a sandy loam, dug out to a depth of about two feet and deposited in a separate heap as the basis of a future rock-garden. This heap had lain as deposited for about three months when I saw it, and in this period about twenty fine plants of the Fumitory had sprung up and were in flower. No other flowering plant had appeared on the heap. As the land for some distance around was either under grass or had recently been converted into flower-gardens, it seems difficult to resist the conclusion that the site was formerly arable land and that the Fumitory had sprung from seed which had lain buried ever since its conversion into pasture. *F. officinalis* is not uncommon in cornfields &c. on similar soil in this part of Surrey.

Another instance of this kind may be that of *Fumaria Martinii* Clav., near Penryn, in Cornwall. When the late F. H. Davey first sent me this plant he informed me that the potato-fields in which he found it in abundance were under grass only a few years previously.

A second suggestive case relates to the Broom (*Cytisus scoparius* Link). About 25 years ago the estate of old Wimbledon House was cut up for building and new roads laid out across it. The greater part of the estate was originally a portion of Wimbledon Common, level above but sloping irregularly downwards to the east and north. When the new roads were made, the estate was almost wholly grassy, park-like land, and Calonne Road, as it descended the slope, was sunk in a cutting several feet deep through this grassland. The sides of the cutting were not left vertical above the new road, but were sloped off so that two broad belts of bare soil were left along the roadside. No fresh soil was brought in from other districts. The road had not long been cut before seedlings of broom appeared on dense bare slopes, and in a very few years they were thickly covered with broom, which even spread to the turf above them and persisted till destroyed years afterwards by building operations. When the road was first made, there was no broom on this slope, and only a little in the remoter parts of the common, growing sparingly among the furze. It is known, however, that less than a century ago the part of the common near Wimbledon House was covered with furze, and at that date broom probably grew with it. It may be surmised that at a still

earlier date, when the grounds of Wimbledon House had not yet been enclosed from the common, the furze and broom extended over that area as well; and the young plants that sprung up on the cutting of Calonne Road may therefore have originated from seeds that had remained dormant for perhaps more than a century.

A third plant to be mentioned is the common Clary (*Salvia horminoides* Pourret). Although Wimbledon Common seems a suitable locality for this species, it is not included in my lists published in the *Wimbledon Annals* for 1904 and 1910, nor have I subsequently seen any record of its occurrence there. It is unlikely that it has grown on the common for very many years. The gravelly upper part of the common was utilised as a military camp during the great war, and was not entirely evacuated till several years afterwards. In 1925, I was surprised to see a few individuals of this *Salvia* in a recently excavated hollow above three feet deep within the limits of the former camp. It seems unlikely that the plant was introduced through the presence of the military or that it was bird-sown; and if it was not purposely planted, it may be questioned whether the seed had not lain dormant in the gravelly soil since some remote date. The nearest known habitat for the species is the Thames bank, formerly near Teddington and still at Hampton Court.

DIPLOTAXIS TENUIFOLIA DC. VAR. *INTEGRIFOLIA* KOCH.

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

In Pegwell Bay, E. Kent (v.c. 15), there is a good quantity of that fine plant, *Diplotaxis tenuifolia* DC., and, here and there, patches of *D. muralis* DC. var. *caulescens* Kittel (var. *Babingtonii* Syme).

When botanising there in September 1924, I noticed a clump of an entire-leaved *Diplotaxis* that at first sight I thought might prove to be a hybrid between the two species mentioned; but on looking more closely into the matter I believe my plant to be undoubtedly the var. *integrifolia* Koch of *D. tenuifolia*. This Koch described (Syn. Fl. Germ. et Helv. i. 57, 1836) as follows: "foliis integris, oblongis vel lanceolatis, grosse dentatis." My plant agrees well with this description and also with the figure in Sturm, Deutsch. Fl. xvi. 68 (1837). Compared with type *tenuifolia*, when growing, the variety appeared to me to differ in its remarkable leaves (all non-lobed lanceolate-acute and either almost entire or coarsely and irregularly toothed) as well as in the following characters:—(1) flowers smaller, 13–16 mm. in diameter; (2) petals less pointed; (3) ripe silicules with stouter and shorter foot-stalk (not longer than broad); (4) fruiting pedicels not so obviously dilated at the apex.

In Herb. Mus. Brit. the variety *integrifolia* may be found in Fiori and Beguinot, Fl. Ital. exsicc. ser. iii. 2060, and this clearly

shows the shorter foot-stalk under the silicule valves, but the leaves are not so acute nor so entire as in Sturm's figure and the Pegwell examples.

Wirtgen (Fl. Preuss. Rheinlande, i. 167, 1870) gives a very detailed and interesting description of *D. tenuifolia* and *D. muralis*. Under *D. tenuifolia* he describes a forma *latifolia* with leaves 12 cm. long, 3 cm. broad, pinnately divided, the axis being 1 cm. broad, with a lozenge-shaped terminal lobe 4 cm. long and 2 cm. broad; the lateral lobes are 5 cm. broad, and project 1 cm. beyond the entire central part.

Also f. *angustifolia* with leaves 10 cm. long, 1–1·5 cm. broad, with an axis 3–5 mm. broad at the base; terminal lobe 2–3 cm. long, 6 mm. broad, with two lateral teeth; the lateral lobes project 10 mm. beyond the axis and are 2–3 mm. broad.

And f. *bipinnatifida* with lower leaves 10 cm. long, with a pinnately-lobed terminal lobe 5 cm. long, 3 mm. broad between the first and second pairs of lobes; of the two pairs of pinnately divided lateral lobes, the uppermost are longest—3 cm. long, and 2 mm. broad at the axis. The upper leaves show only a slight tendency to double division.

He states that the leaves of this species have a very objectionable odour, which Koch likened to a disagreeable cress-smell, Ascherson as unpleasant, and likened it to the smell of roast pork; Wirtgen continues, "to me good roast pork is exceedingly pleasant, while I liken the smell of the *Diplotaxis* to the stinking Cranesbill." He then described plants which appeared to him to be of hybrid origin.

Under *D. muralis* Wirtgen (170 *op. cit.*) states that the plant appears in two forms—with a leafy stem (*D. caulescens* Kitt.) and with a leafless stem (*D. scapigera* Kitt.). This author considered the first as biennial, the other as annual, but Wirtgen says this has not proved correct. He concludes: "There is also a β. *minor* Lef. and Court. Comp. (*subacaulis*) which cannot, however, be considered as a variety, as it is the first stage of the flower-development, as is the case with so many Cruciferæ, which is seen so often, especially in winter, in *Capsella bursa-pastoris* and *Cardamine hirsuta*."

I have noted that one of the best distinguishing features of *D. tenuifolia* is the elongated slender foot-stalk under the silicule valves of the ripe capsule, which is considerably narrower than the expanded apex of the pedicel. In *muralis*, on the other hand, the stalk is practically non-existent and the silicule base and pedicel apex are of almost the same width.

The seeds of *D. tenuifolia* differ from those of *D. muralis* in being darker brown and blunter at both ends, and less than twice as long as broad; in *muralis* the seeds are distinctly yellowish-brown, narrowed and rounded at both ends and about twice as long as broad. In both species they appear to be the same length (1–1⅛ mm.).

The plant we have hitherto, in England, called var. *Babingtonii* Syme should be designated var. *caulescens* Kitt., which antedates it by many years.

As the subject of this note, *D. tenuifolia* var. *integrifolia*, does not appear to have been reported previously from Britain, I am depositing examples in the Herbaria at the British Museum and at Kew.

SOUTH-EASTERN UNION OF SCIENTIFIC SOCIETIES.

Thirty-third Annual Congress.

The Thirty-third Annual Congress of the Union was held at Rochester from June 6–9. A the General Annual Meeting on Wednesday evening Dr. A. B. Rendle, the retiring President, introduced the President-elect, Sir Martin Conway, M.P., whose address on "Mountains" was illustrated from his personal experiences in the Himalayas, the Bolivian Andes, the Alps, and Spitsbergen. Sir Martin referred especially to the effect of the processes of Nature in wearing away and rounding off mountain-ranges to produce the appearances characteristic at the present day of ranges of successively greater antiquity. The neighbouring Kentish downs, the north and south ridges of which were originally united by a dome of chalk, must in the glacial epoch have been very much like what Spitsbergen is to-day.

At the business meeting of the Botanical Section on the following morning Mr. A. D. Cotton, F.L.S., Keeper of the Herbarium at the Royal Gardens, Kew, was elected President of the Section for the year 1929–30. In his report of the work of the past year the Secretary, Mr. F. O. Whitaker, referred to the appeal issued to the affiliated Societies throughout Sussex to co-operate towards accumulating data for the preparation of a Flora of the county. The Natural History societies are urged to make a botanical survey of their respective areas, and especially to check previous records and avail themselves of the services of the various referees in the determination of critical species and varieties. The referees who have promised help include Col. Wolley-Dod, Mr. H. W. Pugsley, and Mr. A. J. Wilmott for flowering plants, Mr. Nicholson for Mosses and Liverworts, Mr. Paulson for Lichens, and Mr. A. A. Pearson for Fungi.

Mr. C. E. Salmon's Presidential Address was on "Fruits and Seeds as a means of distinguishing Allied Plants." Fruits and seeds of closely-allied species of the British flora were compared with the aid of lantern-slides, and characteristic differences in shape, size, or character of the coat were indicated. Useful distinguishing features were thus established. For instance, slight differences in shape of the seeds indicate that the plant from Pembrokeshire, so long known in our Handbooks as *Arabis ciliata*, is correctly placed under *A. hirsuta*, the true plant (*A. Brownii* Jord.) being confined to Ireland. The two night-flowering Silenes, *S. nutans* and *S. dubia*, have distinguishing characters in the size of the capsules and seeds, and in the nature of the sculpturing and colour of the seed-coat. The tubercles of the seed-coat also supply means of separating *Cerastium*

pumilum and *C. tetrandrum*. Colour and seed-sculpture also supply distinctive characters of three species of *Montia*. Similar characters afford help in diagnosing *Anagallis arvensis* and *A. cærulea*. In this connexion Mr. Salmon referred to a statement by Gaudin (*Flora Helvetica*) that small birds eat the seeds of *A. cærulea* with impunity, but are poisoned by those of *A. arvensis*.

The robust limestone-cliff loving *Veronica hybrida* may be distinguished from the chalky heath plant of the Eastern counties, *V. spicata*, by the size and relative length of the seeds; while size and colour also serve to separate from each other *V. polita*, *V. agrestis*, and *V. Buxbaumii*. These are some examples of the series of groups of species described and illustrated.

The Presidential Address was followed by two papers by local botanists. Rev. L. Denton Sayers, M.A., F.L.S., illustrated "Gall-formation in Plants" by special reference to species common in the district. The structure of the commoner types affecting buds and leaves was described with the aid of a series of lantern-slides. Mr. G. E. Hutchings, F.G.S., gave an account of the Vegetation-areas of the Rochester district, with special reference to the chalk-areas of the North Downs and the estuarine areas of the lower Medway valley.

Two botanical excursions were arranged. One, to Upper Halling and Holly Hill, under the guidance of Mr. G. E. Hutchings, illustrated the widely varying types of vegetation on this part of the North Downs. Ascending from the Pilgrims' Way, natural chalk grassland with advancing scrub is succeeded by beech-yew woodland in close canopy. The upper parts of the wood, on clay-with-flints, present a marked contrast with the vegetation of the bare chalk slopes, including coppice with oak-standards. Holly Hill, a small outlier of the Blackheath Pebble Beds on the edge of the Chalk escarpment, showed interesting stages in succession; a mixed scrub dominated by birch and bracken has replaced an old pine-wood; the scrub is varied with more open areas colonised by grasses, mosses, and flowering plants.

The second excursion, led by Mr. C. E. Salmon, was to West Malling and Ryarsh, where the woods are on the Folkestone beds, affording an interesting contrast with the chalk flora.

The bryologists were interested in finding good fruiting specimens of *Leptobryum pyriforme* on the vertical side of a sandstone quarry at Ryarsh. Mr. W. R. Sherrin also reports two new moss records for West Kent (v.c. 16), namely *Trichostomum crispulum* and *Ditrichum flexicaule*, found on the chalk ridge at Holly Hill, near Halling, and also *Barbula convoluta* var. *sardoa* from the Castle Wall, Rochester (East Kent).

The Congress in 1929 will be held at Brighton under the presidency of Sir Arthur Keith, F.R.S.

A. B. R.

NOTES OF INTEREST TO STUDENTS OF BRITISH BOTANY.

THE VASCULUM.—Mr. J. W. Heslop Harrison contributes th following:—

Vol. xiii. 138 (July 1927). Some abnormalities in the flowers *Rosa mollis* Sm.: an interesting account of certain abnormaliti not caused by gall-making insects in the flowers of *R. mollis* *cærulea* Woods.

Vol. xiv. 38 (Nov. 1927). *Bryonia dioica* between Warkwor and Alnmouth (v.c. 68), far from human interference and almo certainly a native (see Baker and Tate).

P. 39. "*Rosa glabrata* (f. n. mihi). If one ventured to apply a English name to this rose, it would have to be the Non-downy Down Rose! It is the most remarkable rose I have ever collected, fo although by habit, prickle characters, etc., etc., certainly one of th *Tomentosæ*, it has glabrous leaves, and peduncles and fruit abs lutely devoid of armature. *Habitat.* Wheel Birks (v.c. 67).

"*R. Richardsoniana* (hyb. nov. mihi). Here, again, we ar brought in contact with a most remarkable rose, a hybrid betwee *Rosa mollis* and *R. pimpinellifolia* var. *rosea*, or if quadrinomi nomenclature be allowed [It is not! ED.] between *R. mollis* and *R. pimpinellifolia inermis rosea.* It is characterised by its dee rose flowers, small fruit, leaves with 5 folioles, the cuneate bases o its individual leaflets in many cases, and its feeble stem armatur The source of the cuneate leaflet bases was quite a puzzle until thes were found on certain of the *pimpinellifolia* plants with which i grew. Named in honour of both my friends at Wheel Birks, Mr. R. E. Richardson and Mr. Hugh Richardson."—C. E. S.

SHORT NOTES.

CARPEL MORPHOLOGY IN THE CRUCIFERÆ.—The view that four carpels are normally present in the Cruciferæ, recently revived and enlarged by Miss E. R. Saunders, receives support from the anatomical investigations of A. J. Eames and C. L. Wilson, described in the *American Journal of Botany* (April 1928, 251–70). The writers draw special attention to the inversion of the vascular bundles in the commissure or "solid" carpel—a matter which seems to have been overlooked in recent studies on the subject. The closing of the open carpel by infolding of its edges produces the condition found in the solid carpel; the two ventral bundles become inverted; the obliteration of the loculus marks the difference. The authors find no evidence for the existence of the "semi-solid" type of carpel assumed by Miss Saunders to be represented in the silicula, where the lateral part of the valve-carpel is regarded as a wing of the fertile carpel. The number, origin, and course of the bundles to the

fertile carpel in the siliqua, and to the median ovule-bearing portion of the silicula, is exactly the same. The secondary venation of the carpels adduced in support of the existence of the wing-development is unsatisfactory, and the assumption of such a development implies an anomalous position of the ovules midway between margin and midrib. The authors take the position that there are generally in Cruciferæ four carpels, in whorls of two, two solid and fertile, and two valve and sterile, and the lateral venation is a secondary adaptation. A few species show vestigial traces in the receptacle of a third, higher, whorl of carpels.

The dissepiment is believed to be an expansion of the ventral margin of the folded solid carpels; the wings of the two carpels meet in the centre forming the septum. The presence of stomata and a cuticle are adduced as proof of its carpellary nature. The problem, hitherto unsolved, presented by the position of the ovules within the loculi of the sterile valve-carpels is elucidated by structural evidence. The ovular traces are derived from the inverted ventral bundles and pass through long funicles to the ovules. The funicles pass out *through the septum*, the wall of which cloaks, usually very loosely, the bases of the funicles, and may in some cases be clearly seen over the bases of the ovules. In a few cases among the many species studied an outer layer continuous with the funicle-sheath was sufficiently distinct to be regarded as representing the septum-wall still persisting about the ovule.

On similar evidence the allied families Capparidaceæ and Fumariaceæ are also considered to have solid and valve carpels.—A. B. R.

THE RED FORM OF *SPIRODELA POLYRRHIZA* L.—Last November the writer recorded in the *Journal of Botany* a red form of *Spirodela polyrrhiza* L. found in the ditches round Lewes. Dr. Rendle suggested that this might be a seasonal form, and recommended that a watch should be kept on the winter-buds to see whether these produced the same form. This has been done, and the fronds are coming along true to colour, viz. red, though in their present immature stage are not so rich in tone as those found later on in the year. Always, as previously stated, this form is associated scattered among plants of *Hydrocharis Morsus-ranæ* L. Observation on the normal form growing *en masse* in a ditch has also been kept, and these are all of the normal colour, green above and purple or reddish-purple below. It is never safe to generalize, and it must be admitted that hitherto the writer's observations on *Spirodela polyrrhiza* have been confined to one locality only—in the neighbourhood of Lewes. Whether this red form occurs elsewhere, which in all probability it does, and apart from *Hydrocharis Morsus-ranæ*, or mixed with plants of the normal colour, would be interesting to know. It is a little surprising to find that, notwithstanding the abundance of literature on the subject of British botany, no mention should be made of this very striking form of the largest of our Duckweeds. One reason may be extreme localism. But in spite of the researches on the Lemnaceæ by Hegelmaier, Arber, and Guppy, there still remains much in the life-history

of this group that requires elucidation. This is the sole object of th writer in recording his observations on them from time to time.— J. GORDON DALGLEISH.

JUNCUS ALPINO-ARTICULATUS.—The first volume of Villars' *Histoire des Plantes de Dauphiné* (1786) consists of general matter including a glossary of botanical terms (pp. 1–111), an account of th families and their properties (113–151), descriptions of the genera (153–246), and lists of plants observed in various districts by Villars himself (247–308), by Chaix (309–382), and by Villars and Guettard (383–398). A large number of new specific names proposed by Villars and Chaix* appeared in these lists, many however being synonyms of previously published species. Some were *nomina nuda*, while others were validated, either by a diagnosis or by a reference to a description in Haller's *Historia* or Gerard's *Flora galloprovincialis*.

In the second and third volumes, comprising the main body of the Flora, only some of the names published in the first volume were adopted, others being cited in synonymy or omitted. Many of the latter have consequently been overlooked, but fortunately only one of them, *Juncus alpino-articulatus* Chaix (Vill. Hist. i. 378), has to be accepted under International Rules. This was based on no. 1321, *Juncus foliis fistulosis, articulatis, panicula simplici, glumis aristatis* Haller, Hist. ii. 170 (1768), and is the earliest valid name for the species commonly known as *Juncus alpinus* Vill. (Hist. ii. 233; 1787). Apparently Villars rejected Chaix's name *alpino-articulatus* as being too long and clumsy, but his action was directly contrary to Art. 50 of the International Rules; hence *Juncus alpinus* Vill. is a *nomen abortivum*.

It has been suggested to the writer that the name *Juncus alpino-articulatus* Chaix should be rejected under Art. 51, 4°†, on the ground that it might be mistaken for a hybrid between *Juncus alpinus* and *J. articulatus* by those who were unfamiliar with the details of its publication. This suggestion appears to be unfounded: as soon as *J. alpinus* is treated as a synonym of *J. alpino-articulatus* in the principal Floras, such confusion—if it ever arose—would disappear. Hence the name *Juncus alpino-articulatus* cannot be a *permanent* cause of confusion or error, and should be adopted under International Rules.—T. A. SPRAGUE.

BONNEMAISONIA HAMIFERA Hariot.—In reference to the occurrence of this Alga in Scotland recently noted in the *Journal* (p. 153) by Mr. Tandy, M. P. Meslin writes from Caen: "Je crois devoir vous signaler que l'*Asparagopsis hamifera* Okamura (*Bonnemaisonia ham.* Har.) en dehors de l'Angleterre, du Japon et des côtes américaines, a été signalé en France à Cherbourg (1898) et depuis rencontré (1926) sur la côte septentrionale du Finistère et (1927) sur la côte du Calvados à Langrune.

* Villars's names are followed by "N" or "nobis," and those of Chaix by "mihi."

† "Chacun doit se refuser à admettre un nom dans les cas suivants: .... 4° Quand .... il devient une source permanente de confusion ou d'erreurs."

PUCCINIA PYGMÆA Eriks. DISCOVERED IN BRITAIN.—At the beginning of June this year the Rev. P. G. M. Rhodes, who has investigated the micro-fungi of Worcestershire so extensively that he has greatly increased the number of species recorded for that country, brought me from Monk Wood some leaves of *Calamagrostis Epigeios*, on which were the sori of *Puccinia pygmæa* Eriks. These agreed in every remaining detail with Eriksson's description, but of course they were only the persisting relics of last year's sori, although the teleutospores were apparently in good condition. In view of the interest of this new discovery, it is as well to publish the record at once, so that others may look for this very rare Uredine elsewhere during the coming season; Fischer says it was found in Switzerland, on *Calamagrostis Epigeios*, in October. The difficulty of seeing it depends upon the minuteness of the sori, which, if they were not in rows, would in fact be almost invisible without the aid of a lens, not being in general more than 0·5 mm. long, and only (*i.e.*, the teleuto-sori) raising the epidermis slightly without discolouring it. Eriksson stated that the sori were hypophyllous, but in the Worcestershire specimens most of them were epiphyllous. There were on the leaves also the remains of uredo-sori, but these had completely lost their colour.—W. B. GROVE.

ANATOMY OF GRASSES.—V. E. Wilkins concludes (*Annals of Botany*, xlii. 305) from a critical examination of the anatomy of Sweet Vernal Grass (*Anthoxanthum odoratum*) that, although plants of this species may differ widely in external form and habit of growth, the internal anatomy remains consistently uniform. In other words, morphological differences within a species are apparently not associated with variations in internal anatomy.

The same rule was found to hold true in the case of established races of wheat (*Triticum*). The several varieties of wheat examined revealed no important differences in internal anatomy. On the particular point of the quality of grain it was found that in a number of pure-line varieties, representing practically every distinct main type of endosperm, the anatomical structure of glume and leaf was uniform, except for a possible variation in the development of the outer sheath encircling the vascular bundles of the leaf.

A detailed description is given of the anatomy of Sweet Vernal Grass and of the empty glume of the Wheat plant.

REVIEWS.

Studies in the Ecological Evolution of the Angiosperms. By J. W. BEWS, M.A., D.Sc. 8vo, pp. viii, 134. Wheldon & Wesley: London, 1927. Price 8*s.* net.

THIS is a reprint of a series of articles which appeared in the *New Phytologist* (1927) (Reprint No. 16). The studies are based on fifteen years' experience in South Africa, where Prof. Bews held the

Chair of Botany in the Natal University College, Pietermaritzbu
His subject was approached through a study of the tropical, su
tropical, and temperate floras of South Africa, and these ha
supplied the motive of the work. "The vegetation of moist-tropic
regions, except in so far as it has become differentiated as a result
the influence of the organic environment, especially competition f
space, is older than that of the drier subtropical regions on the o
hand and that of temperate regions on the other."

In the first chapter—the fossil record and its interpretation—th
author endeavours to show by comparison of leaf-size, leaf-margin
leaf-texture, and structure of the wood that the earlier fossil Angio
sperms were closely similar to the types now occurring in mois
tropical and subtropical areas.

Ecological differentiation among the Angiosperms is regarded a
having taken place, primarily and for a long period, under relatively
unchanging moist-tropical conditions; this has allowed of the differ
entiation of the great family groups and of a number of main type
of plant-form—including evergreen hard-wooded trees with larg
leathery leaves, lianes, epiphytes, mesophytic shrubs, undershrubs and
herbs of the forest undergrowth and margins. More recent climatic
differentiation has led to the production of types of plant-form
adapted respectively to drier and colder conditions. Prof. Bew
reviews the orders and families of Angiosperms, adopting the
Englerian sequence, and finds support for the general ancient
character of the moist-tropical flora by such facts as the proportionally
much better representation in the Tropics of the relatively primitive
Archichlamydeæ than the relatively advanced Sympetalæ, and the
predominantly tropical character of all the great tree-families, and
the fact that most of the orders recognized as primitive are either
tropical, or, if they extend into intertropical regions, are hygrophilous
or show traces of a tropical ancestry. If we confine our attention to
narrower circles of affinity—the families or best-defined orders—there
is again strong evidence that the moist-tropical flora is older than the
flora of drier or colder regions.

The second half of the book deals with a phylogenetic system of
classifying plant-forms. The author attempts to trace some of the
main ecological evolutionary tendencies among angiospermous trees
and shrubs. Starting from the moist-tropical tree-type, derivative
types show to a greater or less extent such features as a greater
localisation of the reproductive processes in time and space, production
of softer types of wood, a general reduction in height of the stem, an
increase in branching, a decrease in size of the leaves, increased bud-
protection, thicker bark, and an increase of minor xerophytic features.
Responses differ according to the nature of the climatic changes.
For instance, in subtropical regions with dry seasons the deciduous
habit is adopted or the leaves are much reduced in size.

Under moist favourable conditions various derivatives result, such
as lianes, epiphytes, hygrophilous undershrubs and herbs. Finally, an
attempt is made to analyse the floristic and ecological differentiation
of the grasses, in many ways the most important response to climatic

differentiation—a type which has become dominant over vast areas
of the world's surface.

The subject of the book is a fascinating one, and students will be
glad to have the presentation of the result of Prof. Bew's work in
this handy form. A. B. R.

Comparative Morphology of Fungi. By ERNST ALBERT GÄUMANN. Translated and revised by CARROLL WILLIAM DODGE. 8vo, pp. 701, figs. 406. McGraw-Hill Publishing Co.: London (and New York), 1928. Price 37*s.* 6*d.*

GÄUMANN's book, *Vergleichende Morphologie der Pilze*, published in 1926, is the best modern work on the comparative morphology of Fungi, though as it keeps somewhat rigidly to the title and bases the comparison essentially on cytology, with the result that Fungi Imperfecti receive much less than 1 per cent. of the space, it is not wholly satisfactory as a presentation of modern mycological knowledge. The American translation will no doubt be well received. The work is divided into 36 chapters with a full bibliography and index. The first four chapters (16 pages) deal with introduction (haploid and diploid phases), the thallus, reproductive organs, sexual organs and sexuality. Then follow the different groups of fungi, beginning with Archimycetes and Phycomycetes, passing on to Ascomycetes and Basidiomycetes, and finishing with Fungi Imperfecti and a review of fungus classification.

The information is given in a concise form and is fully documented. There are a number of phylogenetic trees which display the author's views on the relation between different genera; possibly these serve as useful summaries for text-book purposes, though the only general interest is that Gäumann, believing fungi to be monophyletic in the main, derives them from Chlorophyceæ, with the exception of Archimycetes (*Olpidium*, *Synchytrium*, etc.), which are regarded as a separate line coming from Flagellates through Myxomycetes: the interest here is in the fundamental problem whether fungi ever possessed chlorophyll—that is, are they a division separate from green plants?

It is a little difficult to review the American book, for the reason that it is a revision in which Gäumann, through illness, was unfortunately prevented from collaborating. It is only by collating the two editions that one is able to say where some of the changes have been made, though the dates given of the new literature often supply a clue. The chapters on Basidiomycetes are rearranged in the new book "with the author's approval," for a traditional arrangement had been followed by Gäumann, an arrangement not in accordance with American feeling; most of the orders of Basidiomycetes have been rewritten. Recent work has occasionally "necessitated a complete rewriting of the discussion of a group," *e. g.*, Basidioboleæ, Elaphomycetaceæ, Diatrypaceæ, and Diaporthaceæ, etc. Dr. Dodge also assumes full responsibility for any opinions expressed in the revision of the Gasteromycetes (except Clathraceæ and Phallaceæ). Further,

in the Laboulbeniales "Gäumann's discussion and my criticisms of h statements have been relegated to smaller type at the close of th order, leaving the main discussion a statement of facts," and ther are some additional figures given of this group. It is apparent from this that Dr. Dodge has produced what amounts to a new edition o the book. The German edition appeared in 1926, so that there ha been little time lost; and, as one would expect, there are signs o undue haste here and there, *e.g.*, "my criticisms" in the Preface becomes "Thaxter's unpublished criticism" in the text.

Taking the book as it stands, it is a valuable work and one which will doubtless have considerable influence in America and possibly here also. In my opinion, however, it would have been best to have allowed Gäumann himself to have made any necessary alterations in his book and then to have translated it. Translation does not necessarily mean agreement, and the translator, when his ideas are too ruthlessly trampled on, can salve his conscience by a more or less frequent use of footnotes. The hybrid nature of the present effort shows up badly in one of the few footnotes. "This convincing evidence of the absurdity of recognising the Cantharellales as a separate order was received .... too late to make such radical changes as the suppression of the Cantharellales would make necessary." There are several other points in the original which, though translated without comment, are open to criticism.

In spite of the value of this edition, most British mycologists would have preferred an entirely new book written from an American standpoint.

The American edition is more attractively produced than is the German edition, and is dedicated to Roland Thaxter, the doyen of American Mycology. J. R.

A Laboratory Manual of General Botany. By HUGO LEANDER BLOMQUIST and NUMA FRANCIS WILKERSON. Revised edition. 8vo, pp. 122, 5 text-figs. Duke University Press: Durham, N. Carolina, 1926; Cambridge University Press, 1928. Price 7*s.* 6*d.* net.

THIS little book describes a general course in practical botany which has been gradually evolved by the authors after some years of teaching in the Duke University, and, as embodying the results of their experience, will prove of considerable interest to many teachers. Its purpose, as is explained in the very lucid preface, is "to aid the instructors and to guide the student in the laboratory and the field," and it consists in the main of two parts, the first of 28 and the second of 25 practical exercises. The first half covers the whole range of Cryptograms and includes all the important types, while the second part is devoted to the Spermatophytes. The volume is attractively produced and is interleaved in such a way that additional notes can be incorporated.

The book naturally covers very familiar and elementary ground; but although there is thus little scope for originality, there is a

pleasing freshness about it. The student is told exactly what to do and how to do it, but the instructions are not so detailed as to destroy all initiative. Much of the letter-press is in the form of questions, but these are followed by clear indications of the answers expected, and ensure that investigation is carried out on the right lines.

It is, however, the three short elementary chapters which are the most valuable part of the book. The first is a brief introduction to laboratory methods and study in general, the second describes the use and care of the microscope, and the third gives, with the help of several good diagrams, valuable hints on pencil- and ink-drawing. All these are aspects of practical work only too often neglected, and for those introductory pages, if for nothing else, the book is worth perusal by all practical teachers. R. D'O. G.

BOOK-NOTES, NEWS, ETC.

THE SPRING FORAY OF THE BRITISH MYCOLOGICAL SOCIETY was held at Oxford, May 18–21. There was an informal meeting on Friday evening at the School of Rural Economy, and the members were conducted round the school and also the adjoining Imperial Forestry Institute. The next morning Kennington Forestry Nursery was visited and Bagley Wood worked, and in the afternoon Tubney Wood and Nursery. In the evening the President, Professor Dame Helen Gwynne-Vaughan, gave a lecture at the Botany School on "Heterothallism." Sunday morning was left free; in the afternoon Blenheim Park was traversed. The last day's foray was to Wytham Woods. After tea the members were conducted over the Dry Process Sugar Beet Factory at Wytham, and in the evening Mr. J. Ramsbottom gave a lecture on "The Problem of Species in Fungi."

On the whole, fungi were scarce, doubtless due to the cold and dry weather previous to the meeting. Microfungi appear to require a damp warm atmosphere for their development, similar to that which favours the larger fungi; it might almost be said that the general conditions which benefit the host-plant frequently enable the ordinary parasitic microfungi to flourish, though such parasitic microfungi are not of the lethal type. The foray was, however, very enjoyable, principally on account of the arrangements made by the Oxford botanists. Professor Tansley, his staff, and his students and the staffs of the Rural School of Economy and the Imperial School of Forestry by their hospitality and interest ensured that Oxford will be regarded with favour as the centre for a future autumn foray.—J. R.

FLORA OF THE PANAMA CANAL ZONE.—A substantial and extensively illustrated volume—*Contributions from the U.S. National Herbarium*, vol. 27—is the work of Paul C. Standley, who has twice visited the Canal Zone in order to study the flora. The work is an annotated list of the flowering plants of the Isthmus of Panama, which number about 2000. An introduction on the physiography of

the area and the general characteristics of the vegetation precedes the taxonomic portion which contains ample keys to the genera and species, and full notes on those of special interest. 66 photographic plates, the majority of which depict, natural size, a portion of the plant in question, are a helpful adjunct.

We note that Mr. Standley, hitherto Associate Curator of the U.S. National Herbarium, has removed to the Department of Botany, Field Museum of Natural History, Chicago.

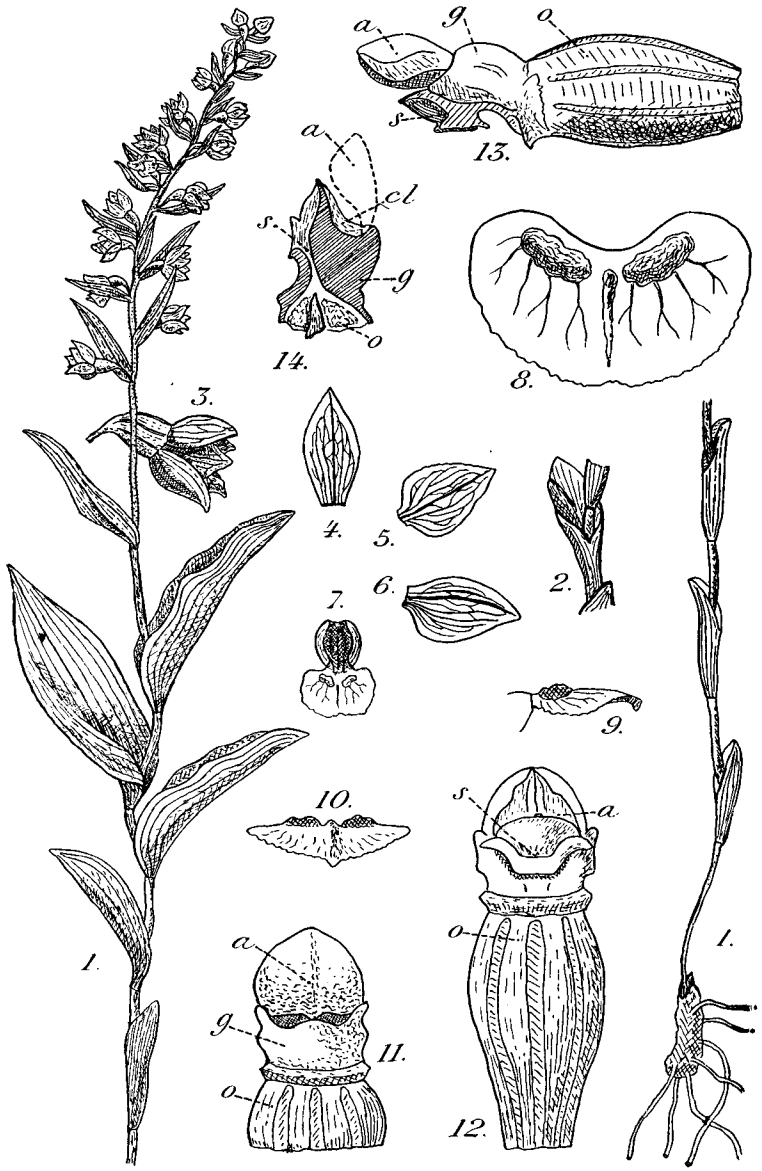
Great Barrier Reef Expedition.—Mr. Geoffrey Tandy, of the Department of Botany, British Museum, has, by permission of the Trustees of the Museum, joined this Expedition, which left on May 20 to study the life and habits of the organisms responsible for building the great coral-reef. Mr. Tandy is botanist to the Expedition, which is in charge of Dr. Yonge and is acting under the auspices of the British Association. The party proposes to spend a year on Low Islands, 20 to 30 miles from Cairns, North Queensland.

Danish Oceanographical Expedition.—The Danish research ship 'Dana' has started on a two-years' round-the world oceanographical cruise. Dr. Johannes Schmidt is leader of the Expedition, the general direction of which is entrusted to a committee under the patronage of Prince Valdemar, with Prof. C. H. Ostenfeld as president. The 'Dana' has been equipped by the Danish Government, and the expenses of the Expedition will be borne by the Carlsberg Fund. We understand that every branch of oceanography is provided for, both in personnel of the staff and technical equipment. Certain areas have been selected for intensive examination—namely, the Straits of Gibraltar, the Eastern Mediterranean, the Straits of Bab-el-Mandeb, and the New Caledonian area.

Dr. Joseph Nelson Rose.—We note with regret the announcement (*Smithsonian Local Notes*, May 18, 1928) of the death of Dr. J. N. Rose at Washington on May 4. Dr. Rose, who was born in 1862, was for forty years associated with the National Herbarium at Washington, in the upbuilding of which he worked untiringly. He published numerous botanical papers, and was a recognized authority on certain difficult families of plants. His best-known work, published by the Carnegie Institution, is the imposing *Monograph of the Cactaceæ*, in which he collaborated with Dr. N. L. Britton. In the preparation of this work Dr. Rose travelled extensively in the Western United States, Mexico, and South America.

Mr. W. J. Dowson, Mycologist at the Royal Horticultural Society's Gardens, Wisley, since 1920, and formerly Government Botanist, Agricultural Department, Nairobi, has been appointed Mycologist to the Government of Tasmania.

The Editor gratefully acknowledges his election as a Foreign Honorary Member of the American Academy of Arts and Sciences, Boston, U.S.A.



EPIPACTIS DUNENSIS GODFERY.

EPIPACTIS DUNENSIS GODF. ON THE FRENCH COAST.

BY R. MESLIN.

(PLATE 586.)

ON August 11th, 1926, at Coutainville, Manche, we discovered an interesting *Epipactis* growing in the sand under maritime pines (*Pinus Pinaster*) near "la Mare delaissée," a long pond parallel with the shore, lying behind a cordon of dunes. There were about a dozen plants, the greater part of the flowers being already over. We identified the plant as *Epipactis dunensis*, recently described by Colonel Godfery (Journ. Bot. 1926, 65), of which we here give a detailed description and plate made from our specimens.

Rhizome short with few root-fibres, buried very deep in the sand. *Stem* slender, 25–30 cm., pubescent above, with 2–3 short, loose, funnel-shaped sheaths at the base. *Leaves* 5–6 rigid, often folded, arched, distichous, the lower oval, the upper oblong-lanceolate, narrow; dimensions 4–5 cm. long by 2–2·5 cm. broad, nodes rather distant, nerves rough with little asperities. *Inflorescence* rather dense, with horizontal or slightly nodding yellowish-green flowers; bracts foliaceous, lanceolate, sometimes obtuse but more often acuminate, the lower exceeding the flowers. *Ovary* shortly-stalked, obovoid, glabrescent. *Sepals* about equal to ovary, oval-acuminate, obtuse, keeled, hooded. *Petals* similar, but more acute. *Labellum* spreading, a little shorter than the sepals; hypochile entire, oblong, very concave, nectariferous; epichile cordate, acuminate, broader than long, ending in a short recurved point, with two scarcely wrinkled callosities separated by a small median crest which is sometimes absent. *Column* short erect, anther terminal free obtuse. *Stigma* surrounded by a thick fold. *Rostellum* caducous, disappearing in the expanded flower. *Pollinia* very friable and pulverulent; pollen-grains united in tetrads, with finely reticulate exine.

Apart from the morphological characters mentioned above, *Epipactis dunensis* presents a most remarkable biological peculiarity. Unlike *E. latifolia* All. and *E. viridiflora* Rchb.*, in which pollination is indirect, and effected by the agency of insects, in *E. dunensis* the pollen-grains, grouped in tetrads, spread themselves over the tumescent clinandrum and the edge of the stigma, so that pollination appears to be direct.

E. dunensis has only so far been recorded from the coastal dunes of Lancashire and Anglesey, where it grows amongst *Salix repens* L.; it is new for France, where it appears to have been confused with *E. viridiflora* Rchb. and *E. atrorubens* Schult.

Epipactis viridiflora Rchb. has been indicated by Besnou at Périers; M. Corbière (Nouv. Fl. de Norm. 1893, 551) mentions

* In an article (Bull. Soc. Roy. Bot. Belg. lix. 69, 1926) on self-pollination in various orchids, P. Martens considers that *E. viridiflora* is uniformly autogamous, but the observations of H. Müller (on which he relies) referred in reality to a plant (*E. Muelleri* Godf.) very different from the *E. viridiflora* of Reichenbach, as Godfery has already shown (Journ. Bot. 1921, 101).

under this name a gathering made by him in the dunes between Denneville and Surville; a single specimen appears to have been found by Méquet in the "mielles" (fixed maritime sands behind a chain of dunes, sometimes partly cultivated) of Agon, near a little pond surrounded by willows; finally, M. Potier de la Varde records it for the maritime sands of Jullouville. All these identifications need to be revised, especially since the description given in the *Nouvelle Flore de Normandie* of *E. viridiflora* does not seem to us to fit Reichenbach's plant, which is only a simple and not very distinct form of *E. latifolia*.

The above is a translation of a paper by M. R. Meslin, of Caen, in the *Bulletin de la Société d'Agriculture, d'Archéologie et d'Histoire naturelle du département de la Manche*, xxxix. 210 (1927), to the courtesy of which Society we are indebted for permission to reproduce the Plate.

The full and clear description and Plate leave no doubt as to the identity of the French plant with the British one. It is an interesting extension of the range of the latter, which may now be considered as an Atlantic plant, whose range southward will probably be extended by further research.

The only differences appear to be that the French plant is 25–30 cm. tall as against 20–40 cm. in the British one; that its spike is slightly denser, that the sepals are about equal to the ovary instead of being shorter, and that the lip-bosses are "scarcely wrinkled" instead of being smooth. They have a small median crest between them, but this also occurred in some Lancashire specimens.

M. J. Godfery.

Explanation of Plate 586.

Epipactis dunensis Godfery. 1. Entire plant. 2. Sheath from the lower part of the stem of another example. 3. Single flower. 4. Upper sepal. 5. Petal. 6. Side sepal. 7. Labellum. 8–10. Different views of the epichile. 11–13. Front, back, and side views of column. 14. Longitudinal section of column.

a. Anther. *o.* Ovary. *cl.* Clinandrium. *g.* Column. *s.* Stigma.

1. Reduced to ½. 2–3. Life-size. 4–7. ×2. 9–10. ×4. 8 and 11–14. ×8.

THE CANARIAN *SEMPERVIVUM*-FLORA: ITS DISTRIBUTION AND ORIGIN.

By R. Lloyd Praeger, D.Sc.

The *Semperviva* are an attractive if difficult group, and they have received attention from a large number of botanists; the most obvious result of which has been that the list of species has become much distended. Phylogenetically, geographically, and horticulturally the *Sempervivа* (sensu lato) are readily divisible into two groups—a

northern or hardy section, embracing *Eusempervivum* and *Jovibarba* or *Diopogon*, spread along the mountains of southern Europe from the Pyrenees to the Caucasus, and *Sempervivella*, which belongs to the Himalayas; and a southern or tender section, including the genera *Aichryson*, *Æonium*, and *Greenovia* of Webb and Berthelot and also *Monanthes*, all concentrated in an extraordinary manner upon the small island-group of the Canaries, with a few outlying species upon other Atlantic islands and the African mainland. Of the European section some 200 species have been described, which under scrutiny are reduced to about 25, while the African section, of which about 100 species have been described, actually number about 60. It is the Canarian portion of the African, or rather Atlantic, *Sempervivum*-flora which I wish to discuss in the present communication.

The Canary group consists of seven islands and a few islets or rocks, strung out in a more or less east-and-west line, save that the two most western islands (Hierro and Palma) lie almost abreast (see map, p. 225). They vary in size from 919 sq. m. (Tenerife) to 122 sq. m. (Hierro), and the channels which separate them vary from 9 to 62 miles in width. The most easterly island (Lanzarote) is distant 60 miles from the African mainland. Most of the islands are steep and high (4000–12,000 ft.), and the flattest of them have hills of 2000 ft. or more.

Since the foundations of a detailed Canarian *Sempervivum*-List were laid by Webb and Berthelot*, which list was almost doubled in numbers by Bolle† in 1859, further species-names have been added to the flora of the islands by Lowe, Hillebrand, Webb, Kuntze, R. P. Murray, Bornmüller, and Burchard, the majority of which can rank only as synonyms or varieties. Three months which I spent on the seven islands in 1924 added six further species—five of my own finding and one of Dr. Burchard's. The fact that a more detailed examination of Tenerife, Grand Canary, Gomera, and Palma extending over four months of 1927 yielded only one additional species—and a very remarkable array of hybrids—may be taken, I think, as indicating that the list of species, as well as the details of their range, are now sufficiently complete to permit of a review of the group and its distribution.

The revised list of species given below, 53 in all, is considerably smaller in number than, and also different in composition from, that accredited to the Canaries in some recent works‡, or which may be obtained by adding up the species placed on record by previous workers. The Canaries have not been fortunate as regards some recent writings on the subject of their flora—so far at least as the *Semperviva* go, which is all that concerns us at present. The standard of careful observation and accurate record set by Webb and Berthelot has been well main-

* *Phytologia Canariensis* (1836–40).

† *Bonplandia*, vii.

‡ Pitard and Proust (1908) enumerate 61 species, to which Lindinger (1926) would add 8 more, exclusive of 6 published by me in 1925.

tained by Christ*, Bolle†, Murray‡, Bornmüller§, Schenck‖, Börgesen¶. On the other hand, Kuntze** writes very rashly concerning a group which he evidently did not know in the field. Pitard and Proust's Flora†† contains many errors, both of commission and omission, as regards both the species themselves and their range (they admit frankly that the group was unfamiliar to them). Lindinger's list‡‡ is inaccurate in many respects—it is quite uncritical and must be used with caution; some of his errors are copied from Knoche §§, whose work leaves much to be desired. None of these had studied the *Semperviva*, which is a distinctly difficult group; but care and caution on the part of these writers would have obviated many errors. The majority of the plants recorded as Canarian, which are not admitted to the list which follows (apart from well-known synonyms), are dealt with, to the number of 26, and their identity discussed, in a recent paper ‖‖.

At present I place the Canarian *Sempervivum*-flora (*Aichryson* W. & B., *Æonium* W. & B., *Greenovia* W. & B., *Monanthes* Haworth) at 53 species; or if one prefers to subordinate *Æ. mauri-queorum* to *Æ. holochrysum* and to group the *Æ. canariense* complex under a single polymorphic species, at 49 species and 4 subspecies. Out of this total four plants, which from their descriptions would seem to be good species, eluded my search during my two visits to the islands, namely:—*Aichryson Bollei* Webb, *A. parviflorum* Bolle, *Monanthes minima* (Bolle) Praeger, and *M. purpurascens* (Bolle & Webb) Christ.

These four plants were all found by Bolle some 70 years ago, each in a single station, and none of them has been collected by any subsequent botanist. With the exception of these, I have had in cultivation for at least several years all the species in the subsequent list, as well as many hybrids and doubtful plants, and have thus had ample opportunity for determining them and considering their specific value.

I now enumerate the Canarian *Sempervivum*-flora as it would appear to stand at present, with its distribution on the seven islands of the group (arranged from west to east) shown by initial letters (H = Hierro, P = Palma, G = Gomera, T = Tenerife, C = Grand Canary, F = Fuerteventura, L = Lanzarote). *Aichryson*, *Æonium*, *Greenovia*, and *Monanthes* are treated as genera, to which rank they appear to me to

* Engl. Bot. Jahrb. vi. 458 (1885), ix. 86 (1887).

† *Bonplandia*, vii. 238, 293 (1859); Bot. Jahrb. xiv. 230 (1891), xvi. 224 (1892), &c.

‡ Journ. Bot. 1899, 201, 395.

§ Bot. Jahrb. xxxiii. 387 (1903), &c.

‖ *Deutsche Tiefsee Expedition*, ii. 1 (1907).

¶ Danske Vidensk. Selsk. Skrift. viii. 6 (1924).

** *Revisio Generum Plantarum*, i. 229 (1891).

†† "Les Iles Canaries," *Flore de l'Archipel*, 1908.

‡‡ "Veg. & Flora der Kanar. Inseln," in Hamburg Univ. Abh. aus dem Gebiet der Auslundskunde C. viii. (1926).

§§ *Vagandi Mos*, I. "Die Canarische Inseln," 1923.

‖‖ Praeger, "On some doubtful Species of the African Section of the *Sempervivum* Group," Proc. Roy. Irish Acad. xxviii. B. (1928).

be entitled. A few changes in the usual nomenclature have been made, which are necessary under the International Rules; the more familiar names in these cases are given in parentheses:—

	H	P	G	T	C	—	—
Aichryson dichotomum (DC.) W. & B.	—	—	—	—	—	F	—
Bethencourtianum Bolle	—	P	—	—	—	—	—
Bollei Webb	—	P	—	—	—	—	—
brevipetalum Praeger*	—	P	—	—	—	—	—
palmense Webb	—	P	—	—	—	—	—
parviflorum Bolle	—	—	—	T	C	—	—
porphyrogennetos Bolle	H	P	G	T	C	F	—
punctatum (C. Sm.) W. & B.						F	L
tortuosum (Aiton) Praeger (*Semperv. pygmæum* C. Sm.)	—	—	—	—	—	—	—
Æonium (Sect. Canariensia).				T	—	—	—
canariense (L.) W. & B.	—	—	—	T	—	—	—
cuneatum W. & B.	—	—	—	—	—	—	—
palmense Webb	H	P	—	—	—	—	—
subplanum Praeger†	—	—	G	—	—	—	—
tabulæforme (Haw.) W. & B.	—	—	—	T	—	—	—
virgineum W. & B.	—	—	—	—	C	—	—
(Sect. Nobilia.)							
nobile Praeger	—	P	—	—	—	—	—

* **Aichryson brevipetalum** Praeger, sp. nov.—*Herba* annua, pusilla, 5–8 (–12) cm. alt., pubescens. *Caulis* erectus, simplex, foliosus, gracilis, purpureus, ex basi pubescens. *Folia* carnosa, pubescentia; lamina rhomboidea vel rhomboideo-spathulata 1–1·5 cm. long., 6–7 mm. lat., apice et versus apicem crenulis purpureis 1–5 erosis; petiolo lineari c. 1 cm. long. *Inflorescentia* terminalis, ramis 2–3 simplicibus ebracteatis vel sparse bracteatis divaricatis 6–12-floris demum 5–10 cm. long. *Pedicelli* 3–4 mm. long. *Flores* 6–7-partiti. *Calyx* pubescens, carnosissimus, 3·75–4 mm. long., segmentis erectis vel suberectis, lanceolatis, obtusis, 3 mm. long., apice purpureis. *Petala* plerumque erecta vel suberecta, 3·75 mm. long., late oblanceolata, flava, apice purpureo-apiculata, basi angustata, carina hirta. *Stamina* plerumque erecta, flava, epipetala 2·5 mm., episepala 3·5 mm. long., filamentis filiformibus, antheris late ovoideis. *Squamulæ* hypogynæ inconspicuæ, viridescenti-flavæ, ·5–·75 mm. long, cuneatæ, apice palmatæ 3–4-cornutæ. *Carpella* gracilia, viridescenti-flava, 4 mm. long.; stylis ovariis æquilongis.

Hab. Insula La Palma, in rupestribus prope rivulam Barranco del Rio supra Santa Cruz. Descriptio ex plantis in hort. bot. Glasnevin, ex seminibus ortis in Barranco del Rio lectis Maio 1927.

A. subvilloso (*A. punctato* var. *subvilloso* Pitard & Proust) affinis, sed caule simplici (nec ex foliorum axillis ramoso), inflorescentia terminali (ramis simplicibus 2–3 ebracteatis vel sparse bracteatis), floribus parvis, calice, corolla, staminibusque plerumque erectis vel suberectis (nec semper expansis), petalis 3·75 mm. (nec 5·5 mm.) longis, etc., differt.

† **Æonium subplanum** Praeger, sp. nov. (*Æ. canariense* quoad plantam gomerensem.)—*Æ. canariensi*, *Æ. virgineo*, *Æ. palmensi* affinis, sed *caulis* raro ramosus (nec sæpe vel plerumque ramosus), *rosula* subplana foliis junioribus plerumque patentibus imbricatisque (nec plerumque erectis vel suberectis), *foliis* in parte inferiore angustioribus et linearibus, parte superiore latioribus et transverse ellipticis, satis differt. (My notes on the flower of this plant were unfortunately lost in a squall on a cliff on Palma; plants brought home in 1924 have not yet bloomed, and on my second visit to Gomera in 1927 the plant was not yet in flower. But the inflorescence and flower offered sufficiently distinguishing characters to justify the evidence of the very distinct rosette and leaf that the plant deserves a separate name.)

(Sect. Holochrysa.)							
balsamiferum W. & B.	—	—	—	—	—	—	L
holochrysum W. & B.	H	P	G	T	—	—	
mauriqueorum Bolle	—	—	—	—	C	—	
undulatum W. & B.	—	—	—	—	C	—	
(Sect. Urbica.)							
Burchardii Praeger	—	—	—	T	—	—	
Castello-Paivæ Bolle	—	—	G	—	—	—	
ciliatum (Willd.) W. & B.	—	P	—	T	—	—	
decorum Webb	—	—	G	—	—	—	
gomerense Praeger	—	—	G	—	—	—	
Haworthii W. & B.	—	—	—	T	—	—	
hierrense (Murray) Pitard & Proust	H	—	—	—	—	—	—
lancerottense Praeger	—	—	—	—	—	—	L
percaneum (Murray) Pitard & Proust	—	—	—	—	C	—	—
urbicum (C. Sm.) W. & B.	—	—	—	T	—	—	—
valverdense Praeger	H	—	—	—	—	—	—
(Sect. Goochia.)							
cæspitosum (C. Sm.) W. & B.	—	—	—	—	C	—	—
Goochiæ W. & B.	—	P	—	—	—	—	—
Lindleyi W. & B.	—	—	—	T	—	—	—
Saundersii Bolle	—	—	G	—	—	—	—
sedifolium (Webb) Pitard & Proust	—	P	—	T	—	—	—
Smithii (Sims) W. & B.	—	—	—	T	—	—	—
spathulatum (Hornem.) Praeger *	H	P	—	T	C	—	—
viscatum Webb	—	—	G	—	—	—	—
Greenovia Aizoon Bolle	—	—	—	T	—	—	—
aurea (C. Sm.) W. & B.	H	—	—	T	C	—	—
diplocycla Webb	—	P	G	—	—	—	—
dodrantalis (Willd.) Webb (*G. gracilis* Bolle)	—	—	—	T	—	—	—
Monanthes anagensis Praeger	—	—	—	T	—	—	—
brachycaulon (W. & B.) Lowe †	—	—	—	T	C	—	—
icterica (Webb) Praeger	—	—	G	T	—	—	—
laxiflora (DC.) Bolle (*M. agriostaphis* Christ)	—	—	G	T	C	F	L
minima (Bolle) Praeger	—	—	—	T	—	—	—
muralis (Webb) Christ	H	P	—	—	—	—	—
pallens (Webb) Christ	H	—	G	T	—	—	—
polyphylla Haw.	—	P	G	T	—	—	—
purpurascens (Bolle & Webb) Christ	—	—	—	—	C	—	—
subcrassicaulis Praeger (*Semperv. Monanthes β subcrassicaulis* Kuntze)	—	P	G	T	—	—	—

This table brings out well the remarkable degree of endemism within each island which characterizes the Canarian *Semperviva*, and which is, indeed, so striking a feature of the whole fauna and flora of that area ‡. Still more striking is the degree of endemism of the

* *Æ. strepsicladum* W. & B. and *Æ. cruentum* W. & B.

† Also on Salvage Islands between the Canaries and Madeira.

‡ The ratio of *Sempervivum* species endemic in each island to the total *Sempervivum*-flora of each is as follows:—H 22, P 33, G 40, T 46, C 46, F 25, L 25.

group with relation to the Macaronesian floral region to which the Canaries belong, for not one of the 53 Canarian species is found outside the Canary Islands, unless we consider the occurrence of *Monanthes brachycaulon* on the Salvage Islands between the Canaries and Madeira to constitute such a case. Almost all of the few extra-Canarian species of the southern *Sempervivum* group display an equally rigid endemism. As regards the range of the genera, *Aichryson* (containing 9 species) is wholly endemic in the Canaries save for one species (*villosum*) confined to Madeira and the Azores and two others (*divaricatum* and *dumosum*) confined to Madeira *. *Aeonium* (30 species) is endemic in the Canaries save for *Æ. arboreum* in Morocco, *glandulosum* and *glutinosum* in Madeira, *gorgoneum* and *Webbii* in the Cape Verde Islands, and *leucoblepharum* in Abyssinia. *Greenovia* (4 species) is wholly endemic in the Canaries; *Monanthes* (10 species) likewise †, save for the case of *M. brachycaulon* mentioned above. The remarkable restriction of range within the Canaries themselves of the species of *Sempervivum* appears from the following table, which shows on how many of the seven islands the various species occur:—

Number of Islands.	Number of Species.	Per cent.
One	35	66
Two	9	17
Three	4	8
Four	2	4
Five	2	4
Six	1	2
Seven	—	—
	53	101

This table may be compared with the following, compiled by Duppy ‡, showing the corresponding figures for all the endemic species (Phanerogams and Vascular Cryptogams) within the Canaries:—

Number of Islands.	Number of Species.	Per cent.
One	248	62
Two	73	18
Three	35	9
Four	28	7
Five	8	2
Six or more	8	2
	400	100

The percentages in the two tables are seen to approximate closely. In considering them, it should be borne in mind that the widest stretch of sea separating any of the seven islands from its nearest neighbour is only 62 miles (100 km.) across (Grand Canary–Fuerte-

* I omit the Nubian *Sempervivum molle* Visiani, at present a doubtful and obscure plant.

† The Moroccan *M. atlantica* Ball is now placed in *Sedum*.

‡ *Annals of Botany*, xxxv. 514 (1921).

ventura), the narrowest channel (Fuerteventura–Lanzarote) being only a little over 9 miles (15 km.) wide.

While as regards endemism *within* the Canaries the *Sempervivum* are thus seen to conform to the whole flora, as regards endemism *outside* they are much more extreme. Taking only the plants which are endemic within the floral region: out of a total Canarian fauna of about 1350 species (Pitard & Proust, p. 69) about 50 species, or 3·7 per cent. (Guppy, *l. c.*), are Macaronesian endemics found also upon the Azores, Madeiras, or Cape Verdes; a much greater number of Canarian plants have a wider range; while, on the other hand, the Canarian *Semperviva* yield not a single instance of a species occurring even on one of the other island-groups mentioned. They are one of the most rigidly endemic groups in the world.

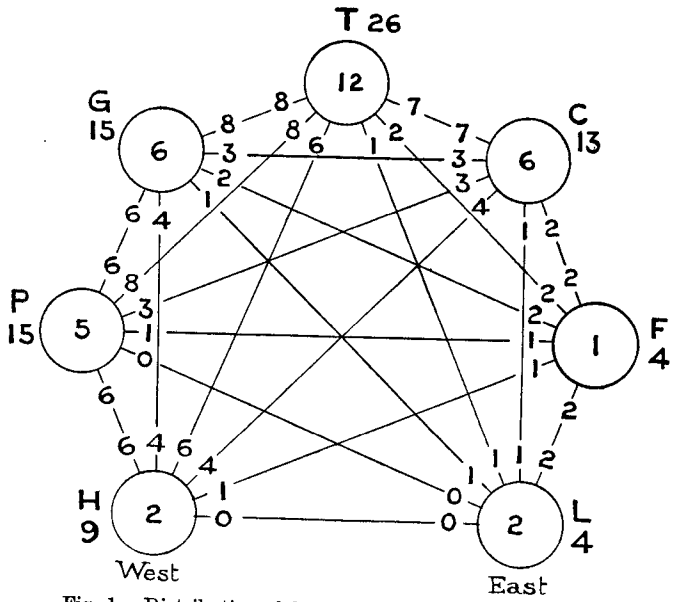


Fig. 1.—Distribution of *Semperviva* on the Canary Islands.

As regards degrees of endemism within the several genera, it will be seen from the table on pp. 221–2 that, apart from the outstanding fact of the remarkable prevalence of endemism, few generalizations can be made. *Aichryson* contains the most widespread species of all the Canarian *Semperviva*—*A. punctatum* in its various forms (especially if, as some botanists have suggested, the Madeiran-Azorean *villosum* should be combined with it); it also contains several of the most restricted. *Æonium*, the largest genus, shows a very large percentage of endemic species, many of them of highly characteristic and distinct appearance. *Greenovia* is more irregular in range, and *Monanthes* has the largest range within the islands of all. But although the whole Canarian archipelago occupies an area of scarcely

smaller than the area of Ireland, and although no water-barrier wider than 62 miles exists between adjacent islands (the average being about half that amount), no species has succeeded in colonizing all seven islands of the group. *A. punctatum* occurs on the six lying to the west, *A. dichotomum* on the five western, *M. laxiflora* on the five eastern, *Æ. holochrysum* on the four western, *Æ. spathulatum* on the four western, skipping Gomera; all the rest on three or less, 35 of them on only one.

A statistical view of the distribution of the species upon the Canary Islands may be obtained from a study of the diagram on p. 224. In this, the seven circles represent the islands (not according to relative size, nor to relative position save that their west-to-east sequence is preserved in the clock-wise arrangement). The numerals under the initial letter which identifies each island show the total *Sempervivum*-flora of each. The numerals inside each circle indicate

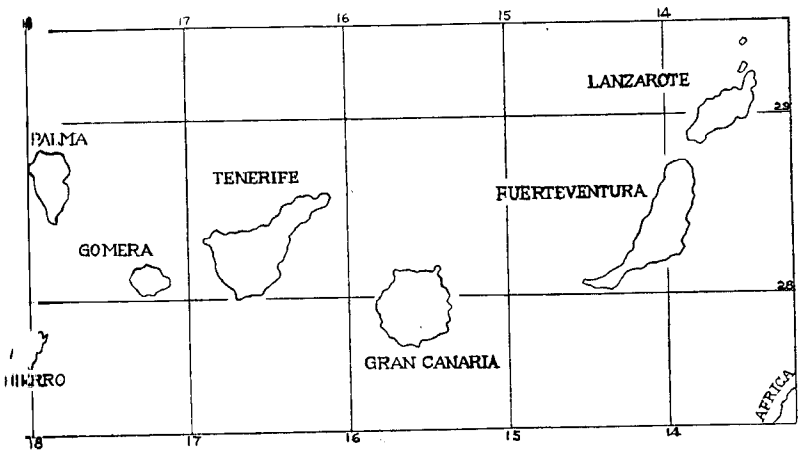


Fig. 2.—Sketch-map of the Canary Islands.

the number of species endemic to each; while the numerals on the radiating lines show the number of species which each island shares with each of the others. Thus, Lanzarote, with a flora of four species, has two endemics; it has no species in common with Hierro or Palma, but has one species in common with Gomera, one (not necessarily a different one) in common with Tenerife, and so on. A study of this diagram will reveal many suggestive facts relative to the Canarian *Sempervivum*-flora. The actual shape and relative position of the islands is shown on the above sketch-map.

As regards vertical distribution, the *Sempervivum* group on the Canaries is usually at a maximum between 2000 and 3000 feet (say, 600 and 900 metres). Lower than that, the summer is too dry; higher than that, exposure and low winter temperature begin to tell. A few species (e. g., *Æ. Lindleyi*, *Æ. tabulæforme*) are usually lowland (say 500–1000 ft., 150–300 metres); a few others (e. g.,

Æ. cæspitosum, *Æ. Smithii*, *Æ. spathulatum*, and the species of *Greenovia*) are usually what in Europe would be alpine (3000–6000 ft., 900–1800 metres). All the islands except Fuerteventura and Lanzarote have plenty of rough ground of optimum elevation, on which the *Sempervivum*-flora often forms a very striking and sometimes a dominating feature. Even the two low islands named have hill-ranges rising to 2500 and 2000 ft. respectively, on which the limited *Sempervivum*-flora is concentrated.

From the point of view of the relative richness in species of each island of the group, the facts may be summarized from the list on pp. 221–2 as follows, the initial letters in the top line standing for the names of the islands from west to east:—

	H.	P.	G.	T.	C.	F.	L.
Aichryson (9 species)	2	6	2	3	3	3	1
Æonium sect. *Canariensia* (6 species)	1	1	1	3	1	—	
„ „ *Nobilia* (1 species)	—	1	—	—	—	—	
„ „ *Holochrysa* (4 species)	1	1	1	1	2	—	
„ „ *Urbica* (11 species)	2	1	3	4	1	—	1
„ „ *Goochia* (8 species)	—	2	2	4	2	—	
Æonium total (30 species)	5	7	7	12	6	—	2
Greenovia (4 species)	1	1	1	3	1	—	
Monanthes (10 species)	2	3	5	8	3	1	1
	10	17	15	26	13	4	4

These figures have little meaning unless accompanied by an elaborate statement regarding the area, elevation, nature of surface, rainfall, &c., of each island—matters beyond the scope of the present paper. It is clear that Tenerife, the largest, highest, and most varied island, leads by about 100 per cent. in *Æonium*, *Greenovia*, and *Monanthes*. But that number of species is by no means dependent on area alone appears below, where the relative areas and floras are compared on a scale of 1 to 10—1 representing the area of the smallest island (Hierro, 122 sq. m., 312 sq. km.) and 10 that of the largest island (Tenerife, 919 sq. m., 2352 sq. km.); while in the lower line 1 represents the minimum island-flora (Fuerteventura and Lanzarote, 4 species each) and 10 the maximum island-flora (Tenerife, 26 species). The islands are arranged according to area. The figures are approximate.

	T.	F.	C.	L.	P.	G.	H.
Area*	10	8·5	6·5	4	3	1·5	1
Flora	10	1	4·5	1	6	5·5	3·5

On taking the ratio of flora to area on each island, and assuming this ratio to be 1 : 1 on the poorest island (Fuerteventura, 4 species on 788 sq. m.), and re-arranging the islands from west to east, we get

* The actual areas of the islands in square miles are as follows:—Tenerife 919, Fuerteventura 788, Grand Canary 634, Lanzarote 380, Palma 318, Gomera 172, Hierro 122. Or in square kilometres, 2352, 2019, 1623, 973, 814, 440, 312 respectively.

the following expression for the relative richness in species of the flora per unit of area on each of the islands:—

H.	P.	G.	T.	C.	F.	L.
14·5	10·5	18·0	5·6	4·0	1·0	2·0

The diminution in the flora-to-area ratio as we pass from the more Atlantic conditions of the west to the more continental (in this case desert) conditions of the easterly islands is very striking. It will be seen that Gomera and Hierro, the two smallest islands, have much the richest flora in proportion to their area, and Palma is also before Tenerife in this respect, while Grand Canary, more to the eastward, is below Tenerife in the scale. Fuerteventura and Lanzarote are much the lowest. This arises from their eastern position and relatively low elevation, resulting in both diminished rainfall and small area of precipitous ground. The exceptional elevation of Tenerife (Pico de Teyde, 12,192 ft.) does not directly increase the *Sempervivum*-flora, since above about 7000 ft. the climate is too inhospitable for their growth.

If we assume that each of the Canarian *Semperviva* originated on one of the seven islands, and that each inter-insular migration which ensued was directed to the island next adjoining on east or west, we find that only 36 such migrations appear to have taken place out of a possible 318.

In view of the minuteness and lightness of the seeds of *Sempervivum*, the narrowness (9 to 62 miles) of the channels which separate the islands, and the large amount of suitable ground present on all the islands except the two most easterly, so small a degree of inter-insular migration does not appear to indicate a great antiquity for the present species. Such apparent paucity of transmarine colonization suggests (1) that the water-barriers between the islands offer more serious obstacles than might be thought; (2) that many species have become extinct on islands which they formerly inhabited; or (3) that the present limited range of species is due to incipient rather than relict endemism; but no one of these suggestions will meet all the facts of the case.

If we take those groups of species which are most nearly akin, and which might therefore be assumed to be of the most recent origin, we find that their members are frequently widely dispersed. To instance the *canariense* group: *Æ. canariense*, confined to Tenerife, has a close ally, *Æ. virgineum*, on Grand Canary; another, *Æ. subplanum*, on Gomera; with a third, *Æ. palmense*, on Palma and Hierro. A case such as this would seem to point to the wide dispersal of a prototype, followed by segregation consequent on isolation. On the other hand, *A. Bethencourtianum* of Fuerteventura comes much closest to *A. tortuosum* of Fuerteventura and Lanzarote, and *Æ. hierrense* of Hierro stands next to *Æ. valverdense* of the same island, pointing to divergence *on* Fuerteventura and Hierro respectively from a common local ancestor in each case.

The suggestion that these Canarian endemics are the relics of a

former African or Atlantic flora does not appear to fit either botanical or geological facts, and it receives very little support from modern plant-geographers. Neither has the theory of a former wider distribution of the species among the islands and subsequent extinction got anything at present to support it. Had this taken place, we should expect to find a certain amount of discontinuous distribution, due to relict species, whereas discontinuous distribution of species among the islands is remarkably rare. Those species which occur on more than one island have almost invariably their homes on consecutive islands, measured along the east-and-west disposition of the island-group. Exceptions are furnished to some extent by *Æ. ciliatum* and *Æ. sedifolium*, present on Palma and Tenerife, but absent from Gomera; *Æ. spathulatum*, present on Grand Canary and Tenerife, and (as var. *cruentum*) on Palma and Hierro, but absent from Gomera; *Greenovia aurea*, present on Grand Canary, Tenerife, and Hierro, omitting Palma and Gomera; and *Monanthes pallens*, present on Tenerife, Gomera, and Hierro, absent from Palma. But a glance at the map will show that none of these furnishes a direct exception, as in no case does the island which is missed lie of necessity in the line of migration. The facts of the case undoubtedly point to incipient rather than relict endemism, and the evidence in favour of this view supplied by the prevalence of uni-insular species is strengthened by the markedly continuous range of the multi-insular plants.

The problem of Canarian endemism has been discussed by many writers, in recent years notably by Schimper* and Guppy—the latter in a very useful paper in which both former and recent views will be found summarized†. It seems clear that the Canarian *Sempervivæ* (as well as the other local endemics) originated on approximately their present territory by the break-up of formerly existing polymorphic species. The occurrence of one of the *Holochrysa* section (*Æ. leucoblepharum*) as far away as Abyssinia, shows that in some cases this break-up may not have been recent; but the case of *leucoblepharum* is an isolated one, the next most distant stations for any of the group being the Azores and Cape Verde Islands, well within the Macaronesian floral region, to which the Canaries belong. These cases would indicate a Macaronesian origin (using that term to denote a greater antiquity as well as a wider geographical or floristic entity) for *Aichryson* (Canaries, Madeira, C. Verde, ? Nubia) and in particular for *Æonium* sect. *Canariensia* (Canaries and Madeira) and sect. *Holochrysa* (Canaries, C. Verde, Morocco, Abyssinia), and a more recent origin for *Æonium* sect. *Urbica* and sect. *Goochia*, *Greenovia*, and *Monanthes*, which would appear to have evolved within the Canaries themselves, and not yet to have got beyond them.

If it be that the endemics of each of the Canarian islands were actually evolved within its boundaries, as would seem to have been certainly the case, it is very interesting to consider that under such uniform conditions as prevail on these small patches of lava, each no

* In Schenck, *l. c.* † *L. c.*

larger on the average than half an English county, a so wide divergence from type can have occurred, and within a period comparatively short. It would suggest that variety in external factors may be of little account as an incentive to rapid morphological change. And yet to what but the influence of local conditions are we to attribute the intensive species-production of the Canaries, not only in the *Sempervivum* group, but throughout the whole flora?

If we add to the genera *Aichryson*, *Greenovia*, and *Monanthes* the four sections of the polymorphic genus *Æonium* (*Canariensia*, *Holochrysa*, *Urbica*, *Goochia*), and assume that each of these genera or groups is descended from an ancestral form or forms, we shall find that some of the offspring of these ancestral forms have (with the exception of *Goochia*, absent from Hierro) spread to all the islands of the group except Fuerteventura and Lanzarote, where the whole flora is very limited. (On those semi-desert islands, *Aichryson* and *Monanthes* alone occur on both, while the *Holochrysa* and *Urbica* have each one representative on Lanzarote.) And, furthermore, the representation on each of the islands of each of the seven groups mentioned bears a close proportion to the representation on each of the whole *Sempervivum* group. We are thus confronted by a significant contrast—the wide penetration of the islands by *Aichryson*, *Greenovia*, *Monanthes*, and the sections of *Æonium*, or their forerunners, and at the same time the strict endemism on the several islands of the majority of the species composing each of these groups at present. The suggestion is obvious that a period of evolutionary quiescence allowed the ancestors of the present groups of species to attain a wide dispersal over the islands; and that that was followed by a rapid break-up of these protypes, producing a crowd of strictly endemic plants with close inter-relationship in each group as between the different islands; and that these derived species have not yet succeeded, save to a quite limited extent, in spreading beyond their islands of origin. Some, like the *canariense* aggregate, have spread and subsequently segregated; others, like *holochrysum* and the polymorphic *punctatum*, have undergone little or no change subsequent to considerable inter-insular migration.

NOVITATES AFRICANÆ.

(Continued from p. 200.)

Hereroa teretifolia L. Bolus. *Caulis* basi 1 cm. diam.; ramuli 10-foliati, internodiis superioribus exsertis, ad 1·5 cm. longis. *Folia* patenti-incurvata, medio fere exacte teretia, superne leviter attenuata, obtusa, viridia, ad 5 cm. longa, 8 mm. diam. *Flores* vespertini, leviter odorati, 3·5 cm. diam.; pedunculus folia suprema haud excedens. *Sepala* 5, subæquilonga ad 1·1 cm. longa. *Petala* numerosa, 3–4-seriata linearia acuta, ad 1·5 cm. longa, 0·5–0·75 mm. lata, lutea, basin versus pallida, externe apicem versus rubicunda. *Stamina* sat pauca in genere, conico-colleeta, staminodiis numerosis setaceis, ad

8 mm. longis, circumdata; filamenta papillata superne pallide lutea, 4–7 mm. longa; antheræ luteæ. *Glandulæ* inter se distantes, crenatæ. *Ovarium* supra leviter concavum, medium versus obtuse 5-lobatum. *Stigmata* gracilia setaceo-acuminata, 9 mm. longa. *Capsula* haud visa.

Hab. Cape Province: exact locality uncertain, but very probably Calvinia or Ceres Div., *E. B. Watermeyer* (National Botanic Gardens, No. 664/23).

Described from a living specimen flowering at Kirstenbosch, June 1924. In the paucity of stamens and presence of numerous staminodes this differs from all other species of *Hereroa* known to me. It remains, also, to be seen whether the fruit is typical of the genus.

Delosperma parviflorum L. Bolus (*Aizoaceæ–Mesembrieæ*). *Fruticulus* humilis subcæspitosus glaber, 6 cm. altus, copiose ramulosus; rami ad 3 mm. diam., internodiis 3–4 mm. longis, vel in ramulis dense 4–6-foliatis vix 1 mm. longis. *Folia* sæpius fere patentia, carina marginibusque obtusis, lateribus convexis, supra leviter convexa, lateraliter visa acuta, lutescente-viridia levissima, ad 1·2 cm. longa, ad 3 mm. lata diametroque, vagina 1·5 mm. longa. *Flores* sæpius solitarii diurni, sine sepalis ad 8 mm. diam., subsessiles vel pedunculis fructiferis ad 2 mm. longis; receptaculum globose turbinatum. *Sepala* 5 inæquilonga, 2 ad 6 mm., cetera ad 3 mm., longa. *Petala* densa, mox recurvata, inter se æquilonga vel pauca breviora, interiora addita, obtusa, integra, læte lutea vel aurea, ad 4 mm. longa, fere 1 mm. lata. *Staminodia* pallide lutea vel inferne alba, apicem versus patentia; filamenta alba; antheræ pallide luteæ. *Glandulæ* saturate virides, sat conspicuæ. *Ovarium* supra fere planum. *Stigmata* 5, anguste subulata, acuminata, 1 mm. longa. *Capsula* generis, 5 mm. diam.

Hab. Cape Province: Uitenhage Div., Despatch, *F. H. Holland* (National Botanic Gardens, No. 676/25).

Described from living plants flowering at Kirstenbosch during the summer. Differs from all the known yellow-flowered species in the small leaves and very small flowers and in being entirely glabrous.

Ruschia Dyeri L. Bolus (*Aizoaceæ–Mesembrieæ*). *Fruticulus* sat rigidus, compactus, apice subplana, glaber, 10 cm. altus, 10–16 cm. diam., caule basi ad 1·2 cm. diam. *Rami* patentes vel adscendentes, ad 9 mm. diam., ramuli erecti, apice sæpissime dense 6-foliati, internodiis inclusis vel in cultis breviter exsertis, demum, foliis delapsis, 1–4 mm. longis, cinereis, pergamentaceis, cicatricibus conspicuis annularibus itaque ramuli coralium simulantes, 3–4 mm. diam. *Folia* erecta vel fere erecta, carina sæpe obscura, supra plana, lateribus convexis, lateraliter visa obtusa vel truncata levia glauco-viridia, ad 1·5 cm. longa, sæpissime 3 mm. lata diametroque. *Flores* solitarii diurni, sessiles vel pedunculis ad 5 mm. longis, 1–1·5 cm. diam. *Receptaculum* turbinatum subcompressum, ad 4 mm. diam. *Sepala* 5, inæquilonga, 2 multo majora lateraliter compressa, 4 mm. longa, cetera plana membranaceo-marginata 2–3 mm. longa. *Petala* 2-seriata, fere æquilonga, inferne angustata, obtusa, lutea, 6–7 mm. longa, 1 mm. vel rarius 1·5 mm. lata. *Stamina* collecta, filamentis albis, ad 4 mm. longis, interioribus papillatis, antheris luteis. *Glandulæ* 5, conspicuæ, atro-virides. *Ovarium* supra valde concavum. *Stigmata* 5, gracilia, superne leviter angustata, apice subobtusa, 1 mm. longa. *Capsula* senecta tantum visa, valvis 5 membranaceo-alatis, carinis crassis, superne divergentibus, alis loculi fere parvum tuberculum attingentibus.

Hab. Cape Province: Albany Div., "15 miles from Grahamstown on the Kingwilliamstown Road, in Euphorbia karroid veld," Feb. 1928, *R. A. Dyer*, 1224.

Differs from typical *Ruschia* in having the nectary composed of separate glands and in the ovary concave above. Described from living specimens.

Ruschia Framesii L. Bolus. *Planta* erecta glabra compacta, supra fere plana, copiose ramulifera, ad 7 cm. alta. *Ramuli* sat graciles, inferne foliis siccis induratisque onusti, superne dense 4–10-foliati, internodiis in vaginis inclusis. *Folia* more sectionis "Uncinata" sed integra, 3–4 mm. longa, ad 3 mm. lata, 2 mm. diam., vagina vix 2 mm. longa, juniora subglobosa, carina marginibusque inconspicue pellucido-lineatis, lateribus convexis, lateraliter visa obtusa, levia, pallide viridia vel subincana. *Flores* solitarii sessiles diurni, ad 1·8 cm. diam., receptaculo turbinato. *Sepala* 5, subæquilonga obtusa, ad 3 mm. longa. *Petala* 2-seriata, interiora angustissima acuminata, rosea, obtusa, 7–8 mm. longa, 0·5 mm. lata vel minus. *Staminodia* staminibus conspicue longiora rosea, 4–5 mm. longa. *Stamina* collecta, filamentis roseis, basi dense papillatis, ad 2·5 mm. longis, antheris luteis. *Discus* annularis crenulatus. *Ovarium* supra subplanum, conspicue 5-lobatum, lobis fere globosis. *Stigmata* anguste subulata, 1·5 mm. longa. *Capsula* haud visa.

Hab. Cape Province: Jansenville Div., a few miles south of Jansenville, *P. Ross Frames* (National Botanic Gardens, No. 2501/27).

Described from living plants which flowered at Kirstenbosch, February 1928. Remarkable for the short entire leaves and the exceptionally long staminodes.

Ruschia triquetra L. Bolus (§ *Microphylla*). *Planta* erecta ad 15 cm. alta, caule basi 6 mm. diam. *Rami* sat rigidi, subflexuosi glabri, internodiis ad 1 cm. longis; ramuli hornotini ad 2·5 cm. longi, ad 10-foliati, internodiis ad 6 mm. longis, basi reliquis induratis onusti. *Folia* sæpe fere erecta, exacte triquetra, basi vix connata, carina leviter decurrente, marginibus carinaque minute papillato-ciliata, apiculo recurvato, sæpius 8 mm. longa, 2 mm. lata diametroque. *Flores* solitarii diurni, 1·7 cm. diam., pedunculo ad 5 mm. longo. *Sepala* 5, subæquilonga, ad 4 mm. longa. *Petala* 2-seriata obtusa, rosea, saturatiora vittataque, 6–7 mm. longo, 1 mm. lata. *Staminodia* staminibus parum longiora, superne recurvata purpurea, inferne pallida. *Stamina* conico-collecta, filamentis medio pappillatis, superne purpureis, ad 2·5 mm. longis, polline albido. *Discus*

annularis crenulatus. *Ovarium* supra convexum. *Stigmata* 5, subulata, saturate rubro-purpurea, 2 mm. longa, stamina attingentia.

Hab. Cape Province: Clanwilliam Div., near Clanwilliam, *Pauline Banks* (National Botanic Gardens, No. 1935/15).

Described from living specimens flowering at Kirstenbosch in June.

Ruschia inconspicua L. Bolus. *Fruticulus* erectus glaber, 15 cm. altus, 18 cm. diam., caule basi 5 mm. diam. *Rami* primarii patentes ad 3 mm. diam., ramulis erectis. *Folia* connata more sectionis "Uncinata," vagina 5–7 mm. longa, carinata, supra plana, lateribus leviter convexa, lateraliter visa rotundata vel subtruncata, seniora late patentia, levia glauca, punctis pallide viridibus, albis minutis intermixtis, notata, sine vagina 7–10 mm. longa, 4–6 mm. lata, 5 mm. diam. *Flores* inconspicua solitarii diurni, 1·2 cm. diam., subsessiles vel pedunculo ad 6 mm. longo, in vagina incluso, receptaculo globoso-turbinato. *Sepala* 5, subæquilonga vel unicum multo brevius, 5–7 mm. longa. *Petala* laxa pauca 1-seriata, obtusa vel subacuta, alba, 5 mm. longa, ·75 mm. lata. *Stamina* conico-collecta, staminodiis paucis circumdata, filamentis albis papillatis ad 4 mm. longis, antheris pallide luteis. *Discus* annularis crenulatus inconspicuus. *Ovarium* supra planum, profunde 5-lobatum, lobis distantibus obtusis. *Stigmata* 5, anguste subulata, longe acuminata, 4–5·5 mm. longa, demum stamina excedentia. *Capsula* expansa 1 cm. diam., valvis vix patentibus exalatis, carinis pallidis crassis, alis dimidium loculi tegentibus tuberculo inconspicuissimo.

Hab. Little Namaqualand: between Arris and Sendling's Drift, Oct. 1926, *Pillans*, 5749.

Described from living plants flowering in Mr. Pillans's garden, Feb.–March 1928.

Readily distinguished from other species in the section "Uncinata" by the inconspicuous flowers and the few petals.

Cynorchis glandulosa L. Bolus (*Orchidaceæ–Ophrydeæ–Habenarieæ*). *Herba* erecta gracilis, sæpius 20–30 cm. alta; tubera 3–4-fasciculata, cylindrica tomentosa, tomento arcte appresso, albida vel pallide brunnea, ad 3 mm. longa, 1 cm. diam. *Caulis* strictus, basi ad 3 mm. diam., velut foliis caulinis, bracteis, ovariis, sepalisque externe, parce pubescens setis glanduliferis, vaginis basalibus 2, ad 1–2 cm. longis. *Folium* productum unicum basale adscendens oblongo-ovale, inferne angustatum, prope basin amplectens vaginansque, setaceo-acuminatum, nervo medio subtus prominente, nervis primariis ca. 6–8, cum nervulis transversis supra magis prominentibus, 10–14 cm. longa 2·5–4·5 cm. lata; folia caulina reducta, sæpe 4, e basi ovato, vaginante vel amplectente, longe attenuata, 2·5–1·5 cm. longa, internodiis multo breviora. *Racemus* 5–6 cm. longus, 10–13-fl., floribus fere erectis, lilacinis; bracteæ cuspidato-acuminatæ 1·5–0·5 cm. longæ; pedicelli 2–5 mm. longi. *Sepala* lateralia oblique ovalia, subacuta, 6 mm. longa; sepalum impar cucullatum, lateraliter visum semi-ovatum acuminatum. *Petala* lateralia semi-cordato-ovata acuta, 5 mm. longa, basi 3 mm. lata; labellum columnæ alte adnatum, basi ampliatum, saccum formans, 3-lobum, lobis lateralibus parvis, ad 2 mm. longis, intermedio subovato acuto, basi bis purpureo-maculato, 5 mm. longo, basi 3 mm. lato, calcare 5 mm. longo, basi 2 mm. diam., deinde leviter constricto, apice dilatato, fere 2 mm. diam. *Rostellum* 4·5 mm. longum, oblongum, medio longitudinaliter canaliculatum, brevissimo 3-lobum, lobio intermedio 2-dentato. *Anthera* fere in basi rostelli posita, loculis globosis, caudiculis translucentibus, 4 mm. longis, glandulis obsubulatis albidis. *Stigma* basin rostelli circumdans, utrinque in 2 processus obtusos, ultra dimidium rostelli attingentes, productum.

Hab. Transvaal: Barberton Div., Kaapse Hoek, Feb. 1928, *Frank Stone* (National Herbarium, No. 7065).

Described from several living specimens received from the National Herbarium, Pretoria. Differs from the two species hitherto described from South Africa in being glandularly pubescent, in the small lateral lobes of the lip, and in the position of the anther.

Aloe karasbergensis Pillans (*Liliaceæ–Aloineæ*). *Caulis* erectus 1–1·5 dm. altus, circa 1 dm. diam., foliis omnino celatus. *Folia* 15–20, dense rosulata, 4–4·5 dm. longa, medio 1·5–2 dm. lata, medio ca. 2·5 cm. crassa, ovato-lanceolata acuminata, innocue mucronata, glauco-viridia, utrinque lineis longitudinalibus atro-viridibus continuis notata, marginibus cartilaginea subcrenata, dimidio superiore decurvata. *Pedunculus* ca. 3 dm. longus robustus compressus. *Panicula* 5–6 dm. longa, 5–5·5 dm. diam., multo ramosa, pyramidalis (apice racemi terminalis ramos ceteros bene superante), ramis primariis erecto-patentibus, apicem versus leviter adscendentibus, infimis ca. 3 dm. longis, supra medium 5–10-ramosis, ramis simplicibus vel divisis, superioribus 0·6–1·3 dm. longis simplicibus; pedicelli 7–12 mm. longi, distantes ca. per 5 mm., graciles patentes; bracteæ 3–6 mm. longæ, deltoideæ acuminatæ, marginibus latis pallido-membranaceis, fere omnino pedicello adpressæ. *Perianthium* 2·3–2·5 cm. longum, basi 5 mm., ore 6–7 mm. diam., cylindricum, leviter decurvatum, declinato-patens, tubo ca. 1·5 cm. longo, extus medio 9 mm. diam., basin apicemque versus gradatim ampliato, pallide corallino-rubro, segmentis 6–8 mm. longis, basi 3·25–4 mm. lata, oblongo-ellipticis obtusis, apice leviter patentibus, basi sordide rubris, vittatis, vitta lata sordide viridi, marginibus pallidis. *Filamenta* perianthio æquilonga vel parum breviora, antheris exsertis vel subexsertis. *Stylum* ca. 1·5 cm. longum, inclusum.

Hab. South-West Africa: Great Karasberg, Naruda Süd, lower sandstone hill opposite mouth of Naruda Süd Ravine; *Pearson* in Bladen Mem. Exped. 7966. Cape Province: Little Namaqualand, west slope of hill between Bushman's Bank and Kuboos, *Pillans*, 5848 (type).

Described from my 5848, which flowered in my garden February 1928, and with the use of Pearson's notes upon his 7966.

Most nearly allied to *A. striata* Haw., from which it is chiefly distinguished by its downwardly-curved and more conspicuously striped leaves, the formation of its inflorescence, and the coloration of its flowers.

NOTES ON THE BRITISH SPECIES AND FORMS OF *EROPHILA*.

By C. E. Salmon and E. G. Baker.

Dr. O. E. Schulz has recently monographed the genus *Erophila* in *Das Pflanzenreich*, Heft iv. 105 (1927), but as Dr. Schulz before writing his monograph had seen very little British material, in order to get a more amplified account of our British forms one of us sent him his collection, and the following remarks mainly refer to identifications made by Dr. Schulz on C. E. Salmon's collection.

In *Erophila* Dr. Schulz has what we might call seven macro-species, but of these seven only three occur in Britain—*E. verna*, *E. Boerhaavii*, and *E. præcox*. They may be separated as follows:—

A. Leaves covered above with minute slender bifurcate and stellate hairs.	
Silicles elongate, oblanceolate. Ovary with 50–60 ovules.....	*E. verna*.
Silicles abbreviate or shortly obovoid or suborbicular. Ovary with 24–48 ovules.....	*E. Boerhaavii*.
B. Leaves covered above with generally simple hairs, rarely with some bifurcate. Ovary with 24–40 ovules	*E. præcox*.

E. VERNA E. Meyer.

O. E. Schulz, Monog. fig. 33 A–N; *Draba verna* L.

Scapes single or several, erect, but the lateral ones ascending, fruiting ones 10–20 cm. long, covered below with short hairs about 0·25 mm. long, stipitate-bifurcate and stipitate-substellate, pale violet, glabrescent above, green. *Leaves* broadly lanceolate or elliptic, apex somewhat acute, margin entire or rather deeply 1–2-dentate towards the apex (f. *pinnatifida* Wirtgen), gradually narrowed into a petiole at the base, 1–1·5 cm. long, ±0·5 cm. broad above the middle, covered especially above and on the edge with rather dense bifurcate and stellate hairs, the petiole ciliate with a very few longer simple hairs, sometimes red-spotted near the base or entirely reddish. *Racemes* 10–20-flowered. Floriferous pedicels 6–3 mm. long, erecto-patent, capillary. *Sepals* 2 mm. long, hairy on the back, the hairs 0·5 mm. long, stipitate-bifurcate, white- or at length violet-margined or entirely violet (f. *rubrocalycina* O. Kuntze). *Petals* 2·5 mm. long. *Stamens* 1·5 : 1·75 mm.; anthers 0·25 mm. long. *Ovary* with 50–60 ovules. *Silicles* on erecto-patent pedicels, very flexuous or elongate-recurved (4·5–)2·5–1 cm. long, the lowest often not far from the leaf-rosette, oblong-ellipsoid, 6·5–9 mm. long, compressed, 2–2·5 mm. broad above the middle, apex rounded, scarcely styliferous, narrowed towards the base, greenish, sometimes reddish, rarely subcontorted. *Seeds* numerous, very small, ovoid, 0·3–0·4 mm. long.

Surrey v.c. 17—Near Witley (Ref. No. 1220), March 1894, *E. S. Marshall* (Rep. B. E. C. 1894, 434, as *E. vulgaris*); Woking, 1901, *Miss M. Saunders*; near Gomshall, March 1893, *C. E. S.* (some "ad var. *majuscula*," others "ad var. *Krockeri* spectans," O. E. S.). *Herts v.c. 20*—Fells's Nurseries, Hitchin (Ref. No. 62),

April 1913; cultivated ground between Wilbury Hill and Ickleford (Ref. No. 70), April 1913, *J. E. Little* (Rep. B. E. C. 1913, 449). *Cambridge v.c. 29*—Cambridge, 1837, *H. Baber*. *Glos. E. v.c. 33*—Kineton Thorns, May 1916, *H. J. Riddelsdell* (Rep. B. E. C. 1916, 557). *Monmouth v.c. 35*—Limestone quarry, Portskewet (Ref. No. 3828; but see under *E. Boerhaavii*), April 1904, *E. S. Marshall*. *Ireland*—Portmarnock, Dublin, 1869, *H. G. Carroll*.

Dr. Schulz arranges the varieties of this species in two series:—Series A—*Flexuosæ*, with a slender scape, the fruiting axis of the raceme evidently serpentino-flexuose: Series B—*Scaposæ*, with the scape somewhat thickened below, rigid above, the axis only slightly flexuose. The 13 varieties occurring in Britain are in the former series.

Var. Bardinii O. E. Schulz; *Erophila Bardinii* Jord.; Jord. & Fourr. Icon. Fl. Eur. i. t. iv. fig. 13 (1866).

Flowers medium-sized; petals 2·5 mm. × 1·5 mm., rose or subrose-coloured. *Leaves* oblanceolate, attenuate at the base, subentire or with few teeth. *Silicle* subelliptic-lanceolate, attenuate towards the ends, especially the base, 7 mm. × 2 mm. *Style* rather long, apiculate.

Essex N. v.c. 19—Roos, near Saffron Walden, 1896, *C. B. Clarke*, n. 49151 B; Colchester, 1922, *G. C. Brown*; Hedgebank, Elmstead (Ref. No. 1399), May 1919, *G. C. Brown* (Rep. B. E. C. 1919, 808, as *E. affinis*?).

Var. affinis O. E. S.; *E. affinis* Jord.

Flowers medium-sized; petals obovate, 3 mm. × 1·5 mm., often rose-violet. *Leaves* subelliptic-linear, somewhat obtuse, narrowed at the base, entire or occasionally subdentate. *Silicle* oblong, gradually narrowed from the middle to the base, 6–6·5 mm. × 2 mm. *Style* short.

Essex N. v.c. 19—Sea-wall by R. Colne, Colchester (Ref. No. 1938), April 1922, *G. C. Brown* (Rep. B. E. C. 1922, 826, as *E. majuscula*).

Var. cuneifolia O. E. S. Monog. fig. 33, O; *E. cuneifolia* Jord.; Jord. & Fourr. *l. c.* t. v. fig. 18.

Flowers rather large; petals 3·5 mm. × 1·5–2 mm. *Leaves* subcuneiform, long-attenuate towards the base, often toothed. *Silicle* obversely oblong, narrowed especially towards the base, 7–8 mm. × 2·5 mm. *Style* short.

Wilts N. v.c. 7—Burridge Heath, May 1920, *C. P. Hurst* (Rep. B. E. C. 1920, 212, as *E. verna*). *Durham v.c. 66*—Rocky pastures etc. from 900 to 1600 feet about High Force, Teesdale (Ref. No. 4466), April 1918, *E. S. Marshall*.

Var. **Salmonii** O. E. S., var. nov.

Folia spathulata; lamina oblongo-elliptica, acutiuscula, integra vel parcissime dentata, in petiolum æquilongum vel longiorem angustata.

Ab *E. verna* (L.) E. Meyer var. *cuneifolia* (Jord.) O. E. S. petalis 2–2·5 mm. nec 3·5–4 mm. longis differt.

Essex N. v.c. 19—Wall between Great Saling and Bardfield, April 14th, 1915, *C. E. Salmon.*

Var. SPARSIPILA O. E. S.; *E. sparsipila* Jord.

Flowers medium-sized, white; petals 3·5 mm. × 1·5 mm. *Leaves* short, lanceolate or sublinear, attenuate at the base, entire or shortly subdentate. *Silicle* oblong, gradually narrowed to the base, 5·5–7·5 mm. × 1·75–2 mm. *Style* short.

Surrey v.c. 17—Reigate, March 1890, *C. E. S.* *Herts v.c. 20*—Cultivated ground on Ash Brook, St. Ippolyts (Ref. No. 83), April 1914, *J. E. Little* (Rep. B. E. C. 1914, 117, as *E. majuscula*?). *Northampton v.c. 32*—Dry places, Kirby Hall, April 1916, *G. Chester* (Rep. B. E. C. 1916, 557, as *E. præcox*?). *Yorks N.W. v.c. 65*—Near High Force (Ref. No. 4465), April and May 1918, *E. S. Marshall* (Rep. Wats. Ex. Club, 1918–20, 94, as *E. virescens*). *Durham v.c. 66*—Near High Force (Ref. No. 4465), April and May 1918, *E. S. Marshall* (Rep. Wats. Ex. Club, 1918–20, 94, as *E. virescens*).

Var. RADIANS O. E. S.; *E. radians* Rosen in Ber. Deutsch. Bot. Gesellsch. xxviii. (1910), 244, 247, text-fig. *b*, t. vi. fig. 2; Cohn, Beitr. Biol. Pfl. x. 392, fig. 8 *a*, t. v. fig. 1.

[*Flowers* small; petals 2–2·25 mm. long. *Leaves* many, in a conspicuous rosette, large, ±20 mm. long, lanceolate, much attenuate at the base, practically entire. *Silicle* 6–6·25 mm. long, 2·5 mm. broad, elliptic, narrowed at both ends, rather more so at the base. *Style* prominent, 0·25 mm. long.—C. E. S.]

Yorks W. v.c. 64—Edge of footpath by wall side, Arncliffe, Upper Wharfedale, May 1913, *C. Waterfall* (Rep. B. E. C. 1919, 808, as *E. majuscula*).

Var. ŒDOCARPA O. E. S.; *E. œdocarpa* E. Drabble in Journ. Bot. 1926, 45.

Flowers medium-sized; petals 2·5 mm. long. *Leaves* oblanceolate, very small, narrowed to the base, entire or ±dentate distally. *Silicle* narrow obovate-lanceolate, 3–4 mm. × 2·25–2·5 mm., terete.

Derby v.c. 57—Ashover, April 1910, *E. Drabble.* *Cheshire v.c. 58*—Wallasey, May 1907, *E. Drabble.*

Var. CABILLONENSIS O. E. S.; *E. cabillonensis* Jord.

Flowers very small; petals 2 mm. × 1 mm. Peduncles long. *Leaves* lanceolate, subacute, attenuate towards the base, shortly toothed or subentire. *Silicle* subelliptic-obovate, narrowed from just below the middle to the base, 6 mm. × 2·75 mm. *Style* very short.

Surrey v.c. 17—Reigate Heath, April 1897, *C. E. S.*; Farnham, *C. B. Clarke*, 1899, n. 46701 B. *Essex N. v.c. 19*—Bank, Alphamstone (Ref. No. 1391), April 1919, *G. C. Brown* (Rep. B. E. C. 1919, 808, as *E. propinqua*?). *Herts v.c. 20*—Wall of West Mill, Hitchin, May 1916, *H. C. Littlebury* (Rep. Wats. Ex. Club, 1916–17, 8). *Norfolk W. v.c. 28*—Dry bank under beech-tree, Watton (Ref. No. 97), April 1915, *F. Robinson* (Rep. B. E. C. 1915, 314). *Perth E. v.c. 89*—Glen Shee, circ. 1600′, July 1892, *E. S. Marshall* (f. *minutissima* (Griseb.) O. E. S.—a reduced form). *Edinburgh v.c. 83*—Near Edinburgh, 1838, *T. B. Bell.* *Sutherland W. v.c. 108*—Gravelly path, Loch Loyal Lodge, between Tongue and Altnaharra (Ref. No. 2418), June 1900, *E. S. Marshall.*

Var. PYRENAICA O. E. S.; *E. pyrenaica* Jord.; Jord. & Fourr. Icon. i. 1, t. iii. fig. 12.

Flowers rather large; petals 3·5 mm. × 2·5 mm. *Leaves* short, ovate or ovate-oblong, obtuse, subentire, narrowed into a short petiole. *Silicle* subelliptic, narrowed for about one-third of its length towards the base, 5–5·5 mm. × 2–2·5 mm. *Style* short.

Essex N. v.c. 19—Field, Berechurch (Ref. No. 1937), April 1922, *G. C. Brown* (Rep. B. E. C. 1922, 826, as *E. serrata*?).

Var. HIRTELLA O. E. S.; *E. hirtella* Jord.; Jord. & Fourr. *l. c.* t. ii. fig. 6.

Flowers rather large, white; petals 3 mm. × 1·5–2 mm. *Leaves* oblanceolate, very acute, usually clearly toothed, occasionally entire. *Silicle* oblanceolate-elliptic, long-attenuate towards the base, 6 mm. × 2·5 mm. *Style* medium-sized.

Durham v.c. 66—Walls near High Force Hotel, Teesdale (Ref. No. 4467), April 1918, *E. S. Marshall* (Rep. B. E. C. 1918, 488, as *E. virescens*).

Var. MAJUSCULA Hausskn.; *E. majuscula* Jord.; Jord. & Fourr. *l. c.* t. v. fig. 20; O. E. Schulz, Monog. fig. 34 A.

Flowers large; petals 3–4 mm. × 2·5 mm. *Leaves* greyish-green, broad, ovate, acute, narrowed into a petiole which is often rather long, coarsely dentate. *Silicle* oblong-obovate, rather large, shortly narrowed towards the base, 7 mm. × 2·5–3 mm. *Style* medium-sized. A rather large plant.

Essex N. v.c. 19—Cornfield, Alphamstone (Ref. No. 882), May 1915, *G. C. Brown* (Rep. B. E. C. 1915, 314, as *E. majuscula*?). *Herts v.c. 20*—Fells's Nurseries, Hitchin (Ref. No. 63), May 1913, *J. E. Little* (Rep. Wats. Ex. Club, 1913–14, 431, as *E. majuscula*). *Yorks N.E. v.c. 62*—Gormire, May 1858, *J. G. Baker.* *Forfar v.c. 90*—The Lurgies, near Montrose (Ref. No. 52), April 1914, *R. & M. Corstorphine* (Rep. B. E. C. 1914, 117, as *E. majuscula*).

Var. AMERICANA O. E. S.; *E. americana* DC.; *Draba verna* L. β *americana* Pers. Syn.; Cus. & Ansb. Herb. Fl. fr. ii. t. 343, n.v. (1868).

Flowers very small; petals 2–2·5 mm. × 1 mm. *Leaves* oblanceolate, gradually narrowed to the base, usually dentate. *Silicle* obversely linear-lanceolate, gradually narrowed from the middle to the base, 7–10 mm. × 1·5–2 mm. *Style* very short and thick.

Surrey v.c. 17—Cultivated field near Lockner Farm, Chilworth, May 1918, *C. E. S.*

Var. KROCKERI Aschers. & Graebn.; *E. Krockeri* Andrz.; O. E. Schulz, Monog. fig. 34 B; *E. stenocarpa* Jord. p.p.; Jord. & Fourr. *l. c.* t. iv. fig. 15.

Flowers very small; petals 1·5 mm. long × 0·6 mm. *Leaves* oblanceolate, ±entire or slightly dentate, acute, narrowed into a petiole. *Silicle* linear-oblong, 7–9 mm. × 1·5–1·75 mm. *Style* short, rather thick.

Hants S. v.c. 11—Near Townhill Park, Southampton, April 1918, *W. R. Sherrin*. *Sussex W. v.c. 13*—Sandy fields near Norwood Farm, Lavington (Ref. No. 2553), May 1901, *E. S. Marshall*. *Surrey v.c. 17*—Weed in garden-ground, Milford (Ref. No. 1218), April 1894, *E. S. Marshall* (Rep. B. E. C. 1894, 435, as *E. stenocarpa*); oatfield at Frimley, May 1894, *A. H. Wolley-Dod & E. S. Marshall* (Rep. B. E. C. 1894, 435). *Herts v.c. 20*—Stony loam in corn, St. Ippolyts (Ref. No. 60), May 1913, *J. E. Little* (Rep. Wats. Ex. Club, 1913–14, 431, as *E. stenocarpa*).

Var. ACROCARPA O. E. S.; *E. acrocarpa* Brenner; *E. stenocarpa* Jord. p.p.

[*Petals* ±2·5 mm. long. *Leaves* small, 7–10 mm. long, obovate-spathulate, slightly attenuated below, dentate. *Silicle* 5–6·5 mm. long, 1·5–2 mm. broad, oblong-elliptic, slightly more narrowed at the base. *Style* prominent, 0·25 mm. long.—C. E. S.]

Surrey v.c. 17—Sandy field near Byfleet Church, 1912; wall near Chilworth, 1913, *C. E. S.* *Essex S. v.c. 18*—Burnham-on-Crouch, May 1915, *W. R. Sherrin* (Rep. Wats. Ex. Club, 1915–16, 525). *Herts v.c. 20*—Garden-wall, Ickleford House, Hitchin (Ref. No. 68), April 1913, *J. E. Little* (one specimen, f. *minutissima* (Griseb.) O. E. S.—a reduced form) (Rep. B. E. C. 1913, 449). *Suffolk W. v.c. 26*—Dry sandy bank near Mildenhall, April 1920, *R. S. Adamson* (Rep. B. E. C. 1920, 213, as *E. stenocarpa* ?). *Beds v.c. 30*—Sandy cultivated ground, Maulden, April 1914, *J. E. Little* (Rep. B. E. C. 1914, 118, as *E. stenocarpa*). *Jersey*—Quenvais, April 1910, *C. E. S.* ("ad var. *œdocarpam* vergens," O. E. S.).

E. BOERHAAVII Dum.

Draba verna L. β *Boerhaavii* Van Hall; O. E. Schulz, Monog. fig. 35 C, D.

Fruiting plant up to 10 cm. high. *Scapes* clothed below with very short, fine hairs, simple and furcate up to 0·25 mm. long, glabrescent above. *Leaves* short, obovate-spathulate, somewhat acute, entire or 1–3-dentate on each side, narrowed into the petiole, clothed with rather dense, very short, and fine furcate hairs, the margins towards the base ciliate with a few somewhat longer simple hairs, with the petiole 4–10 mm. long, 1·5–4·5 mm. broad at the top, membranous, often reddish. *Raceme* rather lax at flowering-time, later lax, 5–10-flowered. *Pedicels* 5–1 mm. long. *Sepals* 1 mm. long, glabrous or hispid. *Petals* 2 mm. long. *Ovary* with 32–[illegible] ovules. *Silicles* on pedicels 1·8–3 mm. long, obovoid subrotund, 4–5 mm. long, 2·5–3 mm. broad, apex rounded, style very short,

apiculate, a little narrowed towards the base, straw-coloured or pale reddish. *Seeds* 0·4 mm. long.

Surrey v.c. 17—Reigate Heath, April 1899, *C. E. S.* ("ad var. *brachycarpam* vergens," O. E. S.). *Herts v.c. 20*—Dry gravelly ground, Fells's Nurseries, Hitchin (Ref. No. 50), March and April 1912, *J. E. Little* (Rep. B. E. C. 1913, 450, as *E. præcox*); cultivated ground N. of West Mill, Hitchin (Ref. No. 69), May 1913, *J. E. Little* (Rep. B. E. C. 1913, 449); wall of West Mill, Hitchin, April 1916, *H. C. Littlebury* ("Etiam var. *linearifolia* O. E. S.") (Rep. Wats. Ex. Club, 1916–17, 8). *Oxon v.c. 23*—Wall between Hook Norton and Wigginton (Ref. No. 4), April 1914, *H. J. Riddelsdell* (Rep. B. E. C. 1914, 116, as *E. verna*). *Yorks N.E. v.c. 62*—Scawton, May 1858, *J. G. Baker*. *Durham v.c. 66*—Sugar Hill, 1805, Herb. James I'Anson. *Linlithgow v.c. 84*—Queensferry, *Balfour*. *Orkneys v.c. 111*—Near Kirkwall, 1817–1818, *Gillies*, n. 53, flowering and almost fruiting 22nd May, with var. *decipiens*.

Forma UNIFLORA O. E. S.; *E. spathulata* Lang β *uniflora* Opiz.

Very small plant, 1·5–4 cm. high. *Scapes* often violet. *Leaves* very small, 1–3 mm. long, often almost all violet. *Raceme* 1–5-flowered. Petals 1·5–2 mm. long. *Silicles* 2–4 mm. long.

Norfolk W. v.c. 28—Ovington, 1915, *F. Robinson*, n. 98. *Monmouth v.c. 35*—Limestone quarry, Portskewet (Ref. No. 2828, but see under *E. verna*), April 1904, *E. S. Marshall*. *Lancs N. v.c. 69 b*—Sandhills, Askham, April 1914, *D. Lumb* (Rep. B. E. C. 1914, 119, as *E. præcox* ?).

Var. CRASSICARPA O. E. S.; *Draba verna* L. var. *crassicarpa* Wirtgen.

[*Petals* 2·25–2·5 mm. long. *Leaves* numerous, narrow, oblanceolate, acute, serrate-subpinnatifid towards the apex, with a few acute teeth. *Silicle* 4–4·5 mm. long, 2·5 mm. broad, obovate, slightly narrowed below. *Style* short, 0·12 mm. long.—C. E. S.]

Surrey v.c. 17—Milford (Ref. No. 1221), March 1894, *E. S. Marshall* (Rep. B. E. C. 1894, 434); Headley, 1888, *C. E. S.*

Var. INFLATA O. E. S.; *E. inflata* H. C. Watson.

Flowers small. *Leaves* linear-lanceolate. *Silicles* manifestly inflated, broadly oval or elliptic, 3–3·5 mm. × 1·5–2 mm. *Style* short, rather thick.

Surrey v.c. 17—Milford (Ref. No. 1217), April 1894, *E. S. Marshall* (Rep. B. E. C. 1894, 434, as *E. virescens* ?). *Perth mid. v.c. 88*—Rocks near Lochan na Chat, at about 2500 ft., July 1913, *C. E. S.*; Ben Lawers, 1837, *W. Arnott*; Craig Caillich, *D. Paul*.

Var. DECIPIENS O. E. S.; *E. decipiens* Jord.; *E. occidentalis* Jord.; Jord. & Fourr. *l. c.* t. v. fig. 19.

Flowers very small; petals 2 mm. × 1·25 mm. *Leaves* broadly oblanceolate, attenuate into a petiole at the base, subdentate or entire. *Silicle* obovate or oblong-obovate, apex rounded, very obtuse, 4·5 mm. × 2 mm. *Style* short.

Sussex W. v.c. 13—Sandy ground, Selham (Ref. No. 2677),

April 1902, *E. S. Marshall*. *Surrey v.c. 17*—Milford (Ref. No. 1223), March 1894; near Witley (Ref. No. 1225), March 1894, *E. S. Marshall*; Reigate, March 1890, *C. E. S.* *Herts v.c. 20*—On cinders, G.N.R. Grove Mill, Hitchin, April 1913, *J. E. Little* (Rep. B. E. C. 1919, 808). *Hunts v.c. 31*—About Ramsey Heights and Woodwalton (Ref. No. 3663), May 1911, *E. S. Marshall*. *Glost. E. v.c. 33*—Fairford, April 1904, *G. C. Druce* (Rep. B. E. C. 1914, 116).

Var. DECIPIENS O. E. S. subvar. LINEARIFOLIA O. E. S.

[Appears to differ from var. *decipiens* by its narrower leaves (2–3 mm. broad) which are more attenuate at the base.—C. E. S.]

Surrey v.c. 17—Reigate Heath, April 1897, *C. E. S.* *Oxon v.c. 23*—Wall between Hook Norton and Wigginton (Ref. No. 5), April 1914 (Rep. B. E. C. 1914, 117, as *E. verna* var.); garden-path, Wigginton, April 1918, *H. J. Riddelsdell* (Rep. B. E. C. 1918, 487, as *E. verna*).

Var. BRACHYCARPA O. E. S.; *E. brachycarpa* Jord.; Jord. & Fourr. *l. c.* t. ii. fig. 7.

Flowers very small; petals 1·5 mm. × 1 mm. *Leaves* oblanceolate, shortly dentate or subentire, narrowed into a short petiole at the base. *Silicles* very small, obovate-subrotund, very obtuse, somewhat narrowed at the actual base and very slightly stipitate, 3 mm. × 2 mm. *Style* short.

Somerset S. v.c. 5—Minehead Warren (Ref. No. 2919), March 1905, *E. S. Marshall*. *Somerset N. v.c. 6*—Bleadon (Ref. No. 2918), April 1905, *E. S. Marshall*. *Sussex W. v.c. 13*—Duncton Down, May 1901; wall-top, Chichester, May 1902; Downs, Houghton, May 1902, *E. S. Marshall* (Rep. Wats. Ex. Club, 1902–3, 7 as *E. præcox*). *Surrey v.c. 17*—Milford (Ref. No. 1224), March 1894, *E. S. Marshall* (Rep. Wats. Ex. Club, 1899–1900, as *E. virescens*). *Oxon v.c. 23*—Wigginton (Ref. No. 3), April 1914, *H. J. Riddelsdell* (Rep. B. E. C. 1914, 118, as *E. præcox*). *Lancs W. v.c. 60*—Frequent on the Green, Lytham, April 1905, *C. Bailey* (Rep. Wats. Ex. Club, 1905–6, 40, as *E. præcox*).

Var. MURICOLA O. E. S.; *E. muricola* Jord.

Flowers medium-sized; petals 2·5–3 mm. × 2 mm. *Leaves* ovate or lanceolate, shortly dentate, occasionally subentire, narrowed into a rather long petiole. *Silicle* elliptic-obovate, 6 mm. × 3–3·5 mm. long. *Style* medium-sized.

York N.W. v.c. 65—Below Ingleborough, May 1926, *I. M. Roper* (Rep. B. E. C. 1926, 251, as *E. stenocarpa*).

E. PRÆCOX DC.

O. E. Schulz, Monog. fig. 35 E, F; *Draba præcox* Stev.

Flowering plant 1·5–5 cm. high, fruiting 2–9 cm. high. *Scapes* often solitary, more rarely several. *Leaves* short, obovate-spathulate, entire or 1–3-dentate on each side, narrowed into a petiole. *Racemes* at first rather lax, later lax, 5–10-flowered; pedicels 5–1 mm. long. *Sepals* 1–1·5 mm. long, glabrous or hairy on the back. *Petals* 2·5–3·5 mm. long. *Stamens* 1–1·3 : 1·2–1·5 mm.; anthers 0·2 mm. long. *Ovary* with 24–40 ovules. *Silicles* on pedicels 12–2 mm. long, shortly obovoid, compressed, 4–6 mm. long, 2–3 mm. broad, apex rounded, style very short, slightly narrowed to the base, straw-coloured or pale reddish. *Seeds* 0·5 : 0·3 : 0·2 mm., when wet manifestly tuberculate.

No localities in Britain recorded by Dr. Schulz.

Var. MORICANDII O. E. S.

Leaves narrow, linear or narrowly oblanceolate, ±1·5 cm. long, 1·8–3·5 mm. broad.

Lancs N. v.c. 69 b—Seashore at Bardsea, April 1918, *W. H. Pearsall* (Rep. B. E. C. 1918, 448, as *E. furcipila*).

Var. VIRESCENS O. E. S.; *E. virescens* Jord.; Jord. & Fourr. *l. c.* t. i. fig. 1.

Flowers medium-sized; petals 2–2·5 mm. long, dull white. *Leaves* rather glabrous or sparsely covered with generally simple hairs. *Silicles* usually ellipsoid, almost rounded at the base, 4 mm. × 1·5 mm. Style very short and rather thick.

Sussex E. v.c. 14—Downs above Lewes, March 1900, *C. E. S.* *Herts v.c. 20*—Gravel Pit, St. Ippolyts (Ref. No. 55 *a*), April 1915; meadow below Walsworth, Hitchin (Ref. No. 84), April 1915, *J. E. Little* (Rep. Wats. Ex. Club, 1915–16, 526).

Var. VIRESCENS O. E. S. forma NANA (Sudre) O. E. S.

Scapes 1·5–4 cm. high, capillary. *Leaves* 2–5 mm. long. *Raceme* 1 6-flowered. *Silicles* 2–3 mm. long.

Herts v.c. 20—Gravel Pit, St. Ippolyts (Ref. No. 55 *a*), April 1915; meadow below Walsworth, Hitchin (Ref. No. 84), April 1915 (Rep. Wats. Ex. Club, 1915–16, 526); wall, Ickleford Manor, Hitchin (Ref. No. 68), April 1915, *J. E. Little* (Rep. Wats. Ex. Club, 1915–16, 525).

Var. SUBNITENS O. E. S.; *E. subnitens* Jord.; Jord. & Fourr. *l. c.* t. i. fig. 2.

Flowers large, petals 4–5 mm. long, pure white. *Leaves* sparsely pilose, ovate or lanceolate, shortly attenuate into the petiole at the base. *Silicles* ovate-elliptic, apex subtruncate, somewhat narrowed to the base, 5–6 mm. × 2·5 mm. *Style* short.

Sussex E. v.c. 14—Walls, Southover, March 1927, *Mary E. Elgar*.

PRESERVATION OF OUR FLORA.

A BOOK has recently been published, the title of which is *Our Vanishing Wild Flowers* (see Review, p. 248), and there is no denying that this regrettable title is amply justified. It calls attention to a subject, the reality and urgency of which is beyond all doubt.

A suggestion has sometimes been made that the preservation of vanishing species might be helped if seeds of the rarer native plants were sown in suitable spots in the wild, the habitat of such species

being thus extended. I have recently seen an instance where this has been done, and the experiment seems successful.

The suggestion looks excellent and there seems to be only one objection, and that is that the appearance of the species in a spot where it was previously unknown may puzzle students, but after all the question is one not solely for students but for the whole community—indeed, it is a national question.

To meet this difficulty, a Central Botanic Authority might inaugurate a register in which would be recorded, as far as possible, all cases in which seeds had been sown in the wild, with full particulars as to date, locality, species, and any other matters that might be deemed useful, and, subject to official approval and supervision, students would have access to the register.

"Sowers of seeds" would be encouraged to register the necessary details of sowings and to send records of results. There is probably very little precise information available now as to seeds sown in the wild, but the practice does and will exist, and it might be hoped ultimately to bring it under control, and even give direction and assistance.

I understand that the keeping of such a register is quite practicable and by no means an unwelcome idea.

The sowing of seeds of foreign or cultivated plants should be strongly discouraged as a most undesirable practice.—C. B. Tahourdin.

We should welcome expressions of opinion on the subject of Mr. Tahourdin's note, which is one of special interest to students of the British flora. The question is not one of preserving or restoring amenities: such, for instance, as rehabilitating areas around a large town which have been stripped of their former population of ferns, primroses, cowslips, and other species generally attractive to the public, but of extending the range of our rarer species. It implies making man a conscious factor in problems of geographical distribution, and students of this subject may not welcome the addition of this uncertain factor. There is a danger also that, unless the seed which is sown is from British-grown plants, forms new to the flora may be introduced.

Moreover, the reason for the suggestion is not very clear. The interest associated with the occurrence of a rare plant depends mainly on its rarity and the problems suggested by that rarity, and that interest would be seriously diminished if its occurrence were due to conscious human agency.

Whatever views may be taken as to the desirability of the suggestion, there can be no doubt as to the importance of keeping a careful record of any such happenings, and the Department of Botany of the British Museum, one section of which is devoted to British plants, would seem to be the most suitable place.

Two problems are involved in the question of plant-preservation, namely, the prevention of the more or less wholesale extermination of certain attractive plants by the public, often through the medium of the hawker or some other commercial agent, and the preservation

of rare, not necessarily attractive, species which have a special appeal to the botanist. Unfortunately, in the case also of the latter category the commercial factor may enter in areas noted for rare plants, such, for instance, as the Lizard in Cornwall, where the man with a vasculum may be shadowed by a shrewd native who for a consideration will give useful information. Public opinion fortified by a stringent bye-law wisely administered will help in the suppression of the greater evil, while self-restraint and a more truly scientific attitude on the part of the botanist and "plant-lover" will tend towards the preservation of the rarer species.

NOTES OF INTEREST TO STUDENTS OF BRITISH BOTANY.

Naturalist, 1927, pp. 75–80, 107–10.

"A Form-variation in *Ranunculus Ficaria*" (illustrated). By M. A. Johnstone.

Valuable notes upon the occurrence of two forms of this plant that are met with.

In one form, the new ground tuber or tubers of the current year are clearly separated from the tuber-growth of the previous year by a well-developed internode of the stem; in the other, no such length of stem is visible; the two sets of tubers are quite close together.

Experiments were carried out upon the plants, and the results are carefully recorded.—C. E. S.

In the *Kew Bulletin*, No. 1, 1928, pp. 1–17, Messrs. E. M. Marsden-Jones and W. B. Turrill commence an interesting series of critical studies upon various Phanerogams, the present being entitled "Researches on *Silene maritima* and *S. vulgaris*."

The general principles upon which the authors are working are as follows:—"(1) a systematic investigation of material accumulated in herbaria, correlating this with a critical reading of all published literature relevant to the subject; (2) a field investigation, by both phytogeographical and ecological methods, of the distribution of the species concerned in all their varieties and forms; (3) controlled selfing and growing in our experimental grounds; (4) growing pure line material under different environmental conditions to study the modifying effects of external factors. It is hoped later to add (5) cytological, and (6) anatomical investigations."

The present article should be consulted by all interested in the life-history of British plants and there is evidence that great care has been exercised in the experiments carried out and the valuable results are clearly tabulated, with explanatory illustrations. Hybrids between the two species are fully described.—C. E. S.

The Irish Yew (*Taxus fastigiata*).—Mr. W. J. Bean has an interesting note upon the Irish Yew (*Kew Bulletin*, No. 6, 1927, p. 254). The first Irish Yews were two plants discovered by a

Mr. Willis in the Fermanagh mountains about 1780. One was planted at Florence Court, the seat of the Earl of Enniskillen, the other in Willis's garden. The latter disappeared, but the former, it is believed, still exists at Florence Court; from this tree probably most or all the plants in cultivation are derived. It is a female tree, and Elwes and Henry remarked in their work "no true male Irish yew has ever been met with." In March 1927 Mr. W. H. H. Fletcher, of Aldwick Manor, Bognor, sent Mr. Bean some shoots of Yew, undoubtedly male and undoubtedly Irish. These he had found at North Mundham, Sussex, also in his own shrubbery and at Chichester. His own bushes (and probably the others) came from the Barnham nurseries near Bognor, and the foreman there told him that Irish Yews had been propagated by them for many years, by cuttings, not by seed, and unfortunarely he did not know where their stock originally came from.

Mr. Bean states that the chief difference between the Irish Yew and the common one, besides that of its erect habit, is the radial arrangement of its leaves, an arrangement which, in the common yew, occurs only on the leading shoots. The ordinary pectinate arrangement is never seen. An Irish Yew, therefore, may be regarded as an assemblage of leading shoots.—C. E. S.

Flora of Moray.—It is satisfactory to read in *The Gardeners' Chronicle*, May 12, 1928, 330, that the Moray Field Club is about to collect together the records of the Society with a view to their publication in book form as a *Flora of Moray*. To the Southerner, the county of Moray is not very familiar, the latest atlases not mentioning it by this name; we believe the name applies now to the county of Elgin alone and not, as in former times, to a far greater area. As far as we are aware, no Flora of Elgin has ever been compiled, beyond the *Collectanea for a Flora of Moray*, by the Rev. G. Gordon, published at Elgin in 1839, a list of species with localities, and the Moray Field Club will be doing a great service to botanists by the publication of their work.

OBITUARIES.

We regret to record the loss by death of two eminent European botanists, Dr. August von Hayek of Vienna and Dr. Albert Thellung of Zurich.

The name of Dr. Albert Thellung, who died very suddenly at Zurich on June 26, was very familiar to British botanists. He had collaborated with Prof. Hans Schinz, under whom he had served for many years in the Botanical Museum at Zurich, in various brochures on the subject of nomenclature: we recall especially a discussion on the definition of "still-born" ("töt-geborenen") species-names shortly after the Vienna Congress (see Journ. Bot. 1907, 433). The Mitteilungen aus dem Botan. Mus. Zurich from time to time contained contributions from him on subjects of floristic or taxonomic interest. He was specially interested in Cruciferæ, and he had recently contributed the section on Umbelliferæ to Hegi's *Illustrierte Flora von Mitteleuropa*—an important piece of work occupying more than 600 pages of the 'Flora.'

La Flore adventice de Montpellier, the 'Habilitationschrift' for his doctorate at Zurich (1911), is an exhaustive study of the adventive flora of Montpellier, carried out during his residence there in 1905 and 1906.

Thellung's death at a comparatively early age, forty-seven, is especially sad, as in the natural course of events he might shortly have succeeded to the position of Director of the Museum.

Dr. August von Hayek's important contribution to Central European floristic work, his *Flora von Steiermark*, had reached the end of the Dicotyledons when it was stopped in 1914, and it still awaits completion—the section on the Monocotyledons has not been published. Dr. Hayek had for many years been engaged on the flora of the Balkan area and his great work the *Prodromus Florae peninsulae Balcanicae*, the publication of which was begun in 1924, has progressed as far as the end of the polypetalous Dicotyledons, leaving the Sympetalæ and Monocotyledons still to be issued. It is to be hoped that the material is available for the completion of this much-needed account of the botany of a remarkably interesting area.

We also regret to learn of the death of the veteran Portuguese botanist, Dr. Julio Augusto Henriques, at the advanced age of ninety. Dr. Henriques had been for many years associated with Coimbra as Professor in the University and Director of the Botanic Garden and Museum. He founded (and edited) the *Boletim da Sociedade Broteriana* (1883), a journal devoted mainly to taxonomic publications dealing with the flora of Portugal and the Portuguese colonies in West Africa, and containing most of Henriques's contributions to botanical knowledge.

SHORT NOTE.

Diplotaxis tenuifolia DC. var. integrifolia Koch.—In reference to Mr. Salmon's interesting note on the occurrence of this plant in Britain (*v. supra*, p. 204) it may be said that it is recorded in the *Flora of Oxfordshire* (45, 1927) from Botley, where I found it in 1891, its identification being due to the late Herr Freyn, of Buda-Pesth. I also got it by the railway near Ashton, Northants, in 1901, and at Slough in Buckinghamshire; but as these were solitary examples, existing for a single year, it is not included in the *British Plant List*. It is not included in Rouy and Foucaud's *Flore de France*. It may be added that neither *Diplotaxis caulescens* nor *D. scapigera* Kittel are given in the *Index Kewensis*; and it must be remembered that Syme put his var. *Babingtonii* under subspecies *tenuifolia* of the species *Brassica brevipes*.—G. Claridge Druce.

REVIEWS.

Illustrierte Flora von Mitteleuropa mit besonderer Berücksichtigung von Deutschland, Oesterreich u. der Schweiz. By Prof. Dr. GUSTAV HEGI. In 12 volumes of more than 7000 pages, 280 plates (mostly coloured), and about 4000 text-figures. Lehmann, Munich, 1906–28. Price M. 420.

IN view of the approaching completion of this important floristic work, we have undertaken to give an account of the successive volumes, the first of which appeared in 1906. The work is conceived on an elaborate scale, and no pains have been spared to produce a remarkably pleasing as well as an up-to-date scientific account of the flora of Central Europe, for the use of botanists and others interested in this flora. The arrangement adopted is the natural system as conceived in the *Pflanzenfamilien*, and as regards genera and species is based largely on the invaluable but unfortunately still incomplete *Synopsis der Mitteleuropaïschen Flora* of Ascherson and Graebner. While Dr. Hegi's 'Flora' naturally includes the area treated by the latter work, its somewhat more popular treatment combined with its wealth of helpful illustrations will ensure for it a wider public than the more highly critical handbook.

The first volume (pages clviii, 402, 41 plates, 475 text-figs.) includes a special feature—an introduction comprising a general account of the morphology and anatomy of plants. This occupies 142 pages and is profusely illustrated by 303 clear line-blocks; it supplies a good account of the general form and structure of the vegetative organs, flowers, and fruits, and is especially useful as explanatory of the terms employed in taxonomic botany. It is preceded by a useful list of the more commonly occurring Latin trivial names with an explanation of their meaning; in this connection we note that Dr. Hegi departs from the recognised practice of the use of the capital initial, which is employed for adjectival geographical forms such as *Australis, Europæus, Anglicus*, while for generic names used specifically, such as *Ficaria, Carota*, the small initial is used; in this he is apparently following the convention adopted (long before 1905) by Ascherson and Graebner.

The main portion of the text deals with Pteridophyta, Gymnosperms, and Monocotyledons to the end of the grasses—Typhaceæ, Sparganiaceæ, Potamogetonaceæ, Najadaceæ (why Najadacaceæ?), Juncaginaceæ, Alismataceæ, Butomaceæ, Hydrocharitaceæ, and Gramineæ.

Under each group there is a key to the families, and the description of each family, which varies in length with its size and economic importance, is followed by a dichotomous key to the genera, and similarly that of the genus by a key to the species. Under the family reference is made to genera occurring outside the area of the 'Flora,' and also to its geographical distribution and affinities. Each genus and species is indicated by a running number for convenience in the herbarium. The derivation of the generic name is indicated, and under each species a limited synonymy is given, and the popular

names in German, French, Italian, &c., are quoted, and, in the case of plants of economic value, are discussed at some length. A description of the species is followed by a note of its distribution throughout the area and its general distribution. Brief descriptions of varieties, subvarieties, and forms follow in smaller print.

Commonly cultivated plants are included in the main series, such as Maize, the various species of wheat and other cereals, with some account of their history.

The illustrations form an attractive and valuable adjunct to the descriptive text. They are all original and have been prepared under the direction of Dr. G. Dunzinger, whose help Dr. Hegi also acknowledges in the preparation of the introduction. The excellent coloured plates are devoted to the illustration of the commoner plant-species, four, five, or even more being illustrated in natural size on one plate; there is sometimes a suggestion of crowding, and a little care is necessary to pick out the enlarged floral details. With some exceptions the species not included in the coloured plates are illustrated by small but clear text-figures.

British Empire Vegetation Abstracts.—Supplement No. 1 to the *Journal of Ecology* (1928) contains the first instalment of the "Titles and Abstracts of Publications on the Vegetation and Ecology of the Overseas Empire and on Related Topics," to be published under the scheme of the British Empire Vegetation Committee, which was appointed at the Imperial Botanical Conference in 1924. The items are arranged under the following geographical headings:—(1) Canada, (2) South Africa, (3) Australia, (4) New Zealand, (5) Pacific Islands, (6) Malaya and East Indies, (7) India, Burma, and Ceylon, (8) Tropical and North Africa, (9) Central and South America. The present issue is concerned with publications bearing the date 1926, relating to the areas (1), (2), (3), (4), (5), and (7). Four collaborators are responsible for the preparation of the abstracts, R. D'O. Good for Canada, A. W. Exell for South Africa, V. S. Summerhayes for Australasia and the Pacific Islands, and J. R. Matthews for India &c. The most useful abstracts are those relating to ecology and phytogeography, but such subjects as researches on plant virus-diseases of sugar-cane and maize are also included; the phytogeography of Tahiti is presumably a "related topic." The Empire Vegetation Committee are to be congratulated on their initial effort, and we shall look forward to the issue of the quota for 1927 at an early date. A somewhat clearer definition of scope seems desirable if the most economical use of effort and space is to be made; applied mycology, for instance, is already well provided for—Nos. 28 and 29 of the present Supplement will be found adequately treated in the *Review of Applied Mycology*, June 1927. We note also that the editor transgresses the "Rules of Nomenclature" in using a small initial for all trivial names—we admit that this saves trouble!

The Supplements will be supplied, apart from the *Journal*, at a subscription price of 5*s.* a year, payable to the Hon. Sec., Dr. T. F. Chipp, 199 Kew Road, Kew, from whom full particulars of the scheme may be obtained.

Our Vanishing Wildflowers. By HENRY S. SALT. Small 8vo, pp. viii, 86. Watts & Co., London, 1928. Price 2*s.* 6*d.*

IN this little brochure the author has drawn upon articles which have appeared in the *Times* and *Fortnightly Review* and elsewhere, calling attention to the various agencies resulting in the disappearance of our wild flowers, and has added some short essays of a general kind. There is no need to recapitulate the facts, they are only too well known; what is the remedy? The need for Sanctuaries is stressed—the establishment of public parks or "reservations" similar to those already formed in America and elsewhere, in which the wild fauna and flora are preserved in their natural surroundings. The assistance of Nature by cautious and well-directed introductions is also suggested, and the mere collecting of specimens for private herbaria is deprecated.

Mr. Salt writes in an easy informative style, and plant-lovers will find much of interest in his booklet.

An "Afterword" is supplied by Sir Maurice Abbot Anderson advocating the consideration of a League for the Preservation and Protection of our Wildflowers. Sir Maurice suggests no hard-and-fast rules, a simple token (a brooch or a button) to be distributed broadcast in our schools and other suitable centres, with an explanation of the meaning and intention of the League. Suggestions are made as to procedure by nature-lovers and others who might become the apostles of the movement. Finally, Sir Maurice offers to undertake, with assistance, the work attendant on the establishment of the League.

BOOK-NOTES, NEWS, ETC.

FIELD MUSEUM OF NATURAL HISTORY, CHICAGO.—*Sugar and Sugar-making* is an illustrated pamphlet (Botany Leaflet 13) of 34 pages by James B. McNair, Assistant Curator of Economic Botany. It describes in popular language the sources and preparation of the various kinds of sugar (cane-, beet-, maple-, and palm-sugars), with a brief reference to other sugars. 'Citrus Products,' Part II. (Botanical Series, vi. no. 2, pp. 213–374), is an account, by the same author, of the Citrus product industry in various parts of the world.

BOTANY OF EPHEDRA.—Among the recent publications in botany of the University of California (vol. xiv. no. 7) is a revision of the American species of this remarkable and widely-spread genus of Gnetaceæ, by G. W. Groff and G. W. Clark. The genus is of economic interest, as yielding active principles of medicinal value which have long been used by Chinese, American Indians, and Mexicans. The number of known species in the genus is estimated at 45, ten of which are native in North America.

ILLINOIS STATE NATURAL HISTORY SURVEY.—The *Bulletin*, vol. xvii., recently received, contains an article, by L. R. Tehon, on the measurement of the prevalence and destructiveness of epidemic diseases of grain-crops in Illinois, 1922–1926, and an interpretation of the relations of disease to weather and climate, based on data accumulated on the occurrence of wheat-leaf rust. Also an article by Samuel Eddy on the Plankton of Lake Michigan. The uniformity of the plankton from year to year and season to season strikingly demonstrates the stability of the lake as a fresh-water habitat.

LICHENS OF SPITSBERGEN AND NORTH-EAST LAND.

BY ROBERT PAULSON, F.L.S.

THE lichens collected by C. S. Elton, Chief Scientist of the 1923 Merton College (Oxford) Expedition and the 1924 Oxford University Arctic Expedition, came from that region of the Spitsbergen Archipelago that lies for the most part between parallels 79° and 80° 35′ N. lat. and is bounded by the meridians 11° and 26° 4′ E. long., an area considerably farther to the north-east than that covered by the 1921 Expedition †.

The more important localities in which specimens were obtained are twelve in number, namely:—(1) Duym Point, (2) Eastern South Waigat Islands, (3) Foster Islands, (4) Liefde Bay, (5) Lomme Bay, (6) North Cape, North-East Land, (7) Mainland, North of Bismarck Strait, (8) Ulve Bay, (9) Wahlenberg Bay, (10) Wijde Bay, (11) Deer Bay, and (12) Reindeer Peninsula. Other localities are referred to by name only.

A map to show the principal places explored by the three expeditions was specially prepared, and is published in the volume that gives an account of the work done in 1927 ‡.

It will be seen on this map that the coast-line of each large bay in the north—namely, Liefde, Wijde, and Wahlenberg Bay—is of considerable length. The separate coast-lines occupy in part the same band of latitude, but they are quite apart as regards longitude, Liefde Bay being the most westerly and Wahlenberg the most easterly. A number of lichens were collected from the shore of each. Wijde Bay, having the greatest length of coast, contributed the largest and most varied amount of material. From its shores came four specimens of *Dactylina arctica* and four of *Dufourea muricata*, lichens that are distinctly arctic, the former not previously recorded from Spitsbergen. There is also a specimen of each from Bock Bay, a southern arm of Liefde Bay, and one of *Dactylina* from Reindeer Peninsula.

Some additional specimens have been included in the following list as a result of the examination of stones and portions of rock collected, on the last two excursions, by N. E. Odell (1923), K. S. Sandford (1924), geologists and leaders of the sledging parties.

The rock and stone collected on sledging expeditions, coming from localities where climatic conditions are most inhospitable, well repay the attention given to them. As an example, it may be seen from this collection that such an arctic lichen as *Lecidea Dicksonii* gradually loses its red colour until it is reduced to microscopic dots, and then disappears altogether. At this last stage fertile apothecia are common on the black net-like hypothallus that remains.

† Paulson, Robert, "Spitsbergen Lichens," Journ. Bot. 1923, pp. 77–81.

‡ Binney, George, *With Seaplane and Sledge in the Arctic.* Hutchinson, London, 1925.

The following list includes 119 species and four varieties. A number following a species indicates locality; where no number is cited the species is common. An asterisk indicates a new record for Spitsbergen.

VERRUCARIACEÆ.

Verrucaria æthiobola Wahl., 3. Thallus dark, olivaceous; spores well formed, abundant, 16–20 × 7–9 μ. Hymenial gelatine I+ wine-red.—*V. rejecta* Th. Fr., on dolomite, by Duym glacier; spores variable, 12–20 × 8–10 μ.—*V. striatula* Wnbg., 3.

DERMATOCARPACEÆ.

Dermatocarpon miniatum Th. Fr., 10.

SPHÆROPHORACEÆ.

Sphærophorus globosus Vain., 2, 6, 7, 10.

LECIDEACEÆ.

Lecidea alpestris Somrft., 4, 7.—*L. arctica* Somrft., 7, 8, 10 abundantly fertile.—*L. auriculata* Th. Fr., 10, 11.—*L. cinerascens* A. L. Sm., 10, 16.—*L. confluens* and f. *oxydata* Leight., 2, 3, 7, 11 medulla I+ blue.—*L. Dicksonii* Ach., 2, 3, 7, 9. Thallus bright rusty-red in most cases. Apothecia black, distinctly concave.—*L. goniophila* Schær., 12, 14.—*L. lithophila* Ach., 14.—*L. lapicida* Ach.—*L. pantherina* (Ach.) Th. Fr.—*L. petrosa* Arn., Oxford Glacier.—**L. pilati* Körb., West Station. Thallus pale with a tinge of yellow. Hypothallus bluish black, parietin present under the apothecium, the minute granules containing it are closely massed and surrounded by a gelatinous substance; granules KHO+ crimson.—*L. vernalis* Ach., subsp. *minor* Nyl., 10.

**Catillaria subalpina* Th. Fr., Green Harbour; represented on two small portions of rock. Thallus bluish grey, hypothallus black. Apothecia black; paraphyses, apices blue black. Spores somewhat imperfectly developed, 8 × 5–6 μ; gelatine I+ blue to wine-red.

Bacidia atrosanguinea (Schær.) Th. Fr., 7.—*B. subfuscula* var. *venusta* (Hepp.), West Station.—*B. subfuscula* (Nyl.) Lynge is represented by two specimens, one of which is over decaying vegetation, probably moss, the other over the minute flakes of a disintegrating piece of horn. Spores of the muscicolous plant 17 × 3 μ, 3-septate; those on horn 18–22 × 3–3·5 μ, also 3-septate. The plant on horn agrees with the saxicolous plant of Mt. Misery, Bear Island, collected by Lynge.

Toninia sp., Th. Fr., 16. A well-grown thallus of whitish pulvinate squamules, diameter 1–2 mm., KHO+ bright yellow, sterile, on non-calcareous rock.

Lopadium pezizoideum Körb., 2, 7, over moss.

Rhizocarpon Copelandi (Kbr.) Th. Fr., Cape Roos, 4. Thallus KHO+ sordid fuscescent; spores uniseptate intermixed with others 3-septate.—*R. effiguratum* (Anzi) Th. Fr., Mt. Celsius.—*R. geographicum* DC., 7, 10, 12; var. *geronticum* Th. Fr., 10. Thallus

white, subpulverulent. Apothecium plane, immersed in the areolæ, substratum calcareous.—*R. grande* (Flk.) Arn., 16.—*R. disporum* Müll. Arg. var. *Montagnei* f. *geminatum*, 7, 9.—*R. obscuratum* (Ach.) Mass., 11. Apothecium adnate, black, plane. Spores colourless to brown, vaguely halonate, 20–30 × 12–18 μ, often difform.

CLADONIACEÆ.

Cladonia coccifera Willd.; 3.—*C. furcata* var. *palamæa* Nyl., 4, 3, 7; entered as var. *spinosa* Leight., 1921 list.—*C. fimbriata* Fr., 4, 6.—*C. gracilis* var. *elongata* (Jacq.) Hoffm.—*C. lepidota* Nyl. f. *hypophylla* Cromb., 3, 9, basal squamules large, white beneath, rising from a stalk-like black base with characteristic white spots; foliaceous podetia up to 17 × 15 mm.—*C. sylvatica* Hoffm., Magdalene Bay. I have compared this specimen with Sandstede's description of *C. mitis*. It has a distinctly lighter colour and less entangled top branches, twisted at a different angle than in *C. sylvatica* of warmer climates. If, as appears possible, these differences are due to severity of climate, the question arises as to whether the points mentioned are sufficient to justify specific rank for this arctic lichen.—*C. pyxidata* var. *neglecta* (Flk.) Mass., 3, 10.—*C. uncialis* Web., 12.

Stereocaulon alpinum Laur.—*S. denudatum* Flk., 2.—*S. paschale* Fr.

CHRYSOTHRICACEÆ.

**Crocynia membranacea* Zahlb., 4. A small portion and a transverse section were submitted to Dr. Bouly de Lesdain, who was too much occupied at the time to examine it critically; however, he replied: "Le *Crocynia* appartient bien à la section *Hyphæ inferne coloratæ. Gonidia protococcoidea.*"

GYROPHORACEÆ.

Gyrophora arctica Ach., 6, 10.—*G. cylindrica* and var. *Delisei* (Despr.) Th. Fr., 6, 9.—*G. erosa* Ach.—*G. hyperborea* Ach.—*G. proboscidea* Ach.

ACAROSPORACEÆ.

Biatorella coracina (Somrft.) Th. Fr., 12, Mt. Scott Keltie.—**B. privigna* A. L. Sm., 7. Thallus evanescent; apothecia single and congregate.

Acarospora chlorophana (Wnbg.) Mass., 1, 10, N. shoulder of Mt. Deception.—*A. molybdina* (Wnbg.) Mass., 10.—**A. smaragdula* (Wnbg.) Havaas, 7. Thallus KHO+ red (sanguineous), pallid beneath. Apothecia minute, several in a squamule, reddish brown. Hymenial layer 180 μ high, gelatine I+ wine-red, at once. Asci 80–85 × 20–25 μ, upper cortex light brown, opaque.

EPHEBACEÆ.

**Polychidium muscicolum* S. F. Gray, Green Harbour. A transverse section of the terete branch shows quite distinctly a well-developed cellular thallus.

COLLEMACEÆ.

Collema arcticum Lynge, 6, 10. Thallus pulvinate; apothecia deeply urceolate.—*C. ceranoides* Schær., no apothecia.—*C. crispum* Ach., 4.

PANNARIACEÆ.

Placynthium asperellum Ach., 6, 16, 19. Algal symbiont not distinct.

Pannaria Hookeri (Hook.) Nyl.

Psoroma hypnorum S. F. Gray, 2, 6, 10.

PELTIGERACEÆ.

Solorina crocea Ach., 6, 7.

Peltigera apthosa Willd., 10.—*P. canina* Hoffm. (incl. var. *rufescens* Hoffm.), Mt. Scott Keltie, 4, 6, 7, 9, 10.—*P. malacea* (Ach.) Fr.

PERTUSARIACEÆ.

**Pertusaria dactylina* Nyl., a well-developed plant over a cushion of moss, 7.

LECANORACEÆ.

Lecanora alpina Somrft., 7, 11.—*L. cinerorufescens* (Ach.) Th. Fr., 14.—**L. complanata* Körb.—*L. epibryon* Ach., 8.—*L. galactina* Ach. (incl. subspecies *dispersa* Nyl.), 4, 12.—*L. gibbosa* Nyl., 14.—**L. Lesleyana* Darb., 4, 12.

I have not seen the type. The Spitsbergen specimens are well grown; the roseate colour of the centre is pronounced, filmy lacinia contrast with the darker hypothallus. Apothecia urceolate, margin distinct, disc pruinose, spores $16 \times 7\ \mu$.—**L. melanaspis* (Ach.) Th. Fr., 12, a handsome specimen, diameter 3·5 cm.—*L. melanopthalma* DC., Mt. Scott Keltie.—*L. polytropa* Schær. On one small stone two groups of apothecia are green in colour.—*L. sordida* Th. Fr. var. *inflexa* A. L. Sm., 7, 10.—*L. tartarea* var. *frigida* Ach.—*L. upsaliensis* Nyl.—*L. verrucosa* Laur., 12.

Hæmatomma ventosum Massal., 14.

Candelariella vitellina Müll. Arg., 4, 9, 12.

PARMELIACEÆ.

Parmelia alpicola (Ach.) Th. Fr., 6, 10, 12.—*P. centrifuga* Ach., 10.—*P. corniculata* A. L. Sm., 4.—*P. omphalodes* Ach., 6, 10.—*P. pubescens* Vain.—*P. saxatilis* Ach., 14.

CETRARIACEÆ.

Cetraria aculeatea f. *hispida* Cromb., 9, 10, 14.—*C. cucullata* Ach., 6, 8, 9, 10.—*C. hepatizon* Vain., 2, 6, 7, 9, 10.—*C. Delisei* (Bory) Th. Fr.—*C. islandica* Ach.—*C. nivalis* Ach.

USNEACEÆ.

Dufourea muricata Laur., 10, 12.

**Dactylina arctica* Nyl., 7, 10, 12.

Alectoria nigricans Nyl., 7, 9.—*A. ochroleuca* Nyl.

Usnea sulphurea Körb., 3.

Thamnolia vermicularis (Sw.) Ach., 5, 8, 9, 14.

CALOPLACACEÆ.

**Caloplaca albolutescens* A. L. Sm., 3, 10.—*C. cerina* Th. Fr. 4, 6, and West Station.—*C. cinnamomea* (Th. Fr.) Oliv. 4, 9, 12, 13, 16.—*C. elegans* (Link) Th. Fr., 3, 4, 14, Mt. Scott Keltie.—*C. Jungermanniæ* (Vahl) Th. Fr., 2, 3, 7, 9.—*C. murorum* and var. *miniatum* Leight., 4.—*C. stillicidiorum* Hornem., 9, 13, 16.

BUELLIACEÆ.

Buellia coniops (Wnbg.) Th. Fr., 3, 10.—*B. disciformis* var. *saxicola* Oliv., 1.—*B. leptocline* var. *Mougeotii* Th. Fr., Cape Roos, on shale-stone.—*B. vilis* Th. Fr., Cape Roos, on gneiss boulder.

**Rinodina Bischoffii* Körb., 2. On banded chert, near Bruce City.—*R. Conradi* Körb., 7, 10, Cape Roos, Point Isis.—*R. milvina* Wnbg., 10, 12.—*R. turfacea* (Wnbg.) Th. Fr.

PHYSCIACEÆ.

Physcia cæsia Nyl. Green Harbour.—*P. muscigena* (Ach.) Nyl.—*P. tribacea* Ach.—*P. intermedia* var. *Wahlenbergii* Lynge, Green Harbour. The Spitsbergen plant is sterile. I have compared it with Lynge's available specimens. There is some uncertainty in the absence of apothecia.

THELOCHISTACEÆ.

Xanthoria lychnea Th. Fr., 1, 4, 6, 7, 10; on rock and moss.—*X. parietina* Th. Fr., 2, 4, 7, 9.

On portions of rock from Low Island, Lomme Bay, and Wilde Bay are widely scattered small rounded yellowish- to reddish-brown squamules of *Acarospora smaragdula*; they are often fertile. Some of them bear a close resemblance to *A. scyphulifera* Vain., but the apothecia are not sufficiently well developed for specific determination.

I avail myself of this opportunity for thanking Drs. N. E. Odell and K. S. Sandford for so generously lending me, for a considerable time, their collections of rock-specimens from Spitsbergen.

NOTES ON A COMPARISON OF THE ANGIOSPERM FLORAS OF KENT AND PAS DE CALAIS.

BY R. D'O. GOOD, M.A., F.L.S.

THOSE familiar with the north-east of France will be aware that a number of plants are found there which are either exceedingly rare in, or altogether absent from, the British Isles. This fact suggested that a somewhat detailed comparison of the floras of two regions, one on

either side of the Channel might bring to light some interesting fac
of plant-distribution.

For this purpose a direct comparison was made between the flora
of the English county of Kent and the French department of Pas d
Calais. These represent two narrowly separated portions of wh
was, but comparatively recently, a single continuous land-surfac

They lie (see accompanying map) opposite one another, separated
only twenty miles of sea, and are so similar in topography and geolo
as to make it probable that each presents very much the same ran
of plant-habitats. The Pas de Calais is, indeed, considerably lar
than Kent, but this is the most conspicuous difference between the

In each is an area of low alluvial land, an area of Tertiary rocks with low relief, and an upland area of rocks belonging to the Upper Secondary formations. The most important geological difference is the presence of a small area of Jurassic and older rocks in the Pas de Calais, but, so far as can be seen, this has little or no effect upon the general flora.

Such a comparison is of very special interest, because nowhere else in the world, perhaps, is there such a considerable traffic and interchange between places separated by a similar sea-distance as there is between Kent and Calais, and if accidental or human introduction is ever to be taken seriously into account as explaining differences between floras it must be here. The following pages describe and discuss the results obtained by comparing these two floras, and it is hoped will add something to the general conception of plant dispersal and distribution. It can hardly be hoped that the plant-lists given are complete, but it is believed that they embody most of the salient features.

The comparison of the two floras is based upon Hanbury and Marshall's *Flora of Kent* and Masclef's *Catalogue Raisonnée des Plantes de Pas de Calais*—two roughly contemporary works. Two lists were made, one of the species in Kent but not in Calais and one *vice versa*. There were then removed all the species of doubtful record and those of so critical a nature that their absence from one or other work might be due to difference in opinion as to their taxonomic value. Next were excluded the species which are obviously escapes from cultivation and also purely casual species which could in no way be treated as regular members of vegetation. Doubtful plants were omitted and doubtful points were elucidated by reference to other floras. The two lists were then sent to Mr. C. E. Salmon, who very kindly corrected and annotated them from his great knowledge of the Kentish flora. Finally, as thorough a search as possible was made in the French literature to collect the records for Calais made since Masclef's book was written.

The resulting lists are given below. In the analyses which follow them the term "absent" is used, not only when the species is entirely absent, but also when it is known only from one or two isolated and casual occurrences and is not regularly established. The term "wide" is used for all those species not confined to one or other of the cardinal geographic divisions of the country. It has not been found possible to take into consideration the relative or absolute abundance of species in the two regions.

List I. *Species* (54) *found in Kent, but not in Pas de Calais.*

Corydalis claviculata.
Cochlearia anglica.
Lepidium Smithii.
Polygala amara.
Linum angustifolium.
Illecebrum verticillatum.
Genista pilosa.
Erodium moschatum.
Ulex nanus.
Lotus angustissimus.
Vicia sylvatica.
Lathyrus maritimus.
Œnanthe crocata.
Peucedanum officinale.
Smyrnium Olusatrum.
Rubia peregrina.

List I. (*continued*).

Valerianella Auricula.
Inula crithmoides.
Cnicus pratensis.
Senecio campestris.
Lactuca virosa.
Lactuca saligna.
Campanula hederacea.
Campanula patula.
Campanula latifolia.
Phyteuma orbiculare.
Myosotis sylvatica.
Lithospermum purpureo-cæruleum.
Verbascum Blattaria.
Mentha Pulegium.
Euphorbia Cyparissias.
Buxus sempervirens.
Urtica pilulifera.
Damasonium stellatum.
Malaxis paludosa.
Iris fœtidissima.
Fritillaria Meleagris.
Leucojum æstivum.
Scilla autumnalis.
Juncus acutus.
Zostera marina.
Eriophorum vaginatum.
Scirpus triqueter.
Cyperus longus.
Carex elongata.
Carex montana.
Carex depauperata.
Arum italicum.
Gastridium lendigerum.
Festuca sylvatica.
Festuca uniglumis.
Bromus diandrus.
Bromus commutatus.
Hordeum sylvaticum.

Analysis of List I.

Distribution of the species in England:—

More or less widely distributed	10
More especially and entirely in the S., S.W., or S.E.	27
More especially or entirely in the W.	8
More especially or entirely in the E.	1
More especially or entirely in the N.	1
Scattered	3

Distribution of the species in France:—

More or less widely distributed	28
More especially or entirely in the W. and/or S.	21
More especially or entirely in the E. and/or N.	0
On coasts as far N. as R. Seine or R. Somme	4

Distribution of the species in the coastal continental countries of N.W. Europe:—

Northern limit in Scandinavia	28
Northern limit in Denmark	4
Northern limit in Holland	0
Northern limit in Belgium	0
Northern limit in France	1

List II. *Species* (88) *found in Pas de Calais, but not in Kent.*

Thalictrum minus.
Actæa spicata.
Anemone ranunculoides.
Anemone Pulsatilla.
Adonis æstivalis.
Adonis flammea.
Delphinium consolida.
Erucastrum Pollichii.
Braya supina.
Lepidium graminifolium.
Silene gallica.
Gypsophila muralis.
Spergula pentandra.
Cerastium brachypetalum.

List II. (*continued*).

Herniaria hirsuta.
Herniaria glabra.
Malva Alcea.
Genista sagittalis.
Tetragonolobus siliquosus.
Trifolium patens.
Lathyrus palustris.
Orobus vernus.
Ludwigia palustris.
Bupleurum falcatum.
Cicuta virosa.
Carum Bulbocastanum.
Selinum Carvifolia.
Orlaya grandiflora.
Caucalis latifolia.
Cornus Mas.
Lonicera Xylosteum.
Galium sylvestre.
Cnicus oleraceus.
Gnaphalium luteo-album.
Antennaria dioica.
Scorzonera humilis.
Senecio paludosus.
Senecio palustris.
Senecio saracenicus.
Lactuca perennis.
Hieracium Auricula.
Campanula persicifolia.
Specularia Speculum.
Vincetoxicum officinale.
Myosotis arenaria.
Echinospermum Lappula.
Verbascum phlomoides.
Verbascum pulverulentum.
Limosella aquatica.
Linaria supina.
Veronica verna.
Veronica Teucrium.
Veronica præcox.
Veronica acinifolia.
Veronica triphyllos.
Melampyrum cristatum.
Melampyrum arvense.
Primula elatior.
Stachys recta.
Lamium maculatum.
Teucrium Scordium.
Teucrium Chamædrys.
Polygonum Bellardi.
Thesium humifusum.
Euphorbia dulcis.
Euphorbia palustris.
Spiranthes æstivalis.
Orchis laxiflora.
Leucojum vernum.
Maianthemum bifolium.
Muscari comosum.
Eriophorum gracile.
Rhynchospora fusca.
Scirpus Savii.
Scirpus acicularis.
Scirpus Rothii.
Carex trinervis.
Carex ericetorum.
Carex limosa.
Carex hordeistichos.
Carex filiformis.
Alisma natans.
Juncus Tenageia.
Leersia oryzoides.
Deschampsia discolor.
Setaria verticillata.
Bromus tectorum.
Nardurus tenellus.

Analysis of List II.

Distribution of the species in England:—

More or less widely distributed	11
More especially or entirely in the S., S.W., or S.E.	13
More especially or entirely in the E.	11
Local Western or Northern species	3
Absent or very occasionally introduced	50

Distribution of the species in France:—

More or less widely distributed	68
More especially or entirely in the N. and/or E.	11
More especially or entirely in the W. and/or S.	6
More especially in the W. and N.	3

Distribution of the species in the coastal continental countries of N.W. Europe :—

Northern limit in Scandinavia	51
Northern limit in Denmark	0
Northern limit in Holland	12
Northern limit in Belgium	13
Northern limit in France	4

Discussion.

The absence of any particular species from any particular region can be explained by one of two, and only two, hypotheses: either the species has never reached the region (that is to say, has never been dispersed into it) or else it has been so dispersed but has been unable to establish and maintain itself. That it has never reached so far may in turn result from two causes: either the time during which normal dispersal has proceeded has been insufficient to enable the species to cover the necessary distance, or else the normal course, direction and speed of dispersal has been modified. The distinction between these two causes is almost entirely a theoretical one and it is only very rarely that there is any indication as to which has played the important part. Modifications of normal dispersal may be brought about by many factors, among which climatic, edaphic, and topographic variation and change are the most important.

The first of these two causes of absence may, for convenience, be called the "time and distance" view. In its simplest expression it takes into consideration only normal or subnormal rates of dispersal, but when it is used as an explanation of geographical facts there must be added to it the assumption that even postulating extraordinary methods of dispersal such as accidental or intentional transport by human or other agency the species has not had time to cover the requisite distance. It must also be remembered that theoretically very little modification of normal dispersal may result in an area within the species-range remaining uncolonized.

The second of the two causes of absence may be ealled the "non-establishment" view. Similarly, but conversely, the adequate dispersal, which is a necessary preliminary, may be brought about by ordinary or extraordinary means. Absence by non-establishment may result from two circumstances: the complete failure of reproduction in the introduced individuals, such as inability to ripen and/or the dying out of individuals after an indefinite period of success, because of subsequent changes in the external conditions. Evidence of the latter is usually historical.

Before attempting to apply these causes to the lists it is necessary to remark upon the geological history of the British Isles. From the botanical point of view two events are of paramount importance, namely, the Pleistocene glaciation and the cutting of the English Channel. Opinions vary enormously regarding the extent of the glaciation: some maintain that those geological features generally taken to be indicative of great glaciation are the results of totally different causes, others maintain that during the greater part of the

ice-age the flora, such as we know it now, must have been almost entirely destroyed and that practically nothing survived. As is usual the truth probably lies somewhere in between. The evidence that, during the Pleistocene, the country was mainly covered by an ice-cap forming part of the great ice-sheet that covered the northern half of Europe, seems incontestible, but it seems possible that the effect of this upon the flora may not have been so devastating as is generally supposed. At least a part, especially the northern and arctic part, of the present flora may have persisted throughout the ice-ages, but it must be remembered that the plants under discussion here belong to the more southerly element of the British and French floras, and, so far as these are concerned, it is probably quite justifiable to assume that they have entirely re-immigrated since the retreat of the ice.

Very little is known of the course of events resulting in the cutting of the English Channel, and it is only possible to quote what is perhaps the most generally accepted view of geologists. It is believed that the British Isles became separated from, and rejoined to, the continent several times during the latter part of the Tertiary, but the final severance occurred very recently indeed, certainly since the ice retreated and, perhaps, only a few thousand years ago. Its relation in time to the retreat of the ice is not known, but possibly it was the direct result of the flooding caused by the melting of the ice, and, if so, then the retreat of the ice and the inception of the Channel would be almost contemporary. It also appears that the Channel was at first much narrower than now and has only lately attained its present width, and this view is supported by a certain amount of historical evidence.

From these considerations it is clear that the present British flora (excluding such a minority as may have survived the glaciation) has immigrated from at least an easterly, and most probably a southerly, direction. It follows that the "time and distance" view is inapplicable to those species present in Kent but absent from the Pas de Calais, because, from whatever direction they may have migrated, they must, in order to reach Kent, have covered a distance which would at least have carried them to Pas de Calais. Actually 42 out of 54 of these species are found in France and Great Britain and also in Belgium or some country further to the north-east, so that from whatever continental direction they have come Pas de Calais is within their range of potential dispersal. All the other twelve species are found in at least some part of France, and hence, even assuming the most improbable fact of a direct north to south migration, Pas de Calais is within their area of dispersal. Nineteen out of the fifty-four are more or less widely spread in England, while on the other north-west continental seaboard twenty-three reach southern Scandinavia. Only the twelve already mentioned are found, on the continent, no farther north than France and of these all but three are confined to the south of England, and their total continental ranges point very decidedly to a southerly point of immigration. The three exceptions are *Œnanthe crocata* found all over Britain, *Ulex nanus* with a wide but uneven British range, and *Rubia peregrina*, essentially

a western plant. The first will be referred to again later; the latter two are, continentally, western or Atlantic species. It is a significant fact that several of the species in List I., such as the *Rubia*, *Ulex*, *Inula*, *Linum*, and *Iris*, essentially Atlantic species, range as far *north* as Kent, but not as far *east* as Calais, although in the first case they have presumably had to surmount the English Channel. No such gap intervenes to their spread north-east in France, but in this direction they are rigidly limited.

While the preceding paragraph shows that the "time and distance" view affords no explanation of the anomalies in List I. it might reasonably be expected to have a wider application under the reversed circumstances of List II., but a study of the details indicates that this is not so. First of all, thirty-eight of the eighty-eight species listed are found in some other part of England, although not in Kent, and presumably the same remarks apply to them as to the species of List I. One slight modification is, however, necessary in the case of such species as *Selinum Carvifolia*, *Senecio palustris*, *Verbascum pulverulentum*, *Veronica verna* and *V. triphyllos*, and *Melampyrum cristatum*, which in this country are rigidly confined to East Anglia and which may theoretically, assuming an immigration from the east, have spread to that region and to Calais without appearing in Kent. These species are, on the other hand, among the most local British plants, and are restricted to a very definite ecological and geographical region, and their range is presumably limited by the range of these conditions. The remaining fifty species of List II. have, in general, a continental limit farther north than the latitude of Kent. Actually only thirteen species have their northerly limit as far south as Belgium, and of these only four—*Trifolium patens*, *Linaria supina*, *Scirpus Savii*, and *Carex hordeistichos*—are confined to France, while twenty-two reach at least the south of Scandinavia. In other words, although these fifty species are absent from Britain, yet forty-six of them have a continental limit farther north than the south coast of this country and a large number of them reach the latitude of Scotland. This remarkable fact at once raises the question of how far the English Channel is an effective bar to the immigration of species into this country. That it is such a barrier is a very facile explanation for certain geographical problems, but further consideration must tend to modify this view, because it is not generally realized what the acceptance of such an opinion involves. The distance alone may be first considered. Taking other parts of the world into account, there is no reason to presume that a sea-belt of 20 miles is sufficient to form a serious and definite barrier to plant-movement. If such were the case, the amount of endemism would be much more than it is, and the differences between neighbouring floras much more marked. But more important than this assumption that the failure of these species to appear in Kent is due to the presence of the Channel is the necessary corollary that the plants have never in their whole history been dispersed across the Channel and that no seeds of any of the species have been accidentally or intentionally transported, because, if it be allowed that such may have happened, then the

question is no longer one of the efficacy of the Channel as a barrier but the much more complex one of the reasons for the non-establishment of introduced plants. Moreover, it has already been stated that the chances of such abnormal transport are probably greater here than anywhere else in the world, and to assume in face of this that the Channel is acting as a barrier is unjustifiable. To attempt to prove that it has never acted as a barrier in individual cases would be absurd, but to assign any appreciable part of the differences between the two floras to this cause is even more absurd.

The continental ranges of the fifty species absent from, or only very occasionally introduced into, England show some points of interest. Thirty-four of them are distributed widely over the continent or at least over the central part. Six others, among them *Trifolium patens*, *Orlaya grandiflora*, and *Veronica acinifolia* are also wide species, but particularly in the southern part of the continent. Eight of the remaining ten have a distinctly south-western continental range, and these include *Erucastrum Pollichii*, *Linaria supina*, *Polygonum Bellardi*, and *Orchis laxiflora*. The two other species are *Braya supina* and *Carex trinervis*, and both are confined to the north-western and western coasts, the former between France and Sweden, the latter between Spain and Sweden.

From these arguments it seems clear that the "time and distance" view is applicable only to perhaps half-a-dozen plants in List II. and that in these the probabilities are considerably against it.

The second possible explanation, the "non-establishment" hypothesis, is not quite so easily discussed. Since there were only two original causes and one has been shown to be untenable, it follows that the other must be the true one, but this reasoning is scarcely enough. There are, however, a number of evidential points which can be produced in support of this view.

If the distribution of certain species is plotted in such a way that the departments or counties occupied are shaded, it will often be found that the result is to show either Kent or Pas de Calais unoccupied itself but surrounded by shaded areas. It is obvious that so striking an effect is largely the result of using an artificial method of representation, but it brings out clearly an important possible type of distribution. Such is, for example, seen in those species which are present in south-east England, in France south and south-west of Calais, and in Belgium, but which have never been recorded from the Pas de Calais. It cannot reasonably be supposed, however, that their absence from Calais is because their dispersal units have never been carried from any part of the periphery into that region. The explanation that they are absent because the local conditions do not allow them to become established is perfectly satisfactory, and clearly the correct one. In other words, they have presumably been introduced, but not successfully.

Other species show the same kind of feature, but less markedly, as when a species-range stops abruptly in a district where, so far as can be seen, there is no obstacle to its further spread. Perhaps the most apposite example is *Œnanthe crocata*. This species is distributed

commonly throughout the British Isles, and is particularly common in the marshes of east Kent. On the continent it is found along the Atlantic seaboard from Portugal in the south to somewhere about the mouth of the R. Somme in the north. Here it stops abruptly, and is absent from Pas de Calais, Belgium, and the country farther north. That there is some barrier to its spread in this direction is obvious, but that there is a similar barrier to its dispersal is unbelievable, and it must be assumed that on the continent north of the Somme the conditions are not those favourable to the development of the plant. A very similar case is seen in the opposite list in those species which are common cornfield weeds in France and yet are entirely, or almost entirely, absent from the British Isles. It is in the corn-fields of north-east France that the differences between the floras on the two sides of the Channel are most forcibly brought to sight. Species like *Delphinium consolida*, *Specularia Speculum*, *Adonis*, *Muscari comosum*, and *Lactuca perennis* are abundant, and yet all are almost unknown in England. Other species like *Iberis amara* and *Centaurea Cyanus*, while occurring in England, are far more abundant in France. *Muscari comosum* is a common garden-plant in this country, and if its absence as a wild plant was simply due to lack of dispersal it would almost certainly by this time have established itself as an escape from cultivation. Moreover, such weeds as these are just those plants which are most likely to be carried from place to place in the débris of cultivation. It is unbelievable that they have not, time after time, been introduced into England from the continent by some means or another, and it seems clear that their absence is due to the fact that differences of farming methods in the two countries here deny them the conditions they need for establishment. This view is supported by the known facts of plant disappearance after a change in farming method and in the gradual elimination of noxious weeds. This explanation is, moreover, just the one which it is hoped to substantiate here—namely, that absence is due, not to failure in dispersal, but to differences of existing conditions.

Another piece of evidence is afforded by those species which, occurring normally and permanently in Calais, have been found once or twice in this country but always as transitory casuals. Such are *Erucastrum Pollichii*, *Caucalis latifolia*, *Scorzonera humilis*, *Tetragonolobus siliquosus*, and *Herniaria hirsuta*. It is quite obvious here that they are fighting an unsuccessful battle against prevailing conditions of various kinds.

An interesting feature of List I. is the little group of maritime species, none of which is certainly recorded from Pas de Calais. They are five in number—*Cochlearia anglica*, *Erodium moschatum*, *Lathyrus maritimus*, *Inula crithmoides*, and *Zostera marina*. The *Lathyrus* has a remarkable general distribution: on the coasts more or less rigidly confined to certain definite types of habitats like certain zones of pebble-beach, but found also inland in Asia and America in such localities as the shores of Lake Superior. It has been suggested that its presence in the latter area is as a relic since the time when the Great Lakes were part of a great sea extending far into the continent,

but fascinating as is this suggestion it seems to place too much onus upon the presumed plasticity of the species. Its absence from Calais can fairly certainly be ascribed to lack of suitable habitat. *Inula* should theoretically be present in Calais, because, although a local English plant, the cliffs of both Kent and Calais would seem to afford a similar type of habitat. The absence of *Zostera* is of very particular significance for evidential purposes, because, being one of the true marine Angiosperms, the Channel must be an active dispersal agency rather than a barrier.

Attention has already been drawn to *Œnanthe crocata* and its sudden limitation at the R. Somme. Exactly the same thing is seen in *Inula crithmoides*, but here the plant is rare in England and restricted to certain types of habitats. These habitats (cliffs) would tend to be rare in Belgium, Holland, and Denmark, but Calais might reasonably be expected to provide habitats very similar to those of Kent. Yet the limit of distribution on the continent is not near the Franco-Belgian frontier, but considerably farther south-west. A somewhat similar feature is seen in *Lathyrus maritimus* and *Cochlearia anglica*, which also show a distributional limit at the Seine or Somme. In these species, however, this limit is not absolute and the species reappear farther north, extending into Scandinavia.

Finally, there is the evidence of our knowledge of the dying out of native or at least established species by changes in their environment. It will suffice here to mention two examples. Two species of *Senecio*, once native in the fens of East Anglia, are now entirely or almost extinct, and, so far as can be seen, this is altogether due to changes of drainage, causing, in turn, differences in edaphic conditions. The second example is *Eryngium campestre*, which, for long well-known from at least one locality in Kent, has been exterminated by golfers.

The conclusion reached from these arguments is that all but perhaps a very minute proportion of the striking differences between the floras of Kent and Pas de Calais is due to the second suggested cause—namely, the differences in external conditions in the two regions, and not to lack of dispersal. Clear as this seems, it is a result not easily realized. The great general similarity between Kent and Calais has been noticed at the beginning of this paper. Geologically the two show an almost identical range of formations, while topographically they are simply disjoined parts of a single natural region. Climatically they are similar, and their differences in this respect are certainly not those which one would expect to find reflected in the floras. As regards the species of cultivated land it is probable that variation in farming procedure may lead to serious changes in environment, but only a very few of the plants in the two lists belong to this class. Nor does there seem to be any particular ecological type unduly absent or present in either list. There are, for example, certain chalk plants found in Kent but not in Calais, but there are also others found in Calais but not in Kent. It is probable that further investigation will alter the lists in details and especially will curtail List I.; but, even allowing for this, the differences described are very remarkable. There seems only one explanation, and this is that the external factors con-

trolling plant-range are far more delicately balanced than is generally supposed. What exactly these controlling factors are in the individual species is as yet but little understood, and the elucidation of this problem offers a most promising scope for original investigation in the field.

The writer's grateful thanks are due to Mr. C. E. Salmon and Mr. A. J. Wilmott for much valuable information; and to M. R. de Litardière and Dr. Bouly de Lesdain for details of the Calais flora.

THE IDENTITY OF THE GENUS *SARCODUM* LOUREIRO.

By E. D. Merrill.

In 1790 Loureiro published his description of the genus *Sarcodum* (Flor. Cochinch. 492), represented by a single species, *S. scandens* Lour., based on material originating in the vicinity of Hue, Cochinchina. Although a fragmentary type exists in the herbarium of the British Museum, the genus has remained until the present as one of doubtful status. Mr. S. Moore made a critical study of the British Museum specimen in 1925 (Journ. Bot. 1925, 286), publishing a photograph of the very fragmentary material and giving additional descriptive data supplementing Loureiro's original description. The nature of this material is such that it is not at all surprising that he did not recognize that Loureiro's species is the same as *Clianthus Binnendyckianus* Kurz. He calls attention to the fact that Bentham had admitted the genus as apparently close to *Millettia*, but differing in its legume and in the leaves, which, he says, are rather those of *Tephrosia*. Mr. Moore states that there seems to be no reason to dissent from Bentham's view, and that, further, as the specimen answers to nothing in Gagnepain's recent account of the Leguminosæ of Indo-China, one is forced to conclude that *Sarcodum scandens* has hitherto escaped the notice of subsequent collectors.

Clianthus is not recorded from Indo-China, and Mr. Moore's statement is correct in reference to collections made in Indo-China up to the year 1927, when, fortunately Chaplain and Mrs. Joseph Clemens secured ample material representing *Sarcodum scandens* with flowers, mature and immature fruits on the lower slopes of Mount Bana, back of Tourane, and some 100 kilometres south of Hue where Loureiro lived in Cochinchina. This material conforms to Loureiro's original description and Mr. Moore's supplementary notes and illustration, and most unexpectedly, from the standpoint of phytogeography, proves to represent a genus hitherto unrecorded from Continental Asia, except as to Loureiro's original description of *Sarcodum*. The specimen is *Clianthus Binnendyckianus* Kurz, the genus hitherto being known by two or three species in Australia, two in New Zealand, and one in the Philippines, Ceram, and Celebes.

Loureiro's generic name (1790), long antedating *Clianthus* Solander (1832) and its synonyms *Donia* G. Don (1832) and *Eremocharis* R. Brown (1849), should, under strict priority, be adopted and

the several species of *Clianthus* transferred here. However, in anticipation that *Clianthus* will be retained in the next list of *nomina conservanda* to be adopted at the 1930 International Botanical Congress, I prefer to retain *Clianthus*, making the following adjustment in nomenclature for the species under consideration :—

Clianthus scandens (Lour.), comb. nov. *Sarcodum scandens* Lour. Fl. Cochinch. 492, 1790; Moore in Journ. Bot. 1925, 286, cum fig. *Clianthus Binnendyckianus* Kurz in Journ. As. Soc. Bengal, xl. ii. 51 (1871); Merr. Enum. Philip. Fl. Pl. ii. 282 (1923).

Hab. Indo-China: near Hue, *Loureiro*, type in Herb. Mus. Brit.; Mount Bana, *J. & M. S. Clemens*, 3773, June 27, 1927, in forests along the road to Mount Bana; flowers rose with a yellow spot on the banner. Philippines (Polillo, southern Luzon, Leyte, Camiguin de Misamis and Mindanao, numerous collections), Celebes, Moluccas (Ceram).

The specimen cited above closely matches in all essential particulars the numerous Philippine specimens available for comparison.

While the finding of a representative of *Clianthus*, a genus, apart from this one species, confined to Australia and New Zealand, in continental Asia is a surprise, yet there are other interesting indications of a phyto-geographic trend between Indo-China, the Philippines, and the Moluccas in such species as the euphorbiaceous *Strophioblachia fimbricalyx* Boerl., a monotypic genus—Indo-China, Luzon, Palawan, Panay, Bungao, Mindanao, Celebes,—and the genus *Pseudotrophis* Warburg, with two species, one in Indo-China and the Philippines, the other in the Kei Islands. The very characteristic grass, *Chloris tenera* (Presl) Scribn. (*C. Ridleyi* Hack., *C. obtusifolia* Balansa), which I reported * from the Malay Peninsula, Pahang, Indo-China, Hainan, Philippines (Luzon, Negros, Bohol), Celebes, Moluccas (Gilolo, Ternate, Banda), and New Guinea, has recently been recorded from northern Sumatra by Backer †, but has not yet been found in Java or Borneo.

MESEMBRYANTHEMUM AND ALLIED GENERA.

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

(Continued from p. 145.)

ARGETA N. E. Br. in Gard. Chron. lxxxii. 113 (1927).

A. petrensis N. E. Br. *l. c.* 114, f. 52 (1927).
Riversdale Division: on hills in the Klein Karoo, *Muir*, 3622!

ARGYRODERMA N. E. Br. in Gard. Chron. lxxi. 92 (1922).

The species belonging to this genus—*A. crateriforme* N. E. Br., *A. duale* N. E. Br., *A. necopinum* N. E. Br., *A. subalbum* N. E. Br.,

* Bull. Soc. Bot. France, lxiii. 27 (1926).
† Backer, C. A., Handb. Fl. Jav. ii. 221 (1928).

and *A. testiculare* N. E. Br., and its varieties *luteum* and *Pearsonii* N. E. Br. are all described and their synonymy given in Gard. Chron. lxxi. 93, 105 (1922) and lxxix. 268 (1926).

To the above has since been added the following:—

A. DELAETII Maass, in Zeitschr. f. Sukk. 1928, 180, f. 1. (*M. testiculatum* (error for *testiculare* Ait.!) Jacq. Fragm. 20, t. 12. f. 2.)

Van Rhynsdorp Division: near Van Rhynsdorp, *Mrs. Rood & Pillans*!

This species differs from *A. testiculare* by its larger leaves and very much longer and narrower petals. The flowers vary from white to yellow and purple in the same way as in *testiculare*.

ASPAZOMA N. E. Br. in Gard. Chron. lxxviii. 413 (1925).

A monotypic genus, native of Namaqualand. The name is derived from the Greek, *aspazomai*, to embrace, in allusion to the manner in which the sheaths of the leaves embrace the stem.

A. AMPLECTENS N. E. Br. (*M. amplectens* L. Bolus in Ann. S. Afr. Mus. ix. 153.)

ASTRIDIA Dinter in Gard. Chron. lxxx. 430 & 447 (1926), and Dinter & Schwantes in Zeitschr. f. Sukk. 1927, 3, 14, & 16.

A. VELUTINA Dint. in Gard. Chron. *l. c.* f. 197; and Dint. & Schwant. in Zeitschr. f. Sukk. *l. c.* 16. (*M. velutinum* Dint. in Fedde Rep., Beiheft, xxiii. 52, 1923.)

Great Namaqualand: Klinghardt Mountains, *Dinter*!

This genus may be a good one, as the plant has a distinct appearance, but the only characters mentioned whereby it can be distinguished from *Mesembryanthemum* are that it has hollow hairs upon its seeds and filiform stigmas, which taken alone appear to me insufficient for its separation. For the hairs upon the seeds are by no means so unique as Dinter and Schwantes have stated; they occur upon the seeds of other plants in the group, and in the genus *Glottiphyllum*, while most species are without such hairs, there are also a few species that have these hollow hairs upon their seeds! At present the genus *Astridia* is insufficiently described, but possibly its fruit, when known, will add further characters.

Schwantes (*l. c.*) has also placed *M. maximum* Haw. under the genus *Astridia*, as *A. velutina* Schwant., but this is a mistake, for *M. maximum* Haw. is a true *Mesembryanthemum* and has glabrous seeds.

BERGERANTHUS Schwantes in Zeitschr. f. Sukk. ii. 179 (1926).

When founding this genus Schwantes included 14 species in it, most of which he afterwards removed to five other different genera, leaving only four species under *Bergeranthus*. The following is a list of the species at present known to belong to it. All are South African, but precise localities are unknown to me where not mentioned:—

B. ARTUS L. Bol. in S. Afr. Gard. 1927, 364, f. 16 *a* & 365.

B. IGNAVIUS Schwant. *l. c.* 180, name only.

B. MULTICEPS Schwant. *l. c.* 180. (*M. multiceps* Salm Dyck, Mon. § 6, f. 6; Berger, Mes. & Port. 253.)

Uitenhage Division: Zwartkops River, and near Uitenhage.

B. SCAPIGER N. E. Br. (*M. scapiger* Haw. in Phil. Mag. 1824, 428; Salm Dyck, Mes. § 6, f. i. *M. scapigerum* Eckl. & Zeyh. Enum. 309; Berger, Mes. & Port. 252 & 250, f. 54, i., copied from Salm Dyck. *Bergeranthus scapigerus* Schwant. *l. c.* 180.)

According to the record this may have been collected in Caledon Division by *Bowie*.

B. VESPERTINUS Schwant. *l. c.* 180. (*M. vespertinum* Berger, Mes. & Port. 253 (1908), and in Engl. Bot. Jahrb. xlv. 228 (1910).)

Somerset Division: near Somerset East.

BROWNANTHUS Schwantes in Zeitschr. f. Sukk. iii. 14 & 20 (1927).

This name is a synonym of TRICHOCYCLUS N. E. Br., being an unlawful change of name for that genus. Schwantes changed the name because he mistakenly supposed that the earlier name *Trichocyclus* Dulac was a recognized genus, and has overlooked the fact that Dulac deliberately and unlawfully changed all existing names used in his *Flore Pyrénées* that were named after people, merely because he thought it wrong to name a genus after a person. Among others the old and well-known genus WOODSIA R. Br. was changed to *Trichocyclus* Dulac, which was therefore an unlawful synonym when it was made, and never had any existence as a recognized genus. Therefore *Brownanthus ciliatus* and *B. Schenckii* Schwant. *l. c.* 21 (*M. ciliatum* Ait. and *M. Schenckii* Schinz, which Schwantes seems not to know are specifically identical) must be called *Trichocyclus ciliatus* N. E. Br., and *B. Marlothii* Schwant. *T. Marlothii* N. E. Br. See also Maass in Zeitschr. f. Sukk. iii. 233.

BIJLIA N. E. Br., gen. nov.

Acaulis, pullulis 2–4-foliatis. *Folia* opposita basi connata, incurvato-patula, clavato-trigona, dorso carinata, angulis subacutis, obtusa, levia, glabra, albida. *Cymæ* inter folia subsessiles, 1–3-flores. *Bracteæ* parvæ. *Pedicelli* breves. *Calyx* subæqualiter 5-lobus. *Petala* 2-seriata, libera, cuneato-linearia, obtusa. *Stamina* in columnam erecta. *Stigmata* 5, filiformia. *Capsula* valvis quinque; valvæ leviter separatæ nec expansæ, carinis valvis dimidio æquilongis invalidis parum elevatis et exalatis; loculi alis subrigidulis acute tecti et foramine tuberculo magno fere clausi.

I found this genus upon specimens of a plant recently received from Mrs. D. van der Bijl, which I at once recognized must be the long-lost *M. canum* Haworth, and as I find that it must constitute a new genus I have much pleasure in dedicating it to that lady, to whom I am indebted for several other interesting plants. But I also find that it must be the plant described and figured by Mrs. L. Bolus as *M. Tugwelliæ*, without having recognized it as being *M. canum* Haw., which it undoubtedly is. Schwantes wrongly refers *M. Tugwelliæ* to his genus *Juttadinteria*, evidently without having examined the plant.

Bijlia is allied to *Cerochlamys*, but differs from that genus by its smooth white epidermis, by the smaller, weaker, and awnless expanding keels of the valves, and by having the opening of the cells of the capsule nearly closed by a large tubercle.

Bijlia cana N. E. Br. (*Hereroa Tugwelliæ* L. Bol. in S. Afr. Gard. 1928, 253, with fig.)

Stemless. *Leaves* in 1–2 pairs to a growth, incurved-spreading, clavately trigonous, 9–18 lines long, 4–6 lines broad and 3–4½ lines thick at the base, and 5–9 lines broad and 4–8 lines thick near the apex, obtuse, flat on the face, strongly and often obliquely keeled on the back and then with one side flattish and the other slightly convex, with somewhat sharp angles, firm, smooth, glabrous, whitish, not shining. *Cymes* 1–3-flowered, with the peduncle not exserted from between the leaf-bases. *Bracts* 1½–3 lines long. *Pedicels* 1–5 lines long. *Calyx*-lobes about 2½ lines long, lanceolate or ovate. *Corolla* 12–15 lines in diameter, yellow. *Stamens* erect, in a column about 4 lines long, yellow. *Stigmas* filiform, as long as or longer than the stamens. *Capsule* 3–4 lines in diameter when open, with 5 valves and cells; valves separating but slightly and remaining inflexed, not spreading open as represented by Mrs. Bolus's figure, the openings between usually less than 1½ line wide; ex-panding keels small, slightly prominent, about half as long as the valve, without free points or marginal wings; cells acutely roofed with slightly stiff cell-wings, with acute depressions between the ridges, and the opening closed by a large tubercle. Seeds several in each cell, ¼ line long, ovoid, pointed at one end, smooth, light brown, with a darker point.—*M. canum* Haw. Obs. 158, Misc. 26, Synops. 219, and Rev. 86, not of Salm Dyck, Berger, nor Marloth. *M. Tugwelliæ* L. Bol. in Ann. Bolus Herb. i. 129, and Journ. Bot. Soc. S. Afr. 1927, t. 3. f. 6. *Juttadinteria Tugwelliæ* Schwantes in Zeitschr. f. Sukk. 1926, 184.

Prince Albert Division: among rocks near Prince Albert, Mrs. D. van der Bijl!

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

Ophrys aranifera Huds. by C. B. Tahourdin (*Orchid Review*, xxxvi. (1928), 230).—The author states that some six or seven years ago he saw for the first time this orchid growing in Kent, and, learning that there were two forms, desired to see the second form, known as *fucifera*. In subsequent years he has examined a great many specimens, probably some hundreds, coming from the well-known haunts of both forms in Kent, Sussex, and Dorset.

Hanbury and Marshall's *Flora of Kent* (1899) 335 has the following:—"*O. aranifera* Hudson (including *O. fucifera* Smith). We follow G. E. Smith, who had unusually good opportunities for forming an opinion, in uniting *O. fucifera* with *O. aranifera*. Even at Queentown Warren, the *locus classicus* for the former plant, every gradation may be met with between the two extremes."

Most writers seem fairly well agreed that the differences between the two plants depend on the roughness or smoothness of the petals and the lobing of the lip, while the time of flowering is also mentioned. Mr. Tahourdin states that, after careful examination and comparison of both forms, he cannot find any real difference in the petals, that in both forms the entire and 3-lobed lip occur, and that in both forms the lateral humps vary from being hardly distinguishable to quite prominent, such prominence seeming to increase as the bloom ages. From his experience he finds that the two forms flower much about the same time in some localities, while in others *fucifera* appears earlier, not later, than *aranifera*. It therefore appears that there is very good ground for the suggestion that these two forms should no longer be separated and that the term *fucifera* should be dropped.—E. G. B.

Tubercules of *Ranunculus Ficaria*.—Miss A. C. Halket (*Annals of Botany*, xli. 731) gives an account of observations on the tubercules of *Ranunculus Ficaria* L. She follows the early French investigators in using the term "tubercules" to denote the small tuberous structures which arise in the axils of the foliage-leaves and which eventually fall off and form new plants. A tubercule is defined as a structure consisting of the axillary bud of a leaf and its adventitious root or roots. Detailed descriptions are given of the anatomical structure of these adventitious roots, the growth of the tubercule during its first year, the deposition and removal of starch in the cells of the adventitious roots, and the cytological changes which take place in the cortical cells during the extraction of their contents. The paper is illustrated by a number of drawings—fig. 6, which consists of a series of drawings made from intact cortical cells from transverse sections of fresh material, illustrating the changes that take place in the cells during the growth of the tubercule, is of especial interest.—Doris Powell.

The 44th Annual Report of the Watson Botanical Exchange Club (1927–8), vol. iii. No. 11, is edited by H. Stuart

Thompson. Mr. J. E. Lousley, the Distributor, dealt with 2039 examples, and the following notes upon various gatherings seem worthy of reprinting for others besides the members of the Club:-

P. 430:—*Vicia gracilis* Lois, Ref. 1409.—Amongst grass by Denbies Drive, Dorking, Surrey, v.c. 17, July 16, 1927.—E. C. Wallace. Yes, with shorter leaflets and smaller flowers than usual. —H. S. Thompson. Rather a small weak form, but appears correctly named. I have no record of this plant as a *native* Surrey species though reported as an introduction—so if wild in this station it would be a new County record.—C. E. Salmon.

P. 435:—*Anagallis arvensis* L. var. *pallida* Hook. f. No. 423, Cult. Wimbledon, 1927. Orig. Poole Harbour, Dorset, 1913.—H. W. Pugsley. This pretty pimpernel, which produces pale pink corollas with a bright crimson centre, was collected at Poole Harbour in 1913, and from seeds sown in my garden the following spring the plant has perpetuated itself without variation up to the present time. The common scarlet pimpernel has also grown in my garden for many years, and although it is often intermingled with the pink form, they both appear constantly to maintain their distinctive features. I have never seen any other colour-form in the garden.

The plant is not sent under the name of var. *carnea* (Schrank), as Schrank (Baier. Flora, i. 461) states that the stem of his plant is erect and its flowers flesh-coloured (without any mention of a dark centre). It is treated as an intermediate between *A. phœnicea* (*A. arvensis* L.) and *A. cærulea*, and under the former of these Schrank gives a variety *β*, "with white flowers," which may be identical with my Poole plant. Some of the pimpernels with nearly self-coloured flowers, flesh-coloured, lilac, or dull purple, which are frequently met with in Britain as on the Continent, are probably referable to *A. carnea* Schrank. Hooker's varietal name *pallida* in the *Student's Flora* is the earliest that I know to denote a form with clearly bicoloured flowers, but it may prove to be antedated.—H. W. Pugsley.

P. 440:—× *Mentha cordifolia* (Opiz) var. *dourensis* Fraser (*rotundifolia* × *spicata*). The Dour, New Aberdour, North Aberdeen, v.c. 93, Sept. 17, 1927. The specimens are somewhat discoloured, because they were considerably shaded by the rank vegetation, consisting of *Spiræa Ulmaria*, *Heracleum Sphondylium*, etc., with which they were competing. The variety differs from the type in the spikes being more slender, more interrupted, and longer, with dark purple instead of pinkish flowers. The leaves are also more pointed and the serratures deeper.—J. Fraser.

P. 444:—*Rumex obtusifolius* × *pulcher* (685). Cricket Field, Hitchin, Herts, Sept. 3, 1926, June 8 and August 1, 1927.—J. E. Little. The present plants differ from *R. pulcher* in the same field by the less flexuous straighter branches and in the greater proportion of unbranched stem at the base. They are taller and more upright growing. But they also differ from the *R. obtusifolius* × *pulcher* (681), distributed in 1923, by the smaller development of the stem-leaves, which hardly differ from those of *R. pulcher*.

I sent a sheet of the Sept. gathering to Dr. K. Rechinger, of Vienna, who replied (*in litt.*, 22 iii. 27):—"(685) ist *R. obtusifolius* × *pulcher*."—J. E. Little.

P. 445:—*Salix triandra* × *viminalis* b. *Trevirani* Sprengel (Ref. No. 452). Cultivated at Kew from Mortlake, Surrey, v.c. 17. Catkins 17th April, leaves 15th August, 1927. By cultivating this hybrid I have been able to get rather better specimens than from the wild bush that gets broken by people gathering catkins they call palm. The stipules of the hybrid are very distinct from those of the hybrids *S. rubra* and *S. undulata*, which the leaves resemble.—J. Fraser.

P. 447:—*Salix cinerea* L. f. *aquatica* (Sm.). Wood, Cambridge Batch, Long Ashton, Bristol, N. Somerset, Mar. 28, June 15, 1927.—Ida M. Roper. Leaves far too hairy for the f. *aquatica*, according to Smith's descriptions and his specimens in the Linnean Harbarium. The leaves are ashen grey or glaucous beneath with a few short scattered hairs, or small tufts occasionally. I would name this *S. caprea* × *cinerea*. The lower leaves are broadly elliptic like *S. caprea*; the upper ones more like *S. cinerea*, and all are tomentose beneath like *S. caprea*. A rare find and beautiful specimens.—C. E. S. J. Fraser.

Transactions of the Devonshire Association for the Advancement of Science, Literature and Art, lix. (1927) 73–85; Nineteenth Botany Report, edited by G. T. Harris, Recorder.—This report contains some 270 records distributed over various districts, many being new records for the county. Unfortunately, owing to the lack of an up-to-date Flora of Devonshire and the scattered nature of existing records, it is difficult to decide whether some presumably new record has been published or not.

The occurrence of *Chrysoplenium alternifolium* near Tiverton is very interesting, as it appears not to have been noted since 1871. Another plant of interest is the butterwort, *Pinguicula vulgaris*, from near Teigngrace. This was reported in the Seventeenth Botany Report from the parish of Ilsington, but Miss Larter has lately seen a specimen and finds that the Ilsington plant is *Pinguicula grandiflora*.

The distribution of the pedunculate and sessile oaks on the north-west fringe of Dartmoor forms the substance of a note. It seems that the sessile oak does not obtain dominance in any part of the district and that even on the moor itself—*e.g.*, Black Tor Copse and Tor Wood, near Lake—the pedunculate oak is the prevailing species.

Thirteen species of freshwater Algæ are added to the county Flora, as shown in a separate list. There are also lists of some of the mosses, hepatics, fungi, and lichens.—E. G. B.

RECENT ADDITIONS TO THE LIST OF PERTHSHIRE PLANTS, by J. R. Matthews (Trans. & Proc. of the Perthshire Society of Nat. Sci. viii. (1926-27, 184).—A careful compilation has been made of all the numerous recent records of the flora of Perthshire additional to Mr. Barclay's paper which appeared fifteen years ago in the same publication and which supplemented Dr. White's Flora (1898). This paper should be consulted by all students of the Perthshire flora.—E. G. B.

THE HEPATICS OF ESSEX, by the late St. John Marriott (*Essex Naturalist*, xxii. 74, 1928).—The author gives a careful list of the fifty-one hepatics occurring in Essex. Fourteen of these species do not appear to have been re-discovered in the county since the days of E. Forster or E. G. Varenne. The majority are probably still to be found, as all, with the exception of *Saccogyna viticulosa*, occur both in Kent and Surrey.

Of the more recent records *Ptilidium pulcherrimum*, first observed in Epping Forest by J. Ross in 1917, is remarkable, as, apart from records in S. Somerset and in Derby, it is much more frequent in the north, extending to Dumbarton in the west and to S. Aberdeen in the east. This species has been observed in several stations in Epping Forest during recent Cryptogamic Forays of the Essex Field Club. *Ricciocarpus natans*, found in a pond near Chigwell in 1917, still occurs there and in another pond near by. During the last two years *Riccia commutata*, *R. sorocarpa*, and *Lophozia turbinata* have been added to the county list.

Many of the older records in the present list have been obtained from an examination of the hepatics in the British Museum Herbarium. This collection includes numerous specimens gathered in Essex by Edward Forster, 1765–1849. Other records have been obtained from "The Cryptogamic Flora of Kelvedon and its Neighbourhood; compiled from the Herbarium and Notes made by the late E. G. Varenne, M.R.C.S.," by E. D. Marquand, which appeared in the *Essex Naturalist*, vol. v. (1891).—E. G. B.

SHORT NOTES.

ISOETES ECHINOSPORA Dur. IN ENGLAND.—In July last I had a specimen of *Isoetes echinospora* Dur. sent to me from a Dorset locality. Mr. C. E. Salmon was staying with me at the time, and we went together to the place indicated, where we found the plant growing in abundance. This is a new record for England.—L. B. HALL.

The discovery of *Isoetes echinospora* in Dorsetshire, v.c. 9, is of great geographical interest and extends considerably its known range in our Islands. It has been reported, hitherto, from Ireland (Kerry, Galway, and Mayo), Scotland (many counties north of Dumbarton, Perth, and Argyll), and from Wales (Carnarvon, Merioneth, and Glamorgan); its presence in England, especially in the south, has

not been suspected, and it should be searched for in suitable localities.

The plant is widely spread on the Continent, its distribution including Scandinavia, Denmark, Belgium, Germany, France, N. Italy, Russia, etc.

The Dorset examples agree well with specimens I gathered near Kinlochewe (W. Ross) in 1896, and with plants from Finland in my herbarium gathered in 1921 by I. Montell.

The elongated spines, or tubercles, on the macrospores—which are smaller than those of *I. lacustris*—readily separate these two species, but the spines are not, apparently, always so acute as our Handbooks would lead us to expect. Its habit is more slender and graceful than that of *I. lacustris*, the leaves being narrower, more flexuous, and very frequently recurved.—C. E. S.

COTYLEDON UMBILICUS AS AN EPIPHYTE.—Several lists of plants which have been found growing in the soil accumulated in the tops of pollard-willows and such trees have been published in various journals, but these plants can hardly be classed as really epiphytic. The only true epiphyte recorded in Britain is *Polypodium vulgare*, which is commonly to be seen on the branches of oaks and other trees, besides, of course, many mosses, lichens, hepatics, and other cellular cryptogams.

However, I found in the dense forest known as Courtenay Walk on Bolthead, South Devon, a number of plants of *Cotyledon Umbilicus* growing sporadically on the boughs and trunks of oak trees, and in one case, on chestnut. The plant is extremely abundant and conspicuous in the wood, and on the ground attained the height often of over 2 feet, and occasionally as much as 3 feet. The epiphytic plants were small, about 3 or 4 inches tall or little more. They grew scattered about on the branches up to a height of 40 feet from the ground. To the south of the place where I saw most of them the ground rose to a considerable height and the plant was abundant here, but it was clear that, though the seeds might have been blown horizontally to the oak-branches in many cases, in some the seeds must have been blown upwards, and that where they reached a small tuft of moss or some suitable spot, they germinated and established themselves. The fruits contain a very large number of minute very light seeds about one-third of a millimetre long, oblong, brown, and minutely papillose. These seeds are readily wind-dispersed, and it is very common to see plants on high rocks, cliffs, and walls where the seeds have been blown by wind. The fleshy leaves and stems of *Cotyledon*, which contain a considerable quantity of water, no doubt contribute to the plant's power of assuming an epiphytic habitat.—H. N. RIDLEY.

EPIPACTIS DUNENSIS.—In reference to its discovery in N. France, it may be of interest to add that the late Dr. Schlechter sent me two specimens of this plant, gathered in August 1911, on sand-dunes in Pomerania, near the island of Usedom. The exact relation to the island I am sorry not to be able to decipher. One plant is over

36 cm., and the other over 50 cm. The taller plant has very wid sheaths, and both plants have more ovate leaves than the Lancashir plants and the figure of the French plant in the August number o the *Journal of Botany*.—T. STEPHENSON.

MAJOR SMITH'S LOCAL LISTS OF BRITISH PLANTS.—Mr. T. Thorpe, the Guildford bookseller, recently offered in one of hi catalogues a manuscript of some interest to British botanists. Thi is a quarto volume containing a series of local lists of plants. Th following are the headings of the several lists, and, in square bracket the approximate numbers of species recorded in each :—

"British Plants in the Vicinities of Salisbury, according to Dr. Maton. [278.]
"List of British Plants in Salisbury and its Vicinities in the Yea 1845." [468.]
"Alphabetical List of Native Plants found in Portsea Island a different times since September 1846." [619.]
"Alphabetical List of British Plants in the Neighbourhood of Gosport &c., with a few exceptions, from June to 1st week in Sept., 1848." [543.]
"List of British Plants in Hull and its Vicinity in the Year 1847." [299.]
"Alphabetical List of British Plants in the Island of Guernsey." [687.]

Fairly detailed localities are given for most of the plants recorded The remainder of the volume is taken up with descriptions of some two hundred British Lichens, arranged, as are all the above lists, in alphabetical order.

Mr. Thorp was unable to give any information as to the source from which he got this manuscript. According to a note pencilled on the fly-leaf, it appears to be the work of one "Major Smith." Townsend, in his *Flora of Hampshire*, quotes certain of the Hampshire records in these lists as from "Major Smith Cat.," but rather curiously omits all reference to them in his list of "Principal Works and Authorities quoted."

This manuscript is now in the Natural History Museum, South Kensington.—I. A. WILLIAMS.

AMERICAN ROSES.—Mrs. E. W. Erlanson (*Rhodora*, 1928, 109) writes on the subject of the great variability of the species of *Rosa*,— "We shall eventually, for the sake of usability, probably be forced to recognize a relatively small number of collective species, which will be characterized both morphologically and cytologically; within these groups there will be lesser elements, most of which will be of the nature of geographical or local races or varieties and stable hybrids, important for the most part in regional floras.

"In a careful analysis of characteristics used to distinguish species, Boulenger (*Roses d'Europe*, 1924–5) has shown how greatly these

characters vary among individuals in European *Rosa* species. Similarly, one can take any of the 'key characters' used to determine North American *Rosa* species and find undoubted cases where each characteristic breaks down when taken by itself. After growing a large number of individuals of many of our native wild roses and studying them intensively for several seasons, I find that many of the specific characteristics act as though they were independent Mendelian units in that they appear combined in every possible way within each species group. In species having well-developed paired infrastipular prickles, individuals can be found with curved or straight prickles and also unarmed. Pubescence and glands on the foliage vary on different parts of the same plant and also seasonally, as well as among progeny grown from seed of a single plant.

"It is also true, as Crépin ('Rosæ americanæ,' Bot. Gaz. xxii. 1) pointed out, that many species are represented by both a tall and a dwarf form; to this I would add that several North American species also have weak-stemmed semi-procumbent forms. These habit forms are very conspicuous in the field, but decidedly less so in the herbarium.

"In every region on this continent where two or more related species of *Rosa* grow, there are to be found forms which seem to be due to hybridization between the common local species. Often a series of more or less stable forms intermediate between two local species occurs throughout a definite range. In the Great Lakes region there is such a series of forms apparently intermediate between *Rosa blanda* Ait. and *Rosa palustris* Marsh. These forms are all characterized by a flowering period of about two weeks occurring between the periods of *R. blanda* and *R. palustris*. In western Indiana, Illinois, and the eastern parts of Missouri and Iowa are many forms which seem to be intermediate between *Rosa carolina* L. and *R. suffulta* Greene, giving the variable group of *R. rudiuscula* Greene as well as such types as *R. Bushii* Rydb., *R. polyanthema* Lunell, and *R. conjuncta* Rydb. As the writer has stated before, it seems best to treat intermediate forms under the species they most nearly resemble rather than to disregard them under the category of unnamed crosses. Any interspecific cross in *Rosa* is bound to yield a number of different forms, and our knowledge of these is at present negligible."

FLOWERING PLANTS OF WHITBY AND DISTRICT.—In the form of a booklet of 48 pages, Canon Robert Fisher has compiled a list of the flowering plants occurring in a radius of from 12 to 14 miles from Whitby as a record of the work of the botanical section of the Whitby and District Naturalists' Club. The list follows the sequence of the *London Catalogue* (ed. 11), and in a parallel column are added the English names as given in J. F. Rayner's *Standard Catalogue*. In the matter of limitation of species the author also follows the *Standard Catalogue*. Mr. R. J. Flintoff has contributed a list of the Cryptogams in the form of an Appendix, and Canon Fisher also acknowledges his help in the compilation of the main list. The price of the booklet is 1*s.* 6*d.* (Horne & Son, Ltd., Printers, Whitby).

REVIEWS.

A Text-book of Systematic Botany. By DEANE B. SWINGLE, Professor of Botany, Montana State College. 8vo, pp. xiii, 254, with frontispiece and 62 figs. McGraw-Hill Publishing Co., 1928. Price 10*s*.

THE object of the author has been to produce a class-room text-book for the teaching of the principles of nomenclature and the taxonomy of the higher plants. The book is an outgrowth of a course given at the Montana State College for the last fifteen years. It is assumed that the student has previously taken a course in general botany. The facts that systematic botany now finds a place in the curriculum in American Colleges, and that highly trained systematists are members of the teaching staffs, have supplied the motive for the present volume.

The subject-matter is divided into two parts. Part I., "Principles and Methods," includes an exposition of the principles of taxonomy and the development of systems of classification. A chapter on "The Phylogeny of Spermatophytes" briefly describes the various efforts which have been made in this direction. Chapters are also devoted to "Nomenclature"—with reference to modern "Codes,"—"Preparation of Herbaria," and "The Terminology of Systematic Botany and its Literature." Prof. Swingle has done good service in bringing within a small compass a discussion of subjects which should be of special interest to the student of systematic botany.

Part II., "Families of Spermatophyta," is a descriptive account of sixty families, chosen on account of their size, economic importance, or peculiar interest. The sequence is that of Engler's *Syllabus*. The author adopts the view that the Angiosperms are monophyletic, and that the Monocotyledons have sprung in some way from the Dicotyledons. The concise descriptions are illustrated by some useful figures mainly borrowed (with acknowledgment) from other text-books, but the treatment is somewhat unequal; a not very clear photograph of a *Cypripedium* does service for the Orchid family. The account of this family might with advantage be elaborated; there is no reference to the remarkable symbiosis between fungus and tuber which has been established in some genera, and the statement that "in saprophytic and parasitic species (*Cephalanthera* and *Corallorrhiza*)" the leaves are reduced to scales, and that the plants are "often vine-like" require modification.—A. B. R.

Handbuch der biologischen Arbeitsmethoden. Edited by Dr. E. ABDERHALDEN. Pt. 243. 8vo. Berlin: Urban & Schwarzenberg, 1927.

"Biochemische Methoden auf dem Gebiete der Pflanzenhygiene." By JULIUS STOKLASA. Pp. 121.

THIS Monograph belongs to that section of the *Handbook* which deals with the nutrition and metabolism of plants. The aspect of

plant hygiene dealt with concerns the deleterious effects of smoke. The substances most commonly responsible for the damage to vegetation by smoke are sulphurous and sulphuric acids, hydrofluoric, fluosilicic, hydrochloric, nitrous, and nitric acids; of this list the two first are, with the exception of hydrofluoric acid, by far the most toxic as well as being the most commonly met poisonous constituents of the atmosphere. The author distinguishes between acute, chronic, and invisible effects; the first of these is caused by an abnormally high concentration of the toxic gas, in the case of sulphurous acid a minimum of 0·05 per cent. by volume, while chronic effects may be brought about by continuous exposure to an atmosphere containing approximately 0·002 per cent. by volume; according to the author's observations, however, conifers, which are the most sensitive trees to the action of sulphurous acid, are unable to tolerate continuous exposure to an atmosphere containing 0·00014 to 0·0007 per cent. As symptoms of chronic effects may be instanced the destructive action upon the chlorophyll and a lowering of photosynthetic activity and general metabolism together with an accumulation of sulphuric acid in the damaged organs. The so-called invisible effects are manifested by retarded growth, premature changing of colour in the autumn, and diminished resistance to parasitic infection; it has even been suggested that marked evidence of depredations upon firs by beetles, such as *Pissodes hercyniæ* or *P. scabricollis*, are trustworthy indications of damage due to smoke and notably to sulphurous acid. Detailed methods are given for estimating the various gases concerned, both in the atmosphere and in the body of the plant. Considerable space is devoted to a description of the action of the fluorine-containing acids and methods for the estimation of fluorine in plants, soils, minerals, &c., are given with full practical details. The monograph is completed by a similar treatment of the toxic action of hydrochloric acid.

"Die Phytochemie als Hilfsmittel zur Lösung phylogenetischer Fragen." By HERMANN THOMS. Pp. 10.

FOLLOWING on the above-mentioned monograph by Stoklasa is a short essay by Thoms, in which the author attempts to substantiate the thesis that the occurrence of similar substances in different representatives of the same plant-group supports the assumption that the different genera are related.—P. HAAS.

Narrative of a Journey across the Island of Newfoundland in 1822. By W. E. CORMACK. Centenary issue edited by F. A. BRUTON, M.A., Litt.D. Sm. 8vo, pp. xx, 138, with illustrations and Map. Longmans, London, 1928. Price 3*s*.

UNDER this title Dr. Bruton has reprinted in a form adopted for use in the schools of the Island the original text of the report of this intrepid pioneer in the exploration of the natural history and resources of the interior of Newfoundland. Some account of Cormack's life

and work has already been given by Dr. Bruton in the *Journal* (see Bibliographical Note, XCI., p. 175). The narrative is in the form of a diary recording the incidents of a walk, with a single Micmac Indian as a companion, across the island from east to west, an arduous and perilous journey through *terra incognita*, which occupied four months of the autumn and winter of 1822. The writer was a good naturalist and includes notes of his observations on the geological and natural history of the region traversed. His list of plants numbers about 170 and was the earliest published account of the vegetation of the island.

Dr. Bruton's handy little volume is nicely printed and well illustrated by reproductions of recent photographs and of illustrations, by permission, from J. G. Millais's 'Newfoundland and its Untrodden Ways.'

Abstracts of Theses, University of Chicago. Science Series, iii. (1924–5). 8vo, pp. x, 354. University of Chicago Press, 1927. Price 15*s.*

THIS volume contains abstracts of the theses submitted to the Faculties of the graduated schools of the University of Chicago for the degree of Doctor of Philosophy, August 1924–June 1925. During the first three decades of its history the University required that all theses accepted for this degree should be published in full. Difficulties in the administration of the regulation and increase in the cost of printing led to the adoption of new regulations which accepted as publication the printing of an abstract, although it was still open to the candidate to publish the complete thesis in addition. The present volume includes abstracts from the Departments of Mathematics and Science; there are seven from the Department of Botany (pp. 275–306), four of which have been elsewhere published in full—namely, "A Plant Ecology Study in Utah," by P. Alice Evans; "Effects of Lime and Potash Fertilizers on certain Muck Soils," by W. F. Loehwing; "Flora of an Illinois Coal Ball," by F. D. Reed, in the *Botanical Gazette* (1925 & '26); and "*Sclerotinia* Species causing Decay of Vegetables, by G. B. Ramsey, in Journ. Agricult. Research (1925); of the remaining three, "The Interrelation of Photoperiodism and Temperature," by B. E. Gilbert, "Phycological Study of Mountain Lakes and Streams in the Rocky Mountains of Utah" by A. Norrington, and "A Study of Tracheids in the Cycadales" by M. Westall, no indication of publication in full is given.

Pioneers of Plant Study. By ELLISON HAWKS, F.R.A.S. pp. x, 288, frontispiece and 16 plates. Sheldon Press, L 1928. Price 12*s.* 6*d.*

WE learn from the Preface that this volume was planned, and some parts of it written, in collaboration with the late G. S. Boulger. The work was interrupted—so far as Mr. Hawks was concerned—by

active war-service, and later by illness in Prof. Boulger's household. After Prof. Boulger's death in 1922 it was decided to proceed with the work on the lines originally planned, but owing to the considerable amount of research necessary its completion has taken longer than was anticipated. "It is hoped that in some measure the book will fill a vacant space in botanical literature, for it covers a wide and—as yet—a little trodden field." This hope is certainly justified, for the information contained in its thirty-eight eminently readable chapters would otherwise have to be sought widely in botanical and other literature, though naturally many of the subjects treated are more fully dealt with elsewhere. Botanists and plant-lovers generally will be glad to possess in a comparatively small volume a sketch of the development of the science from its earliest beginnings, and some account of the pioneers by whose efforts it has been built up. The authors deal not only with the state of plant-knowledge at successive epochs in history but also with the influence of great world events, such as the Renaissance and the discovery of the New World, on its development.

A great deal of remarkably interesting information is contained in the series of chapters the scope of which can only briefly be indicated. In the earlier chapters some account is given of the plants of ancient Egypt, of Assyria and China, of the Old Testament and of Homer, and of the work and influence of Hippocrates and the early Greek Philosophers, of Aristotle and his pupils especially Theophrastus "the Father of Botany." The story of the science in the dark ages leads on to the dawn of a new era in the work of the herbalists, including chapters on "a truculent protestant" (William Turner "the Father of English Botany"); Conrad Gesner the founder of the Zurich Botanic Garden, and the Bauhins; "an historic printing house," Plantin and Clusius; John Gerard, the barber-surgeon of Holborn, and his editor Johnson; the first systematist, the Italian Cesalpino; Parkinson; the first terminologist, Joachim Jung; the foundation of the Royal Society; John Ray; Sir Hans Sloane and the Chelsea Physic Garden; the sexes of plants, with reference to the work of Camerarius, Richard Bradley of Cambridge, Vaillant and Patrick Blair; early experiments in plant physiology featuring Stephen Hales, Jan Ingen-Houss, Andrew Knight and others.

Relatively little space is devoted to later work—a brief chapter on Linnæus is followed by an account of the development of the Natural System of Classification in France under the Jussieus and A. P. De Candolle; and succeeding chapters deal with the history of Kew Gardens, and the work of John Hill and Robert Brown. A very full index facilitates the use of the book. The plates are mainly portraits of some of the more important pioneers, and are reproductions of familiar works.—A. B. R.

BOOK-NOTES, NEWS, ETC.

PRESERVATION OF WILD PLANTS: BYE-LAW.—We are in a position to state that the following bye-law has been provisionally approved for the County of Cumberland by the Secretary of State, subject to the consideration of any objections or representations which he may receive in the interval before it comes into force. The bye-law reads as follows:—"No person shall (unless authorised by the owner or occupier, if any, or by law so to do) uproot any ferns or other wild plants growing in any road, lane, roadside waste, roadside bank or hedge, common, or other unenclosed place to which the public have access."

THE 'BULLETIN OF THE FACULTY OF SCIENCES OF CERNAUTI' (Roumania) ('Buletinul Facultatii de Stiinte din Cernauti'), vol. i, fasc. 2 (1927), just received, contains several papers of botanical interest, all of which are written in German. Dr. M. Gusuleac contributes a critical systematic account of the extra-European species of *Anchusa*—18 in number, including ten which are also European species. The distribution of the species, varieties, forms, &c., is discussed in detail. In the previous fascicle, Dr. Gusuleac dealt with the European species of the genus, and at the close of the present article he includes a systematic arrangement of the whole genus. The species, under which are grouped varieties and forms, of which thirty-two are recognised, are classed under six subgenera—*Euanchusa* (19 species in five sections), *Buglossum* (2 species), *Buglossellum* (5 species), *Buglossoides* (2 species), *Lycopsis* (3 species), and *Cynoglottis* (1 species). Dr. A. Mühldorf describes the anatomy and physiology of lenticels, especially in the Gymnosperms and Araceæ (with 2 plates), and Dr. F. Netolitzky the significance of oxalate crystals in plants. (The fascicles of the Bulletin appear half-yearly in June and December.)

THOMAS BRIDGES, BOTANICAL COLLECTOR.—Ivan M. Johnston (Contrib. from the Gray Herbarium of Harvard Univ. lxxxi. 99, 1928) gives a useful sketch of Bridge's botanical activities in Chile and Bolivia between the years 1828 and 1845, which he has worked out from a study of letters from Bridges, H. Cuming, and A. Caldcleugh, in the Hooker Correspondence at Kew, and from Bridges's plant-lists at Kew and the British Museum. As the geographical data accompanying many of Bridges's plants are very meagre, the information concerning his routes which Mr. Johnston has collected is of considerable value. Mr. Johnston gives a summary indicating the year or years of each collection, its locality, and the assignment to it of the collection numbers quoted in herbaria.

HUNTING SEMPERVIVUMS.—Under this title, Dr. R. Lloyd Praeger, who wrote in the August number of the *Journal* on the *Sempervivum*-flora of the Canaries, gives some account in the *Journal of the Royal Horticultural Society* (liii. 281, July 1928) of his work in the field in the Canary Islands, Switzerland, and the Balkans, on this genus, the study of which is rendered extremely difficult by the ease with which the species hybridise and the numerous slight variations which are in cultivation.

THE BRITISH ASSOCIATION AT GLASGOW.

THE British Association met, in its ninety-eighth year, at Glasgow, from September 5 to 12. The Inaugural Meeting was held in St. Andrew's Hall, and addresses of welcome were delivered by the Lord Provost of Glasgow and Sir Donald Macalister, Principal of the University. The address of the President, Sir William Bragg, K.B.E., entitled "Craftmanship and Science," was a clear and well-reasoned exposition of the interdependence of industry and scientific research, eminently suitable both to the times and to the place of meeting. The home of the meeting was in the beautifully situated University buildings in Kelvin Park, where arrangements were made for housing the different sections. The botanists (Section K) met in the Botany School, under the Presidency of Prof. Dame Helen Gwynne-Vaughan, who took the place of Professor Yapp, prevented by serious illness from serving.

The Presidential Address dealt with sex and nutrition in the fungi, a subject to which the speaker had devoted considerable attention. The address was a valuable review of the position in the great divisions of the fungi and a scientific attempt to unravel the meaning of the very various processes which have been regarded as of sexual interest in the group, which includes between thirty and forty thousand species widely differing in ultimate form and manner of life. In the Mucorales (white moulds of bread &c.) sexual production is still manifest. Here the sexual organs are large cells containing many nuclei. They fuse together, the nuclei pair, and a new generation is produced. As a rule, these organs are quite similar in appearance and behaviour, so that one cannot say which is male and which is female. Nevertheless, they are borne on distinct plants, and will only develop when appropriate plants are brought into contact. To get over the difficulty of nomenclature the two kinds of plants are known as (+) and (−). This is sex at its simplest; we can only define a (−) individual as one which produces a new generation with a (+), and a (+) as one that does so with a (−).

In the Hymenomycetes (toadstools, mushrooms, &c.) the sexual apparatus has wholly disappeared, but, in many cases, before spores can be formed, fusion has to take place between the filaments of two independent plants. When this was first observed it was compared with the condition in the Mucorales; the two kinds of plants were described here also as (+) and (−), and, in spite of the absence of sexual organs, the difference was regarded as one of sex. Things became more complex when fungi were observed in which there were three kinds of plants, any one being able to form a new generation with either of the others, or four kinds, the new generation depending on the association of an appropriate pair. Moreover, it was seen that suitable food would, in some cases, enable a single individual to form spores by itself, and evidence was brought forward that unions between two (+) or two (−) strains were sometimes fertile, if these were derived from different stocks.

The speaker had for some time been doubtful about the sexual

significance imputed to these fusions, and had suggested that the difference between (+) and (−) strains in the Hymenomycetes might lie, not in their sex, but in their capacity to accumulate the food-materials necessary for the formation of spores. It is difficult to envisage a race with four sexes, but a race requiring four or more food-substances in preparation for the fruiting-period is a matter of common experience. She was able to clinch her argument by reference to some work in progress in her laboratory at Birkbeck College. One of the Ascomycetes, a coprophilous species, *Humaria granulata*, had been grown in culture. It fruited readily enough when several spores were planted together, and the fruits were found to develop from the female organ, but without fertilisation. In spite of this, when a single spore was planted alone, the filaments produced from it never gave rise to fructifications; when, however, branches from two appropriate spores were allowed to meet, a row of orange-coloured fruits was the result. Here was another species, showing, like the Hymenomycetes, a (+) and a (−) strain, the co-operation of which was necessary for the new generation; but in this case the sexual apparatus had not wholly disappeared. The (+) and (−) filaments were examined; both were found to bear female organs, but these soon died if one kind of filament was grown by itself. The difference between them was evidently not one of sex; both sorts of filament were female, but apparently neither alone could obtain all the food needed for complete development. The association was a partnership in catering, not a marriage. The way in which this condition had originated, and its relation to other forms of nutrition and to primitive sexuality, like that of the Mucorales, were fully discussed.

The programme of the section included a number of interesting papers which were, so far as possible, grouped under subjects. Prof. F. L. Stevens, of Urbana, Ill., U.S.A., a guest of the section, described the effects of ultra-violet light on fungi in inducing formation of spores and fructifications.

In January 1928, while studying the effect of ultra-violet radiation on fungi in agar plate-cultures, it was noticed that perithecia were present in large numbers on certain portions of the exposed plates. The fungus was a strain of *Glomerella cingulata*, which had been originally derived from apples affected with Bitter Rot, and from which a single conidium had been isolated. All cultures secured from this monosporous source had been devoid of perithecia. This same essentially non-sexual strain in all agar cultures exposed to ultra-violet rays of certain intensity and for certain duration produced perithecia in large numbers. No perithecia appeared in the non-radiated portions of the cultures. The most striking evidence that the radiation induces perithecial formation was given by projecting the rays through a circular aperture of 0·5 mm. diameter upon a susceptible colony. On this area alone perithecia appeared two days after radiation. In four days asci and spores were formed. The perithecia differ from those normally found in that they are spherical and non-stromatic, but the asci and spores agree with those found in

nature. All other strains of *Glomerella* tested have given similar responses to ultra-violet light. It appears certain that ultra-violet rays or others near them greatly accelerate conidial formation in this and other genera of fungi, as for example has been observed to be the case in *Coniothyrium*, which produces numerous pycnidia within a few days under radiation instead of after several weeks under natural conditions. It is held that direct radiation has resulted in the formation of perithecia deeply buried in the agar, while indirect rays have led to the formation of superficial perithecia. That the effect is not the result of a chemical change produced in the medium by radiation, but is a direct response by the mycelium to radiation, is considered probable by experiments directed to this special question.

Miss W. M. Page described the method of spore-discharge in several species of the lower Pyrenomycetes.

In species of *Chætomium* the spores are liberated from the asci within the body of the perithecium and, oozing through the neck, become entangled in the hairs. Slight movements of the hairs due to changes in humidity assist in the dispersal of the spores. Species of *Sordaria*, *Podospora*, and *Philocopra* discharge their spores with considerable energy. In this process the movements of the paraphyses and periphyses take part; the force of ejection and the duration of discharge vary in different species. In several species perithecia with more than one neck have been observed.

Papers of economic interest were contributed by Mrs. N. L. Alcock on "Seed-borne Clover Sickness," by Miss M. J. F. Wilson "A Comparative Study of *Dermatea* Species on Conifers," and by Mr. G. G. Hahn "Life-history Studies of the Species of *Phomopsis* occurring on Conifers."

Dr. J. Burtt Davy, in an account of some observations on the forest-flora of Northern Rhodesia, emphasised the desirability of a botanical exploration of this little-known area.

Miss E. S. Dowding described the results of her work on the ecology of the sand-hill areas of central Alberta. These hills were originally washed out from the terminal moraines, so that they mark the positions of old drainage courses. The vegetation of such areas is one of sharp extremes depending on the varying water-content of the soil. The swamps, bogs, and heaths of the sand-hills were described, and reference was made to the distribution of the Pine Mistletoe (*Arceuthobium*) on the hill-summits.

Dr. K. B. Blackburn discussed the differences in number and the variety in form of the chromosomes in some species of the Caryophyllaceæ; and Dr. E. M. Higgins the types of reduction division in *Stypocaulon* and *Cladophora*. Dr. M. Knight described the results of her further work on Sexuality in the Ectocarpaceæ. The discrepancy in behaviour recorded by various workers for the zoids emergent from the plurilocular sporangia of *Ectocarpus siliculosus* growing in northern waters as compared with those from plants growing in Mediterranean regions had been investigated and found to rest upon a cytological basis. It has been established that, in one and the same species in widely separated geographical regions, two

distinct types of life-history exist, in one of which the haploid and in the other the diploid stage is the dominant. The subordinate stage shows either restricted development or reduction to a single cell stage.

The relationship of the unilocular and plurilocular sporangia in these two cases was discussed. Cytological distinction is found to be associated with complete morphological similarity. The question of relative sexuality as defined and illustrated for *Ectocarpus siliculosus* by Hartmann had been reinvestigated, and his methods extended to other members of the group. Data had been collected that add to knowledge of the sexual reactions of the Ectocarpaceæ.

The facts relative to *Ectocarpus siliculosus* serve as a basis for the wider discussion of the factors underlying unequal numerical occurrence of sexual and asexual generations of algæ in general. The question of the relations between reproductive phase and geographical distribution was raised.

A paper of interest to British algologists was one by Prof. W. Robinson and Miss P. M. Skrine on "The Growth and Propagation of some Salt Marsh Fuci." The forms dealt with were the ecads *muscoides*, *cæspitosus*, and *volubilis* of *Fucus vesiculosus*. Individuals of the first two of these ecads may be arranged as a continuous series varying in size and form according to their habitat, but ecad *volubilis* differs from these and may prove to be an ecad of *Fucus spiralis* L. (*F. platycarpus* Thur.). These ecads are being cultivated successfully in aerated sea-water either with or without the addition of a nutrient solution of salts. Under the cultural conditions the cylindrical ecad *muscoides* has become flattened and has taken on the appearance of ecad *cæspitosus*.

In nature the three forms are found to grow in substrata of different P*h* values, and the experimental work in progress may indicate whether this or more direct nutritional factors determine the morphological differences observed.

As had previously been recorded, the three ecads reproduce vegetatively by means of proliferated branches. The present work has, however, indicated that there are striking differences in the origin and development of the proliferating growths in the different ecads. It is found that the proliferations from ecad *volubilis* are always developed from hair-pits. The branches are produced either singly or in small numbers from the hair-pits, which are found on the margin and on the surface of the thallus. They take their origin in a group of hairs of the hair-pit and develop by the congenital growth of those hairs. An apical cell of the branch is differentiated later, and this continues the growth of the branch. The origin of the proliferations in the ecads *muscoides* and *cæspitosus* shows no relation to the hair-pits, and in this respect their manner of origin may be compared with that of the proliferations in wounded specimens of a typical *Fucus vesiculosus*.

Suggestions were offered as to the bearing of the origin and development of the proliferating branches, which arise in hair-pits, on the morphology of the hair-pit, and on the more general relations of this to apical development in the Fucaceæ.

Of interest also was Prof. F. E. Weiss's account of a mutant of the Garden Nasturtium (*Tropæolum*), which, in place of the normal peltate leaves, bore spathulate leaves often with a pitcher-like formation at the base, which looked as if the normal development of the peltate leaf had been arrested on the adaxial side while the apical portion of the leaf had undergone considerable elongation. Nearer the apex of the shoot the leaves subtending the flowers showed very little of the ascidium formation and were almost spathulate. Compared with the normal foliage of *Tropæolum* the leafstalks were comparatively short and possessed no sensitiveness to contact. Two further peculiarities occurred in the flowers. Firstly, the hair-like fringes characteristic of the anterior petals were either completely absent or only represented by very few lateral outgrowths. Secondly, the flowers were sterile. The pollen was well developed and fertile, but flowers when self-pollinated or crossed, though the ovary underwent some development, produced no fertile seeds. The mutation seemed therefore to affect not only the vegetative leaves but also the anterior petals and the carpels. The pollen was used to pollinate a normal form with differently coloured flowers and was found to be quite fertile, a number of seeds being obtained. In the f^1 generation all plants produced normal leaves, had fringed petals, and produced fertile seeds, so that the mutation seemed to be definitely recessive. In the next (f^2) generation Mendelian segregation took place, the three characters showing themselves definitely linked. The mutation was not linked with flower-colour. The recessive form showed the recessive leaf-form from the seedling stage, the first leaves being spathulate and very different from the partially peltate seed leaves of the normal Nasturtium. It was noticeable, however, that several of the recessive seedlings showed a tendency to outgrow more or less in the further course of their development the abnormal leaf-form, and produced almost peltate leaves. One of these, which was used for further experiment, proved to be partially fertile, so that, with the diminution of the extent of the mutation, the latter showed itself in both the vegetative and floral organs. The offspring of these forms always showed the abnormal leaf-form in their first leaves, but the further leaves showed the mutational character less strongly, some becoming almost peltate. Towards the end of the season, however, the more spathulate leaves again made their appearance in the small leaves subtending the flowers. The interest, therefore, of this mutation lies firstly in the linkage of characters in three different organs, and secondly in the fact that in some of the extracted recessives the factor causing or controlling the mutation seems to vary in strength at different periods in the development of the plant.

Dr. R. M. Buchanan showed that the decay of stone in buildings and monuments is in part a biological problem. The process has hitherto been regarded as due to the solvent action of adventitious gases in the atmosphere arising from the combustion of coal or emanating from chemical works. Another aspect of the problem presented itself a considerable time ago when the decay was discovered to present some features characteristic of an infective process. The

condition in many respects simulated the progress of a disease and appeared in consequence to justify the designation *Lupus lapidis*. The localisation and distribution of the decay and its prevalence in buildings far removed from the influence of smoke or other atmospheric pollution lent support to this view. Cultural experiments were accordingly undertaken, and micro-organisms were found abundantly in material from the decaying surfaces, the organisms evidently finding the conditions necessary and natural for their growth. These earlier cultural tests have been repeated many times in recent years from buildings in different localities with confirmatory results, a distinctive flora tending to appear in each type of decay. Three kinds of organisms—bacilli, yeasts, and moulds—were almost always to be found separately or in association in the decaying surface. Attention was specially directed to the investigation of a few of the species which constantly made their appearance in cultures and which by their production of carbonic acid and sulphuretted hydrogen might justifiably be regarded as factors in the process of disintegration of the stone-work.

Mr. J. Walton described a simple but very ingenious method of preparing rock-sections for examination of the contained fossils. The surface of the coal-ball or other object of examination was levelled and then treated with acid, hydrochloric acid in the case of limestone; the carbonized fossil remained after this treatment as a slightly raised etching on the matrix. The surface was then treated with cellulose-varnish in sufficient quantity to restore the original level and cover the etching. The cellulose surface containing the fossil could then be peeled off as a thin transparent section which could be examined under the microscope. By repeating the process a series of sections of the fossil could be obtained. This new method is a great advance on the tedious and costly method hitherto employed of cutting sections of the rock, and is far less wasteful of the material.

The value of vascular anatomy in solving problems of carpel morphology was the subject of a paper by Prof. McLean Thompson, who maintained that the carpellary vascular system is variable even in a single species, and that it may be regarded rather as expressive of the present state of the carpel than as evidence of past stages in organisation. The points raised were illustrated by reference to the development and adult structure of the legume.

A discussion on "The Size Factor in Plant Morphology," introduced by Prof. F. O. Bower, practically repeated the discussion on the same subject at the Linnean Society on March 29, already reported in this *Journal* (pp. 158–60).

In a joint discussion with the Zoology Section on the need for a biological investigation of British fresh waters, Prof. F. E. Fritsch pointed out that in spite of the large area of fresh waters in the British Isles, very few investigations of their biology are being undertaken. Of our many streams and of the big stretches of the Broads very little is known in this respect. During the early years of this century the Wests had laid the foundations for a detailed study of

British lakes, but this work, though it has proved to be fundamental, has not been pursued to an extent at all comparable with the promising nature of the initial results. In fact, many aspects of limnology are altogether neglected in this country, and this applies even to the phytoplankton, which has received most attention. On the other hand, on the Continent and in the United States of America, a host of workers are dealing with the more or less self-contained biotic systems that are constituted by lakes. A number of lake-types (oligotrophic, eutrophic, dystrophic), characterised by their fauna and flora and the general physical conditions, have been distinguished, and these are evidently represented also in Great Britain, where a study of the transitional types seems likely to be of special interest. Fresh-water habitats in part present analogous problems to those encountered in the sea, and a more intensive investigation of British fresh waters will no doubt help in the solution of problems of marine biology. There is also a possible economic bearing in relation to fresh-water fisheries. Great Britain lacks a fresh-water biological station, comparable to that of Plön in Germany and Linz in Austria, but, in order to initiate and stimulate limnological investigations, such a station has become an urgent necessity. Opinions will differ as to the most suitable site and the source of the necessary funds, but there will be general agreement that such a station is wanted.

Forestry again formed a subsection of Botany, with the Earl of Home as Chairman and Sir John Maxwell Stirling-Maxwell as Vice-Chairman. A series of communications dealt with the forests of Europe. Dr. T. W. Woodhead gave an interesting résumé of our present knowledge of the development of forest-vegetation in early post-glacial times, which has been considerably extended in recent years as the result of researches in many branches of science, especially by Swedish investigators, including a statistical study of the tree pollen-grains found in peat.

Dr. Marion Newbiggin, discussing "Man and the Forests of Europe in the pre-Industrial Period," pointed out: (1) that the greater part of the surface of Europe is climatically suited for tree-growth, and was tree-clad till man interfered; (2) that, as compared with similar latitudes in North America and Asia, the number of indigenous, forest-forming tree species is small; (3) that the surface was very largely denuded by man of its original forest cover before timber entered largely into world commerce, that is, before the industrial period; (4) that re-afforestation has been practised on a considerable scale in parts—but in parts only—of the Continent, and that the reconstituted woodlands differ as a rule both in composition and in character from the original forests. These facts were then considered in relation to the land-forms and relief of Europe with the object of showing the ways in which these influenced both the original characters and distribution of the forests, and man's attitude towards them, alike in its destructive and conservative aspects.

Prof. Dudley Stamp dealt with the same subject in the post-industrial period, describing the consequent changes in the economic

importance of forests and, in conclusion, discussing the prospects of a timber famine.

Dr. W. G. Smith described the ecology of bracken and heather moorland, which may be regarded as a heritage of former forest, the bracken replacing parts of deciduous woods, the heather, etc., representing pine-forest. The forest was dominated by trees, but on their removal sub-dominant species, in the absence of shade, may become stronger and have a wider distribution.

Two types of bracken may be recognised :—(*a*) Dense tall bracken that allows few plants below its shade; (*b*) open bracken, where an undergrowth of grasses, heather, etc., can survive.

Bracken indicates the deeper soils, and tends to follow the distribution of springs and seeps where ground water emerges to the surface. Depth of soil is necessary to protect the rhizomes from frost etc. The eradication of bracken is very difficult owing to the depth of the rhizomes—down to 2 feet.

The heather plant association may occur on three types of soil :—

(*a*) Ling (*Calluna vulgaris*) favours a humus soil, the humus being derived from former forest, or from decay of ling. If burned at short intervals, return is rapid both from seedlings and root-stocks, and growth is strong.

(*b*) Scroggy heather, of ling frequently with purple bell-heath, follows harder soils with less depth and moisture. The ling remains short, and frequently the return after burning is slow.

(*c*) Peat heather occurs on drained parts of true deep peat deposits, frequently with pink bell-heath and blaeberry. Return is rapid after burning.

The displacement of heather by moor mat-grass (*Nardus*) and blow-grass (*Molinia*) is a serious menace to forestry, grazing, and game. Both grasses are extending at expense of heather. This is due in part to intensive grazing by sheep, which eat out the heather. Defective burning when heather is too old leads to slow return, but the grasses are little affected, reappear in a few weeks, and continue to spread before the heather is strong enough to suppress them.

Two sessions were devoted to plant-physiology, including a discussion on the interpretation of growth-curves.

The semi-popular lecture was given by Sir John Stirling-Maxwell on the past, present, and future of forestry in Scotland. The virgin forests, which at various periods covered the greater part of the country, had for the most part disappeared, and planting did not appear to have begun in the Highlands before the end of the eighteenth century. In the lowlands planting began much earlier, and a good many private estates were well sheltered with wood of beech and oak before the end of the seventeenth century, though the country as a whole still seemed bare to southern eyes. It was difficult now to realise how completely the Lowlands of Scotland were transformed between 1700 and 1815. Before 1700 the bulk of the country was still moor and bog. Here and there fields had been carved out, but the great stretches of enclosed farm land, which were now the

dominant feature of the Lothians and Aberdeenshire and the main valleys of the western and central counties, had scarcely begun to be reclaimed.

Two outstanding events, very important to a country endowed by Nature with only one conifer, the Scots pine, were noted. The first was the introduction of the larch, which began to be planted in Scotland about the middle of the eighteenth century. The second was the introduction early in the nineteenth century of the conifers of the Pacific coast of North America. Several of these brought from a climate very like our own, and especially the Menzies or Sitka spruce and the Douglas fir (called after the two gallant Scotsmen who discovered them and brought home the seed), had greatly increased the yield of our woods.

The total area of woodlands in Scotland before the war was about a million acres. Heavy fellings in the early years of the century had resulted in some 70,000 acres being left unplanted. During the war and the two years following the armistice another 150,000 acres were felled. Thus in 1920 about 220,000 acres, or rather more than one-fifth of the whole woodland area of Scotland was denuded. The Forestry Commission was appointed in 1919 with a State planting programme of 150,000 acres for the whole of Great Britain during the first ten years.

The position was now better than it was in 1919, but it was not satisfactory. Nearly 50,000 acres had been added to the woodland area, but 100,000 acres of the old woods were still derelict.

There was one argument which did specially concern Scotland—the argument that by afforestation people could be permanently settled on the land in districts now almost uninhabited.

They were constantly up against the question what land was plantable and what unplantable, and they did not yet know the whole answer. Peat was the great difficulty. If they could find a way of establishing trees on certain types of peat at a reasonable cost the amount of plantable land would be largely increased even within the areas already acquired for planting—even within those already fenced. This was obviously a case in which science could give industry a hand. The laboratory side of this inquiry was in the hands of Dr. Borthwick at Aberdeen. From this research and the field experiments based on it they were already beginning to have valuable results. Dealing with the question of amenity, Sir John said that some people were apprehensive of the effect of large planting schemes on the landscape. Certainly they would change it. But provided the woods conformed to the lie of the land, and the choice of species to the soil, that margins were carefully studied and rectangular forms avoided, the mature woods would beyond doubt be things of beauty.

The report of the Sectional Committee appointed last year to co-operate with other bodies in furthering the preservation of rare plants in Britain is referred to on p. 302.

Several of the communications were illustrated by exhibits which

were on show during the meeting; these also included a large series from the Royal Botanic Garden, Edinburgh, grown by Mr. L. J. Stewart, illustrating vegetative propagation from stem, root, and leaf in a number of genera and species of seed-plants. From the same institution were a number of excellent photographs by Mr. R. M. Adam illustrating Scottish mountain-scenery, plant habitats, etc.

On Thursday afternoon the section enjoyed the hospitality of the Corporation of Glasgow in the form of an excursion to the various parks in and near the town, and on Saturday many of the members joined with the Forestry subsection in an excursion to the Benmore Estate in Argyllshire on Holy Loch at the mouth of the Clyde. This estate was presented to the nation by Mr. Harry George Younger about three years ago, and the Forestry Commission of Scotland are developing the system of sylviculture originated by James Duncan of Benmore and continued by the generous donor. Mr. Younger has also recently presented the mansion-house and policies, and it is proposed to use the building as a training school for forestry apprentices, and in part as a residence for university graduates and students and others who desire to study local forestry conditions. The late Sir Isaac Bayley Balfour had long cherished a vision of this portion of the west coast as a great national arboretum, and the Forestry Commission has dedicated to his memory a picturesque mountain gorge in the Eck Valley known as "Puck's Glen." A footpath follows the stream from the roadside to the summit, whence is a magnificent view of alpine peaks and densely wooded valley. On the small space of level ground a visitors' hut has been erected, designed by Sir Robert Lorimer, architect of the national war memorial at Edinburgh. The hut is panelled with wood representing every variety of timber grown on Benmore, and has a tablet recording the dedication of the hut and glen to the memory of Sir Isaac Bayley Balfour—"in fulfilment of a plan he cherished"; a wood-panel also commemorates James Duncan's share in the afforestment of the place. The *motif* of the excursion was the "opening" of the hut. The little ceremony was gracefully performed by the veteran Sir Herbert Maxwell, who paid tribute to Professor Balfour's life-long devotion to botanical science.

Grateful thanks are due to the Corporation and citizens of Glasgow for their hospitality and the general excellence of the arrangements for the meeting. These included two enjoyable evening receptions at the City Chambers and the Kelvingrove Art Galleries respectively, and other social functions, besides many interesting visits to works and various institutions.

Sir Thomas Henry Holland, K.C.I.E., K.C.S.I., Rector of the Imperial College of Science and Technology, was elected President of the Association for the meeting to be held in South Africa next year. The new President, who has achieved a world-wide reputation through his work in the field of mining research, spent many years in India, where he held various appointments, including that of Director of the Geological Survey and Dean of the Faculty of Science in Calcutta University. From 1909–1918 he was Professor of Geology and Mineralogy in the University of Manchester. At the Oxford Meeting

of the British Association in 1926, Sir Thomas was President of the Educational Section.

The general outline of the South African Meeting is as follows:—

Cape Town, July 22 to July 28–29. Inaugural meeting, July 22, at which it is proposed that the President of the South African Association should address the meeting first, and that the new President of the British Association should then be installed, and reply. Sectional meetings, mornings only, July 23–26. Evening discourse, public lectures, excursions, &c.

Call at Kimberley, July 29–30.

Johannesburg, July 30–31 to August 4. Presidential Address, July 31. Sectional Meetings, mornings only, July 31 to August 3, and other arrangements as above.

Pretoria, sectional transactions, &c., as appropriate in connexion with various co-operating congresses; continuing to August 7.

After the meetings, extended tours through the Union, to Victoria Falls, Rhodesia, Lourenço Marques, &c., as to which members will be afforded opportunity to indicate their preference.

A generous invitation has been received from L'Association française pour l'Avancement des Sciences, and from the City of Le Havre, for members unable to take part in the South African Meeting, to attend that of the French association in Le Havre, as was done in 1914.—A. B. R.

UNRECORDED CITATIONS OF SPECIES FROM COLOMBIA.

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

My colleague, Mr. H. W. Parker, of the Department of Zoology, British Museum, has kindly brought to my notice a work entitled *Los Ofidios Venenosos del Cauca*, which contains some plates and descriptions of plants of the region which are said to be efficacious remedies for snake-bite. Amongst these is a plate of a supposedly new species of *Desmodium*, to which, however, no name has been given, and plates and descriptions of new species of *Piper* and *Peperomia* which must rank as valid publications. The full citations and translations of the descriptions are given below.

Desmodium mauritianum-accesit, sp. nov., E. Garcia, in Los Ofidios Venenosos del Cauca, 65 (1896), pl. 12.

Descr. "The 'Capitana' is a herbaceous plant, 6 to 8 cm. in height, growing in the meadows and extending within a radius of 10–12 cm. The simple leaves are oval and petioled, with a single median nerve, and are arranged alternately on a flexible stem. The small red and azure flowers are papilionaceous, and the fruit is a pod composed of several articulations more or less separated from each other, called by the people 'empanaditas.' These pods, which are

villous, adhere to garments, and are therefore called 'amor-seco' in the *Cauca*. The plant has no noticeable smell or taste and does not seem to possess any stimulating principle."

PEPEROMIA NUMMULARIFOLIA E. Garcia, sp. nov., *loc. cit.* p. 65, pl. 13.

Descr. "The 'Cuartillito' is a plant which may have an energetic therapeutic action owing to the aromatic principles of a stimulating liquid present in abundance in its leaves. It grows over the humid trunks of trees, covering them with verdure. Little roots grow out of the slender and flexible shoots and fix themselves in the trunk, and the small, solitary, completely rounded leaves, with a diameter of 5–6 mm., are arranged alternately. The name 'Cuartillito' comes from the similarity of the leaf-shape to a silver coin used in Colombia. The short petiole is not inserted at the edge of the leaf, but a little within the limb (peltate leaf). These coriaceous leaflets have the peculiarity that they are full of a liquid which distends the two laminæ, giving them the appearance of biconvex lenses, so that, on pressing them between the fingers, the contained liquid is ejected with force. The biconvex shape disappears in from one to two days if the plant is gathered in order to preserve it. The side of the leaf on which the petiole is inserted is then convex and the opposite side slightly concave. The leaf has three nerves, just visible when seen by transparency. The fruits form spikelets up to four centimetres long and inserted in the stem by means of a short pedicel, which bears two rounded leaflets, one on each side, these being smaller than the principal leaves. The spikelet resembles that of the 'Pepilongo' (*Piper longum*).

"The clear transparent liquid contained by the leaves has an acrid oily piquant taste of essence of cubebs."

As far as one can judge from the plate, this is *P. nummularifolia* H. B. K. A specimen had been sent by Garcia to Professor Sandino Groot, of Bogota, for identification, and it is possible that the latter returned it to Garcia with the name *Peperomia nummularifolia*. Garcia may have taken it to be new, and published it as a new species. Otherwise it may be merely a coincidence that it was published for a second time with the same name. In either case the name *Peperomia nummularifolia* Garcia is a *nomen abortivum*.

PIPER TELEMBI E. Garcia, sp. nov., *loc. cit.* pl. 14.

Descr. (loc. cit. p. 67). "The 'Canelón' grows on the banks of the River Telembi in the mountains of Barbacoas, Department of the Cauca. It is one of the most famous remedies and, in our opinion, really active in combatting the effect of the snake-poison. Unfortunately, it has not been possible for us to obtain either flower or fruit of the plant, which has made botanical classification difficult. We have only a gathering of the stem and of the branches with their leaves.

"The 'Canelón' is a woody cylindrical stem, covered with a grey cortex which shows a yellow colour when cut transversely. The size

of the one which we have before us is 14 cm. in circumference, marked on the surface with small nodes corresponding to the insertion of the branchlets and leaves. It is sarmentose and bears adventitious roots in order to fix itself to the trees which serve it as supports. The branches bear simple, alternate, petiolate, lanceolate leaves with acute apex, and are deep green above and a little lighter beneath. They are penninerved and 10–15 cm. long. From the petiole, which is 3–4 cm. long, proceed three principal nerves from the nodes of the stem, which extend from the base of the limb, the one up to the apex, and the other two towards the edges of the leaf, a little below the apex.

"The scent of the wood and cortex resembles pepper; the taste is acrid, bitter, and aromatic. The tincture is an active stimulant prepared by steeping twenty grams of the macerated cortex in a hundred of brandy at 22° of the Centigrade alcoholometer.

"In consideration of the characters noted, the 'Canelón' should belong to the family Piperaceæ."

The publication of the name *Piper telembi* E. Garcia is undoubtedly valid. Up to the present the plate has not been identified with any known species of *Piper*.

NOTE ON *OXYTROPIS HALLERI* BUNGE.

BY A. BECHERER, PH.D.
(Basle, Switzerland).

Two species of *Oxytropis* are known from Britain, both being restricted to Scotland. One is *O. campestris* DC. (1802)=*Spiesia campestris* O. Kuntze (1891)=*Aragallus campestris* Greene (1896) =*Astragalus campestris* L. (1753) (distribution boreal-circumpolar, Pyrenees, Alps, Carpathians, Italy, Balkan Peninsula). The second species is *O. uralensis* DC. (1802) p.p.=*O. Halleri* Bunge (1840) =*O. velutina* Schur (1866)=*O. sericea* Sim. (1886)=*Spiesia Halleri* O. Kuntze (1891)=*Astragalus uralensis* Wulfen (1778) non L.=*A. sericeus* Lam. (1778) excl. β=*A. nitens* Host (1831)= *A. variabilis* Rouy (1900) (Scotland, Pyrenees, Alps, Carpathians, Balkan Peninsula).

According to Beck (in Rchb. Ic. xxii. 123, 1901), Ascherson & Graebner (Syn. vi. 2, 824, 1909), Hayek (Fl. Steiermark, i. 1001, 1910 et Prodr. Fl. Pen. Balc. i. 791, 1926), Schinz & Thellung (in Vierteljahrsschr. Naturf. Ges. Zürich, lviii. 70, 1913), Schinz & Keller (Fl. Schweiz, ed. 3, ii. 321, 1914, and ed. 4, i. 410, 1923), and Druce (Brit. Plant List, ed. 2, 28, 1928) the correct name of the second species is *Oxytr. sericea* Simonkai* (Enum. Fl. Transs. 1886, 186†), which combination is based on the name *Astragalus sericeus* Lam. (1778).

* This combination was made previously by Schur (Enum. Pl. Transs. 162, 1866), but not effectively published ("*O. sericea* Schur herb. Transs.," as a synonym of *O. velutina* Schur).

† Not p. 178, as cited by Ascherson & Graebner (*l. c.*), Schinz & Thellung (*l. c.*), and Hayek (*l. c.* 1926).

Against this view is the fact that there is a North-American *Oxytropis sericea* Nutt. (in Torrey & Gray, Fl. North. Amer. i. 330, 1838), which, though assigned in the *Index Kewensis* to *O. Lambertii* Pursh, 1814 (=*Spiesia Lambertii* O. Kuntze, 1891=*Aragallus Lamberti* Greene, 1896), is treated as a distinct species by recent American botanists, including Britton (Man. Fl. Northern States & Canada, ed. 3, 556, 1907) and Rydberg (Fl. Rocky Mountains, 521, 1917) *.

Since Simonkai's combination *O. sericea* (1886) is later than Nuttall's (1838), it is invalid under Art. 53 of the International Rules, and the correct name for the European *O. sericea* (1886) is *O. Halleri* Bunge.

Oxytropis Halleri Bunge was cited by Koch (Syn. Fl. Germ. ed. 2, 200, 1843) from "Bunge Suppl. Alt. in Fl. Altaic." and this citation was copied by Grenier et Godron (Fl. France, i. 449, 1848), the *Index Kewensis* (ii. 395, 1894), as "Verz. Alt. Suppl. 2," Rouy (in Rouy et Foucaud, Fl. France, v. 189, 1899), Ascherson & Graebner (*l. c.* 1909), as "Bunge in Ledeb. Fl. Alt. Suppl. 2 (1833)," Hayek (*l. c.* 1910, 1926), and others.

Bunge, however, does not appear to have published a second supplement to the *Flora Altaica*, and the name *O. Halleri* is not to be found in Bunge's "Verzeichniss d. i. Jahre 1832 im östl. Theil d. Altai-Gebirges gesamm. Pfl.; ein Suppl. z. Flora Altaica," p. 88, n. 263, 1836 (Acad. Sc. St. Petersb. Mém. Sav. Étr. ii. 523–610, 1835), nor in Bongard and Meyer's "Verzeichniss d. i. Jahre 1838 am Saisang Nor u. am Irtysch gesamm. Pfl.; ein zweites Suppl. z. Flora Altaica," 20, 21, n. 68–71 (Acad. Sc. St. Petersb. Mém. Sc. Nat. sér. 6, iv., Bot. p. 157–246, 1841); nor does *O. Halleri* occur in Bunge's Enum. Pl. China bor. 17, n. 101, 102 (1833) (Acad. Sc. St. Petersb. Mém. Sav. Étr. ii. 75–147, 1835).

Bunge himself (Spec. gen. Oxytropis, 106, 1874) (Mém. Acad. Sc. St. Petersb. sér. 7, xxii. n. 1) cited *Oxytropis Halleri* Bunge "Del. sem. h. b. Dorp. 1840, excl. pl. altaica. Koch, Syn. ed. 2, 200." From all this it appears that the citation given by Koch, and generally accepted down to the present day †, is erroneous. I have not seen the 1840 Del. sem. Dorpat, which is unrepresented at Kew, the British Museum (Nat. Hist.), and the Linnean Society, but there is no reason to doubt the correctness of Bunge's reference.

The name *Oxytropis Halleri* was based primarily on *Astragalus scapis aphyllis, foliis ovato-lanceolatis, sericeis, siliquis turgidis, hirsutis, erectis styliferis* Haller, Hist. i. 179, n. 410, t. 14 (opp. p. 195) (1768), and was originally applied erroneously so as to include also an Altai plant.

The principal varieties of *Oxytropis Halleri* Bunge occurring in middle and west Europe are the following:—(1) Var. *appresso-*

* Britton (*l. c.*) and Rydberg (*l. c.*) use the generic name *Aragallus* Necker (1790) instead of *Oxytropis* DC. (1802), but the latter is a *nomen utique conservandum* under the International Rules (ed. 2, 90, 1912).

† Beck (in Rchb. *l. c.* 123, 1901) cites *O. Halleri* as published in "Bunge Del. sem. hort. Dorp. (1840)."

sericea (Shuttleworth) Becherer, comb. nov. = *O. uralensis* γ. *appresse-sericea* [sic] Shuttlew. Account of a Bot. Exc. in the Alps of the Cant. of Valais (Mag. of Zool. & Bot. [Edinburgh] ii. 519, 1838) = *O. sericea* var. *appresso-sericea* Becherer in Ber. Schweiz. Bot. Ges. xxxvii. (1928, in the press; detailed synonymy given)—Alps, Pyrenees, Scotland. (2) Var. *glabrescens* Ducommun Taschenb. Schweiz. Bot. 177 (1869) = *O. sericea* var. *glabrescens* Becherer (*l. c.* 1928)—Alps. (3) Var. *villoso-sericea* (Shuttleworth) Becherer, comb. nov. = *O. uralensis* β. *villoso-sericea* Shuttlew. (*l. c.* 1838) = *O. sericea* var. *villoso-sericea* Becherer (*l. c.* 1928)—Central Alps.

I am indebted to Mr. T. A. Sprague for friendly help in the preparation of this note.

BIBLIOGRAPHICAL NOTES.

XCIII. Two Unpublished Letters from Linnæus.

By Spencer Savage.

In examining recently some uncalendared manuscripts in the archives of the Linnean Society of London, I found two English translations of letters from Linnæus which appear to have escaped publication. They are included amongst the documents put together in two commonplace books by Peter Collinson (died 1768), and consist of an extract and a complete letter. The former is as follows:—

"Extract of a Letter from Dr. Charles Linnæus, Leyden, March the 7th, 1738.

"I have read with a great deal of pleasure the Ingenuos [*sic*] Mr Logan's Experiments made in North America upon the Sex of Plants, especially that about the Indian Corn. That the E. Indians have observ'd the different Sexes in Palm Trees, we know from Dr Kæmpfer, but the whole was never sufficiently prooved before Vaillant put it out of all doubt. However, good and compleat Experiments have hitherto been very scarce, therefore it is to be wished that those of Logan might be soon publish'd as they are made with skill & accuracy."

To this extract Collinson's son, Michael, added a note: "The valuable doctor Allen, alive in the year 1788.—M. C." A comparison of the handwriting of this translation with that of a letter dated 1776 in the Ellis Correspondence leaves little doubt that the above extract was written out for Peter Collinson by Dr. Joseph Allen, of Dulwich. That the document came to Peter Collinson is proved by his insertion of "Mr" before "Logan" towards the end of the extract, and, further, by his miscellaneous notes written on the verso.

This extract from a letter of Linnæus, written shortly before leaving Holland to return to Sweden for good, is also of interest as indicating that at that time he was not in the habit of preserving all his correspondence, for there are no letters from Dr. Joseph Allen in the Linnean Correspondence. Further, the earliest letter from Collin-

son to Linnæus is dated 13th May, 1739; and its postscript reads: "As Mr. Logan has had two Latin tracts published in Holland, I doubt not but Dr. Gronovius has sent them to you. The one is on generation . . . ." Whether Linnæus addressed his opinion to Allen, or to Collinson, seems to be immaterial; but the fact remains that James Logan's *Experimenta et meletemata de plantarum generatione* (Lugduni Batavorum, 1739) was read by him in manuscript and met with his approval. When the Latin-English edition of this pamphlet was published in London in 1747, Collinson sent Linnæus two copies, each inscribed "Peter Collinson to Dr. Linnæus."

Turning now to the complete letter, which was in reply to one dated 5th September, 1764, and which was answered by Collinson on the 1st May, 1765 (Smith, Linn. Corresp. i. pp. 63–67), there is evidence that Collinson parted with the original, for it bears his note: "Original lent to Solander by Mr Ellis." At the head of this translation Collinson has written: "Translation of Baron Linnæus' Letter, Upsal December 1, 1764. By Doc^r Ribe." The text is as follows:—

"To the Chief and Senior of our Science
Peter Collinson. S. P. D. Caroli Linnæi.

"I received yesterday your letter, which, as usual, was very agreeable and most heartily welcome to me. I am always glad to hear that you are alive and well. I am just recovered from a very dangerous illness, of which all those who were with me thought I should certainly die, and my absent friends proclaimed me already dead. Since that time I have celebrated the nuptials of my daughter; and have also been hard at work with a new edition of my 'Systema Naturæ,' which is now going to be printed. This edition will contain twice the number of species as the previous one [*i. e.*, Ed. 10, 1758–9]. I shall take care that you shall have a copy of it as soon as it is published.

"I have heard nothing from the good M^r Ellis about the *Penna marina*. I do not know to what I should attribute his silence. Pray let me know the nature of this *penna marina*—and where its mouth is situated. I hope you will excuse the trouble I give you with these questions. (I have received a letter to-day from Dr. Bæck with a figure of it.)

"It is with grief that I acquaint you with the loss we have had in the excellent young Forskåhl, who died in Arabia, from whom the Science expected so much, and who had already sent home so many curious things from a country not before visited by any curious traveller. He had sent me a branch of the *Opobalsamum* with flowers on it. It is a shrub belonging to Octandria, Monogynia, and has four petals, quite different from the genus *Therebinthinus* with which the botanists had ranked it.

"The sixth edition of my *Genera plantarum* is published, likewise the *Queen's Museum* [Museum Reginæ Ludovicæ Ulricæ], with descriptions of the Insects from the Indies, and Shells. To this I have joined a sketch of the second part of the *King's Museum* [Museum Regis Adolphi Friderici tomi secondi prodromus].

"Thus, you see that the reasons why I have not written to you, for so long a time, have been my illness, my domestic affiairs, and a multitude of business; besides, I would not trouble you with mere words, without having any news to tell you.

"I have described in the *Queen's Museum* all the insects which I have got from the Cape of Good Hope. I had a long time wished to see the insects from the Southern Hemisphere, which were almost all of them unknown till I received them lately. They are indeed very curious. I have also got a collection of insects from the north of Africa, and amongst them many singular ones. I have lately received from Tartary the *Cimicifuga* alive, which I had long wished for. This plant now grows perfectly well in the Garden at Upsal, but did not flower this year.

"Pray tell Dr. Solander that Mr. Falk is very well in Russia, but that Mr. Rolander lives in the greatest distress in Denmark.

"I have received a great number of plants from the Cape of Good Hope and from the East Indies, and [a] great many animals from Java. Thus, tho' I live in a remote part of the world, the goodness of my friends sometimes enables me to have the delight of getting rarities. I have been promised many things from the Philippine Islands and from Mexico, if only I can survive their arrival. Mr. Alströmer has not come home yet: (He came yesterday).

"I have got Adanson's work [*Familles des Plantes*], but never saw anything more stupid.

"Pray let me know at your leisure what news in our Science you have in your country, which by the industry of your curious countrymen abounds in the more scarce and rare treasures of Nature.

"Adieu, live long and happy.

"Just when I had finished this I received Dr. Bæck's letter with the *penna marina*. I have also got to-day a box of plants from the Cape. I thought that I had seen most all of the Cape plants, but I find in this collection not a few which are quite new. I have received the explanation of Mr. Edwards's figures which Dr. Solander sent me, for which I desire you would give him my thanks and compliments.

"It is now quite certain that the true Rhubarb is the *Rheum palmatum* and not the *Rheum compactum*.

"My best compliments to my good friends, Ellis, Miller, Edwards, Russel, &c.

"God save you.

"Upsal December the 1st 1764.

"If the excellent young Dr. Kuhn is still with you, pray give him my compliments. If he has gone, I shall be glad to know where he has gone to."

In transcribing the above letter, it has been necessary to make a few slight corrections in the spelling and grammar. The Latin original of this letter, at one time in Solander's hands, is now untraced.

NOTES FROM THE BRITISH MUSEUM HERBARIUM.

An overlooked Fumitory from the Canary Islands.

By H. W. Pugsley, B.A., F.L.S.

Two sheets of a Fumitory in the British Museum Herbarium, collected by R. T. Lowe on the Island of Lanzarote, in the Canaries, prove on examination to be distinct from any species hitherto known. The description is as follows.

Fumaria prætermissa, sp. nov.

Fumaria *satis robusta*, plus minusve ramosa, petiolis cirrhosis scandens. *Folia* irregulariter 2–3-pinnatisecta, foliolis in lobos oblongos acutos vel obtusos mucronatos fissis prædita. *Racemi densi*, 12–20-flori, *pedunculis* rectis longiusculis sæpissime *paulo breviores*. *Bracteæ* lineari-subulatæ, acutæ, viridescentes, integerrimæ, *pedicellis* fructiferis breviusculis (2–3 mm. longis), erecto-patentibus, *rectis*, apice incrassatis *plane longiores*, et *infimæ* longissimæ, sæpe pedicellos *plus duplo superantes*. *Sepala 3–4 mm. longa, circa 2 mm. lata, ovato-lanceolata*, peltata, acuta, *parce* irregulariter *dentata* et nonnunquam basin versus paululum laciniata, nervo dorsali lato conspicuo viridiusculo verisimiliter albida, in fructu longe persistentia. *Corolla 8–9 mm. longa*, ut videtur *albida* plus minusve *roseo-tincta*, in fructu (præsertim petalum inferius) longe persistens; *petalo superiore alis purpureis* carinam haud æquantibus apicemque haud attingentibus *angusto acuto*, calcare adscendente rotundato; *petalo inferiore marginibus angustissimis erectis* apicem haud attingentibus *acuto*; petalis interioribus apice sursum curvatis purpureis. *Fructus parvi*, circa 2·25 mm. longi et paululum angustiores, *subrotundo-quadrati*, *obtusiusculi* et interdum apice ipso minute subretusi, inferne abrupte angustati, parum compressi sed valde carinati (conspicuo apicem versus), siccitate apicis foveolis obscuris *sublæves*.

Hab. Lanzarote, Canary Is., *R. P. Lowe*, 1858.

Hæc *Fumaria*, quæ propter racemos longe pedunculatos, pedicellos rectos, sepala magna et corollam angustam acutam ad gregem *Capreolatarum* (in serie *Macrosepalarum*) referenda est, per bracteas angustas longissimas notabilis videtur.

Verisimiliter *F. coccineæ* Lowe proxima est, sed habitu robustiore, foliorum lobis angustioribus, racemis densis, bracteis multo longioribus, fructibusque sublævibus plane differt.

F. macrosepala Boiss. et *F. berberica* Pugsl. racemis haud densis, floribus sepalisque longe majoribus, fructibus rugosis majoribus facile distinguuntur.

At first sight *F. prætermissa* might be suspected to be a hybrid between the two well-known species of the Canaries, *F. coccinea* and *F. muralis* Sonder. Lowe's specimens, however, show abundance of good fruit, and their dense, long-stalked racemes are in no way intermediate but rather resemble those of *F. capreolata* L. And the remarkably long, narrow bracts are unique in the genus. From its general affinities *F. prætermissa* seems best placed in subsection *Capreolatæ*, series *Macrosepalæ*, between *F. berberica* and *F. coccinea*.

The occurrence of a second endemic species of *Fumaria* in the Canaries, in addition to *F. coccinea*, is of considerable interest. Four species of the series *Macrosepalæ* are now known, two of which, *F. prætermissa* and *F. coccinea*, are endemic in the Canaries, while *F. berberica* is confined to Morocco, and the fourth, *F. macrosepala*, inhabits Morocco and Western Algeria, and extends into Andalusia. The limited geographical range of these four species recalls that of *F. purpurea* Pugsl. and *F. dubia* Pugsl., of the series *Eu-Capreolatæ*, and stands in strong contrast to the wide distribution of *F. capreolata* L.

A new Species of *Polygala* from South-west Africa.

By A. W. Exell.

Among a number of specimens of *Polygala*, recently presented by Dr. C. E. Moss to the British Museum Herbarium, there is one which cannot be identified and must be described as new :—

Polygala Mossii Exell, sp. nov. *Suffrutex* (?) parvus, ramulis sparse puberulis; *foliis* brevissime petiolatis, ovalibus apice rotundatis utrinque pubescentibus; *floribus* in racemos terminales dispositis; *bracteis* ovatis puberulis; *pedicellis* gracilibus glabris curvatis quam flores multo brevioribus; *alis* oblique suborbicularibus glabris; *sepalis* ceteris liberis ellipticis glabris; *petalis superioribus* irregulariter spathulatis basin versus nonnunquam angustatis margine ciliolatis; *carina* cristata, crista multifida; *capsula* oblonga alata fere glabra; *seminibus* longe sericeo-pilosis vix maturis; *caruncula* appendiculata, appendicula longitudine seminis trientem æquante.

Hab. S.W. Africa; Low Hills near Luderitz, *C. E. Moss*, 11568 in Herb. Mus. Brit. and Herb. Moss.

Leaves 8–10 × 4–5 mm.; *petioles* ·5–1 mm. long; *racemes* 1·5–3 cm. long; *wings* 5–5·5 × 4 mm.; *sepals* 3 × 1·8–2 mm.; *carina* 5 mm. long.

The plant seems to be suffruticose, as the branchlets are very tough and woody. The flowers are pale lilac in colour in the dried specimen, and the sepals are green with a white margin. The species belongs to Sect. *Orthopolygala* Chodat, but is not closely related to any species with which I am acquainted.

TEUCRIUM SCORODONIA L.: A NEW VARIETY.

By L. B. Hall, F.L.S.

In June 1922, when in the neighbourhood of Exmoor, Somerset, with Mr. N. G. Hadden, I found a large patch of *Teucrium Scorodonia* L., in which all the leaves were sub-circular cordate and the bracts very short and rounded or flattened at the apex. I removed some of the roots and have grown them in my garden for the last six years.

Until 1924 they were grown in half shade in a moderately heavy loam, and from 1924 to the present time (August 1928) they have

been grown in light dry sandy soil, some in shade, others in half shade, and the remainder in full sun.

During these six years the plants have completely retained their distinctive characters. The only effect of the lighter soil and drier position has been to reduce the size of the leaves and the length of the racemes relatively to the height of the stems.

Mr. Hadden has visited the original locality and reports that the plants retain their characters.

Mr. C. V. B. Marquand has kindly looked through available descriptions of continental forms, but has found nothing similar.

I have sent specimens to the herbaria at Kew and South Kensington.

A description follows:—

Teucrium Scorodonia L. var. **acrotomum**, var. nov. *Folia* suborbicularia cordata, nervo centrali in duo vel plures nervulos subæquales divergentes diviso. *Bracteæ* plerumque latitudine longitudinem æquantes, apice rotundatæ vel subtruncatæ. *Calycis* labium superius obtusum vel rotundatum, rarius paullo mucronatum.

Leaves suborbicular cordate, with central nerve divided into two or more subequal divergent secondary nerves. Bracts mostly about as broad as long, rounded or flattened at apex. Upper lip of calyx obtuse or rounded, rarely slightly mucronate.

The main lateral vein on each side of the upper lip of the calyx is strongly incurved towards the apex, whereas in the type these veins often run straight into the mucronate apex.

OBITUARIES.

Carl Axel Magnus Lindman.

We regret to record the death, on June 21st last, of Prof. Carl Lindman, who retired from his post at the Riksmuseum, Stockholm, in 1923, and who was known to many British botanists, owing to his visits to this country in 1890, 1911, and 1912. Born on the 6th of April, 1856, the son of Carl Lindman and Sofia *née* Lohr, he took degrees of Doctor at Upsala in Botany (1884) and Philosophy (1886), becoming "lector" of natural history in the Classical High School of Stockholm in 1887. He was a tutor to the Crown Prince from 1896 to 1904, edited the *Pedagogisk Tidskrift* from 1901 to 1903, and published a High-School text-book of Botany in 1904. In 1905 he became Director of the Botanical Department of the Riksmuseum. Before this he had visited most of the countries of Western Europe and also North Africa and South America. His numerous published works (listed by Krok, 1925; *Bibliotheca Botanica Suecana*, p. 414) deal with biological and ecological aspects of botany as well as systematic. He was a member of the Swedish Royal Academy of Science and of the Central Chamber of Commerce.

His visit to this country in 1911 was as a member of the International Phytogeographical Excursion, when he introduced two new species to the British Floras—namely, *Polygonum calcatum* and *Poa irrigata*, both of them Scandinavian species described by himself. He studied, in addition, our forms of *Cratægus Oxyacantha*, in which group he was then much interested. His impressions of the excursion are published in the *New Phytologist* (1912, 27–28), and the results of some ecological observations made during the tour are printed in the same journal the following year (1913, 1–6). Of late years he was interested in the Arctic Poas, coming to the conclusion that the viviparous forms were the result of hybridisation.

He also wrote on Linnæus, and published an account of a Linnean Herbarium preserved in the Museum at Stockholm. His *Bilder ur Nordens Flora* (1901–5) reached its third edition in 1921, and his *Svensk Fanerogam Flora* (1918) a second edition in 1926, while an abbreviated form of the latter for use as a School Flora was published this year shortly before his death.—A. J. Wilmott.

Rev. James Lamont.

The Rev. James Lamont was born in Crathie on July 11th, 1844. After education at the parish school, he went to the English Presbyterian Theological College, and was ordained as Minister of the Presbyterian congregation at Portsmouth in 1871, where he was also Chaplain to the Forces. In 1873 he went to Hong-Kong, as successor to the famous Chinese scholar, Dr. James Legge, and was five years there. Returning to England, he was for a short time minister at Kentish Town, and then went to New South Wales, where he was first in a widely scattered bush charge, Coonabarabran, and thereafter in East Maitland, Kogarah, and Mosman successively. In 1895 his Church did him the highest honour in its power, making him Moderator of the General Assembly. After his retirement he came to England, and during the war took charge at Swindon in the absence of the minister, and did also much good service among the Australian wounded in London, having the rank of Major in the Australian contingent. Later he retired to Edinburgh, where he died on August 28th, 1928.

He was interested in nature as a boy, but his special interest in botany dates from his meeting William Carruthers while a student of theology; he afterwards married Mary Anna Bruce Moffatt, a sister of Mrs. Carruthers. When he went to China, Mr. Carruthers, then Keeper of the Department of Botany of the British Museum, suggested to him that he should do some collecting—with the result that he presented to the Museum 499 plants from Hong-Kong in 1874 and, later, 458 from New South Wales. Several of Lamont's plants were new to science, and his name is commemorated in several species described from his own specimens, e. g. *Castanopsis Lamontii* Hance in Journ. Bot. 1875, 368 and *Flemingia Lamontii* Hance, *l. c.* 1878, 10, both from Hong-Kong. At the end of his life, during his retirement in Edinburgh, he made (with the help of some lady collectors) a collection of British Mosses, which he recently presented to the British Museum.—S. W. Carruthers.

Emile Jules Gadeceau.

The death of Emile Jules Gadeceau, at Neuilly (Seine) on May 18 last, is announced in *Archives de Botanique* for July 1928, which is just to hand. M. Gadeceau, who was born at Nantes, Feb. 7, 1845, came of a commercial family in that town and succeeded his father in business, but gave up commerce to devote himself to botany. In the latter part of his life he was associated with the Lloyd Herbarium, and later was attached to the Paris Museum under Prof. Lecomte, retiring in 1913. He was interested in phytogeography and published Monographs on Belle-Ile-en-Mer (1903) and the Lac de Grand-Lieu (1909), also a "Géographie botanique de Bretagne" (1906–7). His views on the proper study of plant-geography are expressed in a letter to a student (we quote from the *Archives de Botanique*): "Permettez-moi, en qualité de veteran de vous recommander de vous assimiler tout d'abord la botanique systématique, car pour aborder avec fruit la Géographie botanique, il faut pouvoir lire *sur place* la flore comme dans un livre ouvert." He edited the fifth edition of Lloyd's *Flore de l'Ouest* (1898), and in collaboration with Bois published *Les Végéteaux dans la vie quotidienne* (1909). His valuable French herbarium of 30,000 specimens was purchased by the Trustees of the British Museum in 1922.

PRESERVATION OF WILD FLOWERS.

The Committee of the Botany Section of the British Association, appointed at Leeds in 1928, in an interim report issued at the Glasgow meeting on the question of the Preservation of Rare Plants in Britain, states that it has rejected the proposal for a Plant Protection Act of Parliament with a list of scheduled plants whose gathering would be prohibited by law, on the grounds that it would draw attention to the rare species and would be very difficult to enforce. Among the methods by which the problem of protection might be approached was the suppression of hawkers who dug up and sold large quantities of certain species in some areas, and of all who indulged in the practice of digging up plants for planting in private gardens. The stripping of the countryside of its flowers by motorists and other members of the general public, which was a notorious scandal in the neighbourhood of our large towns, could only be combatted by an educational campaign. The Secretary, Dr. H. Hamshaw Thomas, announced that as a result of a resolution passed at the Conference of Delegates last year, the Under-Secretary of State had called a conference to discuss the possibility of devising an effective form of bye-law for the preservation of wild plants in Britain, and a bye-law has been approved prohibiting the uprooting of wild plants in unenclosed places to which the public have access. [This was reported in the last number of the *Journal*, p. 280.] It was open to local authorities to avail themselves of this bye-law.

The Sectional Committee at the Glasgow meeting also passed a resolution deprecating the scattering of seeds of plants, native or otherwise, in wild situations.

We have received the following from Sir Maurice Abbot Anderson, C.V.O.:—

To the Editor of the 'Journal of Botany.'

Dear Sir,

In the August issue of the *Journal of Botany* you are good enough to say that you will welcome expressions of opinion on the subject of Mr. Tahourdin's note, in which he ventilates the question of the propriety of sowing seeds of the rarer native plants in suitable spots in the wild.

The view I take is as follows. I agree this may be done, if by a "suitable spot" is meant a *known* station of some rare species where that species, from any cause or causes whatever, is gradually dying out or has died out. This granted, obvious difficulties arise.

An observer may visit a plant at a certain spot year by year, and notice its gradual disappearance at that station, until one year he is unable to find any trace whatever of its existence. He accordingly, and presumably quite fairly, makes up his mind that the species is extinct—at any rate, so far as he knows. The following year, bearing in mind his discovery of last year, or from some other fortuitous circumstance, he fails to visit the spot.

If correct in his surmise, is he on this evidence justified in re-establishing this species by sowing, or is the plant ostensibly to be lost to the British flora? In the first place, the plant may be only resting, and may reveal itself again, either the following year or at some time after; and, secondly, it may have been present all the time in the neighbourhood of the parent plant, although it has disappeared, to the satisfaction of the observer, in the original spot.

Speaking generally, my view is that it would be dangerous to reinforce that plant by sowing fresh seed in the exact situation, as the seed which was used for the purpose might have been derived from "Continental" soil, and might possibly be a variety of the species that it is intended to reinforce. Unless, therefore, it has been determined by a competent authority or by personal observation that the plant from which the seed is derived is the *very same species*, or the same variety of that species, as the one that has become extinct or is threatened with extinction, it should not be used for the purpose of reinforcement.

For this reason it would in any case seem to be advisable, if reinforcement is decided upon, to sow the seed at a reasonable distance from the parent spot, and in any circumstances a complete record should be kept.

To take two instances: I was asked a few weeks ago what I thought of the desirability of experimenting by sowing some *Italian* seed of *Trifolium stellatum* at the Crumbles, Eastbourne. Two friends of mine (both responsible botanists) being present, we discussed the matter from every point of view, and decided that it was justifiable to do so, a careful record being kept. As a matter of fact, the sowing was not done, as circumstances prevented it. Then arose

the question as to whether it was justifiable to reinforce the plant at Shoreham shingle with the Italian seed, where it seems to be "on its last legs." We were in agreement that it might be done, but *not* at the present known station; we advised that it should be sown on a spot on the same shingle at a distance from this, so that the following year, if the experiment was successful, the identity of the two plants could be carefully compared. I know of no variations in this plant, but I feel it would be safer to have an opportunity of comparing the two plants before allowing them to grow in juxtaposition.

Again, when at Lyme Regis last year, I was shown the old station of *Osmunda regalis*. In this immediate neighbourhood the fern has been missed for some five years. My informant was a naturalist of repute. I felt justified, in the circumstances, in proceeding to a neighbouring subtropical garden, where I obtained a supply of the sori of *Osmunda regalis* from a ripe frond. I took the trouble to revisit the original station as indicated to me, and there I planted my seed, with the knowledge and approval of my friend, but I have not heard with what result.

I think, therefore, that in the special circumstances as indicated above, one is justified in sowing with discrimination for the purpose of reinforcing, but I should like a record kept of such doings at the Department of Botany in the British Museum.

I also feel that this is quite a different matter from sowing with a view to extending the range of our rarer species indiscriminately, and I am *not* in agreement with this, my reasons coinciding with those expressed in the editorial note appended to Mr. Tahourdin's remarks.

I am,

Yours faithfully,

MAURICE ABBOT ANDERSON.

ROYAL COMMISSION ON NATIONAL MUSEUMS AND GALLERIES.

THE Royal Commission on National Museums and Galleries has issued an interim report. In a general review of the situation the Commissioners refer to the unrivalled quality, variety, and value of the National Collections, which even from the relatively narrow standpoint of money-values represent a great possession, and they emphasise the national prestige which flows from the possession of treasures of incomparable magnificence. "In this country the tendency has perhaps been too much to take the collections as a matter of course without any adequate attempt to make the public aware of their outstanding quality and character. That such possessions should be housed and exhibited with dignity is of fundamental importance, and we regret that in too many cases the cabinet is unworthy of its contents." Certain glaring defects of accommodation are dealt with in this Report.

The origin of the National Museums and Galleries is described, and attention is drawn to their great development during the Victorian

Period. But a comparison of the expenditure on the Museums and Galleries with the cost to the Exchequer of elementary, secondary, and university education confirms the impression that the National Museums and Galleries have for long been treated as the Cinderella of the Social Services. Yet without them the educational fabric of the State would be quite incomplete. To the school-child they present the outward and visible explanation of what he has been taught in books, to the general public they offer edification and instruction, to the scholar material for study, to the artist inspiration, and to industry the resources of Science.

The British Museum figures most prominently among the institutions whose requirements are regarded as urgent. In the case of the parent building the problem of outstanding urgency is the Library, and suggestions are made for efficiently meeting the need with economy of expenditure.

The Natural History Museum is in general congested in all its departments—the exhibition galleries are overcrowded, the libraries are congested and inconvenient, and the importance of the research aspect is inadequately realised. A questionnaire on the Scientific Museums was submitted to the Council of the Royal Society and considered by a special Committee, which laid special stress on the function of the Natural History Museum "to house safely, to classify, to identify, and to investigate the vast and growing mass of specimens which provide the standard for national and imperial reference on all questions of systematic biology." The Committee states that if the collections of the Museum are to be adequately used as a source of new knowledge, it is of the first importance that the members of the staff should be afforded time and facilities for original research, as distinguished from routine work, whether technical or administrative, but the facilities at present available are inadequate, largely owing to deficiency in numerical strength. There is also lack of adequate working-room; research workers who visit the Museum also necessarily suffer from the limitations of space.

As regards the question of a transfer of the Botanical Collection to Kew, the Committee observes that there is much to be said for preserving the character of the present Museum as a complete Museum of Natural History. From the point of view of the botanist alone there is some advantage in having a herbarium of recent plants in proximity to the collection of fossil plants at South Kensington and another in proximity to the collection of living plants at Kew. From the point of view of workers in other biological sciences there is advantage in having a herbarium of recent plants available for immediate consultation. The Committee is not aware of any scientific interest that would be directly served by removal of the South Kensington Herbarium to Kew; the existence of the two collections has, the Committee believes, favoured rather than hindered scientific progress.

The Commissioners recommend immediate extensions on the land available on the North of the present building to meet the most urgent needs in respect of Entomology and Geology, and for a new Whale room, and postpone for future consideration the completion of the Eastern and Western Wings.

SHORT NOTES.

AN UNUSUAL HABITAT FOR A MUSHROOM.—When ascending from a small beach between St. Énogat and St. Lunaire, Brittany, in August, I noticed a couple of agarics growing about three feet up the dead stump of a poplar in a small field in which asparagus, dwarf beans, and lettuce were cultivated. The habitat suggested *Pleurotus*, but they proved to be the common mushroom, *Psalliota campestris*, one specimen fully grown, the other with the ring breaking. There was no soil in the small hole from which they projected, and they appeared to grow directly from the stump. There was a small platform about six inches above the spot with a layer of débris about two inches deep, in which there was a little white mycelium of the same general character as mushroom spawn. It is probable that the mycelium grew downward through interstices to give rise to the fruit-bodies below, but the wood was too hard to remove with the means I had at my disposal.—J. RAMSBOTTOM.

DIPLOTAXIS TENUIFOLIA DC. var. *INTEGRIFOLIA* Koch.—The very day that in this *Journal* (the July No.) I read Mr. C. E. Salmon's article on this, I found the variety in the parish of Paignton, in waste ground near the sea used as a rubbish depository. It was growing deep-wedged in the sun-baked clay; the flowers were nearly over and the seed-pods ripe. The non-native *Alyssum maritimum* Lam. was growing in the same waste, and some garden escapes. From the east of England Mr. Salmon has given us the first record for Britain of this var. *integrifolia* of *Diplotaxis tenuifolia*. Mine probably will be the first from the west of the country.—C. ETHELINDA LARTER.

IN a notice, in the September issue of this *Journal*, of the *19th Botany Report of the Devonshire Association* (1927), allusion is made to the new "find," therein reported, of *Chrysosplenium alternifolium* Linn. at Tiverton. It is stated that this plant has not until now been noted in Devon since the year 1872. May I be allowed to correct the latter statement? I was one of the Botanical Walk party, led by Mr. W. P. Hiern, that, on the 18th May, 1907, collected the plant in the parish of Charles, North Devon. It had, I think in the year previous, been there discovered by Mrs. Kathleen M. Toms, who, on the occasion referred to, led us to the spot where it grew. Another record for Devon was thus added to that of Mr. Thomas Wainwright, "near Barnstaple," in 1872. The Tiverton one is the third for the county.—C. ETHELINDA LARTER.

CERASTIUM RIÆI.—This name should be abandoned in favour of *C. ramosissimum* Boiss., because it was only a mere *nomen nudum*, and still remained *nudum* when Boissier published his name with a full diagnosis and description in his *Elenchus* (1838), no. 36.

Boissier, as appears from his remarks in Voy. p. 106, would have accepted the name *C. Riæi*, but that, in his opinion, "Le nom de Desmoulins doit être rejeté comme en opposition à une règle bien connue de nomenclature botanique." He seems to mean that the name objected to should have been *Duriæi*, though at a later time he accepts *Riæi* without remark in Fl. Or. i. 725. Durieu is spelt as one word by Gay and all other authors, except Desmoulins, the inventor of the name *Riæi*, who in his Cat. Dordogne, 1840–49, always spells his friend's name Du Rieu. But this discrepancy in spelling is immaterial, because, as said before, *C. Riæi* is *nom. nud.*, both in Ann. Sci. Nat. vi. p. 348, quoted by Ind. Kew. and some authors, and in Durieu, Pl. Exsicc. no. 394, as quoted by others.

The lack of a diagnosis on the ticket to no. 394 is exceptional, for in every other case Gay issued a diagnosis on the tickets of that collection. In this instance, instead of a diagnosis, he only prints: "*Cerastium Riæi* Des Moul. in Actes de la Soc. Linn. de Bord. t. viii.," having presumably seen a MS. description which Desmoulins intended to publish in that journal, but it is not to be found there and never was published, as Desmoulins himself informs us in Cat. Pl. Dordogne (1840), p. 68: "Je n'ai pas publié la *description* que j'avais annoncée." He makes this statement whilst grumbling about Boissier's changing his name, and claiming that its publication as a mere name in the *Iter Asturicum* coupled with distribution of the specimen in the exsiccata, were sufficient to give *R. Riæi* the precedence. Such a claim fails under the actual international laws, and Boissier's name holds the field.—C. C. LACAITA.

DOWN HOUSE.—The following announcement was made to the General Committee of the British Association meeting in Glasgow, on September 5, regarding Darwin's home, Down House, in the County of Kent. Mr. George Buckston Browne, F.R.C.S., F.S.A., having acquired the property from Charles Galton Darwin, F.R.S., grandson of the naturalist, has transferred its possession to the British Association under the most liberal conditions and with an endowment amply sufficient for its maintenance and preservation for all time.

At present Down House serves as a private school. When the tenant's lease falls in or is acquired, the donor desires that the property be regarded as a gift to the nation and opened to visitors every day of the week between the hours of 10 and 6, without charge. He also desires that the Association should use Down House and grounds for the benefit of science. The donor has also suggested that certain of the rooms—particularly the old "study," in which the *Origin of Species* was written—should be furnished, as near as may be possible, as they were when Darwin lived in them. The donor has already taken steps to secure this end and has obtained the willing co-operation and greatest assistance from various members of the Darwin family. He has commissioned the Hon. John Collier to paint replicas of his well-known portraits of Darwin and of Huxley to be hung at Down House; these commissions are already completed. It is hoped that the shelves of the old study may be filled with all editions of Darwin's works, and that Down House may become a repository of Darwiniana where students will have an opportunity of consulting all original documents concerning Darwin and his

writings. Such an end can be attained only if the British Association succeeds in enlisting the sympathetic co-operation of all who may be the fortunate owners of articles which were in the possession of Darwin or were associated with his life.

The Donor, Mr. George Buckston Browne, was born in Manchester in 1850, the only son of a well-known medical man—Dr. Henry Browne, Physician to the Manchester Royal Infirmary and Lecturer on Medicine to the Manchester Medical School. Dr. Henry Browne represented the fourth generation of a medical dynasty where son had succeeded father, the founder of the family having been Dr. Theophilus Browne, of Derby, who was townsman and contemporary of Dr. Erasmus Darwin, grandfather of Charles Darwin.

Darwin was born at Shrewsbury, February 12, 1809. Down House was purchased for him by his father, Dr. Darwin, and he took up his residence there on September 14, 1842. There the great naturalist died on April 19, 1882, in his seventy-fourth year. He worked continuously at Down for almost forty years.

REVIEWS.

Systematische Anatomie der Monokotyledonen. By (the late) Dr. Hans Solereder and Dr. Fritz Jürgen Meyer. Heft iii. 8vo, pp. 175, text-figs. 43. Berlin: Borntraeger, 1928. Price 15 Marks.

Solereder's *Systematic Anatomy of the Dicotyledons*, made available for English readers in the *Clarendon Press* edition of 1908 has long been one of the classic text-books of Botany. Though nominally the work of Solereder, it represented to a large extent the accumulated knowledge of his teacher, Ludwig Radlkofer, and the investigators trained in the Munich laboratory of the veteran protagonist of the use of anatomical characters in anatomy. Radlkofer, who died in 1927 in his 98th year, outlived his pupil by seven years. According to the advertisement inside the cover of the present Heft, Solereder had devoted more than ten years to the compilation of this second portion of his great work, but the important families Liliaceæ, Cyperaceæ, and Gramineæ were wanting in the manuscript left by him. At Prof. Radlkofer's suggestion, Dr. F. J. Meyer undertook the completion of the work, which also included bringing up to date the portion already completed by Solereder. A full account of the division of labour in the individual families between the two authors will be given in the Preface to the final part.

The work, when complete, will consist of 7 parts, to be distributed as follows:—Heft 1: Pandanales, Helobieæ, Triuridales. Heft 2: Glumifloræ. Heft 3: Principes, Synanthæ, Spathifloræ. Heft 4: Farinosæ. Heft 5: Liliifloræ. Heft 6: Scitamineæ, Microspermæ. Heft 7: General part, with Preface and General Index. The parts will appear in irregular order at intervals of about six months.

Heft 3, now before us, deals, as indicated, with the three Series Principes, Synanthæ, and Spathifloræ: that is to say, the families

Palmaceæ (pp. 3–85), Cyclanthaceæ (pp. 86–99), Araceæ (pp. 100–169), and Lemnaceæ (pp. 170–175)—the pagination indicates the Heft in addition to the page-number, *e. g.*, iii. 113. Thus the greater part of the issue deals with the Palms and Aroids. The subject-matter in each family is arranged under the headings of the principal organs (leaf, stem, and root), preceded by a general summary of the anatomical characters of the family. At the end of the account of each family is a list of the literature in chronological sequence—as the entries bear no running number, reference from the text, where the name of the author only is given, involves hunting through several pages of closely printed items. An alphabetical arrangement would have been more convenient. Dr. Meyer has included in the work the results of his own numerous investigations, the scope of which is indicated in foot-notes.

As was the case with the earlier portion of the work, the present volume represents a mine of information, and botanists will look forward to its completion.

Biologie der Früchte und Samen (*Karpobiologie*). By Prof. Dr. E. Ulbrich, Custos at the Botanical Museum of the University of Berlin. 8vo, pp. viii, 230, with 51 text-figs. Springer: Berlin, 1928. Price 12 M. (13.20 M. bound).

This volume, which forms part vi. of the *Biologische Studienbücher*, edited by Walther Schoenichen, is an account of the methods of distribution of fruits and seed, of which, the author points out in his Preface, no comprehensive general account has appeared. Gaertner's classical work *De Fructibus et Seminibus Plantarum* (1788–1807), dealt with form and structure almost exclusively, and Hildebrand's *Verbreitungsmittel der Planzen* (1873) covers only a small portion of a wide subject.

The "special portion" is preceded by a "general portion," which occupies the first twenty-six pages and gives a general account of the development and structure of fruit and seed, the factors of distribution, and its significance in problems of plant sociology and geography. It also contains an interesting account of the colonisation of an area near Berlin which had been completely cleared of vegetation at the close of last century and the repopulation of which had been studied for thirty years.

The arrangement of the special portion follows the generally accepted categories under the two main headings—I. Autochory, in which distribution is effected by the plant itself by the mere falling of a suitably formed heavy seed into the substratum, as in the mangrove, by the actual sowing of its seed by the plant itself (geocarpy) as in the pea-nut, by some expelling mechanism, as in squirting cucumber, or by a creeping movement as in awned fruits; and II. Allochory, in which an external agent plays a part. Under this heading are included "ballistic" fruits—such as those of many Labiatæ, where a stiff elastic pedicel acts as a spring, the movement of which shoots a nucule from the cup-like calyx; a category which

perhaps might have been included in the first division. The remaining devices are classified under Zoochory (distribution by animals), Hydatochory (distribution by water), and Anemochory (distribution by air-currents). The last section includes those cases where considerable portions of the plant or the whole plant are carried by the wind ("Steppenläufer")—as the inflorescence of the wig-tree (*Cotinus*) or the plant of the well-known Rose of Jericho (*Hierochuntica*).

Finally, two brief chapters are devoted to (1) Polychory and Polycarpy—the former denoting cases where distribution may be effected by more than one agent, such as light fruits or seeds by wind or water, the latter where different forms of fruit occur in the same inflorescence as in the common marigold, and other Composites; and (2) "Vivipary"—the formation of vegetative organs in place of flowers and fruits, as in the viviparous grasses characteristic of arctic and alpine climates and the bulbil-formation of *Dentaria*.

A list of the literature, arranged alphabetically, and a comprehensive index conclude the volume.

Prof. Ulbrich has produced a very useful handbook, which will fill a gap in our botanical libraries.—A. B. R.

Die Pilze Mitteleuropas. Band I. *Die Rohrlinge (Boletaceæ).* By F. KALLENBACH. Lief. 7. Plates 17, 18, and 23, pp. 37–44, fol. Leipzig: Werner Klinkhardt, 1928. Price M. 5.

THE further numbers of this work uphold the high standard already set. The species dealt with in the coloured plates are *Boletus flavus* and *B. viscidus*, give little difficulty to mycologists in this country, where they are both common. The range of both is well shown in the plates. The varieties of the first species are dropped and the name *flavus* used in preference to *elegans*. The nomenclature of *Boletus*, as, indeed, of many genera of Basidiomycetes, provides abundant problems, on account of the International Rules naming Fries's *Systema Mycologicum* (1829–1832), as a starting-place. Kallenbach gives "*Boletus flavus* (With. 1796) Fr. 1835—*Grevillei* Klotzsch 1832—*elegans* Fr. (non Schum.) 1836/38" as the heading to the description of the species. *Boletus* was treated in the first volume of the *Systema*, i. e. 1829, with no mention of this species. In the index to the work (1832) we find "*B. flavus* (*B. Grevillei*)" and *B. Grevillei* with a reference to "Linn. vii. 198," where Klotzsch (1832) describes this species, noting that it is the same as *B. flavus* of Withering and *B. luteus* of Greville (Pl. 183).

It would appear, therefore, that the specific name of the species should be *Grevillei*, for this is the first name used after 1829.

The black-and-white plate gives microscopic details of *B. elegans*, *B. luridus*, *B. viscidus* and habitat photographs of the last two.

J. R.

Flora of the Presidency of Madras. By C. E. C. FISCHER. Part VIII. Ulmaceæ to Xyridaceæ. Sm. 8vo, pp. 1347–1532. Published under the authority of the Secretary of State for India in Council. London: Adlard & Son, 1928. Price 10*s*.

THE completion of this handy working Flora of the Madras Presidency, the major part of which was carried out by the late Mr. Gamble (see notice of Part VII. in this *Journal*, 1926, p. 85), has been entrusted to Mr. C. E. C. Fischer.

Mr. Fischer is well qualified for the task; he was formerly in the Indian Forest Service, and is now Assistant for India on the Staff of the Royal Botanic Gardens, Kew. The present instalment follows the style of the earlier parts, and includes the completion of the apetalous Dicotyledons, Ulmaceæ, Moraceæ, and Urticaceæ, with *Salix* and *Ceratophyllum*, and the Gymnosperms, represented by single species of *Gnetum* and *Podocarpus* and two species of Cycads. The greater portion of the remainder of the part is occupied by the Orchidaceæ, represented by 60 genera. Two points of bibliographical interest occur to us. In making new combinations it is helpful to include among the synonyms the species from which the trivial is derived—this is not invariably done, see, for instance, *Eulophia epidendræa* and *Ærides ringens*. And the title-page (presumably only a temporary one) may be a source of confusion—surely Mr. Fischer's name should come below Part VIII. Ulmaceæ to Xyridaceæ. The work, as a whole, must be Gamble's *Flora of Madras*.

Handwörterbuch der Botanischen Pflanzennamen. By Dr. ROBERT ZANDER. 12mo, pp. 312, 1927. Nachtrag, pp. 128, 1928. Reichsverband des deutschen Gartenbaues e. V., Berlin.

THE handy little volume which appeared at the close of 1927 is an alphabetical list of the botanical names of the genera, species, and varieties of plants met with in agriculture, forestry, horticulture, and industry. Valid names are distinguished by clarendon type, non-valid names and synonyms are in ordinary type. The name of the family is given after each genus-name, and the common German name is inserted where such exists. Indications of pronunciation are also given, and habit and habitat are indicated by signs. A considerable amount of information is included in this list, which is clearly printed in parallel columns. The purpose of the book, the way to use it, and the general principles of nomenclature are fully explained in an introduction. There is also an index of common names.

The recently-issued *Supplement* is a response to a desire, expressed by many who have acquired the *Handwörterbuch*, for an explanation of the botanical trivials. These, again, are arranged in alphabetical order with their derivation and a definition in German. It forms a very helpful compendium. Dr. Zander is a believer in explanatory introductions as aids to the use of the text. He includes also an outline of Engler's "System of Classification" and an alphabetical list of the families, with the genera referred to in the text also arranged alphabetically under each family.

Editor and Publishers are to be congratulated on the production of a useful little handbook.

BOOK-NOTES, NEWS, ETC.

BULLETIN DE L'INSTITUT ET DU JARDIN BOTANIQUES DE L'UNIVERSITÉ DE BELGRADE.—We give a welcome to this new Journal, the first part of which has recently appeared (Tome i. No. 1, 1928). The editor is Nedeljko Kosanin, who also contributes the first of a series of papers on the Flora of South Serbia—"On the Species of *Crocus*," including the description of two new species. The other papers are also mainly of taxonomic interest, and include "Violæ novæ balcanicæ," by Wilh. Becker; "Geographical Distribution of *Kœleria* in the Balkans," by K. Maly; "On Bosnian Algæ," by G. Beck-Managetta, and "Fungi croatici," by R. Picbauer. L. M. Glišic contributes papers on the "Development of the Female Gametophyte and Endosperm in *Haberlea rhodopensis* Friv." (in English), and "Die Endospermbildung von *Datura Metel* L."; and St. Jakovljevic writes on the "Structure and Function of Hairs" (in French). Most of the papers are in German.

GREAT BARRIER REEF EXPEDITION.—Mr. Geoffrey Tandy, of the Department of Botany, who accompanies the expedition, writes announcing the arrival of the party at its destination, Low Islands, on July 16, since when all have been very busy settling down to work. Mr. Tandy writes:—

"I hope to be able to make some contribution which will justify the trip, and the indications are decidedly favourable. The smaller of our two islets is a mere heap of coral sand about one cable in diameter. On it there are the lighthouse, the three houses of the light-keepers, our combined laboratory and dining-room, and our living huts.

"The plant associations are very numerous and remarkably interesting. One little patch on the eastern side of the mangrove swamp is a young 'dry land' island. It is permanently just above high-water mark, and on it is a dense growth of grass and *Commelina cyanea*. *Flagellaria indica* climbs about over everything, and on some trees not yet flowering the green ants make their nests the size of one's head. I am watching this place very carefully and making collections from time to time.

"The algal associations are bewilderingly varied, but, owing to the kindness of Prof. Osborn, I have the *Phycologia australis* of Harvey, which makes things easier."

THE British Ecological Society met at Edinburgh from August 30 to September 5.

A conversazione was held on the first evening in the Botanical Department of the University at the Botanic Garden. Papers were read by Dr. W. G. Smith on "Experimental Methods in Ecology," by Mr. J. R. Matthews on "Notes on the Vegetation of Ben Ledi," and by Prof. W. Wright Smith on "Evolutionary Contrasts in certain Genera of Plants." Excursions were arranged to the Edinburgh and East of Scotland College of Agriculture Experimental Farm, to Callander, Loch Lubnaig and Ben Ledi, to the Salt Marshes and Sand-dunes at Aberlady and Gullane, and to the Tentsmuir Afforestation area. Photographs illustrating Scottish vegetation were exhibited by Mr. R. M. Adam.

LICHENS FROM YUNNAN.

By Robert Paulson, F.L.S.

(Plate 587.)

The lichens which form the subject of this communication were collected by Professor J. W. Gregory, F.R.S., and his son, Christopher J. Gregory, on their geological-geographical expedition to the Alps of Chinese Tibet in 1922. The collection was made in several localities in this little-explored region.

On May 19, 1922, the expedition leaving Teng-yueh *, 25° 2′ N. lat., 98° 27′ E. long., on the Bhamo road into western China, took an eastward direction into the valley of the Salween and on the ancient track of Marco Palo, passed over the waters of the Mekong into the salt-mining district of Yunnan, reaching its most easterly point 100° 15′ E. at Li-kiang. Beyond this important centre the track turned west toward Shih-ku, on the south bank of the Yangtze Kiang, at the place where it makes the remarkable V-shaped bend, and followed the river northward to Chi-tien where, with a sharp bend to the left, it led over a broad limestone plateau, then through a hilly country to the mission station at Wei-si, and beyond this into the valley of the Mekong to a point some 150 miles north of the bridge, where the river was crossed at the lower level.

It was at this stage of the journey, extending from the Yangtze Kiang to the Mekong, that the expedition passed across one of the most interesting regions of the world. Here three great rivers of Asia, the Yangtze Kiang, Mekong, and Salween, coming down from the Tibetan plateau, race through three parallel gorges for a distance of seventy miles, while confined to a narrow belt a little over sixty miles in breadth. (See Map, p. 315.)

The track now trended northward along the Mekong with the exception of making a circuitous detour through the rain-forest of Pehalo. On returning to the river at Yang-tsa, 28° 15′ N., an arid belt with the associated gorges was entered. A few miles' tramp farther north and a climb along a tributary that comes in from the east, led to A-tun-tze, 28° 28′ N. lat., an ancient town set in the midst of magnificent snow mountains. It was near this place that the track reached its most northerly point, lat. 28° 32′ N., and its greatest altitude, 16,800 feet, on the Jem-sa La, a mountain-pass into Tibet.

The route of the return journey to the south runs for a great part of its length approximately parallel to the Yangtze Kiang. At one time it is twenty miles west, while at another it is quite close to the river. After passing Chi-tien the outward track was covered as far as Li-kiang, but at this point a road leading to the historic town of Ta-li-fu was chosen.

During the first stage of the journey the dominating feature in

* Gregory, J. W. and C. J., *To the Alps of Chinese Tibet*, London, 1923.

the landscape, to the right, was the Pei-ma Shan, White Horse Mountain, altitude 20,000 feet. Farther south the route continues over the alpine passes, Janu La, 15,000, and Jin-go La, 13,000 ft. high. Here the mountain-side is frequently covered with pine-forest, of which Prof. Gregory writes: "The trees are noble pines with tall straight trunks clothed in masses of grey-beard moss"—*Usnea longissima* of the collection.

By travelling south-west from Ta-li-fu, Teng-yueh, from which the expedition set out three months previously, was again reached.

The localities, twenty-six in all, from which lichens were collected, varied widely as regards (1) altitude, from under 3000 to over 16,000 feet; (2) humidity of atmosphere, that of arid plain to rain-forest; (3) light intensity; and (4) character of the rocks.

From a botanical standpoint the ground traversed is of great interest, being a land where three floral regions of the world, as defined by Drude—namely, the Central Asiatic, Eastern Asiatic, and the Indo-Malayan are either coterminous or in proximity.

A large proportion of the lichens was gathered in the extreme north-west of Yunnan, a region of lofty mountain-chains trending north to south, in contrast with those of the Himalaya that trend more or less west to east.

This area includes a part of the arid region of the Yang-tzo-Mekong divide, the Pehalo rain-forest, alt. 8000 to 10,000 ft., the pine-forests of the Cho-ni valley, and the Black Dragon lake of the Tsu-su depression.

Professor Gregory discusses in his book* (*a*) the relation of the Himalaya to the immeasurably older ranges represented in Yunnan, (*b*) the part this ancient system of mountains played in the formation of the hair-pin bend of the Himalaya round Assam, and (*c*) the continuation of the Himalaya south of Assam.

In his closing chapter, Prof. Gregory refers to an important question raised in chapter i.—namely, were the Himalayan uplifts absolutely blocked to the east by the solid foundations of the ancient Indo-Malayan mountains? The answer given is: "So far as we can judge, though the information is woefully inadequate, the extension of the Himalayan line into southern China is through the Nam Shan chain."

Owing to the great wealth of flora recently discovered in this part of the world, questions of plant distribution have become more and more interesting.

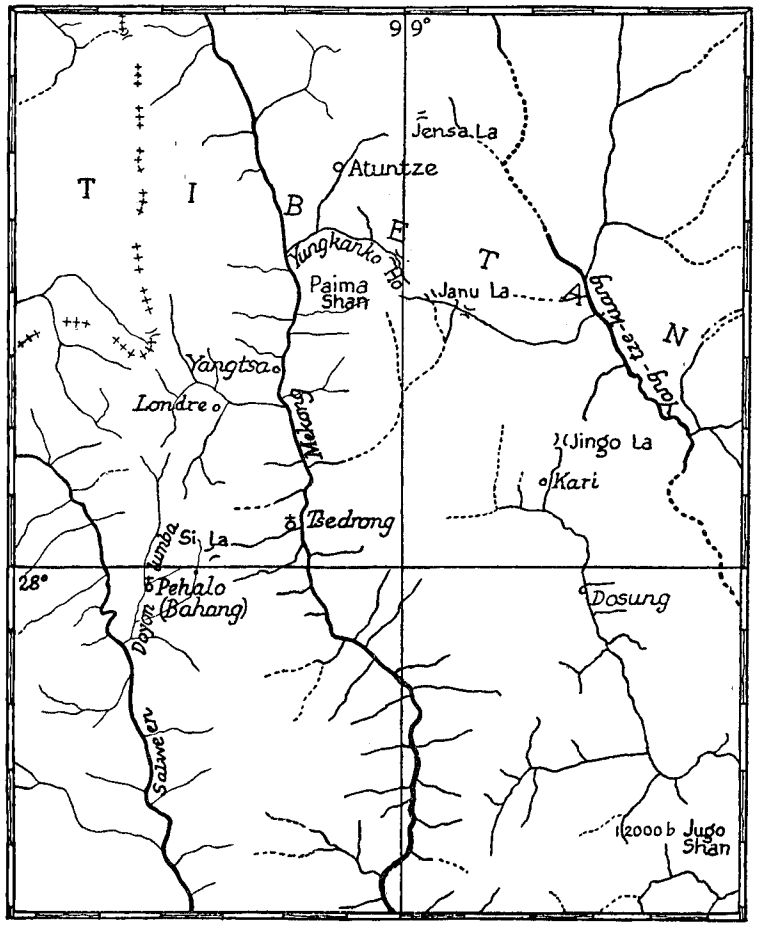
Wind is an important agent in the distribution of lichens. The light spores, that many of them eject, float in the air as dust and are carried by atmospheric currents for considerable distances. Minute portions of thalli are also wind-borne.

Where, however, a warm water-laden wind blows athwart a range of lofty mountains, it loses the whole of its moisture, and other matter that it may be bearing, in the rain-band through which it passes on its course up the mountain-slope, so that by the time it passes over the top of the obstruction it is both dry and pure. There is, however,

* *Ibid.* pp. 304–310.

a considerable gap through the Tibetan barrier in the form of gorges cut by the Brahmaputra (Tsangpo) on its way to the Bay of Bengal.

These gorges were recently explored by Captain F. Kingdon Ward. Among his observations is one respecting the passage of the south-west monsoon through the gap. He says: "The monsoon, though it



Part of North-West Yunnan. (From Gregory's *To the Alps of Chinese Tibet.*) 12,000 b indicates height in feet from boiling-point observation.

cannot cross this obstacle without relieving itself of its burden, is quick to find the breach; and striding over the Burma-Assam Plain towards the narrow mouth of this funnel .... it rushes furiously through the river-gorges. Thus it drenches the country in the neighbourhood of the breach, and the whole of this comparatively narrow

gap is jammed with forest which spreads out fanwise behind the Himalaya and then quickly disappears" *.

Information respecting lichens that have passed through the gorges with the higher vegetation is not to hand, for the cliffs are so precipitous that it is possible to work a way through upon the top only.

Although knowledge of the lichens of Tibet is meagre, it is evident, from the work of earlier collectors and the observations of recent explorers, that the trunks of forest-trees and the branches of shrubs are well covered with interesting species. It has been noted by the writer that parts of shrubs, brought from Tibet, now in the National Herbaria, have often upon them a few small specimens of different species.

Seventy per cent. of the lichens in the present collection are corticolous.

It is not that saxicolous lichens are scarce, but that the weight of rock-specimens adds considerably to the impedimenta of an expedition. The few stones that the writer has seen from Yunnan have each from two to three lichens upon them.

List of Localities.

The localities are indicated by numerals:—

1. Top of pass W. of Yung-lung, 8800 ft.	N. lat. 25° 48′,	99° 18′	E. long.
2. West side of Li-ti-ping, E. of Wei-si, 10,800 ft.	„ 27° 12′,	99° 22′	„
3. Pehalo forest, a rain-forest, 8000 to 10,000 ft.	„ 28° 2′,	98° 39′	„
4. Seroua Lomba Valley, 11,000 ft.			
5. E. side of Si La (pass),			
6. Foot of Si La (pass), 13,000 ft.	„ 28° 1′,	98° 45′	„
7. In *Picea* forest, Jsu-su Valley, 14,200 ft.	„ 28° 32′,	98° 57′	„
8. Tsu-na Lake, East of A-tun-tze, 15,300 ft.	„ 28° 32′,	98° 59′	„
9. Jem-sa La (pass), 16,800 ft.	„ 28° 32′,	99° 1′	„
10. Tse-kon, lake, E. of pass, A-tun-tze, 15,500 ft.	„ 28° 33′,	99° 3′	„
11. Pine-forest, S.W. of Lon-dre, 11,400 ft.	„ 28° 8′,	98° 43′	„
12. Upper valley of Yung-kun-ko Ho, 12,700 ft.	„ 28° 23′,	98° 58′	„
13. Cho-ni Valley, Peima Shan, 13,500 ft.	„ 28° 19′,	98° 59′	„
14. Near Ka-ri, 9200 ft.	„ 28° 5′,	99° 11′	„
15. Do-sung, 7600 ft.	„ 27° 58′,	99° 14′	„
16. S.E. of Li-kiang, 8200 ft.	„ 26° 49′,	100° 15′	„
17. Ju-go Shan (pass),			
18. S. side of Ju-go Shan pass, 8000–12,000 ft.	„ 28° 13′,	99° 6′	„
19–21. R. Yangtze N. of Shih-ku, 6200 ft.	„ 26° 53′,	99° 56′	„
22, 23. Side of Salween-shweli Divide, 7000–7900 ft.	„ 25° 0′,	98° 46′	„
24. Five miles east of Man-hsien (west of Teng-yueh) under 3000 ft.	Outside the limit of the map.		
25. Eight miles east of Man-hsien.			
26. West of Teng-yueh, 5000–5700 ft.	„ 25° 2′,	98° 27′	„

* Ward, F. Kingdon, *The Riddle of the Tsangpo Gorges*, London, 1926.

List of Lichens.

The number in brackets indicates locality.

Graphidaceæ.

Graphis scripta Ach. (25).

Lecideaceæ.

Lecidea cinnabarina Somerf. (25). At an altitude below 3000 ft.

Rhizocarpon geographicum DC. (5).

Cladoniaceæ.

Cladonia pyxidata Hoffm. (16) and (19). C. rangiformis Hoffm. (13).

Stereocaulon paschale Fr. (6). S. alpinum var. densum Laur. (1).

Gyrophoraceæ.

Gyrophora cylindrica var. tornata (Nyl.) (9).

Stictaceæ.

Lobaria pulmonaria Hoffm. (17). L. retigera (Bory) Nyl. (3) and (7).

Pertusariaceæ.

Pertusaria velata Nyl. (22). Not fertile.

Lecanoraceæ.

Lecanora intricata Ach. (2). L. effusa Ach. (2). L. chrysoleuca Ach. (19). L. subfusca var. chlarona Ach.

Hæmatomma punicea Ach. (23) and (2). The spores of this species vary widely in size and septation.

Specimens from Tibet, at a low altitude, have spores equal in length to those from Brazil (viz., 85 μ) described by Vainio, but the septa of the former occasionally number 24 as against 17 for the latter.

Acarospora chlorophana (Wnbg.) Mass. (9).

Parmeliaceæ.

Parmelia physodes Ach. (5). P. kamtschadalis (Ach.), Eschw. (1), (13), (26). P. tinctorum Despr. (1), (17), (22), and (25). P. perlata Ach. (20) and (22).

Cetraria cucullata (Bell) Ach. (8). Small, 2 cm. high, rigid, deeply foveate on under side; closely resembles *C. Tilesii* Nyl., but the medulla is white with no indication of yellow. C. islandica var. tenuifolia Vain. (7). C. Wallichiana Tayl. (26). C. collatum Nyl. (25).

Nephromopsis ciliaris (Ach.) Hue (17).

USNEACEÆ.

LETHARIA THAMNODES (Flot.) Hue (Pl. 587. figs. A, B) (2) and (8). Is evidently plentiful in the localities given. Most of the branches are subcylindrical with more than one chondroid strand; a few are circular in transverse section (see fig. B). Gonidia occur in glomerules on both sides of those branches that are slightly compressed; grows on small twigs (fig. A), to which the lichen is attached at several points. *Thallus* sordid white with a tinge of yellow, soredious, K+ light brown.

One specimen bears several galls, some of which are at the ends of cylindrical branches (fig. B). We cannot regard these excrescences as cephalodia, there being no foreign alga present; nor do they appear to be abortive apothecia, for none of the specimens, with or without these excrescences, are fertile or show any signs of being so.

Among some specimens collected by Elenkin in Russia (1902–1903), labelled *Evernia thamnodes* (Flot.) Arn., is one with a gall exactly similar to the one from Yunnan. The plants are identical.

L. FLEXUOSA, comb. nov. (*Chlorea flexuosa* Nyl.) (Pl. 587, C), (13) and (18), was collected in Sikkim by J. D. Hooker (1849). For more than seventy years it was known only as an endemic. One of the localities mentioned in Sikkim is Donkia Pass, altitude 18,000 ft. On the Gregory Expedition, 1922, it was collected in the Cho-ni Valley, 28° 19′ N. lat., 98° 59′ E. long., and on the south side of the Ju-go Shan pass 28° 13′ N. lat., 99° 6′ E. long. It was among the lichens brought home by the Mount Everest Expeditions, 1922–24.

In the British Museum Herbarium (ex Herb. Hort. Reg. Bot. Edinb.) are two specimens of this lichen, collected by Geo. Forrest, named *Chlorea flexuosa* var. *sinensis* Zahl. One, No. 19879, is labelled "On limestone rocks and cliffs, on the Salwin-kiu Ching divide, 28° 20′ N. lat., 98° 27′ E. long. Alt. 14–15,000 ft., July 1921"; the other, labelled "No. 20,807, Plant of one inch, on limestone rocks and cliffs on the Yangtse-yungning divide, 27° 48′ N. lat., 100° 36′ long. E. Alt. 12,000 ft., Sept. 1921."

All these specimens have been compared. Those from Yunnan are inclined to be more robust than those from the Himalaya. There is a doubt as to whether this lichen grows directly on the limestone rock. A close examination of the points of attachment to its support leads to the conclusion that it grows upon wood. It is possible that it may be occasionally attached to shrubs that grow closely to the rocks.

ALECTORIA BICOLOR Nyl. (2). The spores of this specimen are slightly smaller than the size usually given; they measure 5–6 × 4 μ, in place of 7–8 × 5–6 μ.

A. DIVERGENS Nyl. (2). A. JUBATA Ach. (13).

RAMALINA CALICARIS Fr. (17). R. FARINACEA Ach. (1).

USNEA FLORIDA (L.) Hoffm. (1) and (17). U. BARBATA Web. (21). U. LONGISSIMA Ach. (1), (2), and (3).

THAMNOLIA VERMICULARIS Ach. (v. 416).

BUELLIACEÆ.

RINODINA SOPHODES Th. Fr. (25).

PHYSCIACEÆ.

PHYSCIA SPECIOSA Nyl. (13). P. SETOSA (Ach.) Nyl. (13), (15), (16), and (23). P. PULVERULENTA (Hoffm.) Nyl. (13). P. CÆSIA Nyl. (4), (12), and (25).

The following lichens, omitting those that are cosmopolitan or very widely spread, occur both in N.W. Yunnan and Sikkim:—

Thamnolia vermicularis, Gyrophora cylindrica var. *tornata, Lobaria retigera, Lecanora chrysoleuca, Parmelia kamtschadalis, Cetraria cucullata, Letharia thamnodes, L. flexuosa, Alectoria bicolor, A. divergens, Cetraria Wallichiana.*

With the exception of the last of the above, these lichens are alpine, occurring at altitudes varying from 11,000–16,000 ft. The lichen-flora is alpine rather than arctic. It is thus in keeping with the flowering plants as described by Kingdon Ward.

The collection has been presented to the Department of Botany, British Museum.

EXPLANATION OF PLATE 587.

Fig. A. *Letharia thamnodes*, showing attachment to the wood in several places. G. A gall at the end of a cylindrical branch.

Fig. B. Two galls on the above, × 8. Between the stalked galls is a large sessile one. In the lower, left-hand corner, is part of the normal thallus.

Fig. C. *Letharia flexuosa*, showing the furcate form of the ultimate branches.

MICHELIA MONTANA AND TWO ALLIED NEW SPECIES.

BY J. E. DANDY, M.A., F.L.S.

MICHELIA MONTANA was described by Blume *, in 1823, from material gathered by himself on Goenoeng Salak, in western Java. Since that time the species has been met with in Java sufficiently frequently to show that it is wide-spread in the island, having been collected in Bantam † and Besoeki, respectively the most western

* Verh. Batav. Genootsch. ix. 153 (1823).

† By Forbes (n. 345; Herb. Mus. Brit.). This specimen was enumerated as *M. Champaca* L. by Baker fil. in Journ. Bot. lxi., Suppl. 2 (1924). The Sumatran plant (Forbes, n. 2124), listed by Baker (*l. c.*) as *M. montana*, is *M. pubinervia* Bl.

and most eastern residencies, and in many intervening localities *. The plant is noteworthy in the genus *Michelia* on account of its oligomerous gynæcium, for the number of carpels never exceeds five and is sometimes reduced to one.

In 1859 *M. montana* was reported from Sumatra by Miquel †, the material having been obtained by Teijsmann in Sumatra's Westkust. A year later ‡ the same author described a new Sumatran species, *M. ecicatrisata*, based on specimens gathered in Lampongsche Districten also by Teijsmann. *M. ecicatrisata* was subsequently § reduced by Miquel himself to *M. montana* as var. *subvelutina*, a variety which is untenable, being based upon characters which are of no value in this species. Teijsmann's Sumatran material has now been supplemented by a gathering made in Atjeh by Ostwald (n. 56 in Boschproefstation, n. BB. 8058; Herb. Bogor.).

King ||, in 1889, considerably extended the known range of *M. montana* by recording it from Perak and eastern Himalaya. The Perak specimens were collected by Kunstler (ns. 4310 and 4312) and Scortechini. More recently material has been obtained on Kedah Peak by Bell and Haniff (Herb. Kew.).

The record of *M. montana* from eastern Himalaya was based upon a specimen gathered in Sikkim by King himself, who, in 1891 ¶, in a paper on the Magnoliaceæ of British India, added a plant collected in Assam by Mann. Subsequent authors have accepted the species as a member of the Indian flora. Critical examination of the material involved ** shows, however, that the Indian specimens represent a distinct species differing in several respects from the true *M. montana*, which is exclusively Malayan. The most important point of difference between the two species lies in the perianth, which in both plants consists normally of nine tepals in three whorls of three. In *M. montana* the tepals of the outer whorl are membranous and much thinner in texture than the fleshy members of the inner two whorls, while in the Indian species, for which I propose the name *M. Kingii*, the tepals of all three whorls are subsimilar in texture, the latter being intermediate between the thick and thin types of *M. montana*. The flower-buds in both species are at first enclosed in three or four (rarely two) spathaceous bracts, of which all but the uppermost are quickly deciduous, and which leave annular scars on the peduncle. In *M. Kingii* the second highest bract is inserted well below the middle of the peduncle, whereas in *M. montana* it is inserted usually about halfway up. Finally, the valves of the mature fruiting-carpels are more convex outside in *M. montana* than in *M. Kingii*.

* Koord.-Schum. Syst. Verzeichn. i. 1, Fam. 95, 5 (1912).
† Fl. Ind. Batav. i. 2, 17 (1859).
‡ *L. c.*, Suppl. i. 368 (1860).
§ Ann. Mus. Bot. Lugd.-Batav. iv. 73 (1868).
|| Journ. As. Soc. Bengal, lviii. 2, 371 (1889).
¶ Ann. R. Bot. Gard. Calcutta, iii. 218 (1891).
** Besides the herbaria of Kew and the British Museum, I have seen material from the Buitenzorg, Delessert, Leyden, Paris, University of California, and Utrecht herbaria. To the authorities in charge of these institutions I am deeply indebted for the loan of specimens.

Very closely related to *M. montana* and *M. Kingii* is a third species, to which I give the name *M. hypolampra*, represented by a specimen gathered in Annam by Fleury. This specimen, which bears very immature fruits, shows a strong resemblance to *M. montana* and *M. Kingii*, but differs from them in having more numerous carpels.

Following is a key to the three species under discussion, together with descriptions of the two new ones and the complete synonymy of *M. montana*:—

Gynæcium composed of about 8–10 carpels	*M. hypolampra.*
Gynæcium composed of about 1–5 carpels.	
Tepals subsimilar in texture, all rather fleshy; penultimate bract inserted well below the middle of the peduncle; valves of mature fruiting-carpels not very convex outside	*M. Kingii*
Tepals very dissimilar in texture, those of the outer whorl membranous, those of the inner two whorls fleshy; penultimate bract inserted usually about halfway up the peduncle; valves of mature fruiting-carpels convex outside	*M. montana.*

Michelia hypolampra Dandy, sp. nov.

Ramuli glabri. *Foliorum* lamina obovato-oblonga vel -elliptica, basi cuneata, apice acuminata, usque ad c. 12 cm. longa et 6 cm. lata, tenuiter coriacea, glabra vel primo basin versus ad costam marginemque griseo-puberula, in sicco utrinque nitida denseque reticulata, nervis lateralibus utrinsecus c. 10–12 vix prominentibus; petiolus ecicatrisatus, gracilis, usque ad c. 1·5 cm. longus, juvenilis griseo-puberulus, postea glabrescens; stipulæ a petiolo liberæ, extus appresse nitido-griseo-tomentellæ. *Florum* bracteæ 3, extus appresse nitido-griseo-tomentellæ; pedunculus c. 0·5 cm. longus, breviter appresseque griseo-pubescens. *Tepala* ex cicatricibus 9, 3-mera. *Gynæcium* appresse nitido-griseo-tomentellum; carpella c. 8–10; ovula c. 10 vel plura. *Fructus* immaturi carpella libera.

Hab. Indo-China. Annam: prov. de Nghe-an (Vinh), rés. for. de Co-ba (Ke-nhe), fr. immat., 8.v.1914, *Fleury* in *Chevalier*, 30158 (typus in Herb. Par.).

Vern. "kay-gioi," "ko-ham."

Michelia Kingii Dandy, sp. nov.

Ramuli glabri. *Foliorum* lamina elliptica vel obovata vel elongato-obovata vel obovato- vel elliptico-oblonga, basi cuneata vel late cuneata, apice acuminata vel subacuminata, usque ad c. 19 cm. longa et 8·5 cm. lata, chartacea vel tenuiter coriacea, glabra vel subtus in costa nervisque appresse griseo-puberula vel breviter griseo-pubescens, nervis lateralibus utrinsecus c. 8–16, subtus conspicuis; petiolus ecicatrisatus, usque ad c. 2·5 cm. longus, glaber vel supra minute appresseque griseo-puberulus; stipulæ a petiolo liberæ, extus saltem ad marginem appresse griseo-puberulæ vel -pubescentes. *Florum* alabastrum anguste oblongum; bracteæ 3–4 vel interdum 2, extus

saltem ad marginem appresse griseo-pubescentes vel -puberulæ, summm ad pedunculi apicem, inferiores manifeste infra pedunculi medium insertæ; pedunculus gracilis, c. 1–2·5 cm. longus, saltem apicem versus appresse griseo-puberulus vel -tomentellus, interdum abnormaliter bifurcatus. *Tepala* 9, 3-mera, subæquilonga, textura subcarnosa subsimilia, glabra, 3 exteriora oblanceolato-linearia c. 2–2·5 cm. longa. *Stamina* c. 10–12 mm. longa; connectivum ultra antherm loculos in appendicem brevem longulamve productum. *Gynæcium* appresse griseo-tomentellum; carpella c. 1–5; ovula numerosa (c. 10 16). *Fructus* c. 4–7 cm. longus; carpella matura libera, dehiscentia, in axi sessilia, usque ad c. 5 cm. longa, valvis lignosis extus paulum convexis.

Hab. India. Sikkim: fl. et fr., 1875–1876, *King* (typus in Herb. Kew.). Bengal: Jalpaiguri District, Lataguri, fr., i.1924, *Bengal Forest School Herbarium* (Herb. Kew.). Assam: Sylhet District, Langai forest, fl. et fr., ix. 1890, *Mann* (Herb. Deless., Kew., Mus. Brit.); sine loc. defin., fr., *Jenkins* (Herb. Kew.).

This plant was treated as *M. montana* by King in Ann. R. Bot. Gard. Calcutta, iii. 218 pro parte, t. 68 (1891); Gamble, Man. Ind. Timb., Ed. 2, 11 in obs. (1902); Brandis, Ind. Trees, 8 (1906); Finet & Gagnep. in Mém. Soc. Bot. France, i. 4, 42 (1906).

Michelia montana Bl. in Verh. Batav. Genootsch. ix. 153 (1823).
Michelia ecicatrisata Miq. Fl. Ind. Batav., Suppl. i. 368 (1860).
Michelia montana var. *subvelutina* Miq. Ann. Mus. Bot. Lugd.-Batav. iv. 73 (1868).
Sampacca montana O. Kuntze, Revis. Gen. Pl. i. 6 (1891).
Hab. Malay Peninsula. Sumatra. Java.

MESEMBRYANTHEMUM AND ALLIED GENERA.

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

(Continued from p. 268.)

CALAMOPHYLLUM Schwantes in Zeitschr. f. Sukk. iii. 15 & 28 (1927).

C. cylindricum Schwantes, *l. c.* 29. (*M. cylindricum* Haw. Obs. 411, Misc. 27, Synop. 209, and Rev. 105; N. E. Br. in Journ. Linn. Soc. (Bot.) xlv. 101, t. 7. f. 23.)

C. teretifolium Schwantes, *l. c.* (*M. teretifolium* Haw. Syn. 210, and Rev. 105. *M. cylindricum* var. β Haw. Misc. 27.)

C. teretiusculum Schwantes, *l. c.* (*M. teretiusculum* Haw. Obs. 410, Misc. 27, Syn. 209, and Rev. 105.)

CARPANTHEA N. E. Br. in Gard. Chron. lxxviii. 412 (1925), and in Phillips, Gen. S. Afr. Pl. 245.

C. pomeridiana N. E. Br. in Phillips, Gen. S. Afr. Pl. 246; S. Afr. Gard. 1927, 435 & 434, f. 27, C; Journ. Bot. Soc. S. Afr. 1927, t. 4. f. 3 c. (*M. pomeridianum* L. Sp. Pl. ed. 2, 698; Linn. f. Pl. Rar. Hort. Ups. Dec. 2, 25, t. 13, a good figure; Haw. Obs. 118, Misc. 45, Syn. 245, and Rev. 160; Jacq. Ic. Pl. iii. 6, t. 489; Seba, Thes. i. t. 19. f. 5; Bot. Mag. t. 540; Salm Dyck, Mes. § 65, f. 1; Loudon, Ladies Fl. Gard. t. 18. Var. *Andrewsii* Haw. Rev. 160. Var. *glabrum* DC. Prod. iii. 450. *M. glabrum* Andr. Bot. Rep. i. t. 57, not of Aiton. *M. pilosum* and *M. calendulaceum* Haw. 47, Syn. 245, and Rev. 161.)

CARPOBROTUS N. E. Br. in Gard. Chron. lxxviii. 433 (1925), and in Phillips, Gen. S. Afr. Fl. Pl. 249.

This is the most widely-distributed genus of the whole group, species being found in S. Africa, Australia, New Zealand, Chili, and California, and requires a careful revision by competent observers from living plants in their native countries. A good workable key to the species is especially needed, for it is scarcely possible to identify cultivated plants from the descriptions given or to understand how they differ. In modern books all Australian members of this genus are referred to *Mesemb. æquilaterale* Haw., but, from the very scanty material at Kew, I believe that when properly examined and when the character of the ripe fruit (which has never been noted) is taken into consideration, at least four or five well-marked species will be found to exist there. None of the material I have seen belongs to the true *C. æquilaterus* (*M. æquilaterale* Haw.), which has slender stems and the smallest leaves of all known species. I have never seen it, but from an original drawing of the type at Kew, it is evident that Salm Dyck's figure correctly represents this species. It is unknown in which part of Australia it grows.

The following key indicates the four Australian species as I understand them, which I give to call the attention of Australian workers to these plants and to induce them to work out the species in a more critical manner than has yet been done, and especially to take into consideration the shape, size, or other characters of the ripe fruit as aids to distinction:—

Stems stout, 2½–3 lines thick; leaves 1½–2 in. long and 3–5 lines thick near the apex; stigmas 7–8	*glaucescens.*
Stems slender, 1–1½ line thick.	
Petals acute; leaves 1¼–2½ in. long and about 3 lines thick near the apex; stigmas 9–10	*Rossii.*
Petals obtuse or denticulate at the apex.	
Stigmas 6; leaves 1½–2 in. long and 1½–2 lines thick near the apex, where they are not at all thickened at the keel	*æquilaterus.*
Stigmas 12–14; leaves 2–3 in. long and 2–3 lines thick near the apex, where they are slightly thickened at the keel.	*disparilis.*

The following is a list of the known species:—

C. ACINACIFORMIS L. Bol. in Fl. Pl. S. Afr. vii. under t. 247. (*M. acinaciforme* L. Sp. Pl. 485, founded upon Dillen. Elth. t. 211. f. 270; Haw. Obs. 397 & 444, Misc. 76, Synop. 233, and Rev. 118; Salm Dyck, Mes. § 19, f. 6; Salisb. Parad. Lond. t. 90; Reg. Veg. iii. Atlas Iconogr. i. t. 35; Berger, Mes. 202, f. 40, vi., and see Kew Bull. 1887, Sept. p. 9.)—S. Africa.

C. ÆQUILATERUS N. E. Br. (*M. æquilaterum* (by error *equilaterum*) Haw. Obs. 390. *M. æquilaterale* Haw. Misc. 77, Synop. 237, and Rev. 120; Salm Dyck, Mes. § 19, f. 1; Berger, Mes. 205, partly.)—Australia.

C. CHILENSIS N. E. Br. (*M. chilense* Molina, Saggio sulla storia naturale de Chile, ed. 2, 133 (1810). *M. æquilaterale* var. *chiloense* Salm Dyck, Mes. § 19, f. 1 γ.)—Chili, California.

C. DELICIOSUS L. Bol. in Fl. Pl. S. Afr. vii. under t. 247, and in Ann. Bolus Herb. iv. 109. (*M. deliciosum* L. Bol. in Ann. Bolus Herb. iv. 41.)—S. Africa.

C. DISPARILIS N. E. Br. (*M. virescens* Salm Dyck, Mes. § 19, f. 3, and Rump. & Schum. Sukk. 37, not of Haworth.)—Stated to be a native of Australia.

C. EDULIS L. Bol. in Fl. Pl. S. Afr. vii. t. 247 (*M. edule* L. Syst. ed. 10, 1060, and Sp. Pl. ed. 2, 695, founded upon Dillen. Elth. t. 212. f. 272; Haw. Obs. 392 & 444, Misc. 76, Synop. 234, and Rev. 119; Ann. Sc. Nat. Par. ser. 3, xviii. t. 10; Payer, Organogr. Comp. Fl. t. 80. ff. 25–28; Fiori & Paol. Ic. Fl. Ital. 123; Fl. & Sylv. iii. 167; Garden, lxxi, 600; Berger, Mes. 204 & 203, f. 40, i.–v.; Jardin, xxiii. 293, & xxxi. 117; Marl. Fl. S. Afr. i. 203, t. 50; Bailey, Stand. Cycl. Hort. 2041; Bot. Mag. t. 8783; and see Kew Bull. 1887, Sept. p. 9. *M. edule* var. *virescens* Moss, Cambr. Brit. Fl. ii. 151, t. 153.)—S. Africa, naturalised elsewhere.

C. FOURCADEI, L. Bol. in Fl. Pl. S. Afr. vii. t. 247, Ann. Bolus Herb. iv. 109, S. Afr. Gard. 1927, 434, f. 26 E, and Journ. Bot. Soc. S. Afr. xiii. 12, t. 4. f. 2 E. (*M. Fourcadei* L. Bol. in Ann. Bol. Herb. iv. 84.)—S. Africa.

C. GLAUCESCENS N. E. Br. (*M. glaucescens* Haw. Synop. 236, and Rev. 120. *M. virescens* Haw. Synop. 236, and Rev. 120; not of Salm Dyck. *M. abbreviatum* Haw. in Phil. Mag. 1826, 329; Salm Dyck, Mes. § 19. f. 5.)—Australia. On the original drawing of the type of *M. abbreviatum* at Kew, this is stated to have been "raised in 1923 from seeds collected by Mr. Cunningham at King George's Sound."

C. JURITZII L. Bol. in Ann. Bolus Herb. iv. 109. (*M. Juritzii* L. Bol. *l. c.* iii. 137. *M. dimidiatum* Berger in Engl. Bot. Jahrb. lvii. 64, not of Haworth *.)—S. Africa.

* *M. dimidiatum* Haw. = SEMNANTHE LACERA N. E. Br.

C. LÆVIGATUS N. E. Br. (*M. lævigatum* Haw. Misc. Nat. 76, Synop. 233, and Rev. 118.)—S. Africa. This may be one of the species recently described under another name by Mrs. Bolus. It is unknown to me.

C. MELLEI L. Bol. in Ann. Bolus Herb. iv. 109. (*M. Mellei* L. Bol. *l. c.* iii. 137.)—S. Africa.

C. MUIRII L. Bol. in Fl. Pl. of S. Afr. vii. under t. 247, and in Ann. Bolus Herb. iv. 109. (*M. Muirii* L. Bol. *l. c.* iii. 138.)—S. Africa.

C. PAGEÆ L. Bol. *l. c.* iv. 107

C. ROSSII N. E. Br. (*M. Rossii* Haw. Rev. 120; Salm Dyck, Mes. § 19, f. 2.)—Tasmania.

C. RUBROCINCTUS N. E. Br. (*M. rubrocinctum* Haw. Synop. 234, and Rev. 118; Bot. Reg. t. 1732; Loudon, Ladies Fl. Gard., Orn. Greenh. Pl. 167, t. 33, f. 3.)—S. Africa.

C. SUBALATUS N. E. Br. (*M. subalatum* Haw. Misc. 76, Synop. 235, and Rev. 119.)—S. Africa.

This is probably (as Wolley Dod, in a note under *M. edule*, in Tr. S. Afr. Phil. Soc. xiv. 266, also considers it to be) a hybrid between *C. edulis* and *C. acinaciformis*, its leaves being intermediate between the two species "dark green, curved as in *M. acinaciformis* L., but of nearly equal depth throughout, keels only slightly dilated, slightly serrulated," according to Wolley Dod, and the stem is more winged than in *C. edulis*.

C. VANZIJLIÆ L. Bol. in Ann. Bol. Herb. iv. 108.

C. (?) SAUERÆ Schwant. in Zeitschr. f. Sukk. 1928, 275. This plant probably does not belong to this genus, and is too imperfectly described to admit of identification.

CARRUANTHUS Schwantes in Zeitschr. f. Sukk. ii. 181 (1926).

C. CANINUS Schwantes, *l. c.* 181. (*M. caninum* Lam. Encycl. ii. 487; Haw. Obs. 159, Misc. 31, Synop. 217, and Rev. 87; DC. Pl. Grass. t. 95; Salm Dyck, Mes. § 5, f. 9; Rump. & Schum. Sukk. 34; S. Afr. Gard. 1927, 364, f. 16 E, & 365, ff. 17–18; Berger, Mes. 250. *M. ringens* var. *caninum* L. Sp. Pl. 487, founded upon Dill. Hort. Elth. 241, t. 188. f. 231.)

The variety *vulpinus* is merely a form without teeth on the leaves. I have both forms growing on the same plant. It is figured in Berger, Mes. 251, f. 54, iii.

CEPHALOPHYLLUM N. E. Br. in Gard. Chron. lxxviii. 433 (1925), and in Phillips, Gen. S. Afr. Fl. Pl. 247.

The synonymy of some of the species of this genus is very intricately involved, and has become more so by the manner in which

the rules of nomenclature have been disregarded and Haworth wrongly quoted as being the author of the genus and of many of the species by Mrs. Bolus in *South African Gardening*, 1928, 155, 156. What Haworth did write about it is as follows :—"Genus si bonum, nomen *Cephalophyllum* propono. Forte duo genera." Which may be translated "If a good genus, I propose the name *Cephalophyllum* (for it). Probably (there are) two genera." Wishing to give Haworth all the credit I legitimately could when dividing *Mesembryanthemum* into new genera, I consulted other botanists (as I have done in all similar cases) to see if this genus could be placed to Haworth's credit. But all agreed that as Haworth was uncertain about it and did not definitely state that it was a distinct genus, and never in his later writing did he admit *Cephalophyllum* as a genus nor place any species under that heading, and until his death, with the exception of *Hymenogyne glabra*, placed all the species he ever knew under the one genus *Mesembryanthemum*, and that, as I also found that the twelve species (not seven only, as Mrs. Bolus states) he placed under his section really belonged to two very distinct genera, Haworth could not be credited with the authorship of the genus; still less, according to the rules of nomenclature, can he be quoted as the author of any species under the heading of *Cephalophyllum*, that genus, as distinct and separate from *Mesembryanthemum*, being founded by myself as above quoted.

The extraordinary confusion with regard to some of the older species that has been made by some modern writers was begun by Linné himself, who, first having changed the name of his original *M. loreum* into *M. corniculatum*, retains the name *M. loreum* for two distinct plants, that of the main description being the same as *C. diversiphyllum*, and that printed in italics being *C. diminutum*. A close study of available material and references has enabled me to compile the following list :—

C. ALBERTINIENSE L. Bol. in S. Afr. Gard. 1928, 156, and Mes. 121. (*M. albertiniense* L. Bol. in Ann. Bol. Herb. iv. 3.)

C. ALSTONII Marl. ex L. Bol. in S. Afr. Gard. 1928, 156, and Mes. 120.

C. ANEMONIFLORUM L. Bol. in S. Afr. Gard. 1928, 156, and Mes. 121. (*M. anemoniflorum* L. Bol. in Ann. Bol. Herb. iii. 159.)

C. CAULICULATUM N. E. Br. (*M. cauliculatum* Haw. Synops. 90. *M. diminutum* var. *cauliculatum* Haw. Rev. 107; DC. Prod. iii. 435.)

C. CLAVIFOLIUM L. Bol. in S. Afr. Gard. 1928, 156, and Mes. 121. (*M. clavifolium* L. Bol. in Ann. Bol. Herb. iv. 95; Journ. Bot. Soc. S. Afr. 1927, 12, t. 4. f. 4 D, and Mes. 13, f. 3 D.)

C. COMPTONII N. E. Br. (*C. loreum* var. L. Bol. in S. Afr. Gard. 1928, 155, f. 38, and Mes. 117, 118, f. 38. This plant, according to the figure and description, has little resemblance to *M. loreum* Haw., of which Mrs. Bolus considers it to be a variety, and still less to *M. loreum* L.)

C. CURTOPHYLLUM N. E. Br. (*M. curtophyllum* L. Bol. in Ann. Bol. Herb. iii. 160.)

C. DECIPIENS L. Bol. in S. Afr. Gard. 1928, 156, and Mes. 121. (*M. decipiens* Haw. Rev. 110.) This, in my opinion, is probably the same as *M. dubium* L. Bol. It is only known from Haworth's description made from a young plant that had not flowered.

C. DENSUM N. E. Br. (*M. diversifolium* L. Bol. and *M. læve* L. Bol. in Ann. S. Afr. Mus. ix. 144 partly, but not of Haworth. This will be more fully described later.)

C. DIMINUTUM L. Bol. (*M. diminutum* Haw. Misc. Nat. 26; Synops. 230, Suppl. 99, including var. *pallidum* Haw. and Rev. 107; N. E. Br. in Journ. Linn. Soc. (Bot.) xlv. 63, t. 7, f. 24. *M. corniculatum* Haw. Obs. 411, not of his other works. *M. loreum* L. Sp. Pl. ed. 2, 694, as to the description in italics only, not as to the main description, nor of ed. 1.)

C. DISSIMILE N. E. Br. (*M. dissimile* N. E. Br. in Journ. Linn. Soc. (Bot.) xlv. 105. *M. validum* Salm Dyck, Mes. § 15, f. 8; Berger, Mes. 138, 139, f. 24, iii., copied from Salm Dyck, not of Haworth. *C. procumbens* L. Bol. and *M. procumbens* L. Bol. in S. Afr. Gard. 1928, 127, 156, and Mes. 66, 121; and 1927, 434, f. 26 G, 435, f. 27 D, repeated in Journ. Bot. Soc. S. Afr. 1927, t. 4, f. 3 D, and Mes. 10, f. 2 G, and f. 4 D.

(To be continued.)

TWO NEW SPECIES FROM ZANZIBAR ISLAND.

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

Amongst a collection of plants from Zanzibar Island made by Mr. J. H. Vaughan and presented to the British Museum Herbarium the following species are found to be new :—

Hibiscus zanzibaricus, sp. nov. *Herba* perennis, caulibus verisimiliter erectis stellato-pubescentibus et stellato-pilosis; *foliis* longe petiolatis, petiolo tereti stellato-puberulo et stellato-piloso, ovatis vel suborbicularibus sæpius trilobatis basi truncatis vel nonnunquam paullo emarginatis 5- vel 7-nerviis omnino pilosis pilis simplicibus usque quadrifurcatis; *floribus* terminalibus solitariis pedicellatis, pedicello stellato-pubescente; *bracteis involucri* parvis lineari-oblongis apice obtusis quam sepala triplo vel quadruplo brevioribus; *sepalis* anguste oblongis trinerviis pilosulis; *petalis* obovatis intus glabris

extus sparse pubescentibus; *tubo stamineo* glabro; *stylis* 5, apice liberis, stigmatibus globosis glanduloso-pilosulis.

Hab. ZANZIBAR ISLAND: "a low-lying plant found on coral rag," *J. H. Vaughan*, 39.

Leaves 1–2·5 × 1–2 cm.; *petioles* up to nearly 2 cm. long; *pedicels* 3 cm. long; *epicalyx* composed of bracts scarcely exceeding 1 mm. in length; *sepals* 4 × 1·5–2 mm.; *petals* 12 × 7–8 mm.; *staminal tube* 8–9 mm. long; *styles* projecting for about 3 mm. beyond the staminal tube.

This species belongs to Sect. *Bombycella* (Edgew.) DC., and is remarkable for the very small epicalyx, not quite as long as the connate bases of the sepals. The flowers are rather large for the section and rose in colour.

Grewia Vaughanii, sp. nov. *Frutex* ramulis pulverulentis demum glabrescentibus rugosis; *foliis* petiolatis, petiolo tereti pulverulente vel minutissime pubescente, ovatis acuminatis basi truncatis trinerviis margine denticulatis supra glabris infra in axillis nervorum barbulatis cætera glabris, costis supra prominulis infra prominentibus; *floribus* in cymulas trifloras axillares dispositis; *pedunculo* quam pedicellis triplo longiore glabro; *pedicellis* pilosis; *sepalis* lineari-oblongis basi incrassatis glandulosis apice incisis; *staminibus* numerosis, filamentis glabris; *stylo* tereti erecto glabro, stigmatibus duobus recurvatis subulatis; *ovario* piloso biloculato, ovulis numerosissimis; *fructu* globoso 4-pyreno minutissime pubescente, pyrenis juxtapositis.

Hab. ZANZIBAR ISLAND: "A shrub with small yellow flowers, usually on coral rag," *J. H. Vaughan*, 97.

According to the collector the bark is tough and the fibrous wood is used for fish-traps.

Leaves 3·5–7 × 2–3·5 cm.; *petioles* 8–10 mm. long: *acumens* about 1 cm. long; *peduncles* 6–7 mm. long; *pedicels* 2–3 mm. long; *sepals* 10 × 1·8 mm.; *petals* 7 mm. long, 1 mm. broad in the middle and about 1·5–1·8 mm. broad at each end; *filaments* 6 mm. long; *style* 7 mm. long; *ovary* 1·6 × 1·4 mm.; *fruit* 7–8 mm. in diam.

According to the classification proposed by Burret in Engl. Jahrb. xliv. p. 189 *et seq.* (1910), this species belongs to Sect. *Pluriovulatæ* Burret, Subsect. *Apodogyne* Burret, and is near to *G. Welwitschii* Burret and *G. Holstii* Burret, from both of which it can be distinguished by the much longer petioles and by the glabrous peduncles which contrast suddenly with the pilose pedicels.

More recently Burret (in Notizbl. Bot. Gart. Berl. ix. p. 592 *et seq.* (1926)) has separated the genera *Microcos* L. and *Vincentia* Boj., which were formerly included in *Grewia*, but after consideration of the arguments which he puts forward, I am of the opinion that the differences are only of sectional value, and that the genus *Grewia* in the wide sense is a natural one.

Those who wish to follow Burret in his division of *Grewia* into three genera should note that the retention of the name *Vincentia* Boj. in Hook. Bot. Misc. i. 293, tab. 62 (1830) is hardly justifiable in view of the earlier *Vincentia* Gaudich. in Freyc. Voy. Bot. 417 (1826). The latter genus has generally been united with *Cladium*, but agreement as to this is not universal, and in the circumstances there is no doubt that the use of *Vincentia* Boj. might be misleading, and is scarcely legal under International Rules. Thus Stapf (in Journ. Linn. Soc. xlii. 178 (1914)) describes a *Vincentia malesiaca* belonging to the genus *Vincentia* Gaudich., and also makes the combination *V. samoensis*, stating definitely that he is of the opinion that the genus *Cladium* should be restricted to the section *Eucladium*. Merrill (in Philipp. Journ. Sci. Bot. xi. 258 (1916)) has followed Stapf in keeping up the genus *Vincentia* Gaudich., and described a new species, *V. Robinsonii*. Those who follow Burret's more recent classification should therefore use the generic name *Vinticena* Steud. (Nom. ed. 2, ii. 769 (1841)) in place of *Vincentia* Boj.

NOTES ON PAPERS OF INTEREST TO STUDENTS OF THE BRITISH FLORA.

THE GLOSSY PETAL OF *RANUNCULUS* (*Annals of Botany*, xlii. 739–55).—John Parkin states that the peculiarities of the glossy petal of *Ranunculus* have been little noticed by British botanists, and apparently the study of this petal has been confined to a few German botanists. Möbius, as far back as 1885, described its main structural features and referred to them again in 1912 in a paper on floral pigments.

The author describes the structure of the glossy petal, which is sharply divided into an upper region, usually the main part, highly glazed and deeply pigmented, and a lower, without the glaze and paler in colour. A section through the glossy part shows that the starch is strictly confined to a layer of tissue below the upper epidermis, where the cells are crammed with minute starch-grains. The upper epidermis as seen in section forms quite a narrow layer; the outer walls of the component cells are straight without any convexity, thus rendering the upper surface of the petal perfectly smooth. The yellow pigment is concentrated in the upper epidermal cells—not, however, in the solid, but in the much more unusual liquid state. The pigment is in oily solution.

Köstlin's physiological and biochemical researches on the petals of *Ranunculus acris*, *R. bulbosus*, and *R. Lingua* are then described. An unexpected biochemical feature is its richness in reducing-sugar. Then follows a comparison of the glossy and matt-petalled species.

In his summary the author states that the peculiar features responsible for the gloss are:—

(*a*) A perfectly smooth upper epidermal layer of narrow cells with hyaline contents, consisting of yellow pigment dissolved in a highly refractive oil.

(*b*) A compact subepidermal layer crammed with starch-granules. This layer, contrary to the views expressed by previous investigators, is apparently more than one cell thick.

The writer has attempted a survey of the large genus as regards the presence of starch and gloss in the petal, and, though all the species have not yet been examined, he is able to suggest the following conclusions:—

(*a*) The glossy far outnumber the non-glossy-petalled species.

(*b*) The gloss is always associated with the structural features described above.

(*c*) Except as sports, no glossy species has been found to have petals coloured other than yellow. The matt species, though usually white, may be yellow or even red.

(*d*) Though starch is usually absent from the petals of matt species, it occurs in some, but never so abundantly as in the glossy species.

(*e*) The glossy petal of *Ranunculus* appears to be unique among flowers.

This investigation suggests that glossiness is of first-class phylogenetic, and so of taxonomic, importance within the genus, permitting it to be divided into two subgenera—the one containing the glossy and the other the matt-petalled species.—E. G. B.

THE FLORA OF THE CHALK DOWNS (*Science Progress*, xxii. 444–60, 1928).—Miss V. L. Anderson points out the important part which these grassy uplands of southern England have played in the life of the inhabitants of these islands from the earliest times. They are the chief natural grasslands of England, and have been used as sheep-walks from time immemorial, and this has doubtless played a very important part in causing them to retain their condition, as sheep eat the turf very close and evenly over large areas. Rabbits, too, have had an even greater effect, nibbling off any object above the average level of the vegetation, thus preventing the survival of seedlings of tall plants. When areas of the chalk grassland are enclosed to exclude rabbits and sheep, seedlings of woody plants soon become established and scrub soon replaces grassland, as can be seen in many places on the North Downs where grazing has been considerably reduced during the last fourteen years. This shows that the biotic factor is the all-important one in the maintenance of the chalk grasslands which are therefore a subclimax community.

There are two main types of chalk grassland. One type is dominated by the fine-leaved *Festuca ovina* and other grasses forming a short turf, and is found especially where pasturage has been long established. The other type is dominated by *Bromus erectus* and other taller and coarser grasses, and occurs chiefly where pasturage has not been so severe. With the grasses of both types are associated a large number of dicotyledonous herbs and also many orchids; in fact, the flora of the chalk is exceptionally rich from a taxonomic point of view. This is attributable not only to the edaphic factors, but also to the geographical distribution of the formation, as the chalk has been favourably situated to receive new species of the southern element by way of the Straits of Dover.

Considering its physical properties, the porosity of the chalk is one of its chief characteristics and makes the chalk pre-eminently a dry soil, and therefore the vegetation which it carries is of a xerophytic type. The actual amount of water present in the surface-soil shows a wide seasonal variation ranging from a water-content of 98 per cent. in wet weather to 8·5 per cent. during periods of drought. It is this low minimal value of the water-content which determines the nature of the flora, as only a limited number of plants are equipped with some means of surviving during such periods of drought. At a depth of six inches, however, the water-content shows only half the range of fluctuation recorded for the corresponding three inches of surface-soil. It has been found that the average working depth of some fifty species of chalk-down plants is 4–8 inches below the surface in the more equable region. The chalk is a well-aerated soil, and therefore it is not surprising to find that amongst the more typical plants there are several with root-systems which penetrate to a depth of three feet or more.

The other important characteristic of the chalk is its basic nature which enables many plants which are highly intolerant of acid conditions to thrive in it. However, this quality is liable to be modified by leaching, especially on the flat tops of the downs, where leaching has been continuous and the products of this process have accumulated. The importance of calcium lies not so much in its value as a plant food, but in the far-reaching influence exerted by its physical and chemical properties. Thus, it flocculates the clay particles, favours the development of nitrogen-fixing organisms, and, above all, it is the chief base useful in counteracting soil acidity.

The writer sums up the comparative importance of these two factors in the life of a calcicole plant as follows:—"Favourable as the high calcium-content may be in many ways, it must be noted that every calcicole plant which can exist on the English chalk must be able to withstand drought conditions. Water economy has been a determining factor in every phase of the evolution of the land plant, and its significance is perhaps more emphasised in the flora of the chalk down than in any other inland plant-community of this country."—DORIS POWELL.

BRAMBLES OF KENT AND SURREY (1), by William Watson (*London Naturalist*, 1927, pp. 12–17) (June 1928).—William Watson gives the first part of an account of the brambles he has collected in Surrey and Kent, chiefly within 15 miles of London, adding some interesting critical remarks. This part deals with the brambles in Subsection I. and Subsection II. Group 1, *Suberecti*, to Group 5, *Discolores*.

R. nessensis Hall: Rogers prefers to call this *R. suberectus* Anders.—a much later name for the same bramble—on the ground that Hall's description includes *fissus*, in that "petioles channelled" is a character of *fissus* and not of the present plant. The author,

however, finds that the petioles of *suberectus* are channelled, though not so distinctly as in *fissus*.

R. plicatus N. & W. subsp. *amblyphyllus* Boul. is the name assigned to a plant of Chislehurst Common and Roehampton.

R. erythrinus Genev.: this plant in Rogers's *Handbook* includes four distinct brambles, not one of which is the true *erythrinus*, nor altogether *argenteus* N. & W., by which name it is replaced in British lists; a careful account is given of these segregates.

R. oxyanchus Sud.: this is, *pro parte*, *R. nemoralis*, of Rogers's *Handbook*, but not of Mueller nor of Sudre.

R. pulcherrimus Neum. (non Hooper) occurs frequently.

R. villicaulis var. *atricaulis* (P. J. Muell.): this has been found on Hayes Common, Weybridge Common, and downs above Albury.

R. Winteri P. J. Muell.: this is the bramble which Rogers described under the name *R. argentatus* P. J. Muell., and which nowadays is named *R. Godroni* Lec. & Lam. We have not in Britain *R. Godroni* in the sense in which the name was used by Lecoq and Lamotte.

R. robustus P. J. Muell.: although this appears in Rogers's *Handbook* and in the *London Catalogue*, the author considers that it does not occur in Britain.

R. subinermis Rogers: the author thinks that this species is not well placed in the *Discolores* and gives a detailed description of it, showing how it differs from the other members of that group.

It will be seen from the above few notes that this is a paper well worthy of the attention of British batologists.—E. G. B.

OBITUARY.

Charles Curtis
(1853–1928).

Charles Curtis, who died on August 23, was a native of Devonshire (born 1853), his grandfather, a Norman of the name of Courtois, having settled at Barnstaple many years before. He was first employed as a garden-lad at Bale's Nursery, North Devon, and then at Veitch's establishment. In 1878 he went on a trip to Madagascar to collect for the firm and brought back among other plants *Angræcum sesquipedale* and *Nepenthes madagascariensis*. In 1880 he explored Borneo, Sumatra, Java, and the Moluccas for plants, and brought back *Nepenthes Northiana*, only known previously from a drawing by Miss North. He was appointed to take charge of the Botanic Gardens in Penang and remained there till 1903, when, owing to illness, he retired to Barnstaple, where he cultivated sweet peas, tomatoes, etc., till his death at the age of 75.

He was a remarkably good collector of plants, both living and herbarium specimens, and made extensive collections at Penang, the Lankawi Islands, and neighbouring coasts. His main herbarium was transferred to the Singapore Botanical Gardens after he left, but

many duplicates were distributed to the Herbaria of Kew and the British Museum. He published a Catalogue of the flowering plants and ferns of Penang (Journ. Asiatic Society, Straits Branch, xxv. 67), and a list of the Malay plant-names (*op. cit.* xxxviii. 39), in association with myself. He also contributed many useful papers on cultivation of Bulbs, Aroids, Pot-plants, Ferns, Roses, and Orchids, instructions on drying plants, on the occurrence of guttapercha in Penang, and other notes and papers on various cultures in the *Agricultural Bulletin of the Straits Settlements*, 1897 to 1902. A large number of species of plants discovered by him have been associated with his name, and the genus *Curtisina* Ridl. (Sapindaceæ) was named after him.—H. N. Ridley.

PRESERVATION OF WILD FLOWERS.

CORRESPONDENCE.

I agree with the Committee of the Botany Section of the British Association in having in their interim report rejected the proposal for a Plant Protection Act of Parliament with a list of scheduled plants whose gathering would be prohibited by law, on the grounds that it would (emphatically) draw attention to the rare species and would be, in my opinion, impossible to enforce.

The oftener rare or certain remarkable British plants are talked about in public, illustrated in popular publications, scheduled in Acts of Parliament or by County Councils, and shown at Museums, however good the intention, the quicker will some of them get scarcer and eventually disappear.

It is chiefly a question of education; the cultivation of a greater reverence for all things beautiful in Nature.

As to Mr. Tahourdin's note, I agree only with the interpretation placed upon it by Sir Maurice Abbot-Anderson, and would emphasize the importance of never introducing foreign or garden seed (or plants) unless the garden-seed came from plants or seed originally taken from the wild state in Britain. The closer relation between British and Continental botanists during the past generation has shown how greatly many of the same species of plants vary in different countries, and that even our previous conception of several not uncommon species was incorrect.—H. Stuart Thompson, Hon. Sec., Watson Botanical Exchange Club.

On the question of the advisability of scattering the seeds of rare British plants and re-establishing or planting rare species in known or what are considered suitable habitats, may I suggest an aspect of the case which appears to have been overlooked? Field-botany should be viewed as a study to be pursued in relation to other sciences (geology, entomology, &c.), for plants are dependent on soil and climate, and on birds, animals, and insects, for seed-dispersal and pollination. In this way it plays an important part in helping to throw light on

problems of the earth's past history, which can only be solved by the co-operation of students in all branches of science and by the recording of details which may appear unimportant, but may be invaluable when added to others. While some regard the disappearance of a rare plant merely as a passing sorrow, easily rectified by the planting of fresh material, others who realise the interdependence of plants, animals, and insects regard it as a calamity, for to them a plant established in an artificial habitat has no scientific value. Their interest lies in ascertaining the cause of its disappearance, such as the improved drainage of the land, changed climatic conditions, or the loss of some insect which formerly pollinated it. This knowledge is difficult enough to acquire, yet one man with a handful of seeds promiscuously scattered may upset in five minutes theories which have taken years to formulate. Clement Reid, in his admirable book *The Origin of the British Flora*, gives some idea of the historical and geographical value of the discovery of the fossil seeds of British plants in geological formations dating from the Preglacial to the Roman period. The study of the different floras of the world and the distribution of certain plants and mammals over wild areas has also contributed largely to our knowledge of the probable geographical changes that have taken place on the earth's surface. To those interested in this aspect of field-botany the colonies of *Erica mediterranea* and *Dabeocia polifolia*, out-liers of the Pyrenean Flora in Ireland, which are of the utmost interest where they occur naturally in Connemara, would be worthless if artificially established in the sandy soil of Norfolk, to which they bear no geological or geographical relation. By observing the climate, soil, elevation, and plant-associations of a district, a keen field-botanist delights in guessing what rare plants ought to be found there, and then in proving himself correct by finding them. This interest would be gone if promiscuous planting were encouraged. There would be no further pleasure in searching for *Asplenium serpentini* with a geological map on the strip of serpentine near Cabrach or in noting the best display of sub-alpine species on the outcrop of sericite schist near the summit of Ben Lawers and the base of Ben Laoigh. All land is owned either privately or by a public body, and it is surely as wrong to sow seeds on another man's property as to uproot what is growing. Those who uproot destroy, and the trouble is finished, but those who plant create problems for the future. As Secretary of the "Flora of Glamorgan" I know something of the difficulty. About twelve years ago a flower-enthusiast wrote to me saying that she and a friend had climbed the Brecon Beacons and had planted a few incrusted saxifrages in an almost inaccessible gully. My reply, expressing my views on the matter, brought an apology and an assurance that no one was likely to find the saxifrages in such a remote spot. Years passed and the incident left my memory. Last summer, however, two well-known botanists climbed the mountains and discovered the plants. The matter was mentioned to me and I produced the correspondence, to the disappointment of the botanists, who thought they had made a valuable new record. Such is the trouble caused by a misplaced

desire to beautify nature. To those who consider this point of view selfish, may I point out how few really rare plants are specially beautiful; many like *Ludvigia* and *Lloydia* are inconspicuous and of interest only to specialists. The public do not suffer by their scarcity, and compensation is surely afforded by the increasing abundance of many gaily-coloured aliens such as *Impatiens glandulifera*, *Œnothera odorata*, and *Mimulus*. Those who for kindly or æsthetic reasons wish to beautify the country for the sake of others would surely do better to subscribe to the National Trust for the Preservation of Nature Reserves. The country-side is now over-run by trippers, and saleable plants, until hawking is prohibited, are nowhere safe. To plant roots of royal fern in spots to which the public have access is merely to encourage hawking by providing plants to sell. The native flora of Britain should be regarded as a heritage to be jealously guarded against human interference.—Eleanor Vachell, Cardiff.

REVIEWS.

Recent Books on Mycology.

The Gasteromycetes of the Eastern United States and Canada. By W. C. Coker and J. N. Couch. 4to, pp. ix, 201, tt. 123. University of North Carolina Press, and Oxford Press, London, 1928. Price £2 15*s*.

This work, as its size and cost suggest, is an important contribution to the study of North-American Gasteromycetes. The senior author is well known for similar monographic studies on the Saprolegniaceæ and the Clavariaceæ. The work under review is, however, produced in even more lavish fashion than the others. This is much to be deprecated, for the book can have no appeal other than to mycologists, who as a class are notoriously lacking both in money and in shelf-room. The book is beautifully printed and the plates depicting the several fungi are for the most part excellent. The pages have, however, an excessive margin, and the contents of some of the plates might easily have been combined. An additional saving could have been made in the lists giving the distribution of the common species: half a page of these, with such details as precise dates and localities is unnecessary. Further, many of the plates might have been reproduced as text-figures. It is to be hoped that the authors will consider such matters in any future monographs they contemplate, so that their work may get into the hands of mycologists in general.

The book opens with an artificial key to the families, and then begins at once with their consideration. The addition of a general account of structure and classification would have made the treatment more complete as well as given the authors an opportunity of explaining their views on the systematic points which are scattered throughout the book and nowhere correlated.

The classification adopted is Phallaceæ, Hysterangiaceæ, Hymenogastraceæ, Secotiaceæ, Lycoperdaceæ, Arachniaceæ, Sphærobolaceæ, Tylostomaceæ, Sclerodermataceæ, Nidulariaceæ, and Calostomataceæ. The innovation here is the separation of *Arachnion* from the Lycoperdaceæ and the erection of a new family for its reception. "We have found it impossible to retain it and have any character left to determine the Lycoperdaceæ." The imperfectly-known genera *Arachniopsis* and *Holocotylon* may find a place in this family. *Arachnion* differs from the Lycoperdaceæ in having a simple peridium, peridioles, and no capillitium. Following Fischer, *Protophallus* is placed in the Hysterangiaceæ, being included in the work because of its general interest and the lack of previous illustration, though this monotypic genus is endemic to Jamaica. The authors sometimes appear to be halting between living up to their title and giving an account of Gasteromycetes in general—a work which the late C. G. Lloyd had in mind, and which the reviewer had promised to see through the press. *Hydnangium*, following Lloyd, is sunk in *Octaviania*.

The general procedure is to give a diagnosis of the family with a note on points of interest, allied genera, and so on, followed by a key to the genera. The genus is treated in the same way, and is followed by a key to the species. The species is then described and usually is illustrated by a photograph and often by drawings of anatomical details. The notes to the species are valuable, but frequently they are so discursive that one has the impression that there has been no attempt at pruning. Then follows a list of illustrations with no comment. How illogical this may be is seen with *Ithyphallus impudicus*. Here a dozen references are given—the list could be much extended,—chiefly to European sources, but in the description of the fungus we find "the American form seems to have consistently a pink volva which is elongated or egg-shaped and may best be considered as *I. imperialis* or as a variety of *I. impudicus*" (presumably *Phallus iosmus* Berk. or *P. impudicus* var. *carneus* Lemmermann). The plate given, however, is either a very poor representative of the American fungus or it is neither *impudicus* nor *imperialis*, species which are well known in this country, the first represented in many of the illustrations referred to, the second in Kalchbrenner's *Icones*.

The account ends with a list of specimens collected and those consulted in herbaria.

A new genus, *Nigropogon*, with one species, is described, which differs from *Rhizopogon* in having no adherent superficial fibres, the peridium and tramal plates composed almost entirely of pseudoparenchymatous cells, and the spores strongly angular; and in addition seven new species and a variety. A new name, *Pisolithus tinctorius* (Pers.) is proposed: "as Persoon's *Synopsis Fungorum* is now generally accepted as the starting point for the nomenclature of the Gasteromycetes, there is no reason why his specific name (based on Micheli's plate) should not be applied to this plant."

Scattered throughout the work are points of interest. For example, one of the new species, *Octaviania purpurea*, has a single-spored basidium. Examination showed that the nuclear behaviour in the basidium agrees in essential details with a typical four-spored one, except that three of the nuclei remain in the basidium and degenerate, the fourth entering the spore which is always uninucleate. Again, it is pointed out that the spores of *Cyathus* (and to a somewhat less degree those of *Pisolithus* and *Scleroderma*) show the remarkable peculiarity of carrying on a large part of their growth after the basidia which produced them have entirely disappeared. When the spores are about half grown the basidia become empty and gelatinize, leaving the spores embedded in a gelatinous matrix, the threads of which wrap about the spores in large numbers and furnish the nutrition necessary for the post-basidial growth of the spores.

Literature is referred to throughout, and a list is given of the more important general works. There is also an index.

The plates are a feature of the work. Those showing spores of many different species all with the same magnification will be of great use in assisting determination.

There are many minor points which could be discussed, but this notice is of sufficient length to indicate the value of the work. The use of a friendly blue pencil would have removed almost the only other sources of adverse criticism.—J. R.

Kryptogamenflora für Anfänger. Bd. I. *Die Höheren Pilze Basidiomycetes.* By G. Lindau. 3rd Edition by E. Ulbrich. 8vo, pp. 497, tt. 14. Berlin: Julius Springer, 1928. Price R.M. 29.50.

In his revision of Lindau's book, E. Ulbrich has introduced so much new matter that the size is more than doubled, for the previous edition contained only 234 pages. The body of the work is in the form of a key, a short description of the fungus being given at the end of the dichotomy. Previously there were figures grouped in the text much after the style of the better-known and more satisfactory Constantin and Dufour. These fourteen pages, containing 607 figures, are now issued as a booklet which fits into a slot in the back cover: there are 38 additional figures in the text—incidentally the frequent "nach Ramsbottom" should be accredited to Worthington G. Smith. The general part is extended from 11 to 58 pages. The first section on microscopical technique remains unaltered, but those on collecting, observation and identification, and preparation of herbarium specimens are much enlarged, whereas those on classification, biology and development, mycorrhiza, abnormalities, and glossary are new.

The book is a useful one, because for the most part it is based on modern work. Its range is unusual for a book of this kind, for, although all the German species are not included, many which have not yet been recorded for Central Europe are given. Thus the last two species are *Phallus iosmus* and *P. imperialis*. So far as I am aware, the first of these has been recorded only from this country,

and it is extremely likely that both are names for the same fungus. Another unlooked-for innovation is the founding of new genera and a new family as well as a re-classification of Agaricaceæ (with nearly thirty new names of subfamilies and sections). The new family is the Stichoclavariaceæ with the new genera *Stichoclavaria* and *Stichoramaria*, which, judging from the fact that stichobasidia and chiastobasidia have been recorded for the same fungus, are likely to be still-born.

In spite of such obvious blemishes in a book in a series *Kryptogamenflora für Anfänger*, the compilation has much to commend it. The beginner is introduced to aspects of the subject which will give him a broad systematic outlook. All books on the key-system which are not complete lead one sooner or later into difficulties, for it is a common experience that species not included are among the first encountered. It is surely illogical to give only 83 out of about 200 species of *Cortinarius* recorded for Middle Europe and then give three subspecies and varieties of *Amanita muscaria*.

A pleasing feature is the frontispiece photograph of the late Gustav Lindau, to whom many of us have been indebted for kindnesses at Berlin.—J. R.

Untersuchungen zur Biologie des Kartoffelkrebses. By F. Esmarch. 8vo, pp. 96. Berlin: Bornträger, 1928. Price R.M. 8.

The potato-wart disease caused by *Synchytrium* (*Chrysophlyctis*) *endobioticum* is one of those peculiar diseases which suddenly leap into prominence, their origin causing much speculation. All that is known of the history of the disease, since it was described about thirty years ago by Schilbertsky, leaves one unable to account for its almost casual mention in Hungary to its unenviable position in this country as a notifiable disease.

The present three studies dealing with the biology of the disease appeared in *Angewandte Botanik* for 1926, 1927, and 1928 respectively. The account is a little prolix, but Germans are not the only phytopathologists who affect this style. There are many aspects of the biology of a disease; the work here described is practically confined to an analysis of the conditions affecting the germination of the resting sporangium. This depends upon moisture, though the amount necessary appears to be small. A long drought has a deleterious effect on ease of germination and also kills off some of the sporangia. Germination is independent of the host-plant. The resting sporangia go through a dormant period before germination; some germination may occur the year of their formation, most occurs the following year, while a small proportion remains over for longer than a year. Germination occurs between 5° and 30° C., the optimum being between 19° and 20° C. Soluble nitrogen-salts favour germination.

It is not easy to review three separate studies in which some of the results of the first are explained later. It is to be hoped that it will not become the custom to republish papers of this kind. It is better for everyone concerned to have a connected account of experiments which, though they may be important, are not classical studies hallowed by time.—J. R.

Regeneration and Transplantation. By Dr. E. Korschelt. Vol. I. Regeneration. 8vo, pp. 818, text-figs. 395. Borntraeger: Berlin, 1927. Price 60 M.

The writer of this compendious contribution to the subject of experimental biology is Professor of Zoology and Comparative Anatomy in the University of Marburg, and appropriately dedicates his book to his University in honour of its quater-centenary celebrations.

Though the problems discussed are of general biological interest, the subjects and illustrations are predominantly zoological. In Chapter 1, "Regeneration in Cells and Unicellular Organisms," wound-healing and replacement of parts in plant-cells are discussed. The replacement of the broken tip of the stinging-hair of the nettle is cited as a rare example of regeneration in the cells of the higher plants; among the lower, the large-celled filaments of the Siphoneæ afford suitable objects for the study of replacement of the wall after rupture of the filament.

The second chapter deals with loss and replacement of parts in the plant-body, under two headings: first, "Reproduction," where new shoots are produced, as in the familiar process of budding from leaves in *Bryophyllum* and *Torenia*, or the case of a portion of poplar-root, cited from Vöchting, which produced leaf-buds from the cut upper face, or the tendril of *Passiflora* (after Winkler), which after removal developed a callus on which a new shoot and root were produced. The second, "Reparation," includes the healing of wounds by callus-formation and the replacement of damaged portions in various plant-organs.

Chapter 3 deals briefly with regeneration in crystals, and Chapters 4 to 11 treat of this subject in the various groups of the animal world and in animal tissues and organs.

In Chapter 12, "Regulation and Restitution," examples of "restitution-processes" are quoted from plants, such as Vöchting's experiment, where axillary tubers formed on the subaerial stem of a potato-shoot which was unable to form tubers underground; and, again, in Chapter 17, "Regeneration and Polarity," the relation of shoot- and root-production, after injury, to polarity, is illustrated by examples from plant-organs.

These illustrations will indicate that the subject, though treated mainly from the zoological standpoint, is of considerable interest to the botanist.

THE BRITISH BRYOLOGICAL SOCIETY IN IRELAND.

The British Bryological Society held its Annual Meeting and Excursion at Belfast from August 25 to September 1.

The Rev. C. H. Binstead, M.A., F.L.S., presided at the Annual Meeting, and Mr. W. E. Nicholson, F.L.S., of Lewes, was elected President for the two ensuing years 1929 and 1930, and Dr. Walter Watson Vice-President.

The membership of the Society now exceeds 100.

Daily excursions were arranged, the most interesting being to the Giant's Causeway and Portrush, where some good plants were found on the sand-hills, and Fair Head, where among the basaltic rocks *Glyphomitrium Daviesii* was abundant. On Colin Mountain, *Ditrichum vaginans*, a very rare inconspicuous moss, was found in plenty. It was discovered here by J. H. Davies in 1901, the only other British station being on Ben Nevis. Here also *Cephaloziella Hampeana*, an addition to the Irish hepatic list, was gathered. The beautiful Glenarrif made a pleasing contrast, and here many good plants were obtained. These localities are all in Co. Antrim (v.c. I. 39). One day on Slieve Donard was the only time devoted to Co. Down (v.c. I. 38).

After the official meeting a party of seventeen proceeded to Sligo, where five days were spent. The weather unfortunately became very wet, but two fine days permitted some very useful work to be done, and many additions were made to the moss-floras of Co. Leitrim and Co. Sligo.

On Ben Bulben, already known as the only station for *Barbula recurvifolia* var. *robusta* and as one of the few localities for the rare *Weisia curvirostris* var. *insignis*, were found four rare species which are additions to the Irish moss-flora, viz.: *Encalypta commutata*, *Timmia norvegica*, *Mnium orthorrhynchum*, and *Amblystegium compactum*.

In all some 138 new vice-county records were made—Sphagna 17, Mosses 57, Hepatics 64.

A list of the most interesting of these is given below. The writer was assisted in compiling the list of Sphagna by Mr. W. R. Sherrin and of Hepatics by Mr. H. H. Knight.

Scotland was chosen for next year's Excursion, when Killin and Fort William will be visited from July 26th to August 9th.

Co. Antrim (v.c. I. 39).

Mosses.

Sphagnum compactum var. subsquarrosum.
S. amblyphyllum var. macrophyllum.
S. recurvum vars. robustum and majus.
S. cuspidatum var. plumulosum.
Sphagnum subsecundum var. intermedium.
S. inundatum.
S. auriculatum.
S. aquatile vars. mastigocladum and remotum.

Campylopus flexuosus var. zonatus.
Fissidens decipiens.
Grimmia Stirtoni.
Barbula rubella var. ruberrima.
Philonotis capillaris.
Webera proligera.
Bryum alpinum var. viride.
Neckera pumila.
Thuidium Philiberti.
Hypnum chrysophyllum var. erectum.
H. eugyrium var. Mackayi.

Hepatics.

Riccia sorocarpa.
Aneura multifida.
Metzgeria hamata.
Petalophyllum Ralfsii.
Lophozia badensis.
L. Muelleri.
Cephaloziella Starkii.
Cephaloziella Hampeana.
Hygrobiella laxifolia.
Calypogeia arguta.
Scapania æquiloba.
S. aspera.
Colura calyptrifolia.

Co. Down (v.c. I. 38).

Mosses.

Sphagnum obesum var. canovirens.
S. inundatum var. diversifolium.
S. aquatile vars. turgidum, intortum, and pauperatum.
Bartramia pomiformis var. crispa.
Campylopus atrovirens var. muticus.

Hepatics.

Aneura multifida.
Cephaloziella Starkii.

Co. Leitrim (v.c. I. 29).

Mosses.

Dichodontium flavescens.
Fissidens pusillus.
Weisia calcarea.
Funaria Templetoni.
Bryum concinnatum.
Thuidium recognitum.
Eurhynchium crassinervium.
E. curvisetum.
E. Teesdalei.
Hypnum Patientiæ.

Hepatics.

Dumortiera hirsuta.
Preissia quadrata.
Aneura multifida.
A. palmata.
Calypogeia fissa.
C. arguta.
Trichocolea tomentella.
Scapania aspera.
S. umbrosa.
Madotheca lævigata.
Marchesinia Mackaii.
Anthoceros lævis.

Co. Sligo (v.c. I. 28).

Mosses.

Pottia recta.
P. minutula.
Tortula ambigua.
Barbula sinuosa.
B. gracilis.
Barbula convoluta var. sardoa.
Weisia rupestris.
Encalypta commutata.
Funaria Templetoni.
Amblyodon dealbatus.

Timmia norvegica.
Plagiobryum Zierii.
Mnium orthorrhynchum.
Thuidium Philiberti.
Cylindrothecium concinnum.
Eurhynchium crassinervium.
Amblystegium compactum.
Hypnum chrysophyllum var. erectum.
H. cordifolium.

Hepatics.

Reboulia hemisphærica.
Metzgeria conjugata.
Lophozia badensis.
L. Muelleri.
L. quinquedentata.
Blepharostoma trichophyllum.
Scapania aspera.
Radula Lindbergii.
Madotheca lævigata.
Cololejeunea calcarea.
Marchesinia Mackaii.

J. B. DUNCAN.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY OF LONDON.—The Annual Dinner of the Fellows and their friends was held at the Criterion Restaurant on October 23. The President, Sir Sidney F. Harmer, K.B.E., F.R.S., presided. The dinner was followed by a Reception in the rooms of the Society at Burlington House. The President received the guests in the Library, in which a number of exhibits had been arranged. During the evening Col. C. T. Green showed a beautiful series of coloured lantern-slides of British Orchids. These had been prepared by himself and were, with some few exceptions, photographs of plants growing in their natural conditions.

BRITISH MYCOLOGICAL SOCIETY.—The thirty-second Autumn Foray and Annual General Meeting of the British Mycological Society was held at Littlehampton from October 1–6. Excursions were made to Rewell Wood, Michel Grove, Eastham, and Arundel Park. The previous dry weather rendered it certain that larger fungi would be scarce, but when the finds of forty people were got together they made a much better show than would have been expected. One or two rare agarics were found, including *Clitocybe decastes*, *Crepidotus calolepis*, *Pluteus salicinus* var. *floccosus*, *Lentinus fimbriatus*, *Omphalia gibba*, and *Cortinarius Queletii*.

The General Meeting was held on Monday. Miss E. M. Wakefield was elected President for 1929, Professor M. C. Potter as the second Vice-President, and Dr. B. B. Barnes and Mr. W. D. Buckley as new members of the Council.

On Tuesday evening the President, Dame Helen Gwynne-Vaughan, gave her address on "Problems of Development in the Fungi." This, which was illustrated by lantern-slides, dealt in greater detail with many of the aspects of cytology mentioned in her Section K (British Association) Presidential Address. The following evening Messrs. Alex. Smith and W. C. Moore of the Ministry of Agriculture Laboratory, Harpenden, gave an account of new and interesting plant-diseases and of the methods of bulb-disease inspection in Holland.

On Thursday evening, Col. C. Theodore Green gave a popular talk on "Fungi and their Haunts," illustrated by his coloured lantern-slides, a set of which is exhibited in the Botany Department at the British Museum.

On Friday afternoon, Mr. J. Ramsbottom gave a lecture to the Littlehampton Nature and Archæology Circle on "Fairy Rings," and, after the dinner, Mr. Carleton Rea gave a racy talk on the principal finds of the week.

On account of the scarcity of the larger fungi many members were reduced to intensive search for microfungi, which will doubtless have good results. J. R.

LA SOCIÉTÉ GUERNESIAISE.—The Report and Transactions for 1927 includes in the Report of the Botanical Section a reference to the passing of a law relating to the destruction of injurious weeds; the authorized list of these "Mauvaises Herbes" is as follows:—

Hemlock Water-dropwort (*Œnanthe crocata*),
Cow Parsnip (*Heracleum Sphondylium*),
Common Ragwort (*Senecio Jacobæa*),
Thistles (*Carduus lanceolatus*, *arvensis*, and *palustris*),
Docks (all kinds),
Nettles (*Urtica dioica* and *urens*), and
Wild Garlic (*Allium triquetrum*).

Reference is also made to the enormous acreage now under glass in Guernsey for growing tomatoes, fruit, and flowers. This growth of glasshouses is yearly altering the appearance of the countryside and restricting the area for wild growth. Besides diminishing the indigenous plants, many alien seeds and plants are thus introduced: for example, *Spilanthes leptophylla* is probably one alien from such a source which is adapting itself to the island climate.

INTERNATIONAL CONFERENCE FOR PHYTOPATHOLOGY AND ECONOMIC ENTOMOLOGY. ERIKSSON PRIZES.—The Committee announces that two prizes are offered for the two best Memoirs, giving an account of new and original work on the two following subjects:—

(1) Investigations on Rust (Uredineæ) Diseases of Cereals (Wheat, Oats, Barley, or Rye).
(2) Investigations on the rôle played by insects or other invertebrates in the transmission or initiation of Virus Disease in Plants.

The value of each prize will be 1000 Swedish crowns. Competitors may be of any nationality. Three typewritten copies of each Memoir must be submitted. They may be written in English, French, or German.

Memoirs must reach the Secretary of the Committee, Mr. T. A. C. Schoevers, Wageningen, Holland, on or before May 1st, 1930. The award will be announced at the Fifth International Botanical Conference, to be held at Cambridge in 1930. The copyright of the prize

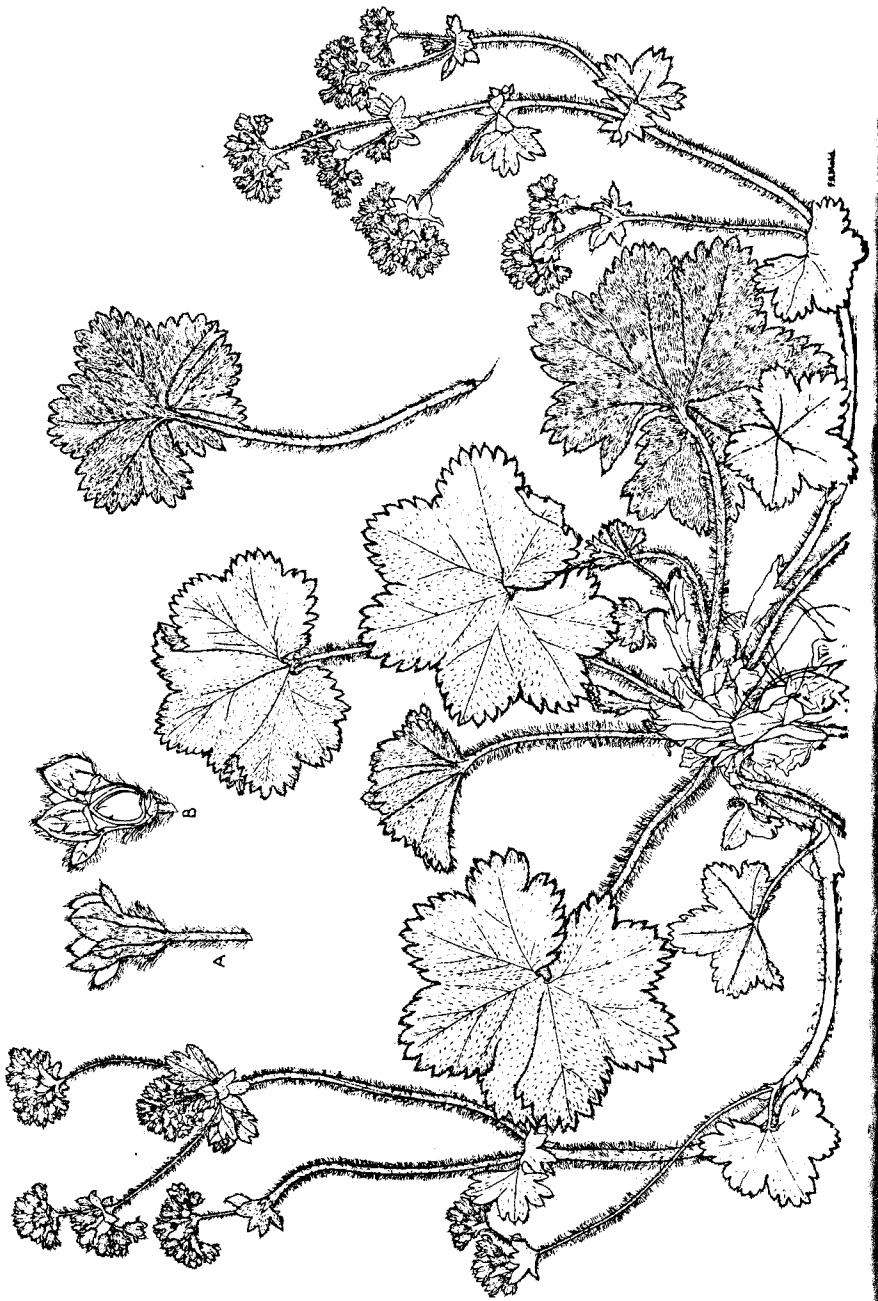
memoirs will become the property of the Committee, who will arrange for their publication.

Further particulars, if required, may be obtained on application to the Secretary at the above-mentioned address.

AUSTRALASIAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.—Hobart, 1928. In his Presidential Address, Mr. R. H. Cambage, C.B.E., F.L.S., noted as matter for extreme gratification that during the last decade there has been a forward movement towards a better appreciation of Science in Australasia. Among other items the Commonwealth Government has established the Council for Scientific and Industrial Research on a sound basis, and the Australian National Research Council has been formed, and is gradually obtaining funds for the purpose of carrying out research in pure science. Reference was made to various recent applications of science to primary production, including the development of improved drought- and disease-resisting varieties of wheat and other grain, and problems of plant pathology generally.

The main part of the address dealt with the origin and development of portion of the Australian flora. A review of relevant botanical and geological investigations during the last half century confirms George Bentham's conclusions as to the predominant indigenous element in the flora. The distribution of a number of characteristic Australasian genera is discussed in detail, and the present state of our knowledge is summarised as follows:—There are more genera common to Africa and the eastern half of Australia only than to Africa and the western half, so that evidence of a direct land-connection between the two continents in late geological times is meagre, and the genera common to both must have had a common origin in the north. Since Cretaceous time the greater land-mass in the Northern Hemisphere has allowed more room for plant development than in the South. Recurrent cold periods have been instrumental in the migration of genera from temperate northern regions across the tropics; after arrival in the south there has been much radiation, development, and evolution. There is evidence in some cases of secondary radiation from the south, especially in the genus *Eucalyptus*. There seems greater evidence of a land-connection between Antarctica and South America, and perhaps also between Antarctica, New Zealand, and Australia, than between Antarctica and Africa. Except for a land-connection between North-east Australia and islands to the north, perhaps as late as Pliocene or Pleistocene times, Australia has long been isolated from the rest of the world. A number of large genera have presumably originated and developed chiefly in Australia; such are *Eucalyptus*, the phyllodineous Acacias, *Grevillea*, *Banksia* and other Proteaceæ, *Goodenia*, *Candollea*, *Boronia*, and others, representing altogether upwards of 1800 species.

THE LATE PROF. WILHELM JOHANNSEN.—The recently issued number of the *Botanisk Tidsskrift* (xi. Heft 3) contains a memoir, by L. K. Rosenvinge, with a good portrait, of Dr. Johannsen, to whose death reference was made on p. 360 of the *Journal* for 1928.



ALCHEMILLA PUBESCENS Lam. AS A BRITISH PLANT.

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

(Plate 588.)

Botanists and other visitors to Switzerland are no doubt familiar with this pretty silvery-leaved and distinct-looking Lady's Mantle, and it is satisfactory to be able to establish it as a native of our Islands.

In this *Journal* for 1913 (p. 142) the plant was noted as an escape in Surrey, and in Rep. B. E. C. 1926, 23, Dr. Druce writes:—"*A. pubescens* Lam. In 1892 I sent many Alchemillas to M. Buser, of Geneva, for identification. These have been mislaid by M. Buser, so that I have never had them back. This year I called upon the veteran botanist, and found that he had lost his eyesight and was very deaf. He told me that my specimens had been determined by him, but that they were lost in his collection, and it was impossible now for him to find them. He distinctly remembered that *A. pubescens*, from Britain, was among them, and that it was the first British specimen he had seen, but, unfortunately, its distinct habitat he could not remember."

The Section of the Genus under which this plant falls is what Dr. Buser calls the group *Pubescentes*, characterized as follows:—"Plantes de petite taille, entièrement, jusque dans les parties florales, velues de poils fins. Feuilles arrondies, petites, 7–9-lobées, crénelées-dentées, glauques, pubescentes, velues en dessous. Tiges ascendantes ou dressées, raides, dures, brun-rouge ou violacé à l'état de maturité, 3 à 4 rameaux pseudo-dichotomes. Fleurs petites, réunies en glomérules souvent confluents sur de petites plantes.—Espèces xérophiles et par conséquent plus fréquentes dans la chaîne méridionale que dans celle du Nord; indifférentes quant au sol." No other British *Alchemilla* is yet reported in this group.

A. pubescens was originally described by Lamarck (Tabl. Ency. Meth. Bot. No. 1703, 347; 1791) as follows:—"A. foliis lobatis subtus pubescentibus, caule villoso: floribus pedicellatis. Ex Europæ montanis. ♃. Alch. hybrida Lin." This is a good enough description so far as it goes, but, in view of the numerous allied species described since those days, it does not go quite far enough. Buser's description (in Nouv. Mém. Soc. Helv. Sci. Naturelles, xxxiv. 1895, p. 110) follows:—"*A. pubescens* Lam.; *A. hybrida* L. et auct. p.p.; *A. vulgaris* var. *subsericea* Gaud., K.; *A. minor* Bus. Notes 1891, non Huds. Plante assez vigoureuse, feuillue, étalée, à teinte claire. Feuilles 9-lobées, un peu ondulées, soyeuses et un peu brillantes en dessous. Lobes des feuilles estivales paraboliques, un peu tronqués, à dents courtes, assez larges, obtuses. Rameaux supérieurs divariqués. Glomérules très compacts. Pédicelles très velus, un peu plus courts que les urcéoles d'abord campanulés, puis sphériques-turbinés.—Très répandu dans les prés et pâturages maigres, ensoleillés; allant de la région montagneuse jusque dans la région subnivale, à 2500 m."

Drs. Schinz and Thellung, G. C. Druce, and others call this plant by the name of *A. hybrida* Miller. Miller's description (Gard. Dict. ed. 8, 1768) reads:—"A. foliis lobatis sericeis acutè serratis, segmentis involucro subrotundis. Small silvery Ladies Mantle with lobated leaves sharply serrated, and the segments of the involucrum cut into roundish segments. *Alchemilla Alpina pubescens minor*. Tourn. Inst. R. H. 508."

A type-specimen of Miller's exists in Herb. Mus. Brit., and this seems to be a garden-grown example of what *may* be *A. pubescens*, but is not exactly the same as the wild plant. The illustration in Miller's *Figures of Plants*, i. t. xviii. f. 1 (1760), bears this out, and in other respects too the plate is unsatisfactory for *A. pubescens*, as the pubescence is omitted!

A. pubescens has been figured by: (1) Willdenow, Hort. Berol. 79 (1816); (2) Reichenbach, Pl. crit. i. t. iv. f. 9 (1823); (3) Lindberg, Nord. Alch. vulg.-form, in Acta Soc. Fenn. xxxvii. No. 10, t. 2 (1909); and (4) Bonnier, Fl. Fr. Suisse et Belg. iv. t. 184, f. 968[2] (1921).

The only other British species that can possibly be confounded with *A. pubescens* is *A. minor* Huds., which is sometimes *almost* silky in appearance, particularly as regards leaves and urceoles; such an example I have before me, collected by W. Bell at Bardon, Leicester, v.c. 55, in 1901 (Watson Ex. Club Rept. 1901–2, p. 13). A close examination shows that the Bardon plant lacks the characteristic leaf-shape and toothing, the silky indumentum, etc., of *A. pubescens*, and must be placed in the group *Vulgares*.

The European distribution of *A. pubescens* is very wide, and it is rather strange that such a beautiful and distinct plant has not been noted hitherto in other spots in our Islands. I have specimens in my herbarium from France, Switzerland, Italy, Finland, and Bohemia, and it is well known in Scandinavia and Denmark. Recorded also from Belgium, Germany, and other countries on the Continent. Buser (*l. c.*) gives the plant as widely spread in sunny places in meadows and poor pastures ascending to the mountains as far as the snow-line, reaching 2500 m.

Distribution in Britain.

Yorkshire, N.E., v.c. 62. In 1914, I noted an example of *A. pubescens* in Herb. Bailey, labelled "Forge Valley, near Scarboro'. 1867. J. Ward." I wrote to Mr. E. R. Cross, a local botanist, and asked him to make a search to re-find it. It appeared that he knew the Valley intimately, having botanized there for twenty years or more, but had never seen it; he wrote: "There are several cottage gardens in The Valley, so that it might be an escape. *Omphalodes verna* occurs in the Valley, and seems to have established itself during the last five or six years. I think this has escaped from a garden some miles further up the Valley." As regards the plant being a garden-escape here, I have shown (Journ. Bot. 1913, 142) how sometimes this *does* happen, but it is not a plant usually listed in Nurserymen's Catalogues. In view of its other Yorkshire station, I am of opinion the Forge Valley locality may be a really wild one, and I hope it may yet be re-found there.

Yorkshire, mid-west, v.c. 64. On grassy banks, Ingleborough, 1928. *Mrs. Wedgwood and C. E. S.*

Edinburgh, v.c. 83. At Kew, in Herb. Lightfoot, an example, labelled *Alchemilla minor*, I identify as *A. pubescens*. The sheet bears the inscription "Yalden," and this refers to one Thomas Yalden (flourished 1750–74), who sent specimens to Lightfoot, and to whom he ultimately bequeathed his herbarium. Fortunately, a MS. on Scottish plants by Yalden is preserved in the Botanical Department, British Museum, and on p. 67 the following note is to be found:—"*A. minor* Huds. Solum modo ab *A. vulgari* differt, quod caules, petioli et Foliorum Pagina inferior sunt pilosi, et forsan parum magnitudine. Hab. cum priori [*vulgaris*] promiscue, at the Water of Leith, near Edinburgh." I trust the Edinburgh botanists will be able to re-discover this at the spot indicated.

A living plant of the Yorkshire *A. pubescens* was sent to Kew Gardens in June last, so that London botanists may be able, easily, to note its distinctive features when growing.

Explanation of Plate 588.

A. pubescens from Yorkshire, natural size.

A. Flower.
B. Section of urceole. } Both enlarged about 5 times.

MISCELLANEA BRYOLOGICA.—XI.

By H. N. Dixon, M.A., F.L.S.

(Continued from Journ. Bot. 1927, p. 11.)

Ephemeropsis tjibodensis Goeb. in New Zealand.

Ephemeropsis is usually looked upon as one of the most, perhaps the most, remarkable of moss genera, owing to the fact that it combines a well-developed sporophyte, having a highly-evolved peristome that might quite well belong to a Hookeriaceous genus, with a quite unique vegetative system, absolutely devoid of leaves, except for the bracts of the male flower. It is an epiphyllous plant, hitherto confined to Java, Sumatra, the west coast of the Malay Peninsula, Siam, and New Guinea. The original locality in Java, Tjibodas, is the only one mentioned by Fleischer, but I have it also from Patoekaberg in that island; from Bencoolen, Sumatra; from Penang, in Malaya, where Mr. Holttum finds it quite abundant on leaves of a *Pandanus*, but not on dicotyledonous leaves; and from three localities in Siam, where it was collected by Dr. Kerr, on dicotyledonous leaves as well as on others.

This remarkable moss was collected in April last by Mr. K. W. Allison, on bark of "manuka" (*Leptospermum scoparium*), near Atiamuri, in the volcanic district of the North Island, New Zealand.

Fortunately the plant was fruiting, or it might easily have been overlooked as an alga, or the protonema of some ordinary moss. So far as I am aware, the fruit has only once been collected, by Fleischer, at Tjibodas, and distributed by him as No. 90 of the M. Frond. Arch. Ind. ser. 2.

When I first examined the New Zealand plant, I thought it would prove to be a distinct species; for one thing, the protonema was green, instead of brown, as it is usually described, and nearly always is in the Malayan plant. I have, however, a precisely similar form from Penang.

In the second place, the plant is corticolous, not epiphyllous; but here again, the specimen from Sumatra referred to above was growing on the *twigs* of a Melastomataceous plant.

The branching of the protonema also exhibits some rather decided differences. In the Malayan form the branches are apparently uniformly very short, rigidly and widely divergent from one another; in the Atiamuri plant they are frequently much longer, narrower, and less divergent, sometimes even parallel, and this appears to be a real distinctive character. Further, in the small material I have received so far, I have observed none of the long "Assimilationsorgane" which are so conspicuous a feature of the usual protonema.

These characters suggested a real difference in the two plants, and if supported by sporophytic characters might well be held of specific value; and at first I thought that these existed. The seta in the New Zealand moss appears to be constantly, if slightly, roughened. The main difference, however, appeared to lie in the exothecium cells. Fleischer describes and figures these as transversely rectangular; but in the New Zealand plant they are clearly isodiametrical, regularly quadrate, and in regular horizontal and nearly regular vertical rows. However, an examination of the fruit of the Javan plant showed exactly the same form of cell, and I think the form found by Fleischer must have been either unusual or more probably observed on a capsule which had not quite completed its longitudinal growth *.

The exothecial structure deserves a little further notice. When the edge of a dry capsule is observed under the microscope, the wall in profile is very highly and regularly crenulate, with alternate ridges and (narrower) depressions (much as a corrugated iron roof would look if viewed in section across the corrugations). This disappears almost entirely when the capsule is moistened. It is explained by the difference in thickness of the walls of the exothecial cells. The superficial walls are thin, and the vertical ones not much thickened, while the upper and lower—the transverse, or horizontal, ones—are decidedly and very regularly incrassate. Owing to the regularly seriate arrangement of the cells, these transverse walls form continuous bands round the capsule. If the exothecium is conceived of as a brick wall, in which all the bricks are square, while the vertical joints of mortar are thin, and the horizontal joints thick, a very good idea will be formed of the structure. The consequence of this is that on desiccation the surface-walls and vertical joints readily contract, leaving the horizontal joints less contracted, and therefore forming horizontal ridges all round the capsule, but much approximated to one another by reason of the cells themselves contracting in a vertical direction.

* For the exothecial structure of *Ephemeropsis*, see further Györffy in Ann. Jard. Bot. Buitenzorg, ser. 2, xiv. 36–51 (1915); and in Bot. Müz. Füzetek, ii. 9–32 (1916); and Fleischer in Hedwig. lix. 209–211 (1917).

The purpose of this somewhat unusual structure may, I suggest, be the following:—The capsule contains, as pointed out by Fleischer, two forms of contents: (*a*) the spores, which are brownish, spherical, or ovoid, smooth or slightly punctulate, and reaching to 50 μ in diameter. Fleischer figures them as containing oil-globules; these I have not seen. (*b*) Fleischer states "Kapsel ausser den Sporen mit winzigen (1 μ) Reservestoffkoerperchen erfüllt, welche lebhafte Molekularbewegung zeigen." The New Zealand plant shows what I presume to be this structure very clearly. Dense masses of highly chlorophyllose bodies were seen, apparently filling the upper part of the capsule (but their relation to the spores and spore-case was not clearly seen), which on pressure emerged from the deoperculate capsule, not singly, but two or more closely connected side by side, shortly cylindric and rounded at the ends, as very short and thick cigars might be in a box. These were unicellular or bicellular bodies, their wall a thin smooth hyaline membrane, partially filled with dense chlorophyll grains, the distal ends (when two-celled) being empty and hyaline. I incline to think these are brood-bodies capable of vegetative reproduction (nearly every part of the plant, gametophyte and sporophyte, appears to have, as Fleischer has shown, the power of regenerative growth). Whatever their function, their development, in the interior of the capsule, rich as they are in chlorophyll, is an unusual thing; and the peculiar structure of the exothecium is, I suggest, connected with this. The cells are large, some of the largest I have seen in any capsule, and the surface-wall as I have mentioned very thin, so the capsule-wall is unusually translucent; and this probably allows of the admission of the light necessary for the formation of chlorophyll; while the regular thickening of the horizontal walls of the cells provides the necessary solidity for the wall of the sporogonium.

The male flower does not seem to differ from that of the Malayan plant, and the sporophytic characters therefore appear to be practically identical in the two. The slight differences, therefore, pointed out in the gametophyte can hardly be considered of specific importance, though if they prove to be constant they may perhaps be held to deserve a varietal name. In any case the discovery, made, moreover, so soon after the recording, by the same collector, of the genus *Buxbaumia* in New Zealand, is of the highest interest.

The Fruiting of Campylopus brevipilus Br. Eur.

Fruit of *C. brevipilus* has been recorded from several European localities, the first being by Joergensen, from near Bergen; subsequently, I recorded it from North Donegal, collected by J. Hunter; and several more records were made from North Germany. Dr. Timm

has recently published an article (Abh. Nat. Ver. Bremen, xxvi. Heft 2 (1927)) discussing these records, and announcing that in all the cases he has studied he finds a mixture of *C. brevipilus* and *C. pyriformis* Brid., and in every case it was the latter which was in fruit. Unfortunately, the original specimen described by Joergensen (a single stem) is missing, and it has not been possible to verify this. On reading Dr. Timm's article I re-examined the Irish moss, cutting sections of the leaf of the fruiting-plant, and this entirely confirmed Dr. Timm's observations; the section of the nerve is distinctly that of *C. pyriformis*, not that of *C. brevipilus*. The sporophyte of *C. brevipilus* is therefore still to seek in Great Britain, and the presumption is very strong that it has not actually been seen at all. The hair-point of the leaf is often scarcely visible, and its absence does not preclude a stem from being *C. brevipilus*. *C. pyriformis*, which has evidently, as Dr. Timm has shown, a strong proclivity for companionship with *C. brevipilus*, finds the tufts of that species an unfortunately too convenient spot in which to rear its own family—a sort of cuckoo among the mosses!

Rigodium dentatum Dixon.

I described this S. African plant as from Pretoria, coll. Rev. H. Friend, in Bull. Torr. Bot. Club. xliii. 79 (1916). Later on I had to correct this, as the collector wrote that the labelling was erroneous, and it should have been recorded as from Cape Town. I have since recognized that it is a rigid and remarkable form of the variable *Rhynchostegiella Zeyheri* (Hampe) Broth., and I hope that after its short and troubled life it may now find decent burial.

Hypopterygium atrotheca, sp. nov.

Some time ago I received through the Department of Botany, British Museum, some mosses collected in the Kibble Palace Fernery, at the Botanical Gardens, Glasgow, by Robert Grierson. The material contained several species, two of which were clearly introductions; one a *Pterygophyllum*, which agreed quite well with the variable *P. dentatum* H. f. & W.; the other was a *Hypopterygium*, which I am unable to refer to any described species, and I propose for it the above name.

Hypopterygium atrotheca Dixon, sp. nov. Autoicum; *saturate viride*. Stipes *haud tomentosus*; folia stipitis brevia, latissima, *suberecta*, apiculata vel brevissime cuspidata. Frons suborbicularis vel oblonga, *mollis*, rami simplices vel parce divisi; folia sicca parum flexuosa, decurva, unde rami superne convexi. Folia *breviter* acuta, *leniter*, *breviter* denticulata, costa longe sub apice desinens; cellulæ minusculæ, rhomboideo-hexagonæ, *valdæ chlorophyllosæ*, inde *opacæ*, 8–10 μ latæ, limbo latiusculo; amphigastria valide cuspidata, structura ei foliorum simile.

Seta circa 1 mm. longa, rubra, theca turgide elliptica, subpendula, basi in setam perabrupte desinens, collo brevissimo, maturitate fusco-olivacea, *demum atro-fusca*, orificio pallidiore. Spori saturate virides.

It is perhaps somewhat venturesome to describe as new a *Hypopterygium* from quite unknown provenance, especially as the distinctive characters might conceivably be due in some measure to unnatural conditions. The fact that the plant has been found fruiting freely, however, does not suggest any great abnormality in environment, nor is there any other reason for assuming this. I know of no other species of *Hypopterygium* in which the capsule becomes blackish when fully ripe, as here; Kindberg in his monograph makes no mention of it in any species, nor does Mitten in the eight species listed in the *Musci Austro-americani*. No specimens in my herbarium exhibit such coloration. The soft texture, and the deeply chlorophyllose cells, together with the weak denticulation of the leaves, are further characters.

H. immigrans Lett in Journ. Bot. xlii. 249, is *e descr.* a much smaller plant, with more toothed leaves, shorter nerve, and different coloration.

The present species grows, and has been known for more than twelve years, on the stems of large tree-ferns and on stones under their shade, where it has spread over a large area. It cannot be said with certainty, therefore, on what plant it was imported. The *Pterygophyllum* with which it was in all probability associated originally might have had its origin in New Zealand or South America. The three species of *Pterygophyllum* given by Mitten in the *Musci Austro-americani* are almost certainly slight forms of one and the same species, identical with the New Zealand *H. dentatum* H. f. & W. (not *P. denticulatum*, as Mitten and other authors have written it).

The *Hypopterygium* certainly does not agree with any of the New Zealand species of that genus.

Peristome of Bryum crassum H. f. & W.

So far as I know, the peristome of this rare species has not been observed; all the specimens I have been able to see in the National collections, and they are very few, have the capsules operculate and somewhat immature. A single stem of this species collected at Atiamuri, New Zealand, in soil-pockets of rocks near Waikato River, shows the peristome in fairly good condition. It is rather large, ·5 mm. in height, the outer teeth bright orange-red, except at the tips, which are hyaline, the endostome of a very pure white. The teeth are erect when dry, the upper fourth part abruptly hamate and inflexed when moist; about 75 μ wide at base, and separated from one another by about half their width; they are very little narrowed above for about three-fourths of their length, then becoming rapidly narrowed and filiform.

They are scarcely bordered, but the inner lamellæ, which are very dense and numerous (more or less 25), project very markedly laterally; the dorsal ridges are very slightly prominent, but the lamellæ are

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ANOTHER INSTRUCTIVE PYRENOMYCETE (*CLADOSPHÆRIA*).

By W. B. Grove, M.A.

Cladosphæria Nitschke.

Fruit-bodies remaining immersed, but slightly raising the epidermis, globose, at length impressed. Perithecia black, with a short scarcely projecting ostiole. Asci fusoid, pedicellate, 8-spored. Spores cylindrical, curved, *i. e.* sausage-shaped, with several (as many as seven) transverse septa, dark olivaceous-brown. Paraphyses present.

C. eunomioides Nitschke. Asci about $200 \times 20\ \mu$, fusoid-clavate, tapering to a blunt end above, longly pedicellate below. Spores $22–28 \times 5–6\ \mu$, tristichous, forming a cluster in the widest part of the ascus. Paraphyses filiform, very numerous, gelatinous, minutely guttulate.

Hab. In cortex of bark of *Fraxinus excelsior*. Sneyd's Coppice, (Worcs.), Feb., Mar. (*Rev. P. G. M. Rhodes*). The fruit-bodies for the most part evenly dispersed, at a distance of 1–2 mm. from one another.

The outward similarity of this species (as implied by its name) to *Valsa eunomia* Nits. (*Cryptosphæria millepunctata* Grev.) is wonderfully close. It is only on microscopic examination that the difference is revealed in the spores. These spores, though already deeply coloured, remain for a long time simple; after a while the middle septum is formed, then one more midway in each loculus, and finally (but not all at the same time) each of the four locelli is again transversely divided, making seven septa in all; the end locelli of the spore are always paler than the middle part.

The fruit-body (*i. e.*, the perithecia enclosed in their conceptacle) is sunk in the thin almost unchanged cortex, depressed-globose, 1–1·5 mm. diam., raising the epidermis a little and at length piercing it by one or more black ostioles which protrude very slightly; the

projecting black dot is at first not more than $15\ \mu$ in width, the epidermis round it being unchanged in colour; then the area occupied by the fruit-body is indicated by a faint black orbicular line, and the opening at length grows larger. As the outer layer of the bark becomes thinner by degrees, it gradually assumes a cinereous-blackish tint to a total width of about 1 mm., with a black spot in the centre. The fruit-body is bounded by a black excipulum, like some *Valsæ*, this being the cause of the black line; the contents are at first whitish, then variegated with black and white. The spores seem usually not to attain the seven septa until after they have escaped from the ascus, but may have all the intermediate states within it. The sporiferous part of the ascus measures about $100 \times 15–20\ \mu$.

I find exactly the same excipulum when the asci are in the *Cryptosphæria* stage (accompanied by numerous young imperfect asci), and have eight allantoid spores, $10–20 \times 2–3\ \mu$, becoming faintly brownish, but without the slightest trace of a septum. Everything connected with the Worcestershire fungus suggests that it is nothing but a further development of the well-known *Cryptosphæria millepunctata* Grev.; the *Cytosporina millepunctata* even occurs with it, as with the normal *Cryptosphæria*. The habit is the same, the shape of the ascus and the arrangement of the spores in it are the same, and the dark olivaceous colour is only an intensification of the tint of the old spores of the *Cryptosphæria*. But the spores of the latter are always much narrower than in the *Cladosphæria*.

It is now well known that many spores grow larger, and many acquire more numerous septa, when they are ready for germination. An excellent instance is seen in *Sphærulina intermixta* f. *valde-evoluta*, which I described in Journ. Bot. 1919, p. 210. This more evolved form was noted by Brefeld in the germinating spores, and was named by Passerini, when found in nature, *Pleosphærulina rosicola* (in Atti R. Accad. Linc. Rom. vii. 46 (1891)), and afterwards by von Höhnel *Pringsheimia sepincola* (in Annal. Mycol. xviii. 97 (1920)). This latter name forms another argument, by-the-bye, for my contention (Journ. Bot. *l. c.* 209) that *Metasphæria sepincola* (Fckl.) Sacc. is merely a stage intermediate between the less and the more evolved forms of the *Sphærulina*. Thus does synonymy become complicated, and nothing but intensive study of special cases will unravel the confusion.

Is *Valsa eunomia* Nits. to be deleted, or is the *Cladosphæria* to be mentioned only incidentally as a *pregermination* form or stage of it? Instances similar to this are slowly accumulating, but their influence on nomenclature is as yet undebated. The present method is to record the two forms separately, under different names, and this is of course best in the early stages of knowledge. One may come across *Cryptosphæria millepunctata* hundreds, or even thousands, of times without seeing the least sign of an advance beyond that form. If, therefore, *Cladosphæria eunomioides* alone were mentioned in books, with perhaps a passing reference to the earlier stage, the mycologist who is learning to know his fungi might easily find himself at a loss. The case is similar in effect, though not in essence, to that of

Cytospora and *Valsa*, which occur on the same host but at different times; it is for the benefit of mycology to keep up the form-genus *Cytospora* (if only for the sake of learners) until all the *Cytosporæ* have become assigned to their corresponding *Valsæ* or *Eutypellæ* (say, three hundred years hence!). The difference between the two cases lies chiefly in the fact that we have at present no ground for believing that the spores of all our *Valsæ* become more highly septate and more deeply coloured as they get nearer to germination. It may be better now, therefore, to revert to Greville's genus with a slight emendation and call the present species *Cryptosphæria eunomia* Fckl. (Symb. Myc. 1869, p. 212), so as to keep it apart from the general herd of *Valsæ*, and thereafter to explain fully the later stages which it assumes. This course need by no means imply that all the other species which happen to have been placed in *Cryptosphæria* have the same life-history.

Another case of a similar character is seen in *Bertia moriformis* (Tode). This species has been known for a very long time, yet in all these years few mycologists seem to have noticed the spores with more than one septum. The normal spores measure 30–38 × 5–7 μ, and are at length faintly 1-septate. Hawley (in Brit. Myc. Soc. Trans. viii. 227) records that specimens collected by Chas. Crossland had spores measuring 48–52 × 5–6 μ, many of them germinating and developing 3–7 septa. I myself have found a similar state of things; in these, however, there was absolutely no sign of a germ-tube. This form I was at first inclined to call *B. macrospora* Sacc., but was dissuaded from that opinion. See also Journ. Bot. 1922, p. 144.

Since writing the above, I have seen an article by Wehmeyer in the *American Journal of Botany*, 1926, p. 237, in which he expresses exactly the same idea as here suggested about the *Cryptosphæria*; the spores which he found in his specimens, however, never had more than four septa. He considers all the following names to refer to one species:—

Cryptosphæria eunomia (Fr.) Grev.
,, *millepunctata* Grev.
Endoxyla Fraxini E. & E.
Cryptosphærina Fraxini Lamb. & Faut.
Cytosporina millepunctata Sacc.
,, *Fraxini* E. & E.

PLANT-COLLECTING IN BRITISH CAMEROONS.

By F. W. H. Migeod.

British Cameroons is a narrow strip of country along the eastern frontier of Nigeria. One's first view of it from the sea embraces the twin peaks of Cameroons Mountain and Fernando Po Island. The latter is a Spanish possession, but is geologically one with Cameroons. The higher of these two peaks is Cameroons Mountain, which is about 13,350 ft. high. Like Fernando Po, it is also virtually an island, rising as it does out of low-lying ground and disconnected with the interior highlands.

I revisited this country last winter, 1927–8, my previous visit having been five years before. In this note I am only concerned with the flora of the southern region, where I collected above, roughly, the 4000 ft. level. I began first with Mt. Cameroons itself, and established myself for this purpose at Buea, the administrative headquarters, where the Resident kindly lent me a bungalow.

Below Buea is Victoria, the sea-port, set in wonderful scenery and having the mouth of the bay closed with a string of wooded islands. The Germans in the days of their occupation laid out a very fine botanic garden here, and experimented with a great many exotic trees and other plants. It was neglected for a number of years, but has now been taken in hand by the Forestry Department.

The original dense forest surrounds the immediate locality of Victoria, but beyond and all around the lower slopes of the mountain up to nearly 3000 ft. the great plantations have taken the place of the forest, and, restored to prosperity by the return of the German planters, cocoa, rubber, and oil-palms now replace the primeval forest.

All above Buea, which is at 3200 ft., is now farmland, chiefly, of course, native farms, but a German company is working a large area with the aid of motor-ploughs and other machinery, and is growing maize, potatoes, European vegetables, etc., with a sufficient surplus for export. A dairy farm is also attached.

As one looks up the mountain-side from Buea, one sees the dense forest extending up to 7000 ft., and going even higher in the gullies and also round to the right (N.E.), where it seems to reach 9000 ft. Immediately above Buea it has been much thinned, both by the natives, the Bakwiri, making their farms therein, chiefly growing coco-yams (*Colocasia*), and also for firewood. Above the forest is grass-land. Here young trees have increasingly few chances of surviving, since the grass is burnt every dry season by the native hunters seeking the few refugee animals up there.

Going up the mountain-side through the damp forest, at a little under 4000 ft. one meets the first tree-ferns (*Cyathea ? camerooniana*), together with a great number of other ferns, epiphytic or otherwise, while the trees themselves are laden also with *Loranthus*, Begonias, a few orchids, etc. Along the steep track grasses and other flowering-plants have found their way in from either above or below. At 6000 ft. is a small abandoned cinchona plantation called Musake, with a small bungalow. The apple trees planted here have scarcely had a chance, but the roses have a fragrance they do not have at Buea, where they are planted all along the roads.

A thousand feet higher, abrupt as are all Nature's transitions, the forest ends and gives place to grass-land. This stretches up a very steep slope to the 11,000 ft. ridge, and in it are many flowering-plants. The forest-trees in the gullies are already of different species, and the last trees left, which extend nearly to 11,000 ft., are scattered speci-

mens of *Agauria salicifolia* (Ericaceæ) with long spreading branches and thick boles, and gnarled, twisted, and covered with lichens. On the side I ascended young trees of this species are almost absent.

At 9200 ft. is a small hut, with a precarious water-supply, and between about 9000 ft. and the top I collected over fifty species of plants, including some grasses and ferns, and a heather (*Blæria Mannii*). After 10,000 ft. I only found twenty plants I had not seen before; and above 11,000 ft., where plant-life was scarce on the lava-rock, only eleven. The last eleven included *Senecio clarenceanus, Crepis Hookeriana*, two ferns, two or perhaps three grasses, a kind of everlasting flower (*Helichrysum Mannii*), a low herb with a compact head of pink flowers, a lichen, and a little blue hare-bell (*Wahlenbergia arguta*). At 13,000 ft. I only saw a few rare specimens of a short grass, but a dandelion (*Crepis* ?) still showed itself, and also a lichen. The ground here, however, whatever the air may be, is quite warm, there being a smoking crater near, and possibly in some sheltered spots away from the sulphur fumes other plants may be hiding themselves. A visit in other months would, of course, reveal other plants.

Having collected about 250 species I left the mountain. A lengthy stay would be necessary to secure all the plants as in turn they flower and fruit, and I could only give a little more than a month to this part of the country. I should mention, too, that Buea, lying almost permanently in a damp cloud-belt, is not a satisfactory place for drying the specimens.

From Buea I travelled to Mamfe, about thirteen days' journey to the northward. The station lies at the head of the Cross River, where two tributaries coming through gorges meet and fall into a very deep circular pool about a quarter of a mile across. The station is between three and four hundred feet only above sea-level. Plant-collecting was not a principal reason, therefore, for coming here, as neither the British Museum nor Kew, which were taking my collections, required the forest-flora. Nevertheless, from the botanic point of view, the over-river side was of some interest, as I had noticed on a previous visit. The forest has been destroyed here in patches, and and in consequence the soil has been washed away. Now only a few grasses, cyperaceous plants, etc., hang on in the crevices of the stratified rock, whence there is a constant seepage, the two most striking being a low "palmetto" (*Schœnodendron Buecheri*) and a "tree-grass" (*Vellozia* ?), neither rising more than about two feet.

From Mamfe I went on to Bamenda on the high plateau, seven days' journey by the shortest route in a direction northerly of east. A 3000 ft. scarp has to be surmounted on the way, the difference in the temperature between the bottom and the top being most striking. The dense forest, however, spreads up the side of the scarp and along on the top, but, there being a thick population up there, it now survives chiefly in the gullies. That in quite recent years it was more wide-spread is shown by solitary oil-palms (*Elæis guineensis*), tall and bare-stemmed, which rise out of the grass where they could not possibly have originated. Tree-ferns begin again, and one sees the wild banana.

Bamenda station is just 5000 ft. high, there being an error (? clerical) of one hundred metres in the figures on the German map. Here I stayed a month, and made numerous excursions up the hills immediately behind—*i. e.*, to the southward. These hills rise to 8000 ft., and at least two peaks farther off are considerably higher; but I was unable to get to them.

This upland region is now mostly all grass-grown. Here the Fula herdsmen pasture their cattle so long as the streams run—after which they descend lower. There is fringing forest in the gullies, and patches of woodland also here and there, chiefly on the steeper and higher slopes, and trees are allowed to grow up of their own accord in and round villages; but the insistent demand for firewood is rapidly destroying the timber-trees.

In this region I collected about 220 species of flowering-plants, etc. It was the dry season, and I had not expected to be so successful, but some heavy rain when it should not have come was all in my favour. There seemed to be an undue proportion of Compositæ up here, with Leguminous plants below the average. Perhaps the most conspicuous flowering-plant in the grass was a tall "poker"-like plant, six to eight feet high, with a single stiff spike of blue flowers (*Lobelia columnaris*). Tree-ferns (*Cyathea Manniana*) and bracken (*Pteridium aquilinum* var. *capense*) were among others that caught the eye, while a thorny bramble (*Rubus pinnatus*) bearing a raspberry-like fruit caught the hand. A few terrestrial and epiphytic orchids were flowering, and all about were showy specimens of *Dissotis* (Melastomataceæ), 8 ft. tall and violet at 5000 ft., shorter with softer leaves 2000 or more feet higher, where some bore violet and some pink flowers. The clumps of bush were bordered with small trees bearing massive panicles of violet composite flowers, while inside one saw two or three different species of Piperaceæ, ferns, Cyperaceæ, *Loranthus* of more than one species bending down the branches of the trees, orchids, mosses, lichens, with, of course, numerous trees not in flower.

I was also fortunate enough to find *Delphinium dasycaulon*, my one gathering being at 8000 ft.

This region would be well worth working in the rainy season, and all the more would the mountainous country, so little known, spreading away to the north.

TWO NEW MICHELIAS FROM KWANGTUNG.

By J. E. Dandy, M.A., F.L.S.

The two new species described below resemble each other, and at the same time differ from all the other Michelias so far recorded from south-eastern China, in the appressed shining rufous or cupreous tomentellum of the lower surface of the leaves. From each other they differ, as will readily be seen from the descriptions, in the shape

and size of the leaves, in the length of the peduncle, and in the number of ovules. In both species the stipules are free from the consequently unscarred petiole, and in this respect they fall into the same group of the genus as *Michelia Maudiæ* Dunn and *M. fallax* Dandy, two species which also are found on the mainland of Kwangtung. The type-specimens of both the new species are in the herbarium of the University of California, Berkeley, California.

Michelia foveolata Merr. MS., sp. nov.

Arbor? c. 4·5 m. alta; indumentum appressum, nitidum; ramuli juniores cupreo- et griseo-tomentosi. *Foliorum* lamina elliptico-oblonga vel oblonga vel lanceolato-oblonga, basi rotundata vel subcordata plerumque subobliqua, apice acuminata vel subacuminata, usque ad c. 22 cm. longa et 8 cm. lata, coriacea, supra primo præsertim ad costam cupreo-pubescens glabrescens, subtus cupreo-tomentella indumento demum cinerascenti, nervis lateralibus utrinsecus c. 16–20; petiolus ecicatrisatus, usque ad c. 2·5 cm. longus, cupreo- et griseo-tomentosus; stipulæ a petiolo liberæ, extus cupreo-tomentosæ. *Pedunculus* crassus, cupreo- et griseo-tomentosus, bractearum 3–4 cicatricibus notatus, in fructu c. 1·5–2 cm. longus. *Tepala* (ex cicatricibus) 9–12, 3–4-mera. *Gynæcium* griseo-tomentellum; carpella numerosa; ovula numerosa (12 vel plura). *Fructus* carpellis multis abortivis c. 8–14 cm. longus, plus minusve distortus; carpella matura libera, dehiscentia, sessilia, usque ad c. 2·5 cm. longa.

Hab. CHINA. Kwangtung: Wang-tong-shan, Tai-tsan, Ying-tak, 19 Oct. 1926, *Tsang Wai Tak and Wong Kam Chow*, 2738, in *Canton Christian College*, 14,599 (TYPE in Herb. Univ. Calif.).

Vernacular name: *kan-ip-lie*.

The collector gives the height of the plant as 15 ft., but makes no note as to its habit. By analogy with related species, however, *M. foveolata* is probably a tree.

Michelia Macclurei Dandy, sp. nov.

Arbor; indumentum appressum, rufum, nitidum, demum cinerascens; ramuli juniores tomentelli. *Foliorum* lamina obovata vel elliptica vel rhomboideo- vel oblongo-elliptica, basi cuneata vel late cuneata, apice acuminata vel subacuminata, usque ad c. 12 cm. longa et 6 cm. lata, plus minusve coriacea, supra primo pubescens glabrescens, subtus tomentella, nervis lateralibus utrinsecus c. 10–15 inconspicuis; petiolus ecicatrisatus, usque ad c. 3·5 cm. longus, primo tomentellus, glabrescens; stipulæ a petiolo liberæ, extus tomentellæ. *Flores* persuaveolentes; pedunculus crassus, c. 1–1·3 cm. longus, tomentellus, bractearum 3 extus tomentellarum cicatricibus notatus. *Tepala* 9, 3-mera, subsimilia, alba, glabra vel extus ad basin puberula, 3 exteriora oblanceolata vel spathulato-oblanceolata c. 3·5–4·5 cm. longa. *Stamina* c. 9–13 mm. longa, connectivo ultra antheræ loculos in appendicem brevem longulamve acutam producto. *Gynæcium* tomentellum; carpella numerosa; ovula c. 5–6.

Hab. CHINA. Kwangtung: Heung-lo-keuk, on mountain side, 14 Mar., 1925, *Floyd A. McClure*, 1468, in *Canton Christian College*, 13,292 (TYPE in Herb. Univ. Calif.; Herb. Arnold Arboretum).

Vernacular name: *nam-muk*.

According to McClure's field-label the type-collection was made from a tree 20 m. tall. In an additional note, however, the collector adds: "This Magnolia was *wild* and *not* cultivated. It was very rare in the region visited, the only plants found were badly injured and dwarfed by repeated accidental burning. The fragrance of the flowers is the most intoxicating I ever breathed."

SHORT NOTES.

JUNCUS MARITIMUS Lam., A NEW VARIETY.—In 1927 I found growing on Studland Heath, Dorset, five large clumps of *Juncus maritimus* Lam., in which the flowers formed densely compact suborbicular heads. These clumps were all growing near to one another, and every flowering-head on each of them was of this form. They were part of a considerable colony entirely consisting of this species. Their unusual appearance contrasted strongly with the typical plants immediately surrounding them. The number of flowering-stems to each clump was about the same as in the type.

I revisited the place several times this year and found that all the plants bore only compacted flowering-heads similar to those of last year. On October 2nd they were carrying ripe capsules with seed. These were freely produced in most of the heads, but in many the number of flowers which had failed to develop capsules was greater than in the average typical plant in the vicinity. At this date the size of the heads varied in diameter from about twenty to forty millimetres.

I have searched in the Herbaria at South Kensington and at Kew, but have not found either a specimen or description of this plant: I consider, therefore, that it merits recording as a new variety:—

Juncus maritimus Lam. var. nov. **congestus** L. B. Hall. A typo paniculis compactis suborbiculatis differt. Differs from type in having the panicles contracted into compact suborbicular heads.—L. B. HALL.

ROSA HIBERNICA Templ.—In the *Journal of Botany*, 1875, p. 100, Christ, under the title of "What is *R. hibernica* Sm.?" (of which the author has since been shown by Britten to be Templeton, not Smith), discusses its origin.

Christ's opinion was based upon "bien authentiques" specimens which he had received from Baker from two sources, one from Kew Gardens and the other wild ones collected by Fisher at Thurstaston, Cheshire.

Christ began by a mistake in saying that these belong to the normal form, since they are glabrous, and that Baker also mentions a variety with slightly pubescent leaflets. This is exactly the opposite of what Baker said in his Monogr. Ros. p. 209, as cited by Christ. He describes *R. hibernica* Sm. as having leaflets "naked or inconspicuously hairy on the midrib, the lower surface thinly hairy on the veins," remarking further down that "a form (var. *glabra* Baker, *Review*) with sharper teeth and leaves quite naked has been gathered" in several localities.

With this material and false ideas before him, Christ expresses perfectly sound views leading up to the conclusion that *R. hibernica* Sm. is without the slightest doubt a hybrid, and that "the plant of Kew and Cheshire is *pimpinellifolia* × *canina lutetiana*."

Now, I wish especially to draw attention to this mistake, since others of similar nature have occurred on both sides of the Channel, due to want of care in supplying a critic or student with correct material on which to base his judgment. These mistakes are largely responsible for our imperfect knowledge of *Rosa* to this day.

In a paper I am preparing for publication in, I hope, this *Journal*, I have given reasons for the great difficulties which surround the determination of the parentage of Rose hybrids, at the same time expressing my conviction that *R. hibernica* Templ., having pubescent leaflets, is derived from a *spinosissima* × *dumetorum* parentage, while the hybrid which Baker called *R. hibernica* var. *glabra*, is distinct, and having glabrous leaflets must be *R. spinosissima* × *canina*.

Christ appears to take up the line, as did Baker, that the two hybrids under discussion are only varietally distinct, but he had never seen type *hibernica* (see last paragraph of his paper), and asks British botanists to send him specimens. I do not know whether this was ever done, but the fact remains that he has impressed on Continental botanists the entirely wrong view (in my opinion) that *R. hibernica* Templ. is *R. pimpinellifolia* × *canina lutetiana*, to use his own nomenclature.

I may add that I know the Thurstaston plant well, and that it is my × *R. glabra*, but I have not seen that from Kew. I have one from the Cambridge Botanic Garden labelled by Roger *R. hibernica* Sm. Rogers did not make many mistakes, and may have had the name from Baker. It is perfectly glabrous, and has been somewhat altered by cultivation from the wild plant, but is, without doubt, × *R. glabra*. Its origin is not stated, and I suspect that it either came from Kew or from the same native source as that specimen.—A. H. Wolley-Dod.

Crepis nicæensis Balb. (em.) at Burton Agnes in the East Riding of Yorkshire.—On June 17th, 1923, Mr. Major Lawson, of Bridlington, discovered a plant, belonging to the genus *Crepis*, growing on waste grass-land at Burton Agnes. The land is not cultivated, but the grass is mown every season. Since this date the plant has been noted each year by Mr. Lawson, and, although

distinguished botanists have been consulted relative to its identity, there has been in this regard considerable confusion. However, this year the question has been decided by Dr. G. C. Druce, who writes: "I am very pleased to see your plant. It is *Crepis nicæensis* Balb., in which I am quite interested. Is it still to be seen *in situ*? It differs from *C. capillaris* and *C. biennis* in its being a rougher plant with often many setæ on the peduncles. The receptacle is quite different, being fovillate—each hole where the achene springs from has a winged border."

Mr. Lawson informs me that the place where this *Crepis* grows is a large grassy space, which is fenced. At the end of June this plant is 3 feet high, a sturdy and handsome growth in full flower. Then the mower comes and cuts it with the grass for hay. In September secondary growths have developed. These flower and fruit, but the flowers are not so fine as the June blooms. In J. Fraser Robinson's *Flora of the East Riding of Yorkshire* there is no mention of *Crepis nicæensis*, and, so far as I can ascertain, there is no record of this plant for the East Riding, and the same remark applies to the North Riding; but Dr. F. Arnold Lees, in his *Flora of West Yorkshire*, gives one record only: "in a field at Harlow Hill, Harrogate," the plant having been found in 1876 by T. J. Foggitt, whose grandson, my friend, Mr. T. J. Foggitt, of Thirsk, writes to me: "I don't believe it has been seen there since that date. My father (W. Foggitt) saw it near Thirsk on the 19th June 1899, 4th June 1901, and the 16th June 1901. I have not noticed it in recent years." The last record for this plant in Yorkshire would appear to be nearly thirty years old.

Dr. Lees indicates that he himself saw it *in situ*. It seems likely, therefore, that Mr. Lawson's discovery is certainly a second record for the county, and, probably, the only one at the present time.

I would like to suggest that this plant sometimes may be confused with *Crepis biennis* L. and *Crepis taraxacifolia* Thuill. Both of these plants are rare in the county.—R. J. Flintoff, Yorkshire Naturalists' Union.

Erodium Ballii Jord. in Ireland.—In the *Journal* for 1920, p. 126, an appeal was made to Irish botanists to re-discover this plant, which was described by Jordan in 1852 from specimens gathered by John Ball on the sea-coast of Ireland. During a visit to North-east Ireland in August with the British Bryological Society, I gathered a Storksbill on the sand-dunes of Newcastle, Co. Down, which agreed with Jordan's diagnosis of *E. Ballii*, and the identification has been kindly confirmed by Mr. E. G. Baker. The specimen is now in the British Museum Herbarium.—Ida M. Roper.

Mibora minima Desvaux.—Mr. H. H. Haines sends to the British Museum Herbarium specimens of this little grass, found by Miss E. Sylvia Haines on sandy waste, near Wimborne, Dorset, April

and May 1928. Apart from doubtful records, *M. minima* is only known as a British plant from Anglesea and the Channel Islands. Mr. Haines writes that the plant was subsequently found in a large garden near by, the owner of which has from time to time received plants from the Channel Islands, and this, no doubt, gives the clue to its introduction. It may be well, however, to put the matter on record.—A. B. R.

South Lancashire.—The following were found in July last:—*Corrigiola littoralis* by Mr. W. Chester and myself on light cindery ballast on a L.M.S. railway-siding, Formby. *Lathyrus tuberosus*, some large patches in dry slacks in the Formby Sandhills, by Mr. W. G. Travis. In July 1920 I observed one plant near the same place, but have never been able to find it again until this year, when it appeared in large quantity.—John D. Massey.

REVIEWS.

Illustrierte Flora von Mitteleuropa mit besonderer Berücksichtigung von Deutschland, Oesterreich u. der Schweiz. By Prof. Dr. Gustav Hegi. Vol. II. Pp. 405, 35 coloured plates, 275 text-figs. Lehmann, Munich. Price 27 R.M.

The present volume comprises the families Cyperaceæ, Araceæ, Lemnaceæ, Juncaceæ, Dioscoreaceæ, Iridaceæ, Amaryllidaceæ, Liliaceæ, and Orchidaceæ. The general treatment resembles that followed in the first volume. The taxonomic description of each family is followed by a more detailed account, including matter of general morphological, biological, and ecological interest, with reference also to economic uses. Among the fifteen genera of Cyperaceæ we note *Trichophorum*, with three species which have received varying treatment by different authors, but which are very closely united by morphological and anatomical characters. They are *T. alpinum* Pers. (*Eriophorum alpinum* L.), *T. cæspitosum* Hartm. (*Scirpus cæspitosus* L.), and *T. atrichum* Palla (*Scirpus alpinus* Schleicher); the last is a rare alpine species. In this genus, as elsewhere occasionally, the author includes notes on the ecological association of which the species is a characteristic member, with photographic representations of the habitat—these photographs are sometimes lacking in clearness, contrasting therein with the general sharpness of the line-block text-figures.

The treatment of *Carex* occupies eighty pages, and includes 105 species and 12 hybrids; the key is placed after, not in the usual place before the description of the species.

Araceæ are represented by the two species of *Arum*, *Calla palustris*, the Mediterranean *Dracunculus vulgaris*, assumed to be wild in Tessin in Switzerland, and the now widely-spread *Acorus Calamus*, the introduction of which from Constantinople in 1857, whence it was sent to Matthioli in Prague, is described.

The representation of Liliaceæ (which is used in the broader Benthamian sense) compares favourably with that of the family in our own flora, including twenty-six genera and 79 species; there are, for instance, eight species of *Gagea*. We note that the alpine species, *Lloydia serotina* is assigned to "England" in the general distribution. The cultivated species of *Allium* are treated in detail apart from the wild species. The arrangement and nomenclature of the Orchids follows in the main that adopted by Ascherson and Graebner (with the cooperation of M. Schulze), but extremes of nomenclature such as *Cypripedilum* (for *Cypripedium*) *araneifera* (for *aranifera* under *Ophrys*) are indicated only in a footnote, the more usual form being adopted in the text. *Orchis*, however, is regarded as of the masculine gender, following the original Greek, though Pliny when using it as the name of a plant made it feminine, as have botanists generally from Linnæus onwards. The effort to achieve accuracy in spelling and gender, which was a feature of the floristic works of the late Prof. Ascherson, often leads to changes in a name-form which has been in use from early botanical times. It is a subject upon which much might be said on both sides, and we do not propose to discuss it here. The treatment of the individual species is naturally much less exhaustive than that adopted by Ascherson and Graebner in the *Synopsis*, but notes on the principal varieties and hybrids are appended to the descriptions of the species.

If a new edition of the work is contemplated it would add to the interest to call attention to methods of pollination—at any rate, in cases of special interest, such as the Orchids. The coloured plates and line-block illustrations maintain the standard of excellence of the first volume.—A. B. R.

Moss Flora of North America, North of Mexico. By A. J. Grout, Ph.D. Vol. III. Part 1. Large 8vo, pp. 1–62, pls. 1–14. Published by the Author, 1 Vine Street, New Brighton, New York City, U.S.A., 1928. Price $2.50.

This is the first part of a new publication, and it may seem strange that it should commence with Vol. III., the present part treating of several subfamilies of Hypnaceæ.

The reason of this is that the work is conceived on much the same lines as the North American Flora, of which two parts only of the Bryophytes have been issued, both as long ago as 1913. To have begun the present work at the commencement, following the usual sequence of Families, would therefore have duplicated what has already been published there, and it is a wise arrangement that has avoided this.

It is natural to compare the present work with the treatment of the mosses in the North-American Flora. The principal differences are three: first, that the area dealt with covers the whole of North America north of Mexico, thus excluding Mexico, Central America,

and the West Indies, most of which are included in the North-American Flora. Secondly, the present work is profusely illustrated, this part containing 14 plates. The species illustrated in Dr. Grout's *Mosses with Hand-lens and Microscope* are not for the most part figured here, the design of the author being that in the two works combined practically all the North-American species in the area will be illustrated. The plates are for the most part reproduced from the *Bryologia Europæa* and Sullivant's *Icones*.

The third important difference lies in the annotations given at the end of most of the specific descriptions, either pointing out the main differences from the allied species or justifying the reductions made in the synonymy. All workers with handbooks of this kind will recognize the practical value of such notes.

The author, while following generally the accepted treatment of the subfamilies dealt with, has not adhered slavishly to any system, but has exercised an independent judgment. He has made *Eurhynchium* include *Rhynchostegium*, but on the other hand he has retained *Rhynchostegiella* for *R. curviseta* (Brid.), and he has created a new genus *Chamberlainia* for certain species usually included in *Brachythecium* having erect symmetric capsules and lacking cilia in the peristome. Whatever may be the opinion as to the status of the genus, all bryologists will be glad of the honour done to the late Ed. B. Chamberlain, whose untimely death robbed all bryologists of a valued colleague and very many of a close friend.

Keys are given to the species in each genus; the synonymy is full, and the descriptions ample without being unnecessarily elaborate.

Criticism will naturally arise on some points. It seems unfortunate that the species are not numbered, either in the text or in the Keys, and reference is thereby made more difficult, a point of some importance in the larger genera, such as *Brachythecium*. However, the beginner is mercifully preserved thereby from seeing at the outset that he has 35 species to deal with in that genus, even after the removal of the species in *Chamberlainia* and *Scleropodium*! A study of the descriptions in *Brachythecium* cannot fail to awake the suspicion that a number of these are far too closely allied to be deserving of specific rank—indeed, Dr. Grout's remarks frequently indicate that he is of the same opinion (*cf.* notes on *B. flexicaule*, *B. campestre*, *B. pseudo-collinum*, *B. subasperrimum*, &c.). One rather regrets that with his sound judgment and wide experience he has not carried out some of these remarks to what seems their logical conclusion.

Hypnum myosuroides L. is placed (with *Isothecium stoloniferum*) in a new genus, *Pseudisothecium*, a departure that no bryologist is likely to object to, since hardly any two bryologists have been able to agree as to where it is properly placed.

Under *Camptothecium pinnatifidum* (p. 57) the author remarks that Cardot holds it to be merely a variety of the European *C. aureum* (Lag.) Br. & Sch., and that certain plants from Vancouver are completely identical with the European plant. One thinks that Dr. Grout should either have given his reasons for disagreeing with Cardot or, if he agrees, should have adopted the earlier name, *C. aureum*.

The book is clearly printed, the typography being very much that of the *North American Flora*. A certain number of misprints have been allowed to pass, but on the whole the work is quite worthy of the somewhat ambitious task the author has set out to accomplish.

It is made clear that the continuance of the publication will depend on the number of subscriptions obtained.—H. N. D.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY.—At the first General Meeting, held on November 1, Mr. V. S. Summerhayes gave an account of his revision of the Australian species of *Frankenia*.

During the last 65 years our knowledge of the Australian species of *Frankenia* has increased enormously. Bentham, in *Flora Australiensis* (1863), described seven species and three varieties. In the present paper forty-four species are recognized.

Among the important characters for taxonomic purposes are the arrangement and number of ovules, and the nature of the leaves. Niedenzu in *Die Naturliche Pflanzenfamilien* divided the genus into two subgenera—*Afra* and *Oceania*—and the latter, containing the Australian species, into the sections *Toichogonia* and *Basigonia*, the former characterised by numerous parietal ovules, and the latter by a single basal ovule to each placenta. Examination shows that there is a series of ovular arrangements leading insensibly from *Toichogonia* to *Basigonia*.

The genus seems to be composed of a number of parallel evolutionary series progressing from the "toichogonial" to the "basigonial" stage, although the final stages have not been reached in all the series. The American species with basal ovules seem to have had a different origin from the Australian ones. Evolution in the leaf-characters has probably occurred from the petiolate to the sessile types. This is supported by the fact that the sessile-leaved species all belong to one group which in ovular characters can be considered rather advanced.

On the whole, the genus may be looked upon as an ancient one, which in Australia has found favourable conditions, and which has consequently produced many species there. Western Australia appears to be the original home of the genus in the continent; the species have spread eastwards into the new country rendered available by the elevation of the land-mass.

Miss T. L. Prankerd explained the results of her continued studies in the Geotropism of Pteridophyta, the subject of her paper being "Specificity in Graviperception."

Upwards of 2000 experiments have been made on the fronds of seven species of ferns in order to determine quantitatively their reaction to gravity at different stages in their ontogeny. The results can be expressed as curves, termed *graviscripts*, which naturally fall into two groups corresponding to the two genera—*Asplenium* and *Osmunda*—into which these species have long been grouped on

morphological grounds. Response to stimulus is thus shown to afford criteria of taxonomic value, and may therefore be taken into account by the systematist who believes that all characters must carry weight in a truly Natural System.

Some generalizations were tentatively put forward with regard to the geotropic irritability of ferns; and it was claimed that *Osmunda cinnamomea*, which will under certain conditions respond to a stimulus lasting only twenty seconds, is the most sensitive plant to the force of gravity as yet discovered.

At the Meeting on November 15, Dr. H. Hamshaw Thomas described some further observations on the cuticle structure of Mesozoic Cycadean fronds. His object has been to show the range of variation in the epidermal structures of different species of the same genus, thus testing the systematic value of cuticle characters. He concludes that species hitherto referred to *Pterophyllum* as the section *Anomozamites* represent a distinct genus, but that there is no justification for the separation into a number of species of numerous well-graded forms of *Pterophyllum* from the Lunz beds of Austria. Palæozoic fronds from the Coal Measures of Blanzy and Commentry in France, placed by Zeiller under *Pterophyllum*, should, according to cuticle structure, be regarded as more closely allied to the Mesozoic genus *Nilsonia*.

Preservation of Wild Plants: Bye-Law.—We note that the bye-law approved for the County of Cumberland by the Secretary of State (see this *Journal*, p. 280) is now effective in the County of Hertfordshire, where it is now an offence to uproot ferns and other wild plants in any road, lane, common, or other unenclosed place to which the public have access.

The Hertfordshire County Council also prohibits the littering of county highways with paper and other waste material.

Prof. Dr. Hans Schinz.—We tender our congratulations to Prof. Schinz, Director of the Botanic Garden and Museum, Zurich, who will be 70 years of age on December 6. Also our good wishes for further years of useful work in his impending retirement from his professorial duties and the Directorship which he has ably filled for so many years.

Appointment.—Mr. George Taylor, B.Sc. (Edinburgh), has been appointed Assistant in the Department of Botany, British Museum, in succession to Mr. R. D'O. Good, now Lecturer in Botany at the University College, Hull. Mr. Taylor graduated in 1926 with first class honours in Botany, since when he has done systematic research work under Prof. W. Wright Smith at the Royal Botanic Garden, Edinburgh.

Professor A. C. Seward, F.R.S., has been appointed President of Section K (Botany) for the South African Meeting of the British Association in 1929.

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.

SUPPLEMENT.

[The Editor is indebted to Mr. J. Ardagh, of the Department of Botany, British Museum, for assistance in the preparation of this Index.]