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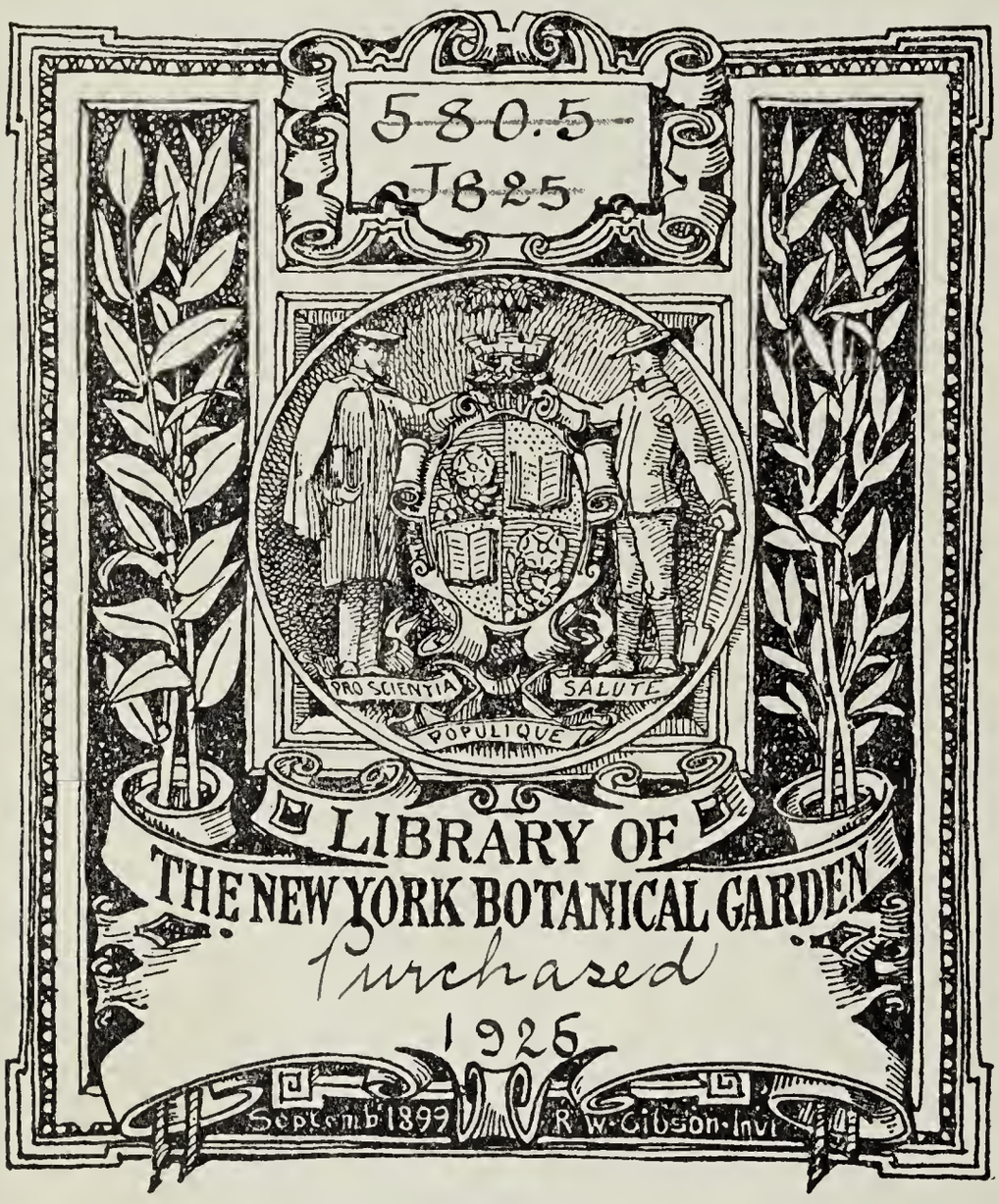
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LATE SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM.

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CORRIGENDA.

P. 89, l. 15 from bottom, after "has" supply "not."
P. 93, l. 21 from bottom, for "*Dictophyllum*" read "*Dicotylophyllum*"; l. 29, for "Mrs." read "Miss."
P. 95, l. 23 from bottom, for "Linbrola" read "Linkola."
P. 208, l. 5 from bottom, omit "Ferns."
P. 216, l. 8 from top, for "1899" read "1889."
P. 226, l. 21 from top, for "1827" read "1727."
P. 229, after title "Hepatics, etc.," supply reference to pl. 568.
P. 249, l. 12 from bottom should read "no knowledge of fiction, which was not."
P. 251, l. 16 from top, for "will be offered" read "has been placed in."
Pp. 280–283, for corrections see p. 320.

SUPPLEMENT.

P. 11, l. 17 from top, for "Meunch" read "Munich."
P. 43, ll. 10, 12 from top, for "Litsæa" read "Litsea."

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POTAMOGETON IN THE ENGLISH LAKES.

By W. H. Pearsall and W. H. Pearsall, D.Sc., F.L.S.

Our former paper (Journ. Bot. 1921, 160–164) dealt with the *pusillus* section of the genus *Potamogeton*, and it was there shown that "*P. pusillus* exhibits distinct variations in relation to the depth of water in which it grows," and that "light-intensity is the chief factor in causing them."

Similar variations occur in the larger-leaved species of *Potamogeton*—and, indeed, in most other aquatic genera—and from similar causes. These will be indicated under the various species dealt with below.

We also "proposed to enumerate the species of *Potamogeton* found in the English Lake District and to summarise their distribution." This is, therefore, an additional object of the present paper. Since form variations in the larger pondweeds appear to be of the same types in all species, it will save repetition if these types of variation are summarised at the outset.

The most important is the variation in the length and breadth of the leaf—most easily expressed as the $\frac{\text{length}}{\text{breadth}}$ ratio. This is associated with a change in the lengths of internode and peduncle—these becoming longer as the relative leaf-length increases. The factors producing these changes have been examined in detail in the case of *P. perfoliatus*, which shows this type of variation to a marked degree. The same factors—more or less—seem to operate also in *P. prælongus*, *P. alpinus*, ×*P. Zizii*, *P. gramineus*, ×*P. nitens*, and *P. crispus*. Relatively longer leaves are produced in deeper water (*i. e.* from lower light-intensity and shorter duration), and broader leaves are found on the more calcareous soils. The chemical character of the salts dissolved in the water appears to have little or no effect. Light-intensity also affects the colour and structure of the leaves. In shallower water they become tinged with red and are several cells in thickness, instead of only two or three. The colour is due to the formation of anthocyanin consequent upon increased photosynthesis and sugar production.

The average leaf area varies very considerably. Particularly in the case of *P. perfoliatus*, *P. alpinus*, and *P. gramineus*, the lake specimens have usually much smaller leaves than those from the

S. and E. of England. This difference is attributed to the less favourable conditions for growth (see Pearsall, Journ. Ecology, viii. 1920, 163). The species to be considered do not all vary to the same extent. Very variable species are *P. perfoliatus*, × *P. nitens*, *P. gramineus*, and *P. alpinus*—and roughly in that order. *P. prælongus* and *P. crispus* vary much less, while *P. lucens* and × *P. Zizii* show little variation, in our experience. The marked variability of *P. polygonifolius* as compared with the stability of *P. natans* is very striking and a familiar fact to most systematic botanists.

P. PERFOLIATUS L. is the most widely distributed species in the English Lakes. The normal British form—with broadly oval leaves—found in calcareous waters in the south and east, does not occur in this area. Practically every lake contains a form of *P. perfoliatus* which differs in leaf-shape and size from those of the other lakes. Moreover, leaf-shape is by no means constant in any one lake.

The following table summarises the differences between the typical forms of various lakes, compared with those of the more usual form from the R. Derwent at Kirkham Abbey, Yorks. The figures for length and breadth are averages of a number of leaves :—

TABLE I.

Lake.	Length (cms.).	Breadth (cms.).	$\frac{\text{Length}}{\text{Breadth.}}$	Remarks.
1. Esthwaite	2·4	1·3	1·85	
2. Derwentwater.....	4·4	2·2	2·0	
3. Kirkham Abbey	6·8	3·4	2·0	Calcareous r.
4. Windermere	3·3	1·4	2·4	Water 3 m. dp.
5. Ullswater.....	9·3	3·6	2·6	f. *macrophyllus* *.
6. Windermere	7·0	1·7	4·1	Water 6 m. dp.
7. Coniston	6·3	1·4	4·5	f. *lanceolatus* *.
8. „	5·8	1·5	5·5	

In considering how these variations might have originated, it was immediately clear that light-intensity was one of the factors involved. We constantly found that the specimens with relatively longer leaves and internodes occurred in deeper water, and had hence developed under lower light-intensity. The effect of this is illustrated by the Windermere specimens (4 and 6 in the table).

While we could satisfactorily explain in this way many of the variations in leaf-shape observed in *P. perfoliatus* in any one lake, the effects of light-intensity alone were found quite inadequate to account for the differences in forms growing in different lakes. For example—the typical "*lanceolatus*" leaf-form in Coniston (No. 7) occurred in water about 4 m. deep. In Windermere the similar form (No. 6) came from water 6 m. deep, though these lakes have water of equal clearness (Pearsall, *loc. cit.*), and consequently the light-intensity will be similar at equal depths in each lake. Further, the typical broad-leaved forms of Windermere, Esthwaite, and Derwentwater do not occur in Coniston, even in shallow water. The Kirkham Abbey specimens also illustrate the same points. The Derwent has turbid water, and the light-intensity is estimated to be about

* Blytt's so-called "varieties."

the same at a depth of 2 m. as that of Windermere at 6 m. The lowermost leaves of a large number of specimens were 9 cms. long and 2 cms. broad—the uppermost being 3·3 cms. long and 2·8 cms. broad. The former were growing in 2 m. of water, while the latter were only 20 cms. below the surface. Clearly the leaves are relatively much broader than any of the lake specimens growing under similar light-conditions, and never does *P. perfoliatus* in the lakes produce leaves in which the length is only 1·2 times the breadth—or indeed anything approaching this ratio.

In 1920 we took material of the three extreme types from Coniston, Esthwaite, and Kirkham Abbey, and grew it in large tanks (5 ft. diameter and 5 ft. deep; =1·5 m.) under the same light-intensity and on the same soil. All three sets of material produced leaves of the same type (about 3 cms. long and 1·5 cm. broad), but on growing these further under different light-intensities, we were not able to produce the extreme types of leaf from which we had started—although in half the original light-intensity the leaves were much narrower (0·9 mm.) and somewhat longer (3·3 cms.). The approach of winter put a premature end to this experiment, but the results obtained seemed to indicate quite clearly that another environmental factor—at least—affected the leaf-shape of *P. perfoliatus*, and the nature of the soil seemed to be the most probable additional influence. The fact that the broad-leaved Kirkham Abbey form occurs on very calcareous soil (+5 % of $CaCO_3$) seemed very suggestive in this connection, and so far as we could ascertain, all the typical broad-leaved southern forms of *perfoliatus* grow on calcareous soils. We had a limited number of soil analyses—from the ecological survey of the lakes—and on referring to these we found, in accordance with the Yorkshire example, that the broader-leaved lake-forms grew on the most calcareous soils and the longer narrower forms on the least calcareous soils as shown by the following table (II):—

Lake.	Leaf $\frac{\text{length}}{\text{breadth.}}$	Available in soil *. K_2O (Potash).	Available in soil *. CaO (Lime).	Ratio. $\frac{K_2O}{CaO}$.
Coniston	4·5 to 5·5	338	90	3·7
Ullswater	2·6	336	280	1·2
Esthwaite	1·8	342	1600	0·2

These figures, although limited in number, are very suggestive when viewed in connection with the facts outlined above. They are confirmed by a similar series for *P. prælongus* (see below), and suggest quite definitely that the proportion of lime in the soil is an important factor in determining leaf-shape in *P. perfoliatus*, and that, along with the effects of light-intensity, it may enable us to account for all the leaf-variations observed in this species in nature. Further experiments to analyse these effects are in progress—they confirm the above conclusion—but open up additional problems which prevent any present statement of results. It seems quite certain that there are no "varieties" in *P. perfoliatus*, but only growth-forms—the view held by Fryer.

* Parts per million of dry soil.

The common deep-water form (No. 7, Table I.) has been named var. *lanceolatus* Blytt (= var. *gracilis* Chamisso). It possesses long, nearly parallel-sided, but slightly tapering leaves of extremely thin texture and light green in colour. It occurs in many of the lakes, but is most abundant in Coniston, where its extreme form (No. 8) has been wrongly identified as *P. Richardsonii*—a species not yet met with in this country.

A form (No. 5) possessing very large and broad leaves of darker colour and thicker texture than usual with us, has been termed var. *macrophyllus* Blytt. This is found only in Ullswater.

The common form of relatively shallow waters and high light-intensity (No. 2), possesses small oval-oblong leaves, and is frequently met with in Windermere, Esthwaite, Derwentwater, Ullswater, and Hawes Water (69 *a*). Hodgson (Fl. Cumb. 316) gives it also for Bassenthwaite and Crummock, but we have not yet seen it in either lake.

In *Potamogetons of the British Isles* (p. 40) the peduncles of this species are stated to be from 2″ to $2\frac{1}{2}$″ in length. We have them $5\frac{1}{4}$″ long from Windermere.

P. PRÆLONGUS Wulfen is a characteristic and beautiful deep-water species frequently occurring in the lake-waters up to 9 m. in depth, but uncommonly in water of less than 2 m. in depth. The variation in leaf-form apparently follows that of *P. perfoliatus* but is much less extreme. The following table (III.) summarises the variations observed and their relation to the environmental conditions:—

		Average leaf.		Length / breadth.	Soil.		K_2O / CaO.
		Length.	Breadth.		K_2O.	CaO.	
Windermere.	Normal form.....	15	2·5	6·0	420	1260	0·33
	Deep water, 6 mm.	18	2·7	6·7			
Ullswater	(Average)	16	2·4	6·7	340	280	1·2
Esthwaite	(*a*)	16	3·0	5·3			
	(*b*)	10	2·3	4 3	460	2400	0·2

Lengths and breadths are averages of 10 mature leaves.

The Esthwaite forms are strikingly different from any others we have seen, the leaves being much broader in proportion to their length. During 1919, when considering the ecological changes taking place in this lake, we ventured to anticipate the probable early appearance of this species, and discovered it there for the first time in August 1920. *P. prælongus* also occurs in Windermere, Coniston, Ullswater, and Derwentwater.

P. LUCENS is a deep-water species very locally found in Windermere, Coniston, and Hawes Water, Silverdale (v.–c. 60). This species does not occur in Derwentwater, the record of it by C. Bailey for "N.W. end of Derwentwater" (Fl. Cumb. 315) referred to *P. Zizii*, which still grows there in abundance.

It shows little or no variation in form in this area, but the leaves of the plants growing in the calcareous Hawes Water are always thickly encrusted with carbonate of lime. This tarn, however, is outside the limits of the Lake District proper, and should not be confused with the lake of the same name in Westmoreland.

×P. ANGUSTIFOLIUS Presl (=*P. Zizii* Mert. et Koch) is a hybrid of *P. gramineus* × *lucens*. At present it is only found in Derwentwater and Coniston. In the former it grows in about 1 m. of water, and the leaves have a reddish colour owing to the presence of anthocyanin. These specimens also fruit freely, and both these distinctive features can probably be attributed to high light-intensity (±35 %) and a consequent high rate of carbon assimilation. The Coniston specimens—growing in water about 3 m. in length (L. I. ±10 %)—lack both the colouring and the fruiting of the Derwentwater plant.

Dr. Hagström (Crit. Res. 212) remarks that "its fruiting-faculty appears in some cases nearly quite undiminished or normal, in most cases considerably reduced, and in many quite lacking." While this accords with our own experience of this species, we may add that the fruiting-capacity—as in the case above—seems to depend very largely upon the light-intensity and the rate of carbohydrate synthesis. If this is high, abundant fruits appear, and in our judgment this is usual among the larger-leaved species of *Potamogeton*.

The leaves of ×*P. angustifolius* show little change in form in the habitats from which we have gathered them. The average size of the Derwentwater specimens is 14 cms. long ×2·8 cms. broad, the Coniston specimens being smaller, but having the same average proportions, *e.g.*, 10 cms. long ×2 cms. broad.

P. ALPINUS Balbis (=*P. rufescens* Schrader). This species is easy to distinguish when the characteristic coriaceous floating leaves are present. These are obovate in shape, cuneate at the base, and have petioles shorter than the laminæ. In the lakes, however, this species—in common with many other species of *Potamogeton*—rarely produces floating leaves, but the reddish tinge of its submersed leaves readily distinguishes it,

Two distinct forms are met with—(1) that of deep water and low light-intensity. This possesses much longer leaves (10–12 cms.) of thinner texture, and (2) the shallow-water form which has much shorter leaves of thicker texture—often, indeed, subcoriaceous. The first occurs in Derwentwater, Ullswater, Esthwaite W., Windermere, and Blelham Tarn. The second is found in the shallow water at the Blelham Beck in Pull Wyke Bay, Windermere. This beck flows from the tarn of the same name, and the difference in habit of the *alpinus* plants growing in each water is primarily conditioned by a difference of light-intensity consequent upon difference of depth in the respective habitats. The two widely different forms pass into one another so gradually in the varying depths of water in the tarn, the beck, and the lake, that it cannot be doubted that they are merely "states" produced by local—and indeed, often changing—conditions.

[×*P. lanceolatus* Smith, given in Hodgson's Fl. Cumb. 315 as occurring in Bassenthwaite was obviously an incorrect determination. Neither this nor any similar species is found there.]

P. GRAMINEUS L. (=*P. heterophyllus* Schreber) prefers relatively shallow water and some degree of shelter. Under such conditions the ordinary form of the species flourishes in Ullswater, Coniston, Windermere, and Loweswater. Occasionally, however, a

very distinctive deep-water form is found. This—the var. *longipedunculata* Mérat—possesses a lengthened stem having a remarkable development of foliage below, few leaves above, and extremely long peduncles—up to 9½ inches in length. We have gathered this form in Ullswater, Esthwaite Water, and Derwentwater. Mr. Arth. Bennett informs us that the same form grows under similar conditions in the Great Lakes of America.

× P. NITENS Weber (*P. gramineus* × *perfoliatus*) is an extremely variable hybrid locally abundant in Ullswater, Derwentwater, Windermere, and the R. Leven, which drains it. As most of the *P. nitens* forms met with in this country greatly resemble forms of *P. gramineus*, the hybrid is commonly confused with that species. *P. gramineus* has sessile submersed leaves with a gradually tapered lanceolate base, serrulate margins, and an acute apex. *P. nitens* has lanceolate submersed leaves with rounded-cordate half-clasping bases. Occasionally, however, it possesses stem-leaves similar to those of *P. gramineus* and then presents some difficulty, but in all such cases the branch-leaves have ± rounded bases. Immature fruits are frequently formed, but so far as our experience goes, mature and fertile fruits are not produced.

In Pots. Brit. Isles 70, the peduncles are given as "short and stout." We often find them slender, and have specimens (*teste* J. O. H.) from both Windermere and Ullswater possessing peduncles 6″ in length.

P. NATANS L. As this species only occurs in the relatively shallow waters near the lake shores, and produces only coriaceous floating leaves, it presents little variation in form, and is, as nearly as possible, identical with the type-specimen of this species in the Linn. Hbm. We have seen it in Derwentwater, Bassenthwaite, Ullswater, Windermere, Coniston, Esthwaite W., and Loweswater. It also occurs in most of the smaller tarns—*e.g.* Elterwater and Blelham Tarn. We have not met with it in either Wastwater or Ennerdale, and only rarely in Buttermere or Crummock.

P. POLYGONIFOLIUS Pourret. The usual form of this species—so generally distributed in the shallow peaty drains and ditches of the district—is absent from the lake-waters proper, but is replaced in a few of them by a deep-water form—the so-called var. *pseudofluitans* of Boswell Syme. In the lakes this occasionally produces a few thin subcoriaceous floating leaves, but normally it possesses only narrow elongated lanceolate leaves attenuated at the base into long petioles. This essentially deep-water state occurs in Wastwater and Buttermere—possibly also sparingly in other lakes. It may, perhaps, be as well, at this point, to state that we do not consider this form a true "variety," but merely a "growth-form" conditioned by its environment, and this opinion extends to all the named "varieties" mentioned in this paper. A long acquaintance with plants of this genus growing under very varying conditions and an extended critical examination of their morphological differences have convinced us that Fryer was undoubtedly correct in stating (Pots. Brit. Isles, 41) that "the texture and shape of leaves are too inconstant to afford satisfactory grounds for varietal distinction."

P. CRISPUS L. Hodgson (*l. c.*) considers this "a very common and widely diffused species," and correctly, but it is certainly not so in the larger lakes. The form which has been named var. *serratus* Hudson, occurs occasionally both in Esthwaite Water and Hawes Water (69 *a*), but is uncommon or absent elsewhere in the lakes.

P. pectinatus L. has been recorded (Fl. Cumb. 318) for Bassenthwaite—probably in error. At any rate, we have not seen it there nor in any other lake up to the present. It is abundant in muddy calcareous tarns near the sea (*e. g.* Urswick Tarn, v.-c. 69 *b*) and in the Cavendish Dock and Ormsgill Reservoir at Barrow.

We have considered it advisable to confine the records given herewith to those of which we have personal knowledge, and have only cited others when they are admittedly incorrect or we are unable to confirm them. Owing to the immense area to be surveyed, and the fact that many of the species are entirely submerged, it may well happen that the list is not exhaustive. However, we have been engaged during the past 15 years in systematically examining the aquatic vegetation of the lakes, and during the past 3 years have visited some of them monthly, and all of them several times in the year. We feel, therefore, that the list may be accepted as a fair representation of the distribution of the various species of *Potamogeton* in the English Lakes at the date of publication.

THE TYPE-SPECIES OF PTERIS.

By William R. Maxon.

Several contributions to the pages of this Journal of late have served to focus attention sharply upon certain features of the present International Rules of Botanical Nomenclature that many writers (both British and American) look upon as objectionable, and to forecast eventual changes in the rules in several important respects, notably in the typification of genera by a definite "method of types." There is, obviously, general desire for an agreement in which all may unite. On the American side this is due in part to a strong drift away from the rigid provisions of the so-called American Code of 1907, and may be credited largely to the efforts of the "Committee on Nomenclature" of the Botanical Society of America, summarized in their two reports of 1919 and 1921 (*Science*, n. s. xlix. pp. 333–336; liii. pp. 312–314). "First species" rules and the like having failed from very arbitrariness, wide modification in the mechanism of applying the method of types is now urged. It has even seemed necessary to the committee to affirm that "rules of nomenclature should commend themselves as being reasonable," and that "they should be as definite as is consistent with reasonableness." However axiomatic, this appears not to have been written in a vein of conscious irony. At any rate, the recent effort has clearly gained support for the type-basis idea in generic nomenclature, and it is coming to be recognized very generally that this concept is not at odds with the principles of the International Rules. To a great majority of American

botanists the universal adoption of the method-of-types principle itself seems the important thing, whatever rules may eventually be agreed upon for its application. The departures of the newly proposed Type-basis Code from the code of 1907 are all in the direction of reasonable elasticity, so that in the case of composite genera that have repeatedly to be subdivided, it will be possible to fix upon type-species in closer accordance with the demands of historic usage. This will mean doing away with many substitute generic names, often obscure, that have been brought forward for old and well-known ones in recent years. The case of the genus *Pteris* of Linnæus (1753) is an excellent one in point.

As is very well known, the name *Pteris* is usually applied to a world-wide assemblage of perhaps 150 pteridoid species having a single indusium, and the name *Pteridium* to the segregate genus of a few species with double indusia, with *P. aquilinum* as type. However, in several recent American floras (Rydberg, *Flora of the Rocky Mountains*, 1917; Small, *Ferns of Tropical Florida*, 1918; Britton, *Flora of Bermuda*, 1918), the name *Pteris* is used for *P. aquilina* and its allies, the species of *Pteris* in the usual sense being placed in *Pycnodoria* Presl, a genus founded upon a single East Indian species in 1851, and up to the present time never before taken out of the synonymy of *Pteris* itself. The confusion to be caused by the proposed retypification of *Pteris*, including the sweeping changes involved in the eventual renaming of its very numerous species, can be borne if the change is known to be necessary, but it cannot be justified if based solely upon a relentless interpretation of some minor code technicality. Evidently the technical requirement is judged to exist, under the code of 1907; but a review of the facts shows that this basis is slight, and that the suggested change is unnecessary as well as unreasonable. The more important facts may be summarized as follows:—

Under the American Code (1907), *Pteris* as a Linnean genus would be typified through citations given in the fifth edition of the *Genera Plantarum* (1754). Since there are, however, no citations under *Pteris* in that work, it is necessary to typify the genus either with reference to citations given in the earlier editions of the Genera or by an analysis of the elements comprising Linnæus's concept of *Pteris* in the *Species Plantarum*.

In the *Species Plantarum* (1753) the species of "*Pteris*" are arranged in three groups. The first, "*Frondibus simplicissimis*," consists of four species now referred to the genera *Paltonium*, *Vittaria*, and *Eschatogramme*; the second, "*Frondibus simpliciter pinnatis*," etc., consists of seven species now referred to *Pteris* (5), *Notholæna* (1), and *Gymnopteris* (1); the third, "*Frondibus subbipinnatis seu ramosis*," consists of eight species, now placed in *Doryopteris* (1), *Pteridium* (2), *Pteris* (3), *Pellæa* (1), and *Gleichenia* (1). The total of 19 species, therefore, represents 10 genera belonging to two families of ferns. Of these, no fewer than eight species belong to *Pteris* in the historic and usual sense. None of the species is of pronounced economic importance. Sixteen of the 19 are altogether American, two are Chinese, and only one (viz.,

no. 13, *P. aquilina*) is European. *Pteris aquilina* was, it must be admitted, the only included species indigenous from the standpoint of the author, but it was a very minor element in the original assemblage of species, and it ought not now to be selected casually as the type of the genus, particularly in view of the subsequent historical facts. These are, that the *aquilina* element was segregated as a new genus, *Pteridium*, by Scopoli in 1760; that this genus has for many years past been recognized as valid, and under this name; and that the main body of "*Pteris*" species have been consistently retained in *Pteris* by most fern writers. There is nothing to show that *P. aquilina* played any special part in forming the generic concept of Linnæus. Moreover, it is evident that other of the included species were known to him in a living condition. Thus of the 19 "*Pteris*" species of the *Species Plantarum* six carry citatations to "*Pteris*" species of the Hortus Cliffortianus. Of the six, the first two are *Pteris grandifolia* and *P. longifolia*; the third is *Notholæna trichomanoides*; the fourth is *Doryopteris pedata*; the fifth and sixth are *Pteridium aquilinum* and *P. caudatum* respectively. Five of the six are American, and these were presumably known to Linnæus from living cultivated plants.

Recapitulating briefly: Of the 19 species of *Pteris* in the *Species Plantarum* eight, or nearly one-half, belong to *Pteris* as commonly understood, while no other genus has more than two. This preponderance, coupled with historic usage, should be sufficient ground for retaining the application of *Pteris* in the usual sense. Furthermore, of the eight species two (*P. grandifolia* and *P. longifolia*) were presumably known to Linnæus in a living condition. The selection of *P. longifolia* as the type of *Pteris* in accordance with tacit practice is quite as justifiable as the choice of *P. aquilina* under the former code provision that stipulates for the selection of an indigenous species.

Typification of *Pteris* through the *Genera Plantarum* leads to a similar conclusion. As above mentioned, there are no citations under *Pteris* in the fifth edition (1754). The first edition (1737) contains what is, apparently, the first generic use of *Pteris* by Linnæus. The brief diagnosis—"Fructificationes in lineam, subtus cingentem marginem folii, digestæ"—is accompanied by a brief reference to "Malp. 30" and by citation of 13 plates of Plumier's American ferns. The Malpighi reference is presumably to plate 51, figure 300 (not fig. 30), of *Anatome Plantarum* (1675), representing a small conventionalized drawing of a fern segment, doubtless *Pteridium aquilinum*, which is discussed briefly by Malpighi as *Filix* (page 72). The 13 Plumier plates cited are all American, and pertain to at least six genera; six belong to *Pteris*, and one to *Pteridium*.

With a single typographical change, an identical entry occurs in the second, third, and fourth editions of the *Genera* in 1742, 1743, and 1752, respectively. There is nothing to show that Linnæus's concept had undergone any change at the time the fifth edition appeared, 1754.

Typifying the genus on the basis of the first four editions of the *Genera Plantarum*, therefore, it is seen that the basis of *Pteris* is

overwhelmingly American, and that while six genera are represented among the American species illustrated, *Pteris* (in the usual sense) has almost a majority,—six species. The claims of these six species as typical are about equal. Here, again, historical usage may properly be considered and a free-veined species selected, since the netted-veined species are commonly placed in separated sections under distinctive names. *P. longifolia* is a reasonable selection, and this is, in fact, the type indicated by Christensen in the *Index Filicum.*

An examination of the Linnean literature thus shows that *Pteris* of Linnæus can be typified by *P. aquilina* only by recourse to a rule that an oldest known or indigenous species *must* be selected as type. In the present instance this would result in excluding from consideration the largest numerical element of the originally included species, namely *P. longifolia* and allied species, known as *Pteris* for more than a century. There appears to be no warrant for this, other than the *mandatory* provision of a rule whose basic idea is essentially sound. To such a course the liberal spirit of the new Type-basis Code is directly opposed.

But assuming that the claims of the name *Pteris* to use in its traditional sense could not be clearly shown, it is still almost certain that it would never be replaced in common usage; nor, in the writer's opinion, should it ever be displaced. Under the type-basis or any other code or set of rules, it is evident, many important genera can retain their usual names only by special exception, and there need be no more than passing regret over the necessity for a list of *nomina conservanda.* The principle of "saved" names is logically correct, and is quite defensible on grounds of expediency alone. Such a list, to receive general support, must naturally be subject to revision and be restricted to those genera that, because of their economic importance, numerous species, or involved nomenclatural history, have legitimate claims to being taken up under their best known names. If properly compiled, with a brief analysis of each case, a carefully considered list would do away with a vast amount of detailed discussion aimed at saving wellknown generic names "by rule," and would make appreciably easier the study of plants themselves. In spite of harsh judgements often levelled at systematic botanists, this, rather than the shuffling of names, is still their chief concern.

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DR. STIRTON'S NEW BRITISH MOSSES REVISED.

By H. N. Dixon, M.A., F.L.S.

The late Dr. James Stirton from time to time published papers, ranging from 1870 to 1915, dealing with British mosses, in the course of which he described numerous new species, reaching the considerable number of over 110; that is to say, an addition of nearly 20 per cent. to the usually recognized total of British mosses. During Dr. Stirton's lifetime very little opportunity was offered for examining these species, but since his death his herbarium of mosses has come into the possession of the British Museum (Nat. Hist.), and it has been possible to

study all of them. In view of a forthcoming 3rd edition of the *Student's Handbook of British Mosses* it became necessary to ascertain the value of these; I have therefore made a careful investigation of the material in the collection, and it appears desirable to publish the results at which I have arrived.

That out of this large number of species all but a very few will be found in the following revision to be reduced to the synonymy of one or other of our wellknown mosses may seem to demand some justification. It arises from two or three distinct causes—primarily because Stirton's conception of a species differed materially from that of most of our bryologists. This is, of course, a matter on which no two opinions will exactly coincide, and it may be held presumptuous for me to set my opinion against Stirton's. But, after all, there is a fairly recognizable standard of "common opinion" to which test any personal view may be brought; and the maxim "quod semper, quod ubique, quod ab omnibus, etc." is applicable to scientific as well as to theological doctrine. It could easily be shown over and over again from his own descriptions, quite apart from any personal individual view, that what to Stirton constituted a specific character does not often amount to more than would, in the opinion of most bryologists, give at best the rank of a variety, usually of a form only.

In the second place, Stirton relied to a considerable extent, particularly in certain genera like *Campylopus*, on minutiæ of cell measurement which no other bryologists have found sufficiently constant or well defined to be of real value as constituting specific characters. And, in addition to these general considerations, there are naturally a certain number of his species which must be rejected because founded either on an error of observation, or by overlooking some affinity, such as falls to the lot of all scientific workers at one time or another.

A more difficult problem is how far some of the species are entitled to the rank of varieties. Opinion there would probably differ more than on the question of specific rank. In the *Student's Handbook* I have restricted the number of varieties within very narrow limits, some would no doubt say too narrow. The hobby-horse of variety-making, when ridden with a loose rein, is apt to run away with its rider. And considerations of space have to be taken into account. I have therefore only in a few cases retained Stirton's species in the rank of varieties, though freely admitting that it is open to question whether certain others may not deserve that rank. On the whole, however, the number of doubtful cases is really few; it will be seen that I have, in the case of quite a number of the species, identified them with varieties already existing.

Moreover, many of the species, especially of *Campylopus*, are based purely or principally on colour, a quality which, I think, by itself is too superficial to be held of specific value, and only rarely should constitute varietal rank. Finally a certain number—especially of *Campylopus*—are based almost entirely on minute, quantitative differences of internal, histological structure. Now whether rightly or not, varietal differences as usually conceived, are for the most part concerned with external characters; and there would seem to be something incongruous, whatever be the histological value of the

character, in giving e. g. *Campylopus symplectus* Stirt. varietal rank under *C. subulatus* on the sole ground that certain cells of the nerve in transverse section have in the one a diameter of 13–18 μ, and in the other of 10–14 μ! (*cf.* Ann. Scott. Nat. Hist. xiv. 108 [1905]).

In the succeeding notes I have not thought it necessary to include some of Stirton's plants which have already been dealt with elsewhere; e. g. *Grimmia retracta* Stirt., *Campylopus Huntii* Stirt.

I have to express great obligation to Mr. Gepp for much help in the preparation of this list; and to Mr. J. R. Lee for looking out certain references only to be obtained at Glasgow.

The order followed (and the nomenclature) is that of the *Student's Handbook of British Mosses*. The locality in brackets, following the name of the species, indicates the specimen or specimens in Stirton's herbarium on which my notes were based. This was wherever possible the type or original gathering, or one to which the author refers in his description as showing the characters on which he relies. Stirton does not, as a rule, indicate the specimen which he considers as type; but when a packet is labelled as "original," or "the most characteristic plant," I have selected that, when there might be a doubt; this however rarely arises. In a few cases, it will be noted, Stirton failed to indicate any locality for the plant described.

Stirton under his descriptions of his species frequently adds "described in" or "published in 1865, 1866" or some other early date. This is, however, misleading. The dates refer to meetings when Stirton exhibited and called attention to mosses which he described later on, but no descriptions which would constitute publication were published or even given at the meetings.

The early volumes of the Proceedings of the Glasgow Nat. Hist. Soc. frequently refer to these exhibits, and testify to Stirton's great activity at that time, and to the large number of newly detected species with which he enriched Scottish and British bryology.

The dates given in the present lists, extracted by Mr. Gepp from Stirton's published papers, give, I believe, the first publication in all cases.

Abbreviations:—

Ann. Sc. N. H. = Annals of Scottish Natural History.
Scott. Nat. = Scottish Naturalist.
"Handbook" = Student's Handbook of British Mosses.

Polytrichaceæ.

Oligotrichum exiguum Stirt. in Ann. Sc. N. H. xvi. 173 (1907). (Glenfinnan, Head of Loch Shiel; Sept. 1906.)—Only barren plants. I can see no reason whatever for separating it from *O. hercynicum*. It is not even a very small form.

Dicranaceæ.

Leptotrichum compactum Stirt. in Ann. Sc. N. H. xv. 111 (1906). (Ben Lawers, 1867.)—The packet contains two plants, one *Cynodontium Bruntoni*; the other, which is the plant described, is *Ditrichum flexicaule* var. *densum*. Stirton in describing it says

"certainly distinct from the var. *densum*, to which Braithwaite refers it." But he does not point out any distinguishing characters, and his description does not suggest any. Stirton refers to this plant in Trans. Bot. Soc. Edinb. x. 426 (1890), as *Trichostomum compactum*.

L. confertum Stirt. in Ann. Sc. N. H. xv. 112 (1906).—This is referred by Stirton himself to *Ditrichum homomallum* var. *zonatum*, in a MS. note in his herbarium.

L. cyclophyllum Stirt. in Ann. Sc. N. H. xviii. 242 (1909). (Onich; Aug. 1908.)—This is a very tall and robust form of *Dicranella heteromalla* var. *interrupta* B. & S. The leaf-base, and the subula denticulate throughout a great part of its length are quite characteristic. I have similar forms of the var. from a number of localities, though not quite reaching the dimensions of Stirton's plant. A form closely approaching it was distributed by the Moss Exch. Club in 1908, from Tyn-y-groes, coll. Owen & Jones.

L. infuscatum Stirt. in Ann. Sc. N. H. xii. 112 (1903). (Mainland of Orkney; Aug. 1886.)—I find no difference whatever from ordinary forms of *Ditrichum flexicaule*. It is not easy to understand from the description what is precisely the character (based on the areolation) on which Stirton founded the species: on the previous page he makes the somewhat astounding statement of *D. flexicaule*, that the cells near the central base are "very generally the largest in any moss."

Ceratodon vialis Stirt. in Ann. Sc. N. H. xiv. 105 (1905). (Glasgow, in streets.)—This is based by Stirton principally on the large cells, "nearly four times the area of those of *C. purpureus*"; but this is a frequent character in hygromorphose forms of *C. purpureus*, and cannot be held a specific character, especially as all intermediate sizes of cell may be found between it and the typical size, if such there can be said to be. It may be added that if the size of the cells be held to constitute a sufficient character, probably Stirton's species is slightly antedated by *C. grossiretis* Card., published in the same year, from the Antarctic. Stirton says that the species is a parallel to *Cynodontium Jenneri* (Schimp.) (*C. laxirete* Grebe), as compared with *C. polycarpum*. But he overlooks the fact that it is not only the size of the cells that distinguishes *C. Jenneri*, but their non-papillose surface and their unistratose arrangement at margin, and that there are moreover good fruiting characters as well; and further, that the areolation in *C. purpureus* is notoriously variable, which is not the case with *Cynodontium polycarpum*.

Cynodontium asperellum Stirt. in Ann. Sc. N. H. xv. 106 (1906). (Behind Craig Chailleach; 31 Aug., 1890.)—The Craig Chailleach plant agrees exactly with *Weisia curvirostris* var. *scabra*. The description of the plant—vegetatively at least—is entirely in accordance with this. Stirton makes a good deal of the "slender connecting tubes between the cells"; and appears to look upon them as a remarkable character, whereas they are a most frequent character in thick-walled cells, though much more conspicuous in some than others. I find them quite marked in all the mounted slides of *W. curvirostris* that I have examined. Stirton describes a single old capsule "the teeth of which are defective." If any remains of

teeth were actually preserved the capsule must certainly belong to some intermixed species, but it is probable that it was rather the defective condition of the capsule that gave an illusory appearance of teeth.

Dichodontium fulvescens Stirt. in Ann. Sc. N. H. xviii. 245 (1909). (Corran, near Onich; Aug. & Sept., 1908.)—Stirton bases this principally on the nerve percurrent or excurrent ("Nerve reaches apex in more than two-thirds of the leaves," Stirton MS. in herb.), and the almost smooth cells. But his specimens, of which there are plenty, do not bear out this observation at all. I find no excurrent nerve, only a few doubtfully percurrent; and the cells are normally papillose for *D. flavescens*. Stirton must, I think, have misinterpreted his observations of the leaf-apex. I find it entirely similar to *D. flavescens*.

Oreoweisia serrulata (Funck) Schimp. is stated by Dr. Braithwaite (Brit. M. Fl. I. 164) to have been recorded by Stirton from Ben Lawers. There are two Scottish specimens so named (with a certain amount of doubt) in Stirton's herbarium:—(*a*) Ben Lawers; July, 1864. This is *Anoectangium compactum*, a short form much encumbered with soil, and different looking from the usual plant; (*b*) Ben Lawers; 1871. This is a small form of *Weisia curvirostris* var. *scabra*.

Dicranella (errore typographico *Dicranidia*) *fusco-rufa* Stirt. in Ann. Sc. N. H. xv. 108 (1906). (Craig Mohr, Arisaig.)—Separated by Stirton from *D. curvata* on the ground of certain "red, long, cylindrical bodies" among the "ordinary pale or greenish paraphyses of the flowers of both sexes; together with a laxer areolation than usual, and the leaves sharply serrated in the upper third. I am not clear that I have detected the special organs in the flowers; it appears to me that the mature paraphyses correspond fairly well with these, while the "ordinary pale or greenish paraphyses" are immature ones merely. The strongly denticulate subula is due to the fact that the moss belongs not to *D. curvata* but to *D. heteromalla*, and I can see only the ordinary ♂ plant of that species in the specimens.

Dicranoweisia Sutherlandii Stirt. in Ann. Sc. N. H. xviii. 168 (1909). (On apple-tree in garden, Southbar, near Glasgow; May, 1908.)—This is another of the species created on the basis of the large cells, and compared with *Cynodontium Jenneri* in that respect, in relation to *C. polycarpum*. The measurements he gives of the upper cells, however (13, 18, or even 20 μ long by 10–14 μ wide), are by no means extremely large for *Dicranoweisia cirrata*, with which he compares it. A specimen picked out at random from my herbarium (on Garrick's mulberry-tree, Abington, Northampton) has them equally wide. The cells figured in the "Handbook" measure about 15–16 μ by 10–13 μ. I can see no grounds for separating the Scottish plant from *D. cirrata* even as a form, on this score. The septate gemmæ described by Stirton are also characteristic of *D. cirrata* (*cf.* Correns, Vermehr., &c. p. 262).

Campylopus attenuatus Stirt. (*C. brevipilus* var. *attenuatus* Stirt. in Ann. Sc. N. H. vi. 119 [1897]). (Unst, Shetland; 1886.)—To my mind this is simply a form of *C. brevipilus* with the hair-points undeveloped.

Campylopus aurescens Stirt. in Ann. Sc. N. H. viii. 104 (1899). (Benbecula; 1885.)—A fine form or var. of *C. brevipilus*, but it must be referred to var. *auriculatus* Ferg., I think, without any doubt.

C. citrescens Stirt. in Trans. Bot. Soc. Edinb. xxvi. 245 (1914). (Plockton, Ross-shire; 1913.)—This only differs from the ordinary forms of *C. fragilis* in having the lamina not or scarçely narrowed at the insertion; a somewhat unusual, but not very important deviation from the type. The mounted slide of this species at the Brit. Mus. (Husnot, M. Gall. 410), agrees with Stirton's plant almost exactly.

C. crenulatus Stirt. in Trans. Bot. Soc. Edinb. xxvi. 244 (1914). (Plockton; 1912.)—I find nothing in either description or actual plant to separate it from *C. flexuosus*, of which it is a rather tall form.

C. Fergussonii Stirt. in Trans. Bot. Soc. Edinb. xxvi. 243 (1914). (Plockton; 1913.)—This is a fairly ordinary form of *C. atrovirens*, of a paler green than usual. Stirton describes the upper cells as not having the sigmoid form usual in *C. atrovirens*. This is more or less true of the younger leaves, but in the older leaves the cells are quite normal.

C. fulvo-viridis Stirt. in Ann. Sc. N. H. xi. 105 (1902). (Lewis, Outer Hebrides; Aug. 1901.)—I can find nothing either in the description or in the specimens to separate this from *C. brevipilus*.

C. fusco-luteus Stirt. in Ann. Sc. N. H. vi. 117 (1897). (Ben Voirlich by Loch Lomond; 1866; original specimen.)—Stirton (*l. c.*) gives 1864 as the date of collecting, and states that the species was published in 1865, but I cannot trace this publication. The specimen examined is quite indistinguishable from *C. subulatus* var. *elongatus*, except that the stems are radiculose below, a character which brings it very near to *C. Schimperi*. A further specimen of Stirton's was sent me by Dr. Braithwaite, as *C. subulatus* in his opinion, a determination with which I entirely agree.

C. leucophæus Stirt. in Ann. Sc. N. H. xii. 110 (1903). (Gairloch; Sept. 1911.)—Stirton does not state the origin of the plant described by him, though it is implied that it was from Tarbert in Harris. The specimen from Gairloch is a later one, but was sent me by Stirton as the correct thing, and it agrees quite well (except in one respect) with the description, so that it may be accepted as genuine. The sole difference from the described plant is that I can only find here and there a sporadic stereid cell on the ventral side of the Guides, to justify Stirton's description of it as a *Palinocraspis*; while in other respects his description points to *C. flexuosus*, quite decidedly. I make it without doubt *C. flexuosus* var. *paradoxus*, with which the description of the general leaf character is entirely in accord. The presence here and there of a few stereid cells on the ventral side of the Guides must be looked upon as an abnormality.

C. melaphanus Stirt. in Ann. Sc. N. H. xii. 110 (1903). (Tayvallich; Aug. or Sept. 1898.)—In my opinion *C. flexuosus*. Stirton, in a lengthy correspondence with me about this moss, mentioned that this had been the opinion of another bryologist. He placed much stress on the blackish colour of the lower, older part of the tufts, and

also on certain fine distinctions in the size of the cells in different parts of the nerve, as between this and *C. flexuosus*, in which I was not able to follow him. As to the colour, I have several specimens in my herbarium of undoubted *C. flexuosus*, notably in the var. *paradoxus*, showing the blackish colour in the older leaves, and I do not think this can be considered of importance.

C. obtectus Stirt. in Trans. & Proc. Bot. Soc. Edinb. xxvi. 426 (1915). (Plockton; 1914.)—Certainly *C. flexuosus* var. *paradoxus*. Stirton writes "no auricles, properly so called." But on a further specimen of same locality and date he writes "the leaves now show distinctly bulbous bases; 31 Mar., 1916";—thus illustrating the variability of *C. flexuosus*. He also writes "*C. obtectus* or *C. obtectans*," in sched. No doubt the name refers to the habitat (on a thatched roof), and *obtectans* would have been more correct.

C. pelidnus Stirt. in Scott. Nat. No. xi. p. 233 (1886). (Benbecula; 10 Aug., 1885.)—Described by Stirton as a subsp. of *C. brevipilus*. I can see no good reason, either in the description or in the plants, for separating it from that, even as a variety.

C. pergracilis Stirt. in Ann. Sc. N. H. xiv. 105 (1905). (Craig Mohr, Arisaig; Aug. 1904.)—Described by Stirton as intermediate between *C. fragilis* and *C. pyriformis*. Forms of this perplexing character do occur, but with little constancy in characters. I should call it a robust form of *C. pyriformis* with nerve rather wider than usual.

C. perplexans Stirt. in Trans. Bot. Soc. Edinb. xxvi. 247 (1914). (Plockton, Ross-shire; Aug. 1913.)—Stirton compares this with *C. atrovirens*, as differing mostly in the basal areolation—but does not say how. I find no differences; the rectangular supra-alar cells perhaps reach higher in the leaf than usual, and the very narrow marginal cells are perhaps more marked than commonly.

C. porophorus Stirt. in Ann. Sc. N. H. x. 113 (1901). (Gap of Dunloe, Ireland; G. E. Hunt, 1864.)—This was sent to Stirton as *C. setifolius*. He separates it from that and *C. Shawii* entirely on the ground of the lower cells having distinctly porose cell-walls. But as *C. setifolius* frequently, if not normally has these, the distinction vanishes. The mounted slide at the British Museum, for instance (Killarney, Binstead), shows the porose walls distinctly.

C. prasino-rufus Stirt. in Ann. Sc. N. H. xv. 108 (1906). (Craig Mohr, Arisaig; Aug. 1904.)—Stirton gives no locality in his published description; but as the above is the only specimen under this name in the herbarium, it is evidently his type. It is simply *C. atrovirens* var. *muticus* Milde. There is indeed nothing in the description to suggest anything different.

C. purpurascens Stirt. in Ann. Sc. N. H. x. 109 (1901). (Tarbert in Harris; Aug. 1890.)—Stirton sent me several of his gatherings of this moss, which I was unable to separate from *C. Schwarzii*. In his reply to my letter suggesting this he sent "a mere scrap of what Prof. Schimper considered *C. Schwarzii*," adding that "in fact we have comparatively little of this *Campylopus* in Scotland." He further states that *C. purpurascens* belongs to a quite different Section of *Campylopus*, and concludes that the difference of opinion

is due to my not having specially studied this genus, as he had done. There seems nothing further to be said, except to call attention to the fact that Stirton's view as to the rarity of *C. Schwarzii* in Scotland is not shared by other bryologists (*cf.* the list of localities for this species in Braithwaite, Brit. Moss Flora); and that Mr. W. E. Nicholson entirely agreed with me in referring *C. purpurascens* and *C. symplectus* to *C. Schwarzii*. The auricles are no doubt less developed than in the typical form of that species, but if this were to be held a character sufficient on which to base a species, others, e. g., *C. flexuosus*, would have to be split up into several species.

C. rubiginosus Stirt. in Ann. Sc. N. H. xv. 109 (1906). (Craig Mohr, Arisaig; Aug. 1904.)—This is a very distinct and well-marked form of *C. flexuosus* var. *paradoxus*. I find nothing to suggest any difference; the reddish colour at base emphasized by Stirton seems to me a very frequent feature of *C. flexuosus*—almost indeed a specific character! This specimen shows very well the remarkable polymorphism of leaf form and apex that is usually associated with the var. *paradoxus*, the same stem showing some leaves with a narrow, almost subulate apex, and others broad, obtuse, cucullate, almost cymbiform.

C. subcinereus Stirt. in Ann. Sc. N. H. viii. 105 (1899). (Tarbert in Harris; Aug. 1886.)—Compared by Stirton with *C. pyriformis*. It is one of the not infrequent and puzzling forms to which I have referred in the "Handbook," intermediate between *C. pyriformis* and *C. flexuosus*. It is a tall plant, over an inch in height, with brown colour and robust stems, but with the filiform leaf-subula of *C. pyriformis*; in structure quite as in *C. flexuosus*, but without, or with little trace of auricles, and only occasionally that. It is better characterised than most of the plants already dealt with, but I cannot see any clear character by which to separate it from either *C. pyriformis* or *C. flexuosus* satisfactorily.

(To be continued.)

NOTES ON THEACEÆ.

By T. A. Sprague, B.Sc., F.L.S.

Under Art. 46 of the International Rules, *Theaceæ* is the correct name for the family commonly known in this country as *Ternstrœmiaceæ* (see Journ. Bot. 1922, 73). Faweett and Rendle's Notes on Jamaica *Ternstrœmiaceæ* (Journ. Bot. 1922, 362) suggest the following remarks:—

1. Cleyera.

The genus *Cleyera* Thunb. (Nov. Gen. Pl. 68; 1783) was based on *C. japonica* Thunb., an evergreen shrub which grew near Nagasaki, Japan. Thunberg cited "Mokokf" or "Mukokf" of Kæmpfer (Amœn. 774, 873; 1712) as a synonym of *C. japonica*. By 1793 he had come to the conclusion that *Cleyera* was congeneric with *Ternstrœmia*, and proposed the name *T. japonica* for the type-species

(Trans. Linn. Soc. ii. 335; 1794). "Mokokf" is admittedly a *Ternstrœmia*, and was figured in 1835 by Siebold and Zuccarini (Fl. Jap. 148, t. 80) under the name *T. japonica*. Thunberg's reduction of *Cleyera* to *Ternstrœmia*, and his previous citation of an undoubted species of *Ternstrœmia* as a synonym of *C. japonica* have led to the conclusion that *Cleyera* Thunb. was a synonym of *Ternstrœmia*. That this is erroneous is evident from his generic description, which included the characters "antheræ hirtæ" and "stylus filiformis." Siebold and Zuccarini (*l. c.* 149) pointed out that Thunberg had confused two species under *Cleyera*, and they applied the name *Ternstrœmia japonica* to "Mokokf" and *Cleyera japonica* to the other species. They recognized (*l. c.* 154) that Thunberg's generic description had been drawn up from the latter, a fact which seems to have been overlooked by recent writers. Their statement that the specific description referred solely to "Mokokf" is incorrect, since the phrase "flores axillares, unus, duo vel tres, pedunculati" agrees with *C. japonica* (Sieb. et Zucc. t. 81), and is inconsistent with *T. japonica* (t. 80), which has the "intercalary" inflorescence (Parkin in Journ. Linn. Soc., Bot. xlii. 512; 1914) characteristic of *Ternstrœmia*.

Cleyera Thunb. is, in fact, identical with the genus described by Bentham (Benth. et Hook. f. Gen. Pl. i. 183; 1862) under the name *Cleyera* DC., and *C. japonica* Thunb. is the same as *C. japonica* Sieb. et Zucc. (Fl. Jap. i. 153, t. 81). No confusion need have arisen had not later authors assumed that Thunberg was correct in citing "Mokokf" under *C. japonica*, and attempted to interpret Thunberg's genus and species not by his description but by Kæmpfer's figure.

The name *Ternstrœmia japonica* Thunb. being a mere synonym of *Cleyera japonica* cannot legitimately be applied to any other species. Hence the *Ternstrœmia* commonly known as *T. japonica* should now be called T. GYMNANTHERA (*Cleyera gymnanthera* Wight et Arn. Prodr. 87; 1834).

2. EROTEUM AND FREZIERA.

Starting from the assumption that *Cleyera* Thunb. was a synonym of *Ternstrœmia*, Fawcett and Rendle (*l. c.*) have suggested that the name *Eroteum* should be used for the genus typified by *E. theæoides* Sw. But, as shown above, *Cleyera* Thunb. is *Cleyera* DC. Therefore, "presuming that the Old World species, *Cleyera ochnacea* DC. and others, are congeneric with the New World *Freziera theæoides* Sw. and allies," the earliest name for the genus is not *Eroteum* Sw. (1788), but *Cleyera* Thunb. (1783). Fawcett and Rendle also recommended that the name *Freziera* Sw. (1800) should be retained for the genus typified by *Eroteum undulatum* Sw. But *Freziera* is antedated by *Lettsomia* Ruiz et Pav. (1794). A further objection to the nomenclature proposed by them is that *Freziera* Sw. was absolutely synonymous with *Eroteum* Sw. Swartz proposed a single genus to which he unfortunately gave two names, *Eroteum* and *Freziera*. How, then, can he be cited as the authority for two different genera bearing these names?

3. Laplacea or Lindleya.

Fawcett and Rendle seem to have overlooked the discussion on this subject in Journ. Bot. 1922, 52–54. *Lindleya* Nees admittedly antedates *Laplacea* H. B. K. But its adoption would involve the replacement of *Lindleya* H. B. K. (Rosaceæ) by *Lindleyella* Rydb. Why change such well-known generic names as *Laplacea* and *Lindleya* H. B. K. when they may be retained by treating *Laplacea* as a "nomen conservatum"? Surely these names should be used until the next International Congress has decided whether *Laplacea* should be placed on the list or not. To make new combinations now under *Lindleya* Nees would amount to prejudging the question.

NOTES ON CARNARVONSHIRE PLANTS.

By H. W. Pugsley, B.A., F.L.S.

The following notes have been compiled from plants collected during four holidays spent at Llanfairfechan in the years 1902, 1905, 1921, and 1922, and two briefer sojourns at Llanberis in 1917 and 1918. They may be regarded as a continuation of the papers on Carnarvonshire plants published in this Journal by Dr. G. C. Druce in 1902, the late Rev. E. S. Marshall, with Messrs. Bickham & Shoolbred, in 1913, and Mr. C. E. Salmon in 1917. All the localities cited fall within District II of Mr. Griffith's *Flora of Anglesey and Carnarvonshire* (1895). Plants marked with an asterisk are believed to be new county records.

Thalictrum alpinum L. Cwm Bochlwyd.—*Ranunculus heterophyllus* Web. Edge of Llyn Padarn, near Llanberis.—*R. acris* L. var. *Steveni* (Andrz.). The small alpine form of this, usually one-flowered, common on the wet rocks of Ysgolion Duon.—*Caltha palustris* L. var. *minor* Syme. Carnedd Llewelyn.—*Trollius europæus* L. Ysgolion Duon.

Fumaria capreolata L. var. *Babingtonii* Pugsl. Llandudno, Deganwy, Llanfairfechan.—*F. purpurea* Pugsl. var. *brevisepala* Pugsl. Gloddaeth (A. O. Hume).—*F. Borœi* Jord. var. *longibracteata* Pugsl. Formerly frequent about Llanfairfechan, both in cultivated ground and loose stone walls of the hillside lanes above, but scarcely noticed in 1921 and 1922. A single fine plant in a potato plot at Bangor, 1922.—*F. Bastardii* Bor. Frequent in cultivated ground. Deganwy, Llanfairfechan, Aber.—var. *hibernica* Pugsl. Seen in one field at Llanfairfechan, with the type (1922).

Alyssum maritimum L. Great Orme's Head; shore at Llanfairfechan.—*Cochlearia alpina* Wats. Wet rocks of Foel Fras, Ysgolion Duon.

Viola palustris L. Noticed in Cwm Bochlwyd. No mountain localities are given for this species in Mr. Griffith's *Flora*.

Polygala serpyllacea Weihe. This appears to be the usual milkwort of the inland hilly districts. Frequent, usually with blue flowers, in Naut Francon, Cwm Bochlwyd, etc.

**Stellaria umbrosa* Opiz. Wood at Gloddaeth.—*Cerastium vulgatum* L. var. *alpinum* Gren. Wet rocks of Foel Fras and Ysgolion Duon. This Welsh plant is characterised not only by its large

flowers but by its subacute sepals and relatively narrow, acute and roughly hairy leaves. It does not appear identical with some of the large-flowered Scottish forms, *e.g.* the plant of the Little Culrannock, which, except for its large flowers, seems inseparable from the common lowland form of the species.—*Sagina maritima* Don. Conway.—*Spergularia marginata* Kittel var. *glandulosa* Druce. Plentiful by the sandspit near Llanfairfechan (with f. *glabrescens* Pugsl.), the petals varying in depth of colour.

Hypericum pulchrum L. By Lake Ogwen. Not recorded for the mountain districts in the *Flora*.

Geranium pratense L. Roadside near Capel Curig, 1922.—**Erodium Lebelii* Jord. Shore near Llanfairfechan. This plant, described as British by Messrs. Baker & Salmon in this Journal (p. 125) for 1920, seems readily recognizable by its *moschatum*-like habit and foliage, and whitish flowers. I noticed it as distinct many years ago near Woolacombe, N. Devon.

Rosa rubiginosa L. Near Lake Ogwen (possibly planted).

Epilobium alsinefolium Vill. Head of Aber Valley; above Llyn-an-Afon.

Anthriscus vulgaris Bernh. Gloddaeth Hills, Llanfairfechan.—*Peucedanum Ostruthium* Koch. Naturalised in a field at Old Llanberis.

Senecio viscosus L. In the shingle of the shore about Llanfairfechan, looking native (1902–1922). This species commonly occurs as a weed of waste ground around London, and in recent years has appeared in the lake-bed of St. James's Park. In Central Europe it is a plant of wood clearings, and I have collected it in the stony forests about Zermatt.—*Crepis paludosa* Moench. By the Swallow Falls. Ysgolion Duon.

Hieracium Leyi F. J. Hanb. In this Journal for 1913 (p. 263) the most abundant hawkweed of Cwm Idwal is identified with *H. hypochæroides* var. *saxorum* F. J. Hanb., and *H. Leyi* is not mentioned. This latter species was founded by Mr. Hanbury on specimens gathered by Ley in this district, where it was said to grow in profusion (Journ. Bot. xxxii. 226), and it is recorded in the *Flora* for numerous stations extending from the Carnedds to Snowdon, in most of which I have collected it. It is certainly the dominant hawkweed on the rocks of Cwm Idwal. In the dried state *H. Leyi* no doubt resembles some of the mid-Welsh material referred to *H. hypochæroides* var. *saxorum*, but the original specimens of this variety from Capel Cellwen are clearly different and related to typical *H. hypochæroides*. W. R. Linton describes the styles of *H. Leyi* as "nearly yellow to livid," but I have found them pure yellow in Carnarvonshire, as noted by Marshall. At the flowering stage *H. Leyi* sometimes shows but little traces of the setiform foliage-hairs which characterize the group *Oreadea*, although in young plants these are generally well seen. The petioles and under leaf-surfaces, however, are also clothed with more or less soft, white hair, and the Oreadean character is much less marked than in *H. Schmidtii* or *H. lasiophyllum*.

H. rubicundum F. J. Hanb. Rocks above Llyn-an-Afon. In

Cwm Idwal there are two forms of this plant, one with yellowish, the other with livid styles. The Oreadean hair-clothing is seldom well-marked in this species.

H. argenteum Fr. Widely distributed but nowhere abundant. Streamside above Llanfairfechan. Rocks by Aber Fall; Foel Fras.

H. cambricum F. J. Hanb. This is one of the most distinct of phyllopodous hawkweeds owing to its nearly glabrous foliage. This feature is seen even in the primordial leaves in early spring, when the plant at first sight might easily be referred to another genus.

H. buglossoides Arv.-Touv. A very distinct hawkweed near this species, but with broader phyllaries, occurs on rocks near Deganwy. It was seen in some abundance in September, 1921, but by July last it had been nearly exterminated—not, it is to be hoped, by an Exchange Club collector! Like Orchids and Orobanches, phyllopodous hawkweeds should, for the most part, be sparingly collected. There is sad evidence of extermination at Clova and Ben Lawers.

H. euprepes F. J. Hanb. Sparingly on Foel Fras (c. 2500 ft. alt.). Rocks above Llyn-an-Afon.

H. irriguum Fr. Streamside above Llanfairfechan. Boulders in Cwm Idwal—a dwarf form growing with a similar state of *H. vulgatum* Fr. This plant seems closely allied to *H. diaphanoides* Lindeb.

H. scanicum Dahlst. Great Orme's Head (a stout form). Streamside above Llanfairfechan. Near Ogwen Falls.

H. sciaphilum Uechtrz. Common about Llanfairfechan on walls and railway-banks.

H. Adlerzii Almq. The Menai Bridge station for this plant is now enclosed, but I obtained good specimens last July by climbing a high wall. These match the earlier British gatherings, and are very close to the Scandinavian material (Dahlstedt Hier. Exsicc. no. 85), albeit their cauline leaves are larger and less deeply toothed. *H. Adlerzii* seems allied to *H. pinnatifidum* Lönnr. and is relatively easy to distinguish owing to its slender rootstock, strict habit, sparse basal rosette, and remarkably large, elliptical cauline leaves. The plant distributed under this name through the Botanical Exchange Club last year, and commented upon at page 587 of the Report recently issued, is widely different and is identical with a form occurring on the Great Orme which I refer to *H. scanicum*.

H. gothicum Fr. With *H. sciaphilum* on walls at Llanfairfechan and by the streamside there (1905–1922)—a form with broad leaves and rather numerous heads smaller than those of var. *latifolium*.

H. stictophyllum Dahlst. var. *serpentinum* W. R. Lint. Rocks above Llyn-an-Afon.

Vaccinium Vitis-Idæa L. Carnedd Dafydd.—*V. Oxycoccos* L. Border of Llyn-an-Afon.

Armeria maritima Willd. In this Journal for 1902 (p. 185) Dr. Druce records var. *vulgaris* for Crib Goch, Clogwyn dur Arddu and Glydyr Fawr, and in the Exchange Club Report for 1915 (p. 203) he refers to having seen var. *planifolia* on Snowdon. This latter variety is abundant on Ysgolion Duon, occurring right to the summit of Carnedd Dafydd. I have also collected it on Clogwyn dur Arddu,

where it is possible that two varieties grow in company, for the plants there certainly differ greatly in the breadth of their leaves. I do not know whether there is any other record of var. *vulgaris* as a British mountain plant.

**Euphrasia confusa* Pugsl. Sparingly in Nant Francon (f. *albida*).—*E. scotica* Wettst. Below Lake Ogwen, 1922. Various stations around Llanberis (Miss E. Armitage, 1919).—*E. hirtella* Jord. Since my discovery of this plant at Llanberis in 1917 and its publication in this Journal two years later, it has been collected by Miss E. Armitage and Dr. Druce in several additional localities in that neighbourhood. Hilly pasture E. of Bethesda, 1922.

Mentha alopecuroides* Hull. Streamside at Llanfairfechan, 1922.—M. rubra* Sm. Ditch near Dolbadarn Castle, Llanberis.—**Stachys ambigua* Sm. Frequent near the shore at Llanfairfechan, 1902–1905; now destroyed.

Ajuga reptans L. var. *alpina* Koch Fl. Germ. p. 575 (1837). Wet, stony rill on Foel Fras, circa 2500 ft. alt., 1922. This is a compact form, not exceeding three inches in height, flowering at the end of July. Its broadly ovate, subentire, and rounded-obtuse leaves are closely set on the stem, and gradually decrease upwards, giving the plant the aspect of *A. pyramidalis*, except for the larger and deeper blue flowers, which clearly exceed the dark purple bracts. When collected, the plants showed short stolons of the previous year, and young stolons were just beginning to grow. A Swiss example in Herb. Mus. Brit., labelled "*A. alpina* L., Gaud. Fl. Helvet. iv. 13, Jura Neocom. 1835," closely resembles this Welsh plant, which is probably the form noticed near Carnedd Llewelyn by Johnson before 1641, and referred to by Dr. Druce in the Bot. Exchange Club Report for 1918 (p. 302). While this plant is obviously a form of *A. reptans*, and is really related neither to *A. pyramidalis* nor to *A. genevensis*, it has a distinct *facies* owing to its compact habit, subentire leaves, and deeply coloured flowers; and the late period at which it blooms and produces its short stolons is peculiar. Koch's variety *alpina* is simply diagnosed as "stolonibus brevibus vel nullis! *A. alpina* Vill. delph. 2, 347," and Villars' plant, though shown as a species, is stated to be really a variety of *A. reptans*, 6–8 inches high, with slightly toothed distant leaves and short stolons. Koch's varietal name is thus applied to a mountain form, scarcely distinguishable but by its short stolons, which is probably widely spread. I collected such an *Ajuga* on Mte. Mottarone, by Lake Maggiore, in 1908. The Welsh plant seems distinct not only in its short stolons, but by its dwarf leafy habit; but these features, being of doubtful stability, hardly justify the creation of a fresh name, and it seems best simply to regard it as a form of Koch's mountain variety.

Chenopodium murale L. Deganwy.—*Atriplex littoralis* L. Shore between Llanfairfechan and Aber.

Salix herbacea L. Summits of Drum and Foel Fras. Both Carnedds.

Orchis prætermissa Druce. Wet meadow near Llanberis, with *O. ericetorum* Lint.—*O. maculata* L. (*O. Fuchsii* Druce). Hillside

above Llanfairfechan, with *Habenaria conopsea* Benth.—*Habenaria chloroleuca* Ridl. Near Dolbadarn Castle, Llanberis.

Juncus triglumis L. Foel Fras.

Carex dioica L. Slope above Llyn-an-Afon.—*C. pulicaris* L. f. *montana* Pugsl. Frequent on rocks of Foel Fras, Cwm Idwal, Cwm Glas, Clogwyn dur Arddu, and elsewhere; and also in wet rills and on boggy mountain-slopes, where it often grows taller and approaches the specific type. I think that in all these mountain plants the perigynia are of a darker, more olive-brown colour than in the lowland form.—*C. rigida* Good. Both Carnedds.

Deschampsia cæspitosa Beauv. var. *brevifolia* Parn. Wet rocks of Foel Fras.—*Poa annua* L. var. *supina* Gaud. Summit of Snowdon.—*P. glauca* Sm. Cwm Idwal.

Lycopodium Selago L. On Llwyd Mawr (c. 2500 ft. alt.), a large straggling form with stems a foot long and spreading leaves, simulating *L. annotinum*. This is apparently identical with Mr. Salmon's plant from Ogo Owen, which he refers to var. *patens* Desv. (Journ. Bot. p. 319 (1917)).—*L. alpinum* L. Carreg Fawr, above Llanfairfechan (alt. 1100 ft.).—*Selaginella selaginoides* Link. Foel Fras; Ysgolion Duon.

ISAAC BAYLEY BALFOUR.

(1853–1922.)

An Appreciation by F. O. Bower, Sc.D., F.R.S.

[The following appreciation, by permission of the writer and of the proprietors of the paper, is reprinted from *The Glasgow Herald* of Dec. 5th. Prof. Bower was so long and so intimately acquainted with the late Sir I. B. Balfour that this sketch from his pen has a special value and interest. A more detailed account of Balfour's botanical work will be found in the *Times* of Dec. 1.—Ed. Journ. Bot.]

By the death of Sir Isaac Bayley Balfour the country and the world have lost a scientific personality of a type that is becoming rarer every day. Such men can ill be spared. An age of ultra-specialism does not favour the cultivation of breadth of view or length of vision. The rush for early achievement consequent on the forcing methods of selection for official posts has tended to breed a myopic intellect, which sees minutiæ at near hand with surprising acuteness, but it fosters ever less and ever less the capacity for grasping the major problems of the world. Balfour was one of those who by birth, experience, and mentality are able to take and hold during life the larger view. All through that wealth of fact of which he was master ran the golden thread of relation. His data were all fitted into a large frame. That was what gave a magic to his conversation and a weight to his scientific advice that was unrivalled. For a quarter of a century he has been the most efficient all-round botanist of the British Empire: the friend and counsellor of all that is best in British botany.

Favoured by birth as the son of a noted botanist, and by the scientific surroundings of Edinburgh during a great period of its history, he made a brilliant start in life. After graduating in Edinburgh he studied in two German universities, and in the intervals he acted as assistant to Huxley and to Lister: while still a mere youth he deputised during illness for his aged father in the Edinburgh Chair. Before he was 30 years of age he had made two expeditions to Oceanic Islands (Rodrigues and Socotra), and described hundreds of species new to science. He had also produced an admirable monograph of the genus *Halophila*, which showed that if he cared to pursue it, morphological analysis was a natural field for him. Many a young man would have entered some such restricted channel and have pursued it; but Balfour took a wider view. His life has been a remarkable record of reconstruction. He spent it in reorganising with the truest insight the factories of science, in the faith that others would use them after him in feeding the broad stream.

His appointment in 1879 to the Regius Chair in Glasgow, in succession to Dickson, gave him his first opportunity. In the brief years he was there he secured the rebuilding of the main range of plant-houses at the Botanic Gardens, the rescue of the Kibble house from military bands and performing dogs, and its establishment as a winter garden. He had almost achieved the purchase of the house that is now Queen Margaret College as a botanical institute when an adverse wave of popular opinion swept his scheme away. His work in the University was no less vigorous. Youth, enthusiasm, and mastery of his subject at once brought a healthy tone into his classroom. He saved the valuable but neglected herbarium from destruction by beetles. He bartered the old lecture hall for two rooms suitable as a student's laboratory for the practical classes which he initiated; and thus he provided himself and his successor with a grievance that could only be set right by new buildings, such as now exist. When I succeeded him in 1885 I found the machinery in working order, and it only needed to be kept running.

Translated in 1885 to Oxford, he set himself to reconstitute the ancient garden and the Botanical Institute, which had fallen into disorder and decay. But the feature which specially marked his short tenure at Oxford was the establishment of relations with the Clarendon Press. Gathering round him a group of botanists, he induced the Press to found the *Annals of Botany*, a quarterly journal now of world-wide repute, of which the 36th volume is in progress. The fact that, though profusely illustrated and sumptuously produced, it has paid its way is in itself a witness to his business capacity. The Press also at his instigation issued a long series of translations of foreign treatises which at that time were necessary for botanical study in English-speaking countries. Balfour himself translated several of them, and edited them all.

Still a young man of only thirty-five years, he was promoted in 1888 to his father's Chair in Edinburgh, and to the Keepership of the Royal Gardens, with the title of King's Botanist for Scotland. Following Dickson in Edinburgh as he had in 1879 in Glasgow, he again galvanised a nerveless regime into vital activity. He came

to the dormant Edinburgh Garden not as a tornado destroying all, but as a new climate, with storms that remove what is rotten but leave standing what is fit for use. The old palm house, now a temperate house, and the stove, now a house for palms and cycads, still remain. But all the rest of the glass ranges, pits, and frames are new. The herbarium stands as before, also the large lecture hall. But all else has been reorganised or rebuilt, so as to form a complete and extensive institute. The very last addition was only finished in 1921, in time for the meeting of the British Association. In the new laboratory a demonstration was given by Kidston and Lang under 100 microscopes of the newly discovered Devonian fossils—a fitting celebration for this last act in the revival which it had taken Balfour 34 years to complete.

He entirely reorganised the outside garden. The arboretum was absorbed. Trees 30 and 40 feet high were successfully moved on specially constructed waggons to fresh and suitable sites. The collections of woody plants were enriched, and the herbaceous ground replanned. But beyond all, the rock garden was created anew on a magnificent scale. This was Balfour's special care. He himself nursed shy plants in favoured crannies on rich schistose soil carried down on his own shoulders from Ben Lawers. His joy in showing them was no less than the pleasure of those who understood the real meaning of his success. It may be said that in the rock garden the true Balfour stood before you—the enthusiastic lover of plants in being: the practical physiologist in the open. His "ecology" was superior to that usually so called, for it was not analytic only, but constructive. At the back of it all was the fact that as a boy he had passed through the potting sheds like any working gardener. No doubt he had absorbed from Sadler, the old curator, much ancient wisdom; but it was refined and extended by his own scientific and horticultural sense. This, combined with his selection of a highly qualified body of leading officials, won for the Edinburgh Garden a special fame for growing shy plants. The cultivation in the Garden is probably as good as any in Europe, and it has been carried into many new and experimental lines.

The real marvel of Balfour's regime in Edinburgh is that alongside of the administration of the Garden he found time to keep abreast of his science, and to develop the academic side of his duties. How efficiently this was done is proved by the stream of scientific graduates who passed through his hands into creditable positions in the world. But above all stood his work with the medical students. I had heard him from time to time speak of his lectures to them, and of his methods; these culminated in his latest years in a course of addresses on such moving biological topics of the time as relate especially to the medical curriculum. I can imagine nothing more stimulating to the mind of a young medical aspirant of parts than to hear a man of Balfour's powers speak plainly out of his vast experience on such questions. But that last session of 1921 broke him. The strain of war, combined with a most cruel personal loss at the front, proved cumulative, and nature gave way. Retirement was inevitable in 1921, and he moved to a southern home, severing finally the ties of a lifetime.

His friends had hoped that he would have been able to use his retirement in writing a comparative and systematic treatise on the flowering plants. I say advisedly that no man living could have done it as he could from first-hand knowledge, wide and deep, and regulated by grasp of principle and mature judgement; moreover, his experience as a systematist was unrivalled. But it was not to be. He had worn himself out in the service of others. That wonderful resistant and elastic fibre had been strained beyond the limit, and was past real recovery. Already in the summer of 1921 the silver cord was loosed and the golden bowl broken.

In all the gallery of Scottish botanists, whose portraits and whose lives Balfour knew so well, there never was one like him—so catholic in his tastes, so willing to help others, and so able to do it from his ample store. Landowners, horticulturists, foresters, and farmers, as well as specialists in pure science, looked to him for advice, and acknowledged its worth. Truly if ever there was one, he was in the fullest sense of the words "The King's Botanist for Scotland."

SHORT NOTES.

Comma between Name and Authority (pp. 261, 337). Dr. Barnhart suggests that the comma between scientific name and authority was introduced by the elder Hooker, and that it has never been used outside the British Empire except by Asa Gray and those who have followed him. Both suggestions appear to be unfounded. Those who are interested in such typographical details will find that the comma was used by Robert Brown in his classic paper on the *Asclepiadeæ* (Mem. Wern. Soc. i. 12–78; 1811), good examples occurring on pp. 27, 31, 51. Did Hooker use it previously? I am aware that he adopted it in his *Exotic Flora* (1823–1827). Among numerous French papers in which the comma was used may be mentioned A. Richard's memoir on the *Rubiaceæ* (Mém. Soc. Hist. Nat. Par. v. 81–304; 1834) and Planchon and Triana's *Guttiferæ* (Ann. Sc. Nat. sér. 4, xiii.–xvi.; 1860–1862). Surely Dr. Barnhart's search for the comma must have been perfunctory.—T. A. Sprague.

——— I have to apologise to Dr. Barnhart for an erroneous statement in my note on this subject in Journ. Bot. 1922, p. 337, where I instanced Wallroth's *Annus Botanicus* as one of the non-British books in which the comma was used between name and authority. The comma is *not* so used in that book; I am quite unable to account for the blunder.—James Groves.

Types of Linnean Species. The cases of *Mesembryanthemum scabrum* and *M. tortuosum* (L. Sp. Pl. ed. 1, 483, 487) may be cited in support of Mr. Wilmott's contention (Journ. Bot. 1922, 197) that a var. β (without varietal name) may be taken as the type of a Linnean species. When Linnæus (Sp. Pl. ed. 2, 692) divided *M. scabrum* into two species he retained the name for his var. β, and gave a new name, *M. emarginatum* to his α. His treatment of

M. tortuosum was similar. For these examples I am indebted to Mr. N. E. Brown.—T. A. Sprague.

Rinorea and Riana: a Correction (see Journ. Bot. 1922, 130). *Rinorea* has priority of place over *Riana*, which is consequently a synonym under the American Code as well as under International Rules.—T. A. Sprague.

REVIEWS.

Flora of South Australia. Part I. *Cyatheaceæ–Orchidaceæ.* By J. M. Black (*Orchidaceæ* by Dr. R. S. Rogers). With Illustrations. Pp. 154. Adelaide: Rogers. Price 3*s*.

This is the first botanical instalment of a series of "Handbooks of the Flora and Fauna of South Australia, issued by the British Science Guild (South Australian Branch)." The editorial preface calls attention to the lack of inexpensive but accurate books dealing with the plants and animals of South Australia, which has been "a real handicap to young Australia and so to the progress of Australian science"; to supply this deficiency, the handbooks are being prepared gratuitously by men of science; "they will be printed and published by the State Government, and will be placed in the public schools, for the use of which they are primarily prepared." So public-spirited an enterprise deserves all encouragement, and the instalment before us leads us to anticipate success for the undertaking.

The first 34 pages are occupied with introductory matter: the absence of a table of contents is to be regretted, especially as the book, as being only part of a volume, has no index. The classification is that of Engler and Gilg; as to nomenclature, "the rules and recommendations adopted by the Vienna Congress have been strictly followed"; only well-established aliens are admitted. There is a brief but well-done summary of the history of Botany in S. Australia, followed by a glossary of botanical terms occupying ten pages, and a key to the families, of similar extent. To these succeeds the Flora proper, beginning with the Pteridophyta: under each family is a key to the genera, the species being treated in like manner under each genus, and this plan is pursued throughout the work: explanations of its origin follow each name, often, in the case of commemoratives, with biographical information—Robert "Moore," by the way (p. 113) should be "More," and "Burchard" has no claim to be considered "an English botanist"; Robert Brown (Prodr. 272) named *Burchardia* in memory of Johann Heinrich Burckhard, of Wolfenbüttel (1676–1738). The description of each species is full and clear, and the distribution in the region is indicated. Figures, mostly from drawings by the author, add to the usefulness of the book; they seem to be given on no particular scale nor definite plan; thus in the Pteridophyta almost every genus is figured, but the other orders are scantily and inadequately represented. In some cases the plates appear to have been borrowed from some other work, otherwise it is difficult to account for a figure of *Helipterum oppositifolium*

appearing with *Chloris divaricata* among the grasses (p. 84) and two Casuarinas in Cyperaceæ (p. 88). The shiny paper and small (though clear) type employed will, we think, somewhat militate against the usefulness of the volume to the school-children and "persons engaged in pastoral or agricultural pursuits" for whom it has been written.

It is doubtless on account of its provision for this special public that the book contains no bibliographical references, nor is there any indication that species are here first published, as we suspect to be the case; should this be so, the absence of Latin diagnoses, as the Rules now stand, debars the names from recognition. The author's preface contains no information on this head, nor is it possible, in the absence of a complete acquaintance with recent Australian botanical literature, to ascertain which species have previously appeared elsewhere. Synonyms are hardly ever quoted. We are glad to note that no attempt has been made to provide each plant with an "English" name, although examples occur—"*Bromus madritensis*, Madrid Brome."

Although, as has been said, there is an absence of bibliographical references, it is evident that the literature has been carefully examined; thus the substitution of *Romulea parviflora* for *R. Columnæ* made in this Journal (1914, 46) has been duly followed, though the subsequent note (p. 217) in which it was shown that the name rests on earlier authority has been overlooked; and names published in the *Illustrations of Australian Plants* (1905) collected during Cook's first voyage are taken up.

The *Orchidaceæ*, which occupy pp. 114–154, have been undertaken by Dr. R. S. Rogers, who occupies towards the order in Australia the position formerly filled by R. D. Fitzgerald. Here, again, we suspect that a large proportion of the species to whose names "Rogers" is attached are here first published, but there is no indication to that effect. The descriptions as a whole are much longer than those in the other orders; the figures, too, from drawings by Miss R. C. Fiveash, are more elaborate and show useful details.

We shall await with interest the continuation, which we hope will not be long delayed, of this useful work, on the execution of which the author, Mr. J. M. Black, is to be congratulated; its cheapness is one of its most noteworthy features. We venture to suggest that the blank pages of the wrapper might profitably have been occupied by an index to the genera included in the part.

Manual of the Trees of North America (exclusive of Mexico). By Charles Sprague Sargent, *Director of the Arnold Arboretum of Harvard University, with 783 illustrations from drawings* by Charles Edward Faxon *and* Mary W. Gill. Second Edition, pp. xxvi, 910. London: Constable. £2 5*s*.

This new edition of a book which since its publication in 1905 has been the recognized authority for all who desired to obtain in a compact form a comprehensive account of North American trees, has been rendered necessary not only by the increased knowledge of the subject, but by the fact that the original issue has for some time been out of print. How great the increase of knowledge has been

is briefly set forth in the preface; during the sixteen years "eighty-nine species of trees and many recently distinguished varieties of formerly imperfectly understood species have been added to the silva of the United States," and much additional information has been acquired in regard to geographical distribution. Representatives of four families and sixteen genera which did not appear in the first edition are here described, which contains descriptions of 717 species in 185 genera; the bulk of the volume has been increased by nearly a hundred pages, and the number of excellent figures has been augmented by 141, "partly from drawings by Charles Edward Sprague, who died before his work was finished, and continued by Miss Mary W. Gill, of Washington." The *Manual* contains the results of forty-four years of the author's continuous study, "carried on in every part of the United States and in many foreign countries," and embodies the observations of the various botanists connected with the Arnold Arboretum, notably of the curator of its herbarium, Mr. Alfred Rehder, and of others who have travelled in various regions on its behalf.

We note with interest the author's adhesion to the Vienna Code of nomenclature, "which the world, with a few American exceptions, has adopted"; and his regret that "the confusion in the names of American Trees must continue as long as the Department of Agriculture, including the Forest Service of the United States, uses another and now generally unrecognised system."

There is no need to enter upon a detailed examination of a work whose reputation, as has already been said, has been so thoroughly established, and which, in the externals of printing and paper, is worthy of the contents. The absence of reference to other works, even to the places where the species were first published, may be explained by the all-sufficing completeness of the descriptive portion, which is rendered easily accessible by the divisions of the larger genera being provided with a conspectus of the species of each group. We note in passing that *Cratægus*, which Professor Sargent has done so much to elaborate, now contains 153 species, as against the 132 of the first edition, and occupies 150 pages of text. The *Manual* is an example, only too rare, of a book which could not be better done.

Elements of Plant Biology. By A. G. Tansley, M.A., F.R.S., University Lecturer in Botany to the University of Cambridge. 8vo, pp. 410, with 63 figs. in the text. London: Allen & Unwin. 1922. Price 10*s.* 6*d.*

This book is intended for medical students and others who desire or are obliged to obtain some elementary knowledge of plants, particularly in relation to general biology. It is based on the first part of the Elementary Biology Course at Cambridge, which has been framed to serve as an introduction to Biology suitable for freshmen, many of whom know nothing of the subject—this first portion occupies one term and comprises twenty-four lectures and forty-eight hours of practical work in the laboratory. The scope of the Cambridge Elementary Biology Course, as far as concerns the botanical portion, has increased and broadened considerably since its early days of the 'eighties. Then it was mainly a morphological study of repre-

sentatives of the main groups of plant life, with a little physiology introduced where opportunity offered. Mr. Tansley's volume does not in the least recall the original course. The plan of the book is explained in some detail in the preface. It is essentially biological. After an introductory lecture on the general characters and differences in animals and plants, the student is introduced to the most important organic substances which make up the plant-body, and then to a consideration of some of the physical characters of organic substances and of protoplasm. Then follows an account of amœbæ and of the chief functions of organisms in general, and this again is succeeded by a general account of the cell. The green plant-cell and its physiology is next explained, and then the plant without chlorophyll is illustrated by yeast and bacteria, followed by types of saprophytic and parasitic fungi. The origin of sex is traced in the simple green algæ; and *Fucus* illustrates a primitive tissue differentiation. Liverworts, Mosses, and Ferns are treated very briefly, and the rest of the volume is given to the study of the form, life-history, and physiology of the seed-plant.

At the close of each chapter (except the last) are given suggestions for practical work occupying from 2 to $2\frac{1}{2}$ hours; these follow pretty closely the schedules of the Cambridge Course. The illustrations, which are clear and often diagrammatic, are copied, with or without modification, from published figures.

Mr. Tansley has produced an eminently useful, well-written, and readable introduction to the study of plant life; the matter is well arranged and the text clearly printed.

A. B. R.

BOOK-NOTES, NEWS, ETC.

We take from the *Times* the following summary of the life of the late Henry John Elwes, who died at his family residence at Colesborne, Gloucestershire. He "was born on May 16, 1846, and was educated at Eton and abroad. After serving for five years in the Scots Guards, he retired with the rank of captain. In his travels he visited, often several times, Turkey, Asia Minor, Tibet, India, Nepal, Sikkim, North America, Mexico, Chile, Russia, Siberia, Formosa, China, and Japan. He was the scientific member of the Indian Embassy to Tibet in 1886, and represented Great Britain at botanical and horticultural congresses at Petrograd and Amsterdam. Of the Royal Horticultural Society he was a past vice-president and Victoria medallist, and past president of the Royal English Arboricultural Society and of the Royal Entomological Society of London." A fuller and appreciative account of Elwes's work, with a graphic sketch of his striking personality, is contributed to the *Gardeners' Chronicle* of Dec. 6 by his friend Mr. F. R. S. Balfour, accompanied by an excellent portrait. Although his name is chiefly connected with trees and tree-growth, Elwes's interest in botany was by no means limited to that branch of the science; in 1880 he published, in a handsome folio volume with plates by Fitch, *A Monograph of Lilium*; numerous plants discovered by him during his travels have been figured in the *Botanical Magazine*, and it is due to his interest,

and largely to his generosity, that the regrettable suspension of that publication, due to the exigencies of the times, was removed, and that its publication has been resumed. Elwes's most important work was of course that undertaken in conjunction with Dr. Augustine Henry, *The Trees of Great Britain and Ireland*, published by subscription in 1906–13. He became a Fellow of the Linnean Society in 1874, and in 1897 was elected a Fellow of the Royal Society.

The *Journal of Ecology* for November contains "Notes on the Forest Communities of the Garhwal Himalaya," by A. E. Osmaston, with 9 plates; "Early Stages of Redevelopment of Woody Vegetation in Chalk Grassland (Studies of the Vegetation of the English Chalk)," by A. G. Tansley (1 plate); "Studies of the Somerset Turf Moors," by M. M. Barker and C. M. Gibson"; "A New Method for the Analysis of Plant Communities," by O. Arrhenius; "The Distribution of *Primula elatior* in Britain," by Miller Christy; "The Suffruteseent Habit as an Adaptation to Environment," by J. Burtt-Davy; "The Terrestrial Algæ," by F. E. Fritsch; and a list of Lichens noted on Chesil Beach, Dorset by Dr. Watson during the excursion of the Ecological Society in August. Mr. Christy's paper is accompanied by an excellent map showing the distribution of *P. elatior* in Britain, and eontains a note on the Suffolk popular name "Five-fingers," which may be worth reproducing:—"It seems at first particularly inappropriate, for the flowers bear no sort of resemblance to fingers of the human hand when these are held fully extended and spread, as one usually thinks of them. If, however, the forearm be held upright and the hand bent over sharply at the wrist, with the fingers relaxed and slightly spread, the resemblance of the umbel of the Oxlip, with its characteristie droop, to the human hand beeomes strikingly obvious."

The *Annals of Botany* for October eontains the following:—"The Gametophyte and Embryo of *Botrychium simplex*," by D. H. Campbell (1 pl.); "Growth and Abscission in Sea Island Cotton," by T. G. Mason; "A 'Volumometer' Method of measuring the Growth of Roots," by J. H. Priestley and W. H. Pearsall; "On the Organization of Growth and Differentiation in the Stem of the Sunflower," by D. Thoday (1 pl.); "On the Course of Absorption and the Position of Equilibrium in the Intake of Dyes by Discs of Plant Tissue," by G. M. Redfern; "The Significance of the 'Foliar Ray' in the Evolution of Herbaceous Angiosperms" (2 pls.), by E. W. Sinnott and L. W. Bailey; "Spermatogenesis in *Asterella hemisphærica*," by W. L. Woodburn (1 pl.); "Some Types of Endolithic Limestone Liehens" (1 pl.), by E. J. Fry; "On the Influenee of Immersion in certain Eleetrolytes upon Cells of *Saxifraga umbrosa*," by M. Williams. One wonders whether, with a view to convenience of reference, it would not be possible to shorten the titles of some of the papers that appear in the *Annals*.

The *Daily Graphic* (Dec. 13) has been letting itself go on the Cypripediums at the R. H. S. show on Dec. 12: "One cypripedium had a curious dorsal sepal with dark red spots, which gave it the effeet of a bird's egg. The flower's parents, Beryl and Eurybiades,

were not unlike their offspring, only Beryl's petals were green with fewer markings, and the father's petals were a brownish tint. The patience required by orchid growers can be imagined when you realise that the ancestors of some of the flowers lived thousands of miles apart. 'Most of my orchids had their origin in the forests of South America, and some in the vast denseness of African forests,' said Mr. Black: 'it sometimes takes twenty years to produce a generic orchid.'"

The first volume of Mr. Ridley's *Flora of the Malay Peninsula* containing the Polypetalæ has been issued by Messrs. L. Reeve & Co.: it forms a handsome book of 950 pages, and includes 75 useful figures by Mr. J. Hutchinson. An introduction describes the area and physical features of the Peninsula and defines the botanical areas, enumerating with brief biographical details the botanists and collectors who have contributed to our knowledge of the Flora and the principal publications relating to it; there is also a synopsis of the orders and an excellent index. A new genus of doubtful affinity, based on "very incomplete specimens" and placed at the end of *Olacineæ*, is named *Cautleya*, after its discoverer.

The *Proceedings of the Linnean Society* from Nov. 1921 to June 1922 contains, besides the usual accounts of meetings, abstracts of some of the papers read, among which Botany is represented by a "Note on the Occurrence of *Brachiomonas* sp.," by Mr. W. Neilson Jones, and "The Life-History of *Staurastrum Dickiei* var. *parallelum*," by Mr. Charles Turner, the latter illustrated by a plate. The number also includes "Notes on a Catalogue of the Linnean Herbarium," by Dr. Daydon Jackson, which contains information additional to that already published in his *Index* to the Herbarium and elsewhere.

The Department of Agriculture of South Africa has issued an interesting report on the value of Prickly Pear (*Opuntia*) as a fodder for sheep. The results of a series of experiments by Messrs. A. Stead and E. S. N. Warren show that sheep take the "leaves" readily, and that those getting plenty require no water to drink, hence the plant is invaluable in times of drought, both as a source of water and of food; sheep can live for at least 250 days on prickly pear only, and it "is a valuable succulent roughage for fattening and production purposes in general, provided it is fed with protein-supplying foodstuffs as, for example, lucern-hay."

The late Reginald Farrer's last book *The Rainbow Bridge* (Arnold, 1921) abounds in references to and descriptions of plants, including, we believe, names of species hitherto undescribed: yet the volume is absolutely destitute of anything in the shape of an index! It is little short of scandalous that a book of this kind should be issued without some key whereby its contents can be made available, and we should welcome any enactment by which such issue should be made penal.

The *Naturalist* for December contains a list of the fungi observed in Bishopsdale, N. Yorkshire, on the occasion of the visit of the Yorkshire Naturalists' Union to that region in August last. The number also contains "West Yorkshire Botanical Notes" (largely on mosses) by Mr. A. Wilson.

THE

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BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.C.S.G., F.L.S.

LATE SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM.

The Journal of Botany was established in 1863 by Seemann. In 1872 the editorship was assumed by Dr. Henry Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

Without professing to occupy the vast field of General Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains.

Until the beginning of the late War the Journal paid its way and even allowed a slight margin of profit; but during that period the subscribers were reduced in number, and the continental circulation almost ceased. It has now regained its position, but the increased cost of production, which has not as yet been substantially reduced, has resulted in an annual deficit which at one time became so serious that the continuance of the Journal was threatened. By the generosity of those who felt that its cessation would be a misfortune, especially for British botanists whose principal organ it has always been, the deficit has been met and an appeal is now made for an increased number of subscribers.

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THE COMMON TEASEL AS A CARNIVOROUS PLANT.

By Miller Christy, F.L.S.

I have always felt a special interest in the Common Teasel (*Dipsacus sylvestris*), as an exceptionally handsome and (in its cultivated form) an extremely useful plant. Moreover, I have long been convinced, as a result of observation, that the Teasel ought to be regarded as a carnivorous plant, and have felt surprise that it has never been generally recognized as such. Yet, for some reason which is not obvious to me, it never has been so recognized, as is shown by the fact that it is not mentioned as carnivorous by Sachs, Pfeffer, Goodale, Jost, Clements, Reynolds Green, Haberlandt, nor (so far as I have been able to discover) by any other writer on plant-physiology; nor does Darwin mention it as such in his 'Insectivorous Plants' (1875). An accidental occurrence has led me recently to examine the point with some care, and the following remarks are the outcome.

Every botanist is aware that the Teasel has, on its main stem, certain cup-like receptacles, formed by the bases of its large, obovate-lanceolate, connate-perfoliate leaves; also that, during the time when the plant is in perfection and flowering (that is, from the beginning of July onwards for about six or seven weeks), these receptacles are usually more or less full of water containing dead and putrefying insects and other small creatures.

It must be remembered that the Teasel (a biennial plant) produces, in its first year, nothing but radical leaves, which, though large, scarcely rise above the surface of the ground and form no cups, and that it does not produce its familiar tall stem with water-cups until its second year. The first-year procumbent leaves differ in various ways from the second-year cup-forming leaves described above. First, they are remarkably wrinkled, the corrugations in their upper surface serving, perhaps, to retain rain-water for the plant's sustenance; for these leaves possess pores or stomates on both surfaces. Secondly, they are provided both above and below with numerous spines sufficiently hard and sharp to protect them from being eaten during winter by browsing animals; for these leaves persist until the spring, when they die off completely. On their upper surfaces are a number of short, stout, straight, white spines, arranged chiefly in two well-defined rows, one on each side of and about a quarter of an inch from the midrib. Each of these spines is set on the top of a curious, raised, pustule-like inflation of the leaf, which readily gives when pressed; an arrangement which probably serves to prevent the spine being broken when the leaf is trodden upon, as it is very liable to be. There are also, nearer the margins of the leaves, other less well-defined rows of smaller spines, not set on pustules. Below, a number of sharp semi-hooked spines are set close together along the entire length of the midrib, and smaller spines along each of the branch side-ribs.

The plant's habit of catching and retaining water in its cups was definitely recorded by a British botanist nearly four centuries ago,

when Turner wrote (*Herbal* [o. iiij.], 1551) that the leaves "have an hollow thyng at the cummyng out of the two leues, whyche cum one furthe agaynste an other: wher in is gathered water, both of the rayne and also of the dew." Gerard, more precise, wrote (*Herbal*, p. 1005, 1597):—"The leaves growe foorth of the iointes by couples, not onely opposite or set one against an other, but also compassing the stalke about, and fastened togither, and so fastened that they hold deaw and raine water in manner of a little bason."

These "basons" or "cups" are entire and hold water perfectly, unless punctured or broken. There are generally three or four of them, one above the other, on the stem of each plant of average height, which is often six or seven feet, though most of our botany books give the height as five or six feet. There are also usually smaller and less perfect cups on some of the lateral branches. This collection of water in the cups is a regular and every-day occurrence, not a casual or occasional phenomenon. There is *always* a certain amount of water in the cups, unless in times of very exceptional drought. Indeed, the very name of the genus, *Dipsacus* (from the Greek διψίος, thirsty), is derived from this characteristic habit, though some members of the genus do not possess it. There are, of course, other plants with connate leaves which similarly form cups round their stems and catch water in them, as, for instance, *Silphium perfoliatum*, a North American plant belonging to the Compositæ. There are also plants the leaves of which, though not connate, form receptacles that, though not perfect cups, hold water effectively, as, for instance, *Billbergia*, mentioned hereafter.

On 3rd July 1883, when in an open part of a wood at Chignal St. James, near Chelmsford, which had been cut down, I believe, two years earlier, I noticed a large number of Teasels with their cups full of water—the result of heavy rain which had fallen about five o'clock that morning, there having been none for several days previously; and, as the cups seemed to be unusually full, the idea occurred to me that it would be of interest to ascertain what total quantity of water an average plant is capable of holding in its cups at one time. Thereupon, by the best means available (which were, I admit, somewhat rough and ready), I measured the water in the cups of eight average-sized plants, with the following results:—

No. of Plant.	Height of Plant.	Quantity of Water.
1	6 ft. 6 ins.	¾ pint.
2	6 ft. 0 ,,	⅓ pint.
3	6 ft. 0 ,,	½ pint.
4	6 ft. 0 ,,	½ pint.
5	5 ft. 9 ,,	¾ pint.
6	5 ft. 4 ,,	⅓ pint.
7	5 ft. 0 ,,	½ pint.
8	5 ft. 0 ,,	½ pint.
Averages ...	5 ft. 8½ ins.	About ½ pint.

It will be seen that the water-cups on the eight plants held altogether a little less than four pints and a half of water, or an average

of rather over half-a-pint each plant. Unfortunately I neglected to note the number of water-cups borne by each individual plant; had I done so, it would probably have explained why the quantity of water per plant bore, as will be seen, no regular relation to the height of the plant.

Erasmus Darwin's statement, made nearly a century and a half ago (Bot. Gard. ii. 30 n.; 1789), that "There is a cup around every joint of the stem of this plant, which contains from a spoonful to half-a-pint of water," is incredible, if he means (as apparently he does) that any *single cup* is capable of holding the last-named quantity. Much more nearly correct is the estimate of Sir Francis Darwin, who says (Q. Journ. Microscop. Soc. xvii. 269; 1877) that the cups hold "from 12 to 100 cc. of fluid," the larger quantity being equal to about one-sixth of a pint; which, reckoning three cups to a plant, agrees approximately with my own observations given above. Barthelémy has stated (*Comptes-rendus* Acad. Sci. lxxxvii. 1878, p. 609) that the cups of the var. *fullonum* are larger and more numerous than those of *D. sylvestris*. On one plant of the former, 1 m. 60 cm. high, he counted 15 cups, which contained 280 grammes of water; and he estimates that a fine plant when in perfection might hold from 300 to 350 grammes.

The source of this water has been investigated by French botanists. As long ago as 1863, Charles Boyer made observations (Bull. Soc. Bot. France, x. 746; 1863) on plants growing in his garden at St. Remy, near Montbard; but his results are not very conclusive. "L'eau s'amasse la nuit," he declares; adding that the quantity accumulated during one night, by excretion from the plant itself, might be from half to one-fifth of the capacity of any cup, the amount varying according to the position of the cup. The sun and wind cause, he says, considerable evaporation of the liquor. His conclusion is "que la sécrétion joue le principal rôle dans la production de l'eau, et que la rosée n'y contribue guère que pour un huitième. Le siége de la sécrétion doit être dans les tiges, puisqu'elle persiste après l'ablation de la presque totalité du limbe des feuilles. Pendant la période de grande végétation, la tige est gorgée de sêve, qui, sous forme de goutelettes, s'échappe à l'instant de la moindre blessure."

Fifteen years later, A. Barthelémy (*op. cit.*), as a result of observations extending over several years, arrived at conclusions totally different from those of Boyer. The cups of some plants he grew under cover remained dry; from which he concludes that the water is due neither to dew nor to secretion from the plant itself, but is provided by the rain alone. He had watched plants during heavy rain and had seen the water gathering rapidly in the upper cups; then overflowing their capacity; next, trickling down the stem; and finally filling the lower cups. The latter are filled in the same way from the upper cups when the plant is shaken during a high wind.

There can be no doubt, I think, that in the main Barthelémy was right; for I have notes that on 6 June 1882 and 3 July 1883 I found the cups exceptionally full immediately after heavy rain, and I have seen the same thing many times since. Yet there seems considerable probability that Boyer was right in part, and that the liquor found in

the cups may be due to some small extent to excretion from the plant itself. This seems the more probable in that, during active growth, the stem of the plant is gorged with a colourless slightly viscous sap, which appears to be under some pressure; for directly the stem is cut, it oozes copiously from the pores, as Boyer observed.

This conclusion seems to be confirmed by the fact that on 18th June 1921, when examining a number of teasels growing in the huge chalk-pits at Grays Thurrock, Essex, I noticed that nearly all the cups of those which grew among grass and bushes on a steep chalk slope contained a little liquor, while all the cups on other plants growing in the open, on the bare and drier floor of the pit exposed to the sun, were empty or practically so. As this was during a period of very exceptional drought (only 3·94 in. of rain having fallen there since the 18th January, a period of 22 weeks*), it seemed remarkable that any of the cups should have held any water at all. It seemed clear, therefore, that the small amount of water met with must (unless derived from dew) have been excreted by the plants themselves; in which case it must first have been absorbed by their roots from the chalk in which they grew. Now chalk retains at all times a certain amount of moisture; and that the plants growing among grass and bushes should have held more water than those growing in the open was due, no doubt, to the fact that chalk covered with herbage would retain more moisture than chalk exposed to the full rays of the sun, which had been very hot for some weeks previous to the date named. Five weeks later, on 25 July (there having been no more than 0·08 in. of rain in the interval, making 4·4 ins. only in 27 weeks*), all cups were absolutely dry.

The water which gathers in the cups of the Teasel may very likely serve to succour the plant in time of drought, by being absorbed (perhaps in part re-absorbed) into the tissues of the plant, as has been held by many who have written on the subject. Thus, in 1789, Erasmus Darwin (*l. c.*) wrote that it "serves . . . . for the nutriment of the plant in dry seasons." Pfeffer, more cautious, says (Physiol. Plants, transl. A. W. Ewart, i. 160; 1900) that "a little of the water collected . . . . may be absorbed, although these plants do not normally require any supply of water from this source." Kerner (Nat. Hist. Pl. i. 240) also expresses doubt whether the water collected is absorbed to any great extent. Barthelémy reached, however, a totally different conclusion (*op. cit.* 609); plants the cups of which he kept empty of water attained (he says) no more than a third or a quarter of their normal height and their lateral shoots failed to develop. He declares explicitly that "l'eau joue un rôle considérable dans la phase du végétation de cette plante"; and his conclusion seems justified, so far as it goes, though there may be another interpretation of the evidence on which he relies. On the other hand, Boyer denies altogether that the water nourishes the plant (*op. cit.* 647): "Le séjour de l'eau dans les feuilles est sans influence sur la végétation des *Dipsacus*. Un *Dipsacus* dont je

* For these figures, I am indebted to the kindness of Mr. A. C. James, M.Inst.C.E., of Grays.

trouais successivement toutes les feuilles n'en a pas paru souffrir dans sa végétation."

On the whole, it seems probable that the Teasel does derive some direct benefit from the water it catches in its cups. At the same time, it may be recognized that the plant is one not likely to be often in serious need of such succour; for it grows as a rule in fairly damp situations, not particularly likely to be affected by drought. Without doubt, therefore, the plant's habit of collecting and storing water in its cups is also of use to it in some other and more specialised way or ways.

One such use of the water-cups has been suggested by many writers: namely, that of protecting the nectar or pollen of the plant against wingless robber-insects, which, were the water absent, might crawl up the stem and steal either or both. In much the same way, the nectar of *Lychnis*, *Silene*, *Hyoscyamus*, and many other "catch-fly" plants is protected by a sticky exudation on the stem or leaves, which catches and holds small crawling insects. As long ago as 1789, Erasmus Darwin asserted (*l. c*) that the water-cups of the Teasel served "to prevent insects from creeping up to devour its seed [meaning pollen]." Since his time, many other botanists have accepted the same idea:—see, for example, Kirchner (*Flora von Stuttgart*, pp. 678–679: 1888), Francis Darwin (*op. cit.*), Lubbock (*Ants, Bees, and Wasps*, 8th ed., p. 52: 1886), and Ainsworth-Davis (*The Flowering Plant*, p. 112: 1890).

That the water-cups of the Teasel are capable of serving this purpose effectively is certain. Yet, for several reasons, one may doubt whether, in fact, they really do so serve to more than a very small extent, if at all.

In the first place, the stem of the plant is so tall, so smooth, and so well provided with thorn-like downward-pointing prickles, that the number of insects capable of crawling up it and reaching the flowers, six or seven feet above the ground, must be infinitesimally small. In the second place, of the very few small creeping insects capable of achieving this feat, few or none would be able to benefit by it; for the flowers of the Teasel (which are adapted for pollination, and are visited freely by long-tongued lepidopterous and hymenopterous insects—see Muller, *Fertilization of Flowers*, 308, and Knuth, *Pollination*, ii. 557) have corolla-tubes from 10 to 13 mm. in length, about 2 mm. in width at the entrance, and taper at the bottom to so narrow a point that no insect, however small, likely to be capable of crawling up the stem and reaching the flowers could enter, and none but flying insects having a tongue almost or quite 10 mm. in length could possibly reach the nectar.

It seems clear, therefore, that the primary object of the collection of water in the cups is neither the succour of the plant in time of drought nor the protection of its nectar against predatory insects. It appears more probable, from facts to be given hereafter, that the main object of the plant in collecting water is the catching and drowning therein of the many small creatures already mentioned, and that their juices, after putrefaction, are digested (or, at any rate, absorbed) by the plant. Other members of the genus *Dipsacus*, but not all, also possess this insect-catching habit.

The most superficial observation suffices to show that the water in the cups is never pure, except when quite freshly accumulated: it is always of a dirty coffee-colour, of an oily consistency, and smells very offensively as a result of the putrefaction of the bodies of the many small creatures which have crawled or fallen into it and been drowned. How offensively the liquor smells will be realized fully only by one who, after having gathered some of it in order to examine the creatures contained in it, has been obliged to deodorize his fingers. In short, the presence of many small putrefying creatures in the liquor in the cups is practically invariable—as much a matter of course as the presence of water in the cups.

It has been stated that in early times this foul stinking liquor was collected and used as a cosmetic, as a cure for inflamed eyes, and otherwise. This is probable enough; for our ancestors had a strong belief in nasty medicines: Ray himself wrote of the Teasel (Cat. Plant. Cantabr. p. 45: 1660): "Aqua pluvia in alis foliorum hujusce plantæ stagnans commendatur ad verrucas abigendas, si manus eâ aliquoties laventur. Atque hinc fortasse Labri Veneris nomen obtinuit." It was probably the use anciently of this foul liquor as a cosmetic which gained for the plant the name "Venus's Bath." Pliny wrote of the Teasel as *Labrum Venereum* (Nat. Hist. bk. xxv. ch. 108).

Whether or not this use of the fetid liquor found in the cups of the Teasel survives in England, both Boyer and Barthelémy state that the country people of France, especially those of the centre and east, still attribute marvellous curative properties to it, regarding it as a cure for sore eyes and eruptions on the face: hence they speak of the Teasel cup as "*une fontaine de Venus.*"

It has also been suggested that, during July, a thirsty traveller might refresh himself from the water in the cups of the Teasel; but one might almost as well drink crude sewage. As Parkinson remarked (Theatr. Bot. p. 985: 1640), sensibly enough (alluding to a statement by earlier writers who had spoken of the liquor as thirst-quenching):—"The water conteined in these leaves groweth bitter by standing in them and [is], therefore, not fit to quench but to encrease thirst rather." Nevertheless, the water, when quite freshly-caught, is clear, limpid, and not altogether undrinkable. At this stage, says Barthelémy (*op. cit.* p. 609), chemical analysis shows no impurities except traces of bicarbonates and of soil blown in by the wind. Mr. A. J. Wilmott informs me that years ago, when he was a boy, being in a large wood on a hot day and very thirsty, he actually drank from the cups of some teasels (which were quite full, as a result of recent heavy rain) and was refreshed. He drank, however, only the upper and sweeter portion of the liquor. Moreover, one of the names by which, according to Barthelémy, French country people speak of the Teasel cup—namely, "cabaret des oiseaux"—implies their belief that birds are accustomed to drink therefrom.

The belief that the water was drinkable seems to have been fairly general; thus the younger Withering, in his (the seventh) edition of his father's *Arrangement of British Plants* (ii. 216: 1830), says that in desert countries the traveller "would often exchange the

whole of his property for the luxury of a draught from one of these water-lodging plants," adding that "this curious structure would appear to be rather destructive than preservative of animal life, for in the basins formed by these connate leaves many insects are drowned; so that *Dipsacus* may rank among the vegetable *Muscicapæ*."

As to the particular small animals usually found putrefying in the cups: examination shows that they are not only very numerous individually, but that they belong to a great variety of widely-differing species and even classes *, but usually in such an advanced stage of decomposition that they are difficult to identify. My own observations show that the majority are Insects, chiefly flies (Diptera) of many kinds—blue-bottle, green-bottle, large horse, and numerous others. Beetles, too, of many species (Coleoptera), are frequent. Less common, but still often met with, are lady-birds, plant-lice, spiders, earwigs, caterpillars, moths, and butterflies—even such large species as the Cabbage White (*Pieris brassicæ*). Mollusca, too, are not infrequent. I have identified the slug *Limax agrestis* several times. Further, at Grays Thurrock, on the occasion referred to above (that is, during the great drought), I found dead in the cups a considerable number of *Helix hispida* (or its var. *concinna*) and at least a dozen *H. cantiana*. The latter is a surprisingly large and heavy creature to be captured by any carnivorous plant; for the adult animal weighs about 75 cg. On a later occasion, also during the great drought, I found several adult living individuals of *H. aspersa* sheltering in the empty cups, which they had entered, no doubt, for the sake of the slight moisture (scarcely more than dampness) remaining in their bottoms: but these had not been "captured" by the plant.

Sir Francis Darwin records (*l. c.*) that he found the following in the cups of some wild Teasels:—"In one cup, six large malacoderm beetles, from half to three-quarters of an inch in length, one fair-sized caterpillar, and two flies; in another [cup], seven of the same beetles, one earwig, a blue-bottle fly, besides many smaller flies and much debris. A much larger number of insects were counted in some other teasel-cups, but the notes were lost."

Sir Francis also met with some "large slugs" (? *Limax arborum*, *L. flavum*, or *Arion ater*) in the liquor. The occurrence of these is surprising; for they are much larger and heavier animals than even *Helix cantiana*, and one would have thought that they, above all other crawling creatures, would have been stopped in their ascent of the stem by the many sharp, downward-pointing, thorn-like prickles. As these prickles would hardly serve to stop smaller creatures, such as ants (which could easily pass between them), and are not stiff enough to keep off large browsing animals, they appear functionless. Yet they are so numerous and form so striking a feature of the plant that one can scarcely regard them as vestigial merely.

* So many of the creatures found in the cups are not true insects that I prefer to speak of the Teasel as a "carnivorous," rather than an "insectivorous," plant.

In addition to the many small animals mentioned, various extraneous objects also frequently find their way into the cups. Thus Kerner (*op. cit.* i. p. 156) writes that in them "there is invariably a collection of dust-particles, small dead animals, pollen-grains, etc., which have been blown in by the wind; whilst rain, trickling down the stems, brings very various objects with it from higher up and washes them into these reservoirs in the leaves. Sometimes, too, a few animals are drowned in the receptacles."

Mr. Robert Paulson informs me that he has observed in the cups fungus-spores, unicellular algæ, pollen-grains, and seeds of a grass (*Holcus lanatus*), some of these latter actually germinating therein in the autumn. In late summer and autumn, I have often found in the cups a considerable number of the plant's own corolla-tubes, which fall as the flowering-season advances.

There is, however, one Order of Insects of which one might, at first sight, expect to find examples in the cups of the Teasel, but which are practically never found therein — namely, the bees (Hymenoptera). This is, in one way, surprising; for, as stated already, the pollination of the flowers is effected largely by these insects, which are to be seen constantly visiting its flowers and might easily fall in. Yet their absence from the cups is not really surprising; for these bees are clean feeders and are, therefore, not at all likely to be attracted by the fetid liquor, as the foul-feeding flies (Diptera) seem to be. In any case, I have only once found a bee dead in the liquor—an individual of *Bombus derhamellus* ♂ (identified by Mr. C. Nicholson), which I found in one of the cups of a plant growing in the Grays chalk-pits on 17th August 1922. I assume that it had fallen in accidentally whilst visiting the flowers of the plant. Sir Francis Darwin does not mention having met with any bees in the cups.

The water-cups offer, one would have thought, ideal breeding-places for mosquitoes; but these creatures never use them as such in this country, so far as my observations go. The late Mr. Arthur Bacot, who had given much attention to the breeding of mosquitoes, informed me, shortly before his recent death, that he knew of no instance of their so doing. Yet in America a species of mosquito and certain other insects elsewhere are known to breed in very similar situations. Thus, there are various species which lay their eggs habitually and exclusively in the pitchers of certain species of both *Nepenthes* and *Sarracenia*, the grubs, when hatched, living in and upon the putrescent liquor existing therein, subsequently eating their way through the walls of the pitchers and pupating in the earth. The first to call attention to this curious fact was Dr. Charles V. Riley, who recorded the habit in connection with a Flesh-fly (*Sarcophaga sarraceniæ* Riley), which thus uses the pitchers of *Sarracenia flava* and *S. variolans* (see Trans. Acad. Sci. St. Louis, iii. pp. 235–240: 1875). At least two other species of Flesh-fly (*S. rileyi* Aldrich and *S. jonesi* Aldrich) are known to do the same (see Aldrich in *Publications of the Thomas Say Foundation*, i. pp. 86, 241, and 242: La Fayette, Ind. 1916). An American species of mosquito (*Wyeomia smithii*) makes a similar and exclusive use of the pitchers

of a *Sarracenia* (? sp.) growing in New Jersey (see Howard, Dyar, and Knab, Mosquitos N. and Centr. America, iii. (1), pp. 97–101 : 1915). Again, J. C. H. de Meijere has described seven species of Diptera which, in Java, make exactly the same use of the pitchers of *Nepenthes* (see Ann. Jard. Bot. Buitzenzorg, 2nd ser. Supp. iii. pp. 917–940 : Leyden, 1910). Hepburn and Jones have shown that the larvæ of *Sarcophaga sarraceniæ* (and probably those of the other two species named above) are able to live in the digestive fluid in the pitchers of *Sarracenia* because their bodies contain certain "anti-proteases," or digestion-resisting compounds (see Contrib. Bot. Laboratories Univ. Pennsylv. iv. pp. 460–463 : 1919). It is, perhaps, because these substances are absent from the bodies of the larvæ of our English mosquitoes that these latter cannot (or, apparently, do not) live in the putrescent liquor in the cups of the Teasel.

It is clear from what has been said that insects and many other small creatures are captured and drowned, at all times and in large numbers, in the water-cups of the Teasel. It is necessary, therefore, to enquire *how* this is effected and *why*.

That the formation of the cups is well adapted to retain any small creatures which may enter them is obvious. First, the sides of the cups are sloped very steeply, the leaves forming them being set at an angle of about 30 degrees with the stem and about 60 degrees with the surface of the ground, while the wing which connects the bases of the leaves is sloped at an even sharper angle with the stem. Secondly, the surface of the stem and the interior surface of the cups are both extremely smooth and glossy, rendering it likely that any small creatures which may have been induced, by whatever means, to enter or approach the cups will slip down into the liquor in their bottoms and be drowned therein. As Sir Francis Darwin has remarked (*op. cit.* 270): "The plant is well adapted for catching and drowning insects. . . . The cups undoubtedly form most efficient traps. . . . I have seen a beetle struggling to get out and observed his tarsi slipping, over and over again, on the smooth stalk."

There is, however, nothing in the foregoing, and apparently nothing in connexion with the structure of the plant or its water-cups, to suggest, at first sight, *why so many small creatures should enter the cups at all* (unless, perhaps, to drink in time of exceptional drought); still less why they should get drowned therein so frequently.

Both Boyer and Barthelémy took the view that the many small creatures found in the cups had all "fallen" in (*tombent*). Kerner (*l. c.*) clearly shares that view. Yet the presence in the cups of numerous dead insects is (as has been shown) almost invariable. This cannot be due solely to accidental causes ; for it is impossible to suppose that the presence of so many dead creatures in such comparatively minute areas of water can be due merely to wind-transport, rain-wash, accidental falls, or other such casual causes. There must surely be something which *definitely attracts* the creatures in question : otherwise, they would not be found in the water so invariably and in such numbers.

Subject to careful chemical investigation, I can only explain the

phenomenon by hazarding the surmise that the plant exudes into the water, when accumulated, some strong-smelling or sweet-tasting toxic substance which first attracts insects and other small creatures and then narcotizes or intoxicates them, leading them to fall in and get drowned. Their subsequent putrefaction is, doubtless, due (in the main, at any rate) to bacterial infection from the air.

That insects really are both attracted and stupefied in some way by the liquor seems proved by an observation I made on 25 August 1916. Early in the morning of that day, I happened to notice a newly-dead individual of the Large White Butterfly (*Pieris brassicæ*) floating in the putrescent liquor in one of the upper cups of one of a group of plants of the cultivated Teasel* growing in my garden. Whilst I was fishing out and examining the insect, I was surprised to see two other White Butterflies, till then unnoticed, fly up from one of the lower cups, having been disturbed, no doubt, by the slight shaking I had given the whole plant. That these two butterflies had become, in some way, more or less stupefied through imbibing the liquor seems to me certain; for they did not fly up till some time (perhaps a quarter of a minute) after I had begun my examination; whereas, had they been normally alert, they would have taken flight immediately I began my examination of the plant, or even before I had approached it closely, being, like all butterflies, very shy by nature.

Further evidence to the same effect seems to be provided by the fact, already cited, that I have found slugs (generally, I believe, *Limax agrestis*) and several species of snail (including *Helix cantiana*) dead in the cups; while Sir Francis Darwin found "large slugs" in them. Now all these molluses (which find no difficulty in crawling up a perpendicular glass window-pane) could surely, in ordinary circumstances, have crawled with ease up the sides of the Teasel-cups, in spite of their exceedingly steep and smooth sides. Indeed, Sir Francis says: "I find that slugs, if dropped into the teasel-cups, can crawl up the smooth leaves [*i. e.*, the sides of the cups]." The obvious conclusion is, therefore, that those molluses which failed to crawl out, had been stupefied or intoxicated in some way and drowned through imbibing the liquor.

The presence in the fluid of some such intoxicating element was suspected, many years ago, by Sir Francis, who says:—"I tried a number of experiments by taking a large number of . . . malacoderm beetles and placing one half in water, the other in the fluid of the Teasel-cups. The result showed that beetles are drowned much more readily in the Teasel fluid than in pure water. Whether there is a narcotising poison in the fluid or whether, as is far more probable, the oiliness or stickiness of the decaying fluid causes the insects' spiracles to be blocked up, I cannot say."

In this connexion, it may be noted again that most of the small creatures commonly found in the cups are notoriously addicted to foul feeding—the Diptera and some Coleoptera, in particular. Even the

* This, though generally spoken of as a distinct species (*D. fullonum*, the "Fuller's Teasel"), is probably no more than a variety of *D. sylvestris*, slightly altered by long cultivation.

dainty Lepidoptera are not free from the habit, as shown by the old method used for taking the Purple Emperor Butterfly (*Apatura iris*)—that of placing in its haunts the putrid carcase of an animal. Again, it is well known that these insects are extremely fond of fermenting liquors. On 17th October 1878, at Portslade, Sussex, I watched for some time a Red Admiral Butterfly (*Pyrameis atalanta*) fluttering persistently round a wine-merchant's delivery-van laden with spirits, which had been left standing in a road. Again, in "sugaring" for moths, the attraction provided is not so much the sugar as the rum or gin mixed with it. Further, it is very well known that butterflies and other insects frequently suck the fermenting sap which exudes from injured trees *. Clearly, therefore, such insects are liable to be attracted and intoxicated by the fermenting liquor usually found in Teasel cups. On the other hand, the Hymenoptera are clean feeders, so that the putrid liquor can have no attractions for them : consequently, they are very rarely found dead in the cups.

In view of all the foregoing, it is hard to doubt that some constituent of the liquor in the teasel-cups *definitely attracts and stupefies* these many small creatures, causing them to drown. It is equally hard to doubt that, this being accomplished, the plant does actually derive benefit *from the absorption of the highly-nitrogenous liquor* which must result from their putrefaction in the cups.

This latter conclusion was, indeed, reached definitely by Sir Francis Darwin forty-five years ago, and his conclusion was endorsed explicitly by his father, Charles Darwin. Sir Francis, in the course of an article † on certain "protoplasmic filaments" he had observed protruding from the glandular hairs on the leaves of the Teasel, writes (*op. cit.* 270–2) :—

"I believe that the plant does profit by the insects caught in the cups. . . . But, whether or not the glands which find themselves immersed in the putrid fluid of the teasel-cups take advantage of their position to absorb nitrogenous matter, there is no doubt.—That the protrusion of filaments is not a habit originally developed for this special purpose; for . . . the glands on the seedlings, which do not form cups and therefore catch no insects, have well-developed filaments. . . . That the function of the protoplasmic portion of the filament was originally to assist in the act of secretion, but that it has been subsequently utilized by the plant as a mode of nutrition. That the protoplasmic filaments have the power of absorbing nitrogenous matter and that, in the seedlings, they probably absorb ammonia from the rain-water and dew. In the adult plants, they absorb the products of the decaying insects for the capture of which the plant is adapted."

Later observations raise doubt as to the part played by the "protoplasmic filaments," but Sir Francis's main conclusion still stands, and has been held more or less vaguely by others since he

* For a summary of observations thereon, see Charles Nicholson in Essex Nat. xix. (1920) pp. 12–14, 170–171.

† See Proc. Roy. Soc. xxvi. (1878) pp. 4–8, and Quart. Journ. Microscop. Sci. n. s. xvii. pp. 169–174; also, much more fully, in Quart. Journ. Microscop. Sci. n. s. xvii. (1877) pp. 245–272.

wrote. The nature and functions of the filaments are now being investigated carefully by Mr. Robert Paulson, who believes them to be separate organisms, probably Rhizopods.

That absorption does take place seems highly probable in view of the fact that stomates or pores of some kind are known to exist in the cuticle of those portions of the stem and the inner walls of the cups which are submerged when the cups are full of water, and also of the leaves. These stomates were observed by Barthelémy in 1878. They also are now undergoing investigation by Mr. Paulson, who finds that those upon the stem vary in some points of detail from those on the upper side of the leaves. Either or both of these kinds may serve either as excretion-glands or as absorption-glands, or as both. It is necessary, however, to await Mr. Paulson's further results before speaking positively as to their functions.

Another matter which must be awaited is a careful analysis of the liquor found in the Teasel cup, both in its early freshness and in its later fetid condition. More than two years ago, I made arrangements for such analyses; but my plans have been defeated by the recent abnormal weather-conditions. In 1921, owing to the excessive drought, liquor was not obtainable in analyzable quantity: in 1922, though liquor was obtainable in sufficient quantity, the cold wet weather which prevailed at the critical season was so prejudicial to insect life that practically no insects were caught and the liquor never attained its normal putridity.

On the whole, however, if there is as yet no conclusive proof, there seems every reason to believe that the main use of the water-cups of the Teasel is the catching of small "insects"; that the plant exudes into the water which collects in the cups some narcotizing substance; that this both attracts and stupefies the "insects," causing them to drown; that, after drowning, they decompose in the fluid, causing it to become very highly charged with nitrogenous matter; that the plant then digests and absorbs this matter, deriving nutriment therefrom; and that the Teasel is, therefore, truly carnivorous, as suggested at the outset. It is difficult to see how any other conclusion can be reached; inasmuch as we find, in connection with the plant, practically all the characteristic features which occur, in one form or another, in connection with other plants which are recognized universally as carnivorous.

Assuming my contention to be proven, it may be said of the Teasel that it is one of the largest carnivorous plants known—certainly by far the largest in Britain; that it is capable of capturing and digesting larger and heavier creatures than any other; and that, in capturing its prey, it employs methods which differ considerably from those of nearly all other plants having similar habits.

Carnivorous plants may be divided roughly into four classes, according to the methods of capture they employ. Thus:—

(1)—*Dionæa*, *Pinguicula*, and *Drosera* all exude a sweet viscid substance on the surface of their leaves, which, when small insects have been attracted and caught thereby, curl or close over, cover, and digest them.

(2)—*Nepenthes* and *Sarracenia* both have deep "pitchers,"

containing a liquor, secreted by the plant itself, which attracts insects, whose escape is prevented by retaining-hairs at the entrance and by a more-or-less complete lid. The insects are then drowned and become putrid, after which their products are absorbed by the plant.

(3)—In *Utricularia*, a genus of small floating (rootless) aquatic plants of which two species are fairly common in Britain, the method employed is surprisingly ingenious. The plant has on its leaves many small bladders, each of which is provided at the entrance with a trap-door surrounded by hairs. When any wandering creature, however small, approaches the entrance, guided by the surrounding hairs, it touches one special hair which is sensitive. This, acting like a trigger, causes the trap-door to open suddenly inwards, thus causing a sharp current of water to enter the bladder, carrying with it the tiny creature in question. This is at once imprisoned and retained by the re-closing of the trap-door, and is then digested at leisure. Attention has been called only recently to the working of this highly-ingenious piece of mechanism by Mr. C. L. Withycombe (*Knowledge*, xxxix. 1916, pp. 238–241). Earlier observers, including Darwin, had supposed that the prey forced its way into the bladders, attracted by some sweet substance secreted inside.

(4)—In *Dipsacus* a totally-different and simpler method is employed. The plant has neither pitchers, nor bladders, nor any partially-closed receptacles provided with lids, trap-doors, or retaining-hairs at their entrances. On the contrary, its cups in which insects are captured are widely open at the top and the liquor contained in them is certainly derived—in the main, at any rate—from falling rain and dew. Yet it seems to contain some sweet toxic substance (excreted, apparently, by the plant itself) which attracts and stupefies many small creatures; while the structure of the cups is such as to facilitate their capture, drowning, and putrefaction, leading, ultimately, to the absorption by the plant of the resulting highly-nitrogenous product. A somewhat similar method is employed in *Billbergia* (Order *Bromeliaceæ*), of which there are many species, all epiphytic on trees, in the West Indies and northern South America. Water is caught and retained by the bases of the leaves, though these do not form true cups. In this, many insects and other creatures become drowned, and these putrefying, soon render it highly offensive. The extraordinary variety of creatures thus caught has been investigated by C. Picardo (Bull. Scient. France et Belg. xlvii. 1913, pp. 215–360), H. Scott (*Zoologist*, 1914, pp. 183–195), and D. J. Scourfield (Journ. Queckett Microscop. Club, ser. 2, viii. 1903, p. 539). Mr. J. L. North, Curator of the Royal Botanic Society, informs me he has heard a man relate how once, travelling in Brazil, he had passed beneath a tree the branches of which were covered with plants of *Billbergia* in full flower, and, reaching up with his riding-crop to pull down some blossoms, had been at once drenched with putrid evil-smelling liquor!

DR. STIRTON'S NEW BRITISH MOSSES REVISED.

By H. N. Dixon, M.A., F.L.S.

(Continued from p. 17.)

C. symplectus Stirt. in Scott. Nat. No. xi. p. 234 (1886). (Tarbert in Harris; Aug. 1886.)—This also is a form of *C. Schwarzii*, only differing in the somewhat smaller auricles, and in that respect forming a slight approach to *C. Schimperi*.

Dicranum capnodes Stirt. in Scott. Nat. No. xii. p. 257 (1886). (Ben Voirlich by Loch Lomond; 1872.)—I can see no reason why this should not be *D. uncinatum* C. M. The description suggests this, since it says that the structure of the leaf-base "is that of *D. circinatum*," and it does not point out any distinguishing characters. The leaves in this specimen are, it is true, mostly not circinate, simply falcate, and this is perhaps the reason why Stirton did not associate it with *D. uncinatum*; but some of the leaves are very strongly falcate, and in another gathering from the same locality they are quite as circinate as usual in *D. uncinatum*.

D. expallidum Stirt. in Ann. Sc. N. H. vi. 118 (1897). (Tarbert in Harris; Aug. 1886.)—Stirton gives no locality; but this is the only specimen, so that it is certainly the one described. Except that the nerve is rather unusually narrow for *Campylopus subulatus* and that the stems are tall, this differs in no way from specimens gathered at the same time and place, and referred by Stirton to *C. subulatus*. It is *C. subulatus* var. *elongatus* Bosw.

D. Fergussoni Stirt. in Ann. Sc. N. H. viii. 42 (1899). (Arisaig, 1906; Tayvallich, 1898, &c.)—Stirton describes this from several gatherings, not indicating any one as type. The original gathering was in Mull; but the specimens described by Stirton as "showing a greater degree of development than those of any other known locality" are from Arisaig.

Stirton compares it with *D. Scottianum* (but there is certainly no close connection with that), with *D. fuscescens*, and with *D. Muehlenbeckii* B. & S., considering it on the whole nearest the last, on account of the dense tomentum and porose cells. The cells in *D. fuscescens*, however, are frequently porose, and the tomentum in the specimen is no more dense than in some of Stirton's own specimens of *D. fuscescens*; it is certainly that species, and not, I should say—as *D. fuscescens* goes—a very marked form of it.

D. hypselum Stirt. in Scott. Nat. No. xii. p. 258 (1886). (Ben McDhui, G. E. Hunt, 1868.)—Stirton described it as without pores in the cell-walls; but the lower cells have the walls distinctly porose. It differs in no way from *D. molle*. Stirton, indeed, in describing it, educes no distinguishing characters of any weight; only the habit, which is not marked, the alar cells red instead of orange, several oil-globules in a cell instead of one, &c.!

D. interludens Stirt. in Ann. Sc. N. H. xii. 114 (1903). (Ben Lawers: 1865.)—Compared with *D. majus*, *D. congestum*, and *D. Bonjeani*. It appears to me a simple form of the last. The

leaves are undulate at tip, the cells agree, and the description suggests no difference, except that the upper cells are said to be like *D. congestum*, which is not borne out by the specimen.

D. leiophyllum Stirt. in Ann. Sc. N. H. xvi. 178 (1907). (Arisaig; Aug. 1906; on stone walls.)—This is a tall fine form of *Dicranoweisia crispula*.

D. mediellum Stirt. in Ann. Sc. N. H. xii. 113 (1903). (Ben Lawers, 1902; D. Haggart.)—Described as allied to *D. Starkei*, with the ♂ flower close to the perichætium, but with different cells. The cells are short everywhere, and markedly papillose in the subula; the capsule is short and only faintly strumose. If these characters were constant, it might well stand as a species, or a subsp. of *D. falcatum*, to which it is more nearly allied than to *D. Starkei*. But I find (*a*) some of the leaves have cells of the normal form, and are scarcely rough; (*b*) I have in my herbarium specimens of both *D. Starkei* and *D. falcatum* with short cells but not particularly rough subula, or even quite smooth; and (*c*) a parallel form of *D. Starkei* gathered by L. J. Cocks on Mam Soul, Ross-shire, has almost identical cell-characters, and a similar, short, scarcely strumose capsule; but the size of the leaves, and the strongly marked auricles are certainly not those of *D. mediellum*, but of *D. Starkei*. If *D. mediellum* were maintained, this would certainly have to take similar rank. It seems better to look upon both as derivative forms, the one from *D. falcatum*, the other from *D. Starkei*; and since intermediate forms occur, it is hardly possible to give them varietal rank.

D. notabile Stirt. in Scott. Nat. No. xii. p. 257 (1886). (Lenoxtown woods, Campsie; 1863.)—This is certainly *Dicranodontium longirostre*; the leaves are distinctly abruptly widened above the base, not gradually lanceolate as described by Stirton; he may possibly have had two plants under his eye.

D. subnitescens Stirt. in Ann. Sc. N. H. viii. 44 (1899). (Kinloid Farm near Arisaig; Sept. 1906.)—This specimen is certainly *D. Scottianum*; there seems nothing in the description either to separate it, except that the subula is described as toothed, but I find it quite or practically entire. As Stirton has reduced this to a var. of *D. Fergussoni*, it is probable that it was mixed with *D. fuscescens*, since the leaves of that are distinctly toothed, while here they are entire.

Grimmiaceæ.

Schistidium nodulosum Stirt. in Ann. Sc. N. H. xvi. 175 (1907). —There is no packet so named in the herbarium, but three packets labelled "*Schistidium apocarpum* var. *crispulum* (Strn.); Ben Lawers, 1864"; and "Ben Lawers, 1867 (June)" are certainly the originals. They are all *Grimmia apocarpa* var. or subsp. *gracilis*, with which the description quite agrees.

Grimmia calvescens Stirt. in Ann. Sc. N. H. x. 112 (1901). ("Arisaig; Aug. 1906. See Annals of Scott. Nat. Hist., Apr. 1901".)—This specimen post-dates the actual description; but Stirton probably considered it to be a better developed plant than that

described, and more characteristic. It is simply *Rhacomitrium heterostichum* var. *alopecurum*. The leaves are shortly hair-pointed.

G. fuliginea Stirt. in Ann. Sc. N. H. xvii. 171 (1908). (Arisaig; Sept. 1907.)—This is merely a rather robust form of *G. trichophylla*. There is nothing in the description inappropriate to this species.

G. fusco-viridis Stirt. in Ann. Sc. N. H. x. 112 (1901). (Tarbert in Harris; Aug. 1900.)—This is the sub-obtuse leaved form of *Rhacomitrium heterostichum* var. *alopecurum* (*G. obtusa* Lindb.).

G. halophila Stirt. in Ann. Sc. N. H. ix. 177 (1900). (Unst, Shetland; July 1884.)—This is a *Ceratodon*, with nerve excurrent and margin entire or nearly so; probably *C. conicus*. Stirton has a MS. note "doubtful whether the description referred to the *G. halophila*," whatever that may mean. There is, however, one packet only, and it contains no mixture, and the description seems quite applicable to the *Ceratodon*.

G. hemipolia Stirt. in Ann. Sc. N. H. xi. 109 (1902). (Skye, near Broadford; 2 Sept., 1881.)—This is clearly *G. ovata*. Stirton does not compare it with that, and appears to have overlooked the affinity.

G. Horni Stirt. in Scott. Nat. No. xxvii. p. 218 (1890). ("Scotland, Glen Ogle, Geo. Horne; Apr. 1887. *Grimmia spiralis* forma. Leaves not spirally twisted.")—There is no doubt of this being the original of *G. Horni*, though the packet is not so labelled. It is the small form of *G. funalis* referred to in the "Handbook," showing scarcely any twisting of the leaves. The areolation and other characters quite agree. One or two stems show very clearly and prettily the spiral *arrangement* of the leaves, though the individual leaves when dry exhibit scarcely any spiral alteration of position.

G. inæqualis Stirt. in Ann. Sc. N. H. xvii. 172 (1908). (Garscube near Glasgow; Dec. 1905.)—This is that form of *G. subsquarrosa* Wils. which in basal cells, presence of gemmæ, colour, and habit is quite characteristic, but the leaves are scarcely subsquarrose. I have seen this form now from several localities, and look upon it as distinctly connecting *G. subsquarrosa* and *G. trichophylla*. Stirton seems to have been rather worried by the margin being recurved on one side only, but this is not infrequent in *G. trichophylla*, and usual in *G. ovata*. A further specimen, "Dalmeny near Edinburgh; Dec. 1905; Jas. McAndrew," is the same thing. I find in my own herbarium a specimen from Corstorphine Hill, near Edinburgh, July 1906, coll. Jas. McAndrew, sent me as *G. inæqualis* Stirton, which I have annotated "A form of *G. subsquarrosa*, quite similar to forms from Pembrokeshire" (*cf.* Moss Exch. Cl. Report, 1908, p. 277).

G. papillulata Stirt. in Ann. Sc. N. H. xi. 110 (1902). (Tarbert in Harris.)—This is based entirely on the faintly papillose cells in the upper part of the leaf (totally distinct, as Stirton points out, from those of *Rhacomitrium canescens*); it is no doubt an unusual feature, but it occurs for instance in "*Rhacomitrium heterostichum* var. *gracilescens*, Husn. M. Gall. 819," to almost the same extent. It is not associated with any other characters, and can hardly be treated as more than a slight form, I think, of *R. heterostichum* var. *alopecurum*.

G. platyphylla Stirt. in Scott. Nat. No. xxvii. p. 219 (1890). (Near Callender; 1865.)—A rather marked form of the very variable *G. apocarpa*, having very wide, short leaves, and a long hair-point, almost equalling the length of the leaf.

G. polita Stirt. in Ann. Sc. N. H. xvi. 172 (1907). (Arisaig; July 1904.)—The author says it is allied to *G. trichophylla*, but quite distinct; he fails, however, to point out any distinguishing characters. It is *G. trichophylla* forma *propagulifera* Limpr. (which is *not G. subsquarrosa*, as Limpricht states, by the way).

G. rubescens Stirt. in Scott. Bot. Rev. i. 90 (1912). (Gairloch, Ross-shire; Sept. 1911.)—Stirton does not compare this with any species. It is only *G. trichophylla*.

G. subaquila Stirt. in Ann. Sc. N. H. xviii. 243 (1909). (Loch-nam-Uamh, near Arisaig; Sept. 1908.)—This is simply *G. decipiens*.

G. sublurida Stirt. in Scott. Nat. ix. 36 (1887). (Tarbert in Harris; Aug. 1886.)—A very ordinary form of *Rhacomitrium heterostichum* var. *gracilescens*. Dr. Braithwaite also referred it to this species.

G. undulata Stirt. in Scott. Bot. Rev. i. 91 (1912). (Gairloch, Ross-shire; Aug. 1911.)—This is one of the frequent forms of *G. trichophylla*, showing an approach to *G. subsquarrosa* in the basal areolation.

Rhacomitrium consocians Stirt. in Ann. Sc. N. H. xvi. 179 (1907). (Glen Lochay; D. Haggart; 1903.)—This is the hairless form of *Rhac. canescens*, which I take to be a form rather than a stable variety.

R. divergens Stirt. in Ann. Sc. N. H. xvi. 179 (1907). (Type, Onich; Sept. 1909.)—As the description would suggest, this is *R. ramulosum*, the more robust form with wide hair-points, to which I have referred in the 'Handbook.' *R. ramulosum* has been looked upon as a rare moss in Scotland, but Stirton has it from several localities in Ross-shire, &c.

R. heterostichum var. *amblyphyllum* Stirt. in Ann. Sc. N. H. xi. 112 (1902). (Near Killin.)—This is the var. *alopecurum* with rather broad apices to the leaves, and hair-points.

Tortulaceæ.

Didymodon turgescens Stirt. in Scott. Nat. No. xv. 35 (1887). (Ben Lawers; July 1886.)—Stirton has written across the label of this "=*Zygodon lapponicus*," which the moss undoubtedly is.

Leptodontium Rossii Stirt. in Trans. & Proc. Bot. Soc. Edinb. xxvi. 424 (1915). (Blairmore on the Clyde; Oct. 1914; L. W. Stirton.)—A very fine, tall, robust, sterile form of *Rhabdoweisia crenulata* Jameson. I have not seen it so robust from Britain, but I have gathered a very similar form in the Pyrenees.

Barbula aggregata Stirt. in Ann. Sc. N. H. vi. 120 (1897). (*Mollia aggregata* Stirt. in Ann. Sc. N. H. xix. 171 (1909).) (Tarbert in Harris; July 1886.)—Stirton later considered that this might belong to *B. fragilis* (*Trichostomum fragile*), and reduced it to a form of that; I should certainly refer it to that species.

B. chlorophana Stirt. in Ann. Sc. N. H. xii. 116 (1903). (Ben Lawers; 1867.)—This gave me a good deal of trouble. Stirton compares it with *B. recurvifolia*. It is very much like a robust form of that, with leaves fully 3 mm. long, but differs in several marked characters, as it does from all the allied species of *Barbula* with which I compared it. It turns out to be a very marked form of *Grimmia apocarpa* subsp. *gracilis*, with hairless leaves; the nerve highly muricate at back is quite characteristic; the recurved leaves are unusual, and I think, if this plant be treated as a subspecies, rather than as a var. of *G. apocarpa*, Stirton's may well be given varietal rank under it. I propose therefore to call it

GRIMMIA GRACILIS Schleich. var. CHLOROPHANA (Stirt.) Dixon comb. nov.

B. ferruginascens Stirt. in Ann. Sc. N. H. ix. 176 (1900). (Orkney, Mainland; Aug. 1889: published 14 Apr., 1900.)—The date 1887 in the published description is an error. There is only one packet. It is *Barbula rubella* var. *ruberrima* Braithw. The margin is not actually thickened, as the description might seem to imply, but very closely reflexed, as Stirton makes clear in his MS. notes.

B. incavata Stirt. in Scott. Bot. Rev. i. 93 (1912). (Onich, rocks near the sea, and old walls; Sept. 1909.)—This is a very compact form of *Weisia rupestris*—indeed, the var. *compacta* B. & S.

B. limosa Stirt. in Ann. Sc. N. H. xiv. 106 (1905). (Muddy stream near the sea, Arisaig; Aug. 1904.)—This is a small form of *Trichostomum flavo-virens*, with no very distinct characters. Stirton, in describing his *Mollia subbifaria* (which appears to me very ordinary *Trich. flavo-virens*), states that he is now disposed to put *B. limosa* as a var. under it. In another publication Stirton refers to this plant as *Mollia limosa*.

B. limosella Stirt. in Ann. Sc. N. H. xvi. 175 (1907). (Arisaig; Sept. 1907.)—This is one of the very few of Stirton's species which appears to me of value. It clearly has affinity with *Trichostomum flavo-virens*; but it is an extremely small plant with very small leaves, which are more or less strongly recurved when moist, the margins plane, not incurved above, the apex subobtuse with the nerve excurrent in a short cuspidate point. The cells are slightly larger than in *T. flavo-virens*, and are very pellucid, nearly smooth, instead of being highly obscure with dense papillæ as in that species. I propose to retain it as an independent species, but it is possible that it ought to be considered as a subsp. of *T. flavo-virens*.

B. obtusula Lindb.—Stirton (Glasgow Nat. vi. 99 [1914]) has recorded this as a British plant on the basis of a specimen from the Bridge of Allan. The specimen is labelled "Nr. Bridge of Allan; 25 Apr. 1914," but Stirton has corrected this to "Markinch, end of May, 1914."

B. obtusula Lindb. is described as twice or thrice as large as *B. revoluta*, the leaves more spirally contorted, seta paler, perichætium more prominently exserted, more open, &c., &c. I do not find any of these characters in Stirton's plant, which appears to me to differ in no way from our southern *B. revoluta*. I have not seen *B. obtusula*, which Lindberg states he has not seen from anywhere beyond Sweden.

I am quite sure, however, that it cannot be recorded as British on the strength of this plant.

B. viridescens Stirt. in Ann. Sc. N. H. xv. 110 (1906). (Connel Ferry; Sept. 1905.)—This must, I think, be referred to *B. vinealis*. The cells are perhaps more highly papillose than is usual, but I do not find them appreciably larger (Stirton describes them as having an area 3 or 4 times larger than that of *B. fallax* or *B. cylindrica*). It is a robust form, and therefore somewhat intermediate between *B. vinealis* and *B. cylindrica*.

Limneria viridula Stirt. n. gen. and sp. in Trans. & Proc. Bot. Soc. Edinb. xxvi. 428 (1915). (Plockton, Ross-shire; Aug. 1915.)—This cannot be separated from *Barbula spadicea*. I find no characters of any importance to distinguish it from ordinary forms of that species except that the lids are unusually long; but I have a similar form from Bolton Woods, Wharfedale, with the lids sometimes equally long, sometimes as short as usual.

Mollia aggregata Stirt. See *Barbula aggregata*.

M. conspersa Stirt. in Ann. Sc. N. H. xviii. 172 (1909). (Onich; Sept. 1908.)—This is *Trichostomum mutabile*, and appears to me a fairly ordinary form. Its relationship (as well as that of *M. intumescens* Stirt.) to *Trich. mutabile* (as *Mollia brachydontia*) is recognized by Dr. Stirton.

M. Haggartii Stirt. in Ann. Sc. N. H. xi. 106 (1902). (Near Killin, D. Haggart; 1901.)—"To me unique," Stirton says. He is not the first who has been taken in by this plant, which is the sterile plant of *Diphyscium foliosum*. Husnot, it may be remembered, described it as *Didymodon Camusi*.

M. intumescens Stirt. in Ann. Sc. N. H. xviii. 171 (1909). (Onich; Sept. 1908.)—This is *Trichostomum mutabile*, a form with rather acute points to the leaves, and the leaves themselves rather long and narrow, but not extraordinarily so for so variable a plant.

M. laxula Stirt. in Ann. Sc. N. H. ix. 175 (1900). (Ben Lawers, 1863; and Ben Lawers, 1863 or 4.)—This is *Barbula rubella*, a slight variation from type.

M. limosa. See *Barbula limosa*.

M. scaphoidea Stirt. in Ann. Sc. N. H. ix. 175 (1900). (Near Bowling on the Clyde; 1863.)—For some doubt as to the locality see Stirton, *op. et loc. cit.* The leaves are wide for *Trichostomum crispulum*, but it is certainly only a form of that, nearest perhaps to var. *elatum* Schimp., which has similarly wide, subobtuse leaves, but is a larger plant.

M. subbifaria Stirt. in Ann. Sc. N. H. xviii. 241 (1909). (Back of Keppoch near Arisaig; 11 Sept., 1907.)—This is quite ordinary *Trich. flavo-virens*; I can see no points of difference at all. Stirton, in describing it, says he is now inclined to place *Barbula limosa* as a var. under it.

M. terrena Stirt. in Ann. Sc. N. H. ix. 176 (1900). (Onich, west Fort William. The most typical form.)—It is *Trichostomum tenuirostre* var. *Holtii*. The leaves are sometimes faintly pale bordered in 1 or 2 rows, but the leaves seem hardly the right shape

for var. *Daldinianum*. Other plants under this name in Stirton's herbarium are various states of the robust form of *T. tenuirostre*.

M. thrausta Stirt. in Ann. Sc. N. H. xviii. 170 (1909).—This is referred by Stirton himself to *Trichostomum tortuosum* var. *fragilifolium*.

Trichostomum compactum Stirt. See *Leptotrichum compactum*.

T. episemum Stirt. in Ann. Sc. N. H. xvi. 178 (1907). (Connel Ferry; Sept. 1905.)—A rather tall form of *T. mutabile* var. *littorale*. The description, it will be seen, quite implies this.

(To be continued.)

NOTES ON JAMAICAN TERNSTRŒMIACEÆ.

By W. Fawcett, B.Sc., and A. B. Rendle, F.R.S.

Mr. Sprague's criticisms (p. 17) of our notes in the December number of this Journal (p. 361) have suggested the following remarks:—

Mr. Sprague states that "*Theaceæ* is the correct name for the family commonly known in this country as *Ternstrœmiaceæ*" (see Journ. Bot. 1922, 73). We would refer him to his own remark on p. 70 of the article to which he refers, namely, "it will be necessary to have a list of *nomina conservanda* for families, in order that well-known names may not be superseded on purely technical grounds." Just on this account we think that the name *Ternstrœmiaceæ* should be retained until the list of *nomina conservanda* of families is agreed to and published.

1. Cleyera.

Mr. Sprague quotes characters from Thunberg's generic description, namely, "antheræ hirtæ" and "stylus filiformis," and from the specific description "flores axillares, unus, duo vel tres, pedunculati" to support his argument that Thunberg in describing his genus *Cleyera* had before him a specimen of the plant described and figured by Siebold and Zuccarini in Fl. Japon. 153, t. 81. But the specific description also has the words "folia in ultimorum ramulorum ultimo apice subverticillata, quaterna, quina vel sena, inæqualia . . . . sesquipollicaria," which fits the species of *Ternstrœmia*, but does not agree with the species of *Cleyera*. Again, of the leaves it is said "oblongo-ovata, obtusa, apice tenuissime serrata," which does not agree with either species. On the whole, the description is so confused that we cannot wonder that botanists have taken Kaempfer's figure, which Thunberg himself cites, and the identity of which is certain, as representing Thunberg's genus *Cleyera*. Kaempfer's figure represents *Ternstrœmia japonica*, with which Thunberg himself later (Trans. Linn. Soc. ii. 335) identified his own *Cleyera japonica*. It is of interest to note that there is in Herb. Banks a specimen of *Ternstrœmia japonica* from Japan sent by Thunberg and named *Cleyera japonica* Thunb.

On this account (Art. 51, 4) we suggest that the name *Cleyera* should not date from Thunberg's description, in which case it is

antedated by the name *Eroteum*, which must be kept up, unless an International Conference makes *Cleyera* a *nomen conservandum*.

We do not agree with Sprague that there is any necessity to change the name *Ternstrœmia japonica* to *T. gymnanthera*.

2. Eroteum and Freziera.

As botanists have considered it advisable to divide the genus originally called *Eroteum* (Sw. Prodr. 85, 1788) into two genera—one with a long branched style and hairy anthers, the other with style wanting and glabrous anthers—the question arises which of Swartz's two species should be considered the type-species. If we take the full description of the genus written by Swartz for Schreber's 8th edition of the *Genera Plantarum*, 807 (1791), the wording clearly points to *Eroteum theæoides*, as described in Fl. Ind. Occ. 972 (1800), *e. g.* in both the anthers are said to be "subrotundæ, minutæ," and the style in Schreber is said to be "erectus, staminibus fere longior, subulatus, apice trifidus," which is repeated for *E. theæoides*, except that instead of "fere" we read "paulo"; whereas in *E. undulata* the anthers are said to be "lanceolatæ, filamentis longiores," and the style "subconicus, altitudine petalorum." Swartz also gives a drawing of *E. theæoides*, t. 19. This species must evidently be regarded as the type-species of *Eroteum*. Humboldt and Bonpland described (Pl. Æquin. 22, 1808) four or five new species from Peru congeneric with *E. undulatum*, retaining them under *Freziera*. De Candolle included both of Swartz's species and Humboldt and Bonpland's, but by his generic description of the style as "brevissimus" he really excludes *E. theæoides*.

Choisy (in Mem. Soc. Phys. Hist. Nat. Genève, xiv. 1855) cleared up the confusion between the constituents of the two genera by pointing out that *Freziera theæoides* was congeneric with the species described under *Cleyera* (he renames it *Cleyera thæoides*), which name he retained; while he used the name *Freziera* for the group of species which includes the original *Eroteum undulatum* Sw. (*F. undulata* Sw.) and the allied New World species. A similar distinction and nomenclature are maintained in Bentham and Hooker's *Genera Plantarum*.

This position is not in accordance with the Rules. If it is agreed to pass over the original *Cleyera* Thunb., then *Eroteum* Sw. is the earliest name for the genus now generally known as *Cleyera*. If *Cleyera* is to be retained, then *Eroteum* Sw. must be used for the genus of which *E. undulatum* Sw. was the first described species; that is, the genus now generally known as *Freziera*—unless *Freziera* finds a place in the list of *nomina conservanda*.

A point of interest is—Where does *Freziera* date from? Not from the original description by Swartz, where it is a *nomen abortivum*; Swartz had no right to substitute a new name for his original genus *Eroteum*. Humboldt and Bonpland added several species congeneric with *Freziera undulata*, but their "observations" (p. 24) show that they retained the genus as Swartz defined it, merely extending it to include their new species.

De Candolle included both of Swartz's original species in his

Freziera, which he regarded as synonymous with *Eroteum*, though his diagnosis excludes *F. theæoides* Sw. If De Candolle had been consistent, he should have used the name *Eroteum* for this genus. It is a nice point whether we can regard *Freziera* as dating from De Candolle, or whether we must wait till Choisy's Memoir for a diagnosis of it as a genus distinct from *Eroteum*. Sprague suggests that *Lettsomia* Ruiz and Pavon (1794) is an earlier name for *Freziera* Choisy. Choisy regarded *Lettsomia* as a distinct genus, though botanists generally take Bentham's view that the two are congeneric. But *Lettsomia* Roxb., a later name for a group of species of *Convolvulaceæ*, has been used in that sense by Clarke in the *Flora of British India*, and it is conceivable that botanists may prefer to retain it as a *nomen conservandum*, in which case *Lettsomia* Ruiz and Pavon is ruled out. In any case, it is antedated by *Eroteum* Swartz.

3. Laplacea or Lindleya.

We referred to these names as illustrating a rather nice point. Both Blake and Sprague assume that *Lindleya* should be accepted as the earliest published name, but the circumstances of the publication are so unusual that we thought them worth recording more fully than had been done by either of the two previous writers. We can imagine a lover of nomenclature discussion taking up the position that *Lindleya* Nees was *not* legally published in *Flora*, 1821. We agree with Mr. Sprague's concluding remarks: we did not propose to use the name *Lindleya* nor to make new combinations.

THE DISTRIBUTION OF EUPHRASIA IN CORNWALL.

By F. Rilston.

Eleven species of *Euphrasia* have been recorded for Cornwall, viz. *E. stricta* Host., *E. borealis* Towns., *E. occidentalis* Wettst., *E. curta*, Fries, *E. brevipila* Burnat and Gremli, *E. Vigursii* Davey, *E. nemorosa* H. Mart., *E. gracilis* Fries, *E. confusa* Pugsley, *E. Kerneri* Wettst., and *E. Rostkoviana* Hayne.

Of these, *E. gracilis* and *E. Vigursii* are distinctly heathland species. The former, a very distinct and easily-recognized plant, occurs with considerable frequency, but is always, I believe, confined to peaty or heathy ground. *E. Vigursii* is a plant of similar, though somewhat wider, range of habitat, but more restricted territorial range, occurring chiefly on more or less level heathy places north of the watershed. In respect of habitat it differs from *E. Rostkoviana*, which is usually a plant of rough hillsides, occurring thus on the granite slopes of Kit Hill, Cheesewring, Caradon, and Helman Tor in East Cornwall, as well as in steep uncultivated slopes nearer the coast. I have also seen specimens collected by Rev. H. H. Harvey from Carnmenellis, another granite hill, near Redruth. *E. Rostkoviana* grows also on roadside and other banks, but, though occasionally found on level spots, seems never to luxuriate there.

Most of the Cornish plants are small-flowered forms; typically large-flowered plants are scarce, and a proportion of these have violet-purple corollas; but all agree in habit and in the dense clothing of long flexuous glandular hairs.

Davey (Fl. Cornwall) subdivides the county into eight districts. Under *E. gracilis* he gives localities in each of the four West Cornwall districts and in the two westernmost districts of East Cornwall, leaving the plant unrecorded for the Tamar Valley. *E. Rostkoviana*, on the other hand, is locally plentiful in all the East Cornwall districts, but scarcer in West Cornwall, and not recorded at all from the Land's End area (District 8). Except for a single locality in the south-east of the county all the recorded stations for *E. Vigursii* are in district 5, a strip of land thirty-five miles in length, and nowhere more than six in width, extending along the coast from Padstow to Hayle and bounded inland by the watershed. In this district *E. Rostkoviana* is, I believe, a very rare plant.

The coastal range of *E. occidentalis* is difficult to understand. The species is frequent all round the Cornish coast from Bude to Looe, and sometimes occurs two miles or more inland. At Polperro it grows freely with thyme and short grass on dry slopes above the cliffs, and more sparingly in grass land some distance inland. At Holywell Bay near Newquay the habitat is short turf on shell-sand near the beach, on St. Breock Downs heathy roadsides, and at Perranporth waste ground, the site of an old mine. Some of the Perranporth plants are unusually tall, approaching *E. brevipila*, but Mr. Bucknall's final decision was *E. occidentalis*. The species evidently requires a light dry well-drained soil, but that does not sufficiently explain its coastal distribution. The var. *præcox* Bucknall was described partly from plants collected at Polzeath and St. Minver, both near Padstow. I have seen similar plants on St. Breock Downs in the same part of the county; Polperro examples are equally early-flowering and only slightly larger.

The distribution of *E. nemorosa* (a fairly common plant in all the districts) is curiously suggestive of alien origin. Plants easily assignable to this species are usually collected from roadsides, waste places, and field-borders; see Fl. Cornwall, p. 335, where Davey with his usual accuracy of observation says: "Pastures, roadsides, waste places, &c." Such plants are usually of procumbent habit, a tall erect bushy form occurs in moist ground, and moorland forms may be found which are near *Kerneri*. Plants referred to *E. stricta* have much the same distribution, but are scarcer, and up to the present are only known from the neighbourhood of Perranporth.

The same suspicion of alien origin attaches to *E. Kerneri*, which in Cornwall is certainly not calcicolous, but grows in waste ground and gravelly roadsides in the Seaton Valley below Hessenford, and near the Cheesewring. An Eyebright from boggy ground near Perranporth has also been referred to this species.

E. confusa var. *albida*, distinct in its leaf-form and in the opaque white of its small corollas, has been found in close turf on two of the upland granite areas of the county, viz., Bodmin Moors and Helman Tor area, and may yet be found on the granite of the Redruth and Land's End districts.

Of the three remaining species *E. borealis* has only two authentic records to its credit, viz. Penhallow Moor, Newlyn East (C. C. Vigurs, 1910), and Port Holland in district 6 (E. Thurston, 1913); *E. curta*, recorded from eight localities, chiefly in West Cornwall, appears to be, as far as this county is concerned, an obscure form allied to *E. nemorosa*, but confined to heathy places; and *E. brevipila* is a plant of well-defined characters, but of rather wide range of habitat, being found in thin grass, healthy places, waste ground, or cliff slopes. The last-named occurs in each of the eight districts, but its main distribution, judging from its recorded station, is distinctly north and west.

DIPLOLOPHIUM AND PHYSOTRICHIA.

By C. Norman.

In looking through the species of *Diplolophium* and *Physotrichia* in the British Museum, it became evident to me that some confusion had arisen between the two genera, and that species really belonging to the former have been assigned to the latter. Both genera belong to the Tribe Seselineæ (Umbelliferæ) and are confined to Tropical Africa.

Diplolophium was founded by Turczaninow in 1847 (Bull. Soc. Imp. Nat. Moscou, xx. 173) on a plant from Abyssinia (*Cachrys abyssinica* Hochst. Schimper, No. 213), which he called *Diplolophium africanum*; Turczaninow also cites *Kotschy, No. 572*, from "Æthiopia." The herbaria of the British Museum and Kew have each a sheet of Kotschy's plant: this is now known as *D. abyssinicum* Benth. & Hook. f.: it is a large stout plant, with large many-rayed umbels with conspicuous bracts to involucre and involucel, and hairy fruits without calyx-teeth.

Physotrichia was founded by Hiern in 1873 (Journ. Bot. xi. 161) on a plant collected in Angola (Welwitsch, 2512), which he named *P. Welwitschii*. This is a *slender*, graceful plant, with small, few-rayed, umbels with relatively inconspicuous bracts to involucre and involucel, and papillose fruits with persistent calyx-teeth. It seems to be rare; the only specimens at Kew or in the British Museum are those collected by Welwitsch.

The following species hitherto placed in *Physotrichia* have the characters of *Diplolophium*, and should be transferred to that genus: *P. Buchanani* Benth.; *P. Swynnertonii* Bak. fil.; *P. arenaria* Engler & Gilg; *P. Helenæ* Buscalioni & Muschler.

Diplolophium Turcz.

I append a descriptive key of the known species:—

Stem-leaves ternato-pinnately decompound.
- Segments of leaves filiform, lax; segment ± 3–4 cm. long ..... 1. *D. abyssinicum.*
- Segments of leaves acicular, stiff; segments ± 1 cm. long ..... 2. *D. zambesiacum.*

Stem-leaves bipinnate.
- Leaflets ± 20–40 mm. broad ..... 3. *D. Buchanani.*
- Leaflets ± 8–12 mm. broad ..... 4. *D. Swynnertonii.*

1. *D. abyssinicum* Benth. & Hook. f. Gen. Pl. i. 900 (1867); Hiern in Fl. Trop. Afr. iii. 17.

Scott-Elliott 6429! Bagshaw 1272! etc. in Herb. Mus. Brit.

2. *D. zambesiacum* Hiern in Fl. Trop. Afr. iii. 18 (1877).

Eyles 651! 269! Rand 473! etc. in Herb. Mus. Brit.

3. *D. Buchanani*, comb. nov. (*Physotrichia Buchanani* Benth. in Hook. Ic. Pl. 1358; 1891.)

Buchanan 90! 953! Whyte 14! in Herb. Mus. Brit.

A large stout plant, with all the characters of *Diplolophium*, such as habit, the large many-rayed umbels, the large and numerous bracts of involucre and involucel, and the tomentose fruit. It forms, however, a very well-marked species, distinguished at a glance from the preceding ones by its bipinnate foliage.

4. *D. Swynnertonii*, comb. nov. (*Physotrichia Swynnertonii* Bak. fil. in Journ. Linn. Soc. Bot. xl. 76 (1911).)

As Mr. Baker points out in his description, this and *D. Buchanani* are very closely allied, *D. Swynnertonii*, a less robust plant, being separated by its narrower and more pointed leaflets.

Swynnerton 649! Eyles 743! in Herb. Mus. Brit.

Doubtful Species.

I am unable to find any real distinction between *Physotrichia arenaria* (Engler & Gilg in Kunene Sambesi Expedition, p. 324. No. 834!) and *D. zambesiacum* Hiern, but it appears to be an altogether smaller plant than the former, so it is perhaps best to leave the question open until more material is available. But whatever its position specifically, there is no doubt that generically it belongs to *Diplolophium*.

Physotrichia Helenæ Buscalioni & Muschler in Engler's Jahrb. xlix. 482 (No. 1150 *a*) I have not seen; it is separated by its authors from the last-named solely on the measurements of the bracts and bracteoles. These measurements vary (e. g., *D. zambesiacum*) in accordance with the age of the inflorescence, so that this distinction seems very unsatisfactory, and I therefore conclude that most probably the two plants are inseparable.

The four species dealt with above have the hairy fruit normal to *Diplolophium*, as opposed to the papillose fruit of *Physotrichia*. As regards this latter point, however, it is to be noted that Wolff in Engler, Jahrb. xlviii. 272, has (1912) described as *Physotrichia Kassneri* (Kassner, 2416) a plant with hairy ovary ("ovarium . . . . villosum") the mature fruit of which he had not seen. There is a specimen of this in Herb. Mus. Brit. without flowers or fruit, but with the general appearance of *Physotrichia*, in fact much like *P. Welwitschii* Hiern.

Wolff (*l. c.*) suggests that it may prove necessary to establish a section or sub-genus in *Physotrichia* for plants with hairy fruits; this suggestion does not seem to me sound.

The ultimate factor in deciding the genus of an Umbelliferous

plant is the fruit, and if hairy-fruited plants are admitted into *Physotrichia* the real distinction between that genus and *Diplolophium* breaks down. On the other hand, by restricting *Physotrichia* to papillose-fruited plants, the distinction between the two is, as Umbelliferous genera go, well marked.

REVIEWS.

A Summer in Greenland. By A. C. Seward, *Master of Downing College and Professor of Botany in the University of Cambridge.* Cambridge at the University Press, 1922. Cr. 8vo, cloth, pp. xi, 100; 29 plates, 2 maps. Price 7*s.* n.

In this attractive little volume, Prof. Seward gives an interesting account of an expedition undertaken in 1921 with the object of obtaining "as representative a set of fossils as possible for the British Museum and for Cambridge," inspired thereto by an examination of the collections in the Museums of Copenhagen and Stockholm. His object was attained by the acquirement of nearly a thousand specimens of fossil plants, most of which will be sent to the British Museum when their description has been completed; in addition to these, collections of the recent flora, including flowering plants and cryptogams, were made, which will be distributed to Kew and other museums. An account of the fossil and recent plants naturally occupies a considerable portion of the book, but its interest is not confined to these; there is a summary of the early colonisation of Greenland, followed by a sketch of the physical and geological history and a description of the fossil-bearing rocks and of glaciers and icebergs, with an account of the Eskimoes and their industries, and of the system of government by the Danes.

About two hundred specimens of flowering plants were collected; no list is given, but there is a great deal of information regarding many of the species, conveyed in the interesting manner which characterises the book throughout. "The abundance of flowers makes an unexpected impression upon a visitor imbued with the idea of a country practically buried under a mass of ice of unknown depth and of a long winter when the sea is frozen and even the coastal regions are covered with snow. One effect of arctic conditions is to limit the production of foliage shoots and often to induce an abnormal development of subterranean stems and roots and a prolific crop of flowers"; Prof. Seward says that the root of one Willow dug up was traced for at least twelve yards growing horizontally not many inches underground. The colour effect of large patches of Dandelions, Willowherb, Yellow Poppies, *Diapensia*, *Phyllodoce*, *Dryas*, with species of *Ranunculus* and *Potentilla*, is very striking; although "not equal in brilliance to Alpine meadows at their best," in the more favoured situations there is a paradise of flowers characterised by a harmony of colour in keeping with the sombre grandeur of the setting. . . . "The geographical distribution of many of the Greenland flowering

plants presents interesting problems in relation not only to the efficiency of plants as travellers, but to the position of the places from which they originally spread"; in this connexion *Cassiope tetragona* and *Phyllodoce cærulea* are considered in detail.

A word must be said in praise of the illustrations from photographs, which as a whole are excellent; those groups of plants, however, are on too small a scale, and the one supposed to represent *Pyrola grandiflora* might well have been omitted.

Researches on Fungi, Vol. II. By A. H. Reginald Buller, B.Sc.(Lond.), etc.; Professor of Botany in the University of, Manitoba. Longmans, London, 1922. Pp. 466, with 157 figures in the text. Price 25*s.* net.

This work of absorbing interest is indispensable to the student of our larger fungi. It embodies the results obtained by years of painstaking and laborious investigation. Professor Buller confirms Fayod's discovery of the excretion of a drop of water at the hilum end of a spore immediately before its discharge, and finds that the drop is always present there for a few seconds in all the Hymenomycetæ examined by him, and considers it is essential for the violent projection of the spore from the sterigma. The hymenium of the Hymenomycetæ consists of basidia, paraphyses, and cystidia. The basidia are present from the very first in great numbers and come to maturity in a series of successive generations, but each individual basidium only produces one generation of spores, and after the projection of the spores the sterigmata shortly afterwards collapse on the exhausted basidium. The paraphyses are distinct elements of the hymenium from the very first, and their function is to support and nourish the other members. The cystidia, like paraphyses, are sterile elements, and differ from these in their larger size, peculiar form, and smaller number, and are present in some species and not in others. All these elements of the hymenium are most beautifully and accurately depicted in a series of camera lucida drawings, photographs, and diagrams at the various and successive stages of their development.

We consider Professor Buller wrongly unites *Dacromyces deliquescens* Duby and *D. stillatus* Nees as representing the two conditions of one and the same species, because the latter differs from the former in its larger basidiospores and basidia, and the oidial form is well known to all systematists. The monstrous fruit-bodies of *Polyporus rufescens* Fr. (now more generally known as *Dædalea biennis* (Bull.) Quél.) arise from failure to respond to geotropic stimuli, but all other authors consider them to be the well-known *Ptychogaster* or conidial form of this species.

The systematist will be greatly interested in the description and illustrations of the curious and abnormal forms of *Marasmius oreades* that arise when this plant is cultivated for four years from spawn on a soil-covered bed of manure. He will also read, perhaps with some

surprise, the statement that *Coprinus radiatus* (Bolt.) Fr. is only a pigmy of his *C. lagopus*, and that the author has proved the same by growth in pure culture; but, as we all know, Schoeter some years ago considered it was only the dwarf form of *C. stercorarius* (Bull.) Fr. The reader is in some doubt as to what Prof. Buller means by *C. lagopus*, as he gives no authority for this name, and at several places in this work he brackets it as $=C.$ *fimetarius*; for nomenclature of *Coprinus* he professes (foot-note to p. 84) to follow that set out in Lange's revision of the genus in his *Studies in the Agarics of Denmark*, but we find this author treats *C. lagopus* Fr. and *C. fimetarius* Linn. as distinct species. Faull's discovery that the autumn-formed tubes of *Fomes fomentarius* only discharge their spores in the following May and also that the older layers of tubes are still fertile for several years agree with the experience of British mycologists, who always find that the best spore maps of the hard woody Polypores are obtained in the early spring. The statements that Discomycetes have smooth spores (see p. 33), the basidia of the Clavariæ have four sterigmata (see p. 185), and *Polyporus giganteus*, *P. umbellatus*, and *P. frondosus* are terrestrial (see p. 120) are incorrect; many of the Discomycetæ have as rough, if not rougher, spores than the Basidiomycetæ, many of the Clavariæ have only two sterigmata to the basidia, and Schroeter proposed his genus *Clavulina*, including such species as *Clavaria cristata* and *C. cinerea* L. for their reception, and these Polypores are often lignicolous or grow in close association with certain trees.

Apart from these small blemishes, the book is a very valuable addition to our knowledge of the larger fungi, and all mycologists will impatiently await the publication of the promised further volumes.

CARLETON REA.

Lowson's Text-book of Botany (Indian Edition). Revised and adapted by BIRBAL SAHNI, M.A., M.Sc., *and* M. WILLIS, *with a Preface* by J. C. WILLIS, M.A., Sc.D. Third Edition. 8vo, pp. xii, 640. 332 figs. in text. London: University Tutorial Press, Ltd. 1922. Price 9*s.* 6*d.*

THE first (1913) and second editions (1919) of this work were reviewed at some length in this Journal (1914, p. 343, and 1919, p. 324) by the late Prof. Boulger, who criticized the book from two points of view—its value as a text-book of botany generally and as one specially adapted for Indian students. We agree with the position taken up by him on both these points. The aim of the book is obviously to enable students to pass examinations, and that it has survived so many years is a comment on the persistence of a method of teaching which can excite little interest in the science on the part of the student. The look of the pages suggests a diet of marbles or something almost as indigestible, and, as Prof. Boulger pointed out, for the Indian student, who is given to learning by rote, the marshalling of many facts in short paragraphs with leaded head-lines is particularly unsuitable. The opportunity is still open for Mr. Sahni

to write a good Indian text-book on Botany for his students, and he will be well-advised if he does not attempt to put his new wine into the old bottles. It should be added that the chief alteration in the present edition is the addition of a supplement in the form of a chapter (separately indexed) on Evolution and Genetics, in which the student will find an explanation of the various terms in ordered paragraphs. A. B. R.

BOOK-NOTES, NEWS, ETC.

At the meeting of the Linnean Society on 14th December, 1922, Mr. W. O. Howarth read a paper "On the Occurrence of *Festuca rubra* in Britain," illustrating it with dried specimens. He enumerated several of the forms under Hackel's *F. rubra* as occurring in Britain, and suggested that both *F. heterophylla* Lam. and *F. dumetorum* Hack. non al. be considered as species altogether distinct from *F. eu-rubra*; that the latter, now named *F. rubra*, should include subspecies *fallax* and *genuina*; and that *F. rubra* var. *genuina* should include as varieties all the mentioned subvarieties and var. *planifolia*. Reasons were given for regarding Linnæus's *F. rubra* = *F. eu-rubra* var. *genuina* Hack.; Linnæus's *F. duriuscula* Sp. Pl. eds. 1 and 2) = *F. fallax* Thuill.; and Linnæus's *F. dumetorum* (Sp. Pl. ed. 2) = *F. eu-rubra* var. *genuina* subvar. *barbata* Hack. non al. Thus *F. dumetorum* Hack. is really *F. juncifolia* St. Am. Mr. H. W. Pugsley exhibited a series of specimens of British species of *Calamintha*, including a species new to this country. The involved nomenclature of the true Calaminthas, which were placed in the genus *Melissa* by Linnæus, was first alluded to, and reasons given for treating the three recognised British species as *Calamintha ascendens* Jord., *C. Nepeta* Savi, and *C. sylvatica* Bromfield. The new form, first found near Swanage, in Dorset in 1900 and again in 1912, was identified with *C. bætica* Boiss. & Reut., although showing differences in minor features, which were attributed to climatic influence. The salient characters of *C. bætica* were pointed out and contrasted with those of the other British species, and the geographical distribution of the new plant was indicated, with special reference to its interest as an additional unit in the Lusitanian element in the British Flora.

At the same meeting Dr. Lily Batten gave a condensed account of her paper on "The Genus *Polysiphonia*; a Critical Revision of the British Species, based upon Anatomy." British species of *Polysiphonia* show great diversity of habitat. Anatomically, the group is divisible into ecorticate and corticate species, and the attachment organ can be correlated with the anatomy of the species and the subtratum on which the plant is growing. Four main types are distinguishable:—(i) Ecorticate plant attached when young by rhizoids developed by longitudinal proliferation of basal siphons. Later, siphons of procumbent branches develop rhizoids, which may have discs at their distal ends, or may ramify among filamentous algæ without expanding or may be swollen to form haustoria. (ii) Species having a number of siphons or the beginning of cortication at the base, show elementary aggregation of the rhizoids to form one large

disc, the expanding tips of the rhizoids themselves interlocking mechanically. (iii) Stunted procumbent branches develop at the base of the plant, which function specially in the formation of attachment rhizoids. (iv) Corticate species having an upright habit develop a large disc-like expansion by the longitudinal proliferation of basal siphons and corticating cells. The genus is divided into thirteen ecorticate and eleven corticate species, and *P. spiralis* is described for the first time.

At the meeting of the Linnean Society on Jan. 18, Captain G. H. Wilkins gave an account of the Shackleton-Rowett Expedition in the 'Quest' to the Antarctic Regions. On St. Paul's Rocks no plants save a few algæ were found, but at St. Georgia, an island about 100 miles long and 20 miles broad, a considerable collection was made, though the flora is fairly well known; and reindeer thrive. Lichens and mosses only were observed on Elephant Island; Tristan da Cunha was visited and 16 species gathered; Gough Island is known from the 'Scotia' reports; the most conspicuous member of the flora is *Phylica arborea*, growing to 20 feet; a variety of *Sophora tetraptera* is now described. Tussock-grass, ferns, and *Empetrum* grow luxuriantly, and a new species of *Apium* allied to *A. australe* Thouars, but having broad cuneiform segments to the leaves, is described. The specimens have been presented to the British Museum by Mr. J. Q. Rowett. Mr. E. G. Baker followed with a *résumé* of the flora of Gough Island, 20 flowering plants and 10 ferns being now known from it. Amongst these may be named the endemic *Cotula goughensis*, *Hydrocotyle leucocephala*, *Gnaphalium pyramidale*, *Rumex frutescens*, and *Empetrum nigrum* var. *rubrum*. The only small trees on the island are the *Phylica* and *Sophora* previously mentioned.

Professor C. S. Sargent has completed his fifty years Directorship of the Arnold Arboretum, and has reprinted from its Journal an account of his stewardship. The Arboretum was established by funds bequeathed by James Arnold, a merchant of New Bedford, Mass., who died in December 1869, who "gave one and one-quarter of the twenty-four parts into which he divided his residuary estate" to trustees, by whom it was to be "applied for the promotion of agricultural or horticultural improvements or other philosophical or philanthropic purposes." "Two of the three trustees were interested in trees; ... it was natural that the idea of a scientific station for the study and cultivation of trees should have occurred to them, and they fortunately realized that such an institution could be permanently and safely controlled by Harvard College." An estate was acquired and Mr. Sargent was appointed Director: "he found himself with a worn-out farm, partly covered with natural plantations of native trees ruined by excessive pasturage, to be developed into a scientific garden with less than three thousand dollars a year available for the purpose." Of the various stages of that development and of the position which the Arboretum has now attained, the pamphlet under notice gives a full account. We may be permitted to congratulate Prof. Sargent on his great achievement, and on the fact that he has lived to celebrate and to chronicle its jubilee.

The Ferns of Bombay have hitherto failed to receive adequate attention from botanists and amateurs: this is probably to be explained, as the Rev. E. Blatter and J. F. d'Almeida tell us in their book about them (Taraporevala & Co., Bombay, price 7–8 r.), by the absence of ferns near the centres of human commerce and by the inaccessibility of the fern-forests during the rainy season. In the northern parts of the Presidency semi-desert conditions prevail, while in the southern parts, especially south of Mahableshwar, the rainfall is heavy and the fern vegetation luxuriant. Only a few scattered lists of the Bombay ferns have been published previously, the best being that of T. R. M. Macpherson containing 75 species, which appeared in Journ. Bombay Nat. Hist. Soc. v. p. 375 (1891). The present authors, following the classification employed by Beddome in his *Handbook of the Ferns of British India*, have furnished a total of 143 species, three-fourths of which are native to the Presidency. The rest are found in cultivation, being introduced from Madras or other parts of India, or from so far away as Fiji, New Zealand, South America; their inclusion in the book will be of great assistance to the student. The text is simple and easily understood, and the determination of specimens is facilitated by the number of keys. The numerous figures, though often roughly reproduced, are, like the photographs, of great help in showing at a glance those points of fern-morphology which words alone cannot adequately describe.

Parts 1 and 2 (printed as one) of vol. viii. of the *Transactions Mycological Society* contain an account of the Worcester Foray held last September, with a list by Miss Wakefield of the Fungi collected, of the Mycetozoa by Miss Lister, and of the Lichens by Mr. H. H. Knight, and the Presidential Address of Mr. Carleton Rea, who passed in review the work of the Society since its foundation in 1896. There are numerous papers, beginning with one on "The Parasitism of *Nectria cinnabarina* (Coral Spot), with special reference to its action on Red Currant" (with one plate), by Mr. J. Line; Mr. Ramsbottom reprints from Messrs. Charlesworth's Catalogue for 1922 his important essay on "Orchid Mycorrhiza" (7 plates), and Dr. M. C. Rayner writes on "Mycorrhiza in the Ericaceæ"; "An Eocene Microtheriaceous Fungus from Mull, Scotland" (1 plate), is described by Mr. W. N. Edwards; Mr. G. H. Cunningham writes on "A singular *Cordyceps* from New Zealand (*C. Kirkii*, sp. n.)" (1 plate); "The Structure and Affinities of *Leuconostoc mesenteroides*" are discussed by Mr. W. B. Crow; Dr. W. T. Elliott writes on "The Mycophagous Propensities of Slugs"; and Messrs. G. R. Bisby and A. H. R. Buller contribute a "Preliminary List of Manitoba Fungi." There is presumably some reason for the adoption of large black capitals for the headings of all the papers; but the effect is aggressive and ugly.

In the Annual Report of the Department of Agriculture, Pretoria, for the year ending with June, 1922, Miss Ethel Dodge, Acting Chief of the Division of Botany and Plant Pathology, gives a summary of the work in plant pathology and mycology. Miss Stent spent two months at the Kew Herbarium on a special study of South African grasses,

taking with her for determination some 500 specimens from the National Herbarium and 300 to 400 from Rhodesia; it was found that certain genera badly need revision, and copious notes were made for future work. The work of the Botanical Survey is summarised; Dr. Schönland reported on the invasion of *Helichrysum argyrophyllum*, on the Amatola Mountains, and suggested that the Survey should take steps to investigate means of restoring the veld to the original condition of a grass veld.

The *Kew Bulletin* issued in December (no. 9) contains papers on "Oospores in Cultures of *Phytophthora Faberi*," by S.F. Ashby; "The Fruiting of *Ginkgo biloba* at Kew," with plate, by W. Dallimore; "Buttresses as an Assistance to Identification," by T. F. Chipp; "The Occurrence of *Fusarium* in Uganda," by W. Small; "A Contribution to the Flora of the Near East," by W. B. Turrill (*Astragalus Durhamii*, sp. n.); and "Dunn's Wattle" (*Acacia Dunnii*) Turrill, sp. n.

The *Kew Bulletin* (no. 10), also issued in December, contains an unsigned article on the Efwatakala Grass of West Africa (*Melinis mimetiflora* Beauv.) with illustrations, in the course of which Dr. Stapf describes two new species, *M. effusa* and *M. tenuinervis*; an account of the Government Gardens, Sokoto, Nigeria; "New and Noteworthy South African Plants" (chiefly Acacias with six new species); and a list of the late George Massee's publications. Miss Roper reports that the experiment at Cleveden, Somerset, of planting *Spartina Townsendii* as a mud-binder has proved unsuccessful.

The *Supplément Botanique* to the *Revue Zoologique Africaine* (x. fasc. 3; Dec. 15) is devoted to "Notes on a Collection of Hepaticæ from Belgian Congo ex herb. R. Naveau, Antwerp," by Mr. W. H. Pearson, in which many new species are figured and described. We note that the volume which this number completes contains other botanical papers, which, in view of the title of the *Revue*, are likely to be overlooked.

The Government of the Gold Coast has issued a *Forest Officers' Handbook* for that region prepared by Dr. T. F. Chipp, who, before his appointment to Kew Gardens as Assistant Director, was Deputy Conservator of Forests. In addition to an account of the forests and of the climate in its relation to distribution, the Handbook contains notes on plants and trees of economic importance and an index of their botanical and native names, with twenty plates of the more important species. The Handbook is published by the Crown Agents for the Colonies, 4 Millbank, S.W. 1.

The second number of the *Japanese Journal of Botany* (National Research Council of Japan, Tokyo) contains a paper by M. Nishimura on "The Comparative Morphology and Development of *Poa pratensis*, *Phleum pratense*, and *Setaria italica*," with four plates, and a list by Y. Kudó, of the Labiates of Hokkaidó; abstracts of papers relating to Botany which have appeared in Japan from July 1921 to March 1922 are added.

THE

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EDITED BY

JAMES BRITTEN, K.C.S.G., F.L.S.

LATE SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM.

The Journal of Botany was established in 1863 by Seemann. In 1872 the editorship was assumed by Dr. Henry Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

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Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains.

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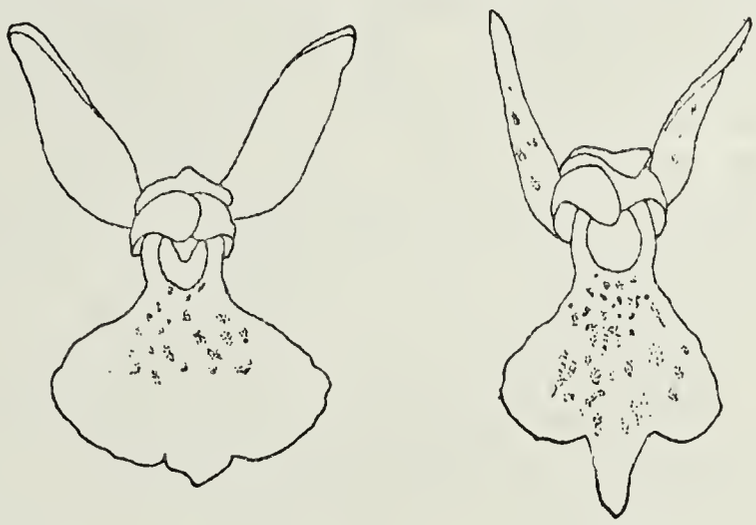
ORCHIS PRÆTERMISSA Druce.

By T. and T. A. Stephenson.

(Plate 566.)

Orchis prætermissa was described by its author in Rep. Bot. Exchange Club for 1913, 34, and its status and geographical range have been the subject of notes in each subsequent Report. In this Journal it has been discussed by Col. Godfery (1919, 137), and was by us briefly described and figured (1920, 257, tt. 556, 559). More recently Dr. Druce has described and named (Rep. B. E. C. 1919, 577) a var. *pulchella*, which is a distinct and beautiful plant.

O. prætermissa itself is not new. It has been well known to botanists all along, but has been referred to *O. latifolia* L. or (less frequently) to *O. incarnata* L. The claim of the plant to a distinct status has been contested, especially by the late Mr. Rolfe, who held (*Orchid Review*, 1920, 165) that *O. latifolia* is properly a species with unspotted leaves, seeing that Reichenbach had already separated (as *O. majalis*) the spotted forms from the *latifolia* aggregate. We cannot, however, agree with this contention; for, in all continental



A. B.

Orchis prætermissa, enlarged flowers.

floras we have seen, *O. latifolia* is still described as a plant with leaves usually spotted, and no large group of unspotted forms is separated, as far as our memory serves. In Ascherson and Graebner's Syn. Mitteleur. Flora, for example, there is a most elaborate analysis of the species, in which the first group is placed under *majalis*; but this includes a group with leaves little or not at all spotted. On the other hand, there are other groups or forms with unspotted leaves, but none that could be at all identified with *O. prætermissa*. Our own view is that *O. prætermissa* is a thoroughly well-marked and distinct species, whose segregation has helped materially to clear up the puzzling problems connected with the Marsh Orchids.

We shall only attempt to describe the forms sufficiently to distinguish them from their nearest neighbours, and especially from *O. incarnata*. As to habitat, they prefer damp situations, though they are not so often found in standing water as *O. incarnata*. In comparison with this species, *O. prætermissa* generally flowers about

a fortnight later, on the same ground. The tubers are palmate, and not long-tapering, as so often in *O. incarnata*. The stem is hollow in varying degrees, sometimes nearly solid, and scarcely ever so hollow as with *O. incarnata*. The height of the plant is very variable, from 2 to 7 dm.; the habit may be slender, but is more often robust. The leaves are *always* unspotted, as in *O. incarnata*, and may somewhat approach these in type, but on the whole they are very different, more spreading, less evenly tapered, often broadest above the middle, and of a more ovate-lanceolate type, though narrow-linear forms sometimes occur. They are usually not so fleshy in texture, nor so heavily keeled, nor have they the yellowish tint very often found in *O. incarnata*. They do not often come above the base of the spike, and rarely overtop it, though they often do in *O. incarnata*. The bracts are very variable, from very broad to somewhat narrow, more divaricate, scarcely ever curving inwards, as those of *O. incarnata* usually do. The flowers are usually purple in colour, but range from a soft dark crimson-purple to very pale lilac and white. This colour-range is quite unlike the *O. incarnata* series of maroon, flesh-tint, yellowish-pink, straw-yellow, rose, and dead-white; nor are the purples the same as those which are found in some groups of *O. incarnata*. The texture of the flowers is thinner than in those of *O. incarnata*. The flowers themselves are usually larger, the lips not at first reflexed, and usually broader than long. The side-lobes are very regular; the centre-lobe is distinct and rounded or sometimes bluntly wedge-shaped, and sometimes long and prominent, even pointed. The lip-markings are typically fine dots and streaks, very different from the line-pattern characteristic of *O. incarnata*. Measurements of a good many lips from various localities give lengths of 6 to 8 mm., with corresponding breadths of 7 to 12 mm.; this is very different from the almost equal length and breadth of *O. incarnata*, of which the great majority are about 7 mm. each way. The sepals are of the erect type, but not, as a rule, quite so completely turned back as in *O. incarnata*; the spur is usually nearly straight, and slightly longer and less stout than in *O. incarnata*. Where a plant has a pale lilac colour and grows near pale specimens of *O. incarnata*, a cross may be suspected; but we have seen some very pale plants which were otherwise of quite normal type.

The largest specimen we have seen is from the Isle of Wight, and was sent by the late Mr. Hunnybun. It was 7 dm. high, with a spike 14·5 cm. by 4 cm. and seven leaves, of which the longest was 2 dm. in length and the broadest 3·3 cm. in width; the two uppermost were bract-like, not reaching the base of the spike, the lower bracts large, much exceeding the flowers. The spur was about two-thirds as long as the ovary, rather shorter than usual, stout; the lip 8 mm. long and 10 mm. wide, with very regular side and centre lobes, the flowers purple, and the lip with fine spots. Dr. Druce mentions (Rep. B. E. C. 1917, pp. 53 and 159) a lusus *ecalcarata*, and a lusus *reversa*, having the ovary not twisted, also a sub-variety *albiflora*, from Berks. M. Sipkes has also named a var. *macrantha*, to which reference will be made later.

The var. *pulchella* is, in all respects except the flower, similar to the type. There may be, however, a larger proportion of slender

plants, with rather long narrow leaves, scarcely tapering until near the tip. The flower, however, is very different, being, by far the oftenest, of a rich, deep red-purple, quite like that of *O. purpurella*, with very heavy broken lines and blotches in darker purple on the lip, and sometimes on the sepals. The centre-lobe is small and rounded, or wedge-shaped, but we have not met with the long-tapered centre-lobes sometimes found in the type. Dr. Druce gives the colour-range as "bright tints of purple, purplish-rose, dark bluish-purple, rarely pale rose or white." The side-lobes are often angled or notched along their margin.

This form is obviously very dissimilar to all ordinary types of *O. incarnata*; but Dr. Druce has named as *O. incarnata* var. *pulchella* (Rep. B. E. C. 1917, p. 167) a plant with a similar flower, but with the habit otherwise of *O. incarnata*; this has been found in the New Forest.

On the relation of *O. prætermissa* to *O. latifolia* not much needs to be said. The habit is precisely similar; but *O. latifolia* is distinguished by the spots or rings on the leaves, which are almost always present, and by the very distinct lip-pattern of continuous lines. By far the greatest number of plants of *O. latifolia* have paler-tinted lips, often nearly white inside the lined pattern, not the soft purples or magenta of *O. prætermissa*, nearly always more slender spurs, and generally a different facies.

Both forms hybridise freely, crossing almost always with *O. Fuchsii* and *O. ericetorum* when they grow together. *O. prætermissa* × *O. ericetorum* has been named by Dr. Druce × *O. Hallii* (Rep. B. E. C. 1914, p. 24, and 1917, p. 157). There is no doubt that many of the plants called generally *O. latifolia* are such hybrids, though we still think that not all our British plants can be accounted for in this way; there appear to be some *latifolia* types which, whatever their origin, are stable and breed true. Hybrids of the type-form of the species have also been reported, resulting from crosses with *O. incarnata*, *O. latifolia*, *Gymnadenia conopsea*, and *Cæloglossum viride* × *O. maculata*. The last two forms are particularly interesting; the former was named by Dr. Druce × *O. Wintoni* (Rep. B. E. C. 1914, p. 25; 1917, p. 157, t. 10); the latter does not appear to have been named (see Rep. B. E. C. 1913, p. 342; 1914, p. 24; 1917, pp. 158, 172, t. 11).

The distribution of the two forms is being pretty well worked out for Great Britain. The type is prevalent in England and Wales, and the var. *pulchella* in Scotland. *O. prætermissa* is distributed over the whole area of England and Wales, wherever the ground is suitable, but occurs much more sparsely in Scotland, where it is occasionally found, as also in the Shetland Islands. Conversely, the var. *pulchella* is very plentiful in Scotland; it was for a long time called by Dr. Druce "Northern Incarnata," before its status had been more exactly determined; its occasional occurrence in England and Wales has been noted as far south as Surrey and Dorset. As regards Ireland, not much information is available. Mr. Praeger says that *O. prætermissa* is known to be frequent in the N.E., but apparently absent from E. and S.E.; the var. *pulchella* has also been found in N.E., but seems to be scarce.

The European distribution of the species has not yet been worked out. M. Sipkes, however (*De Levende Natuur*, June 1921), gave several stations in Holland, both for this species and for *O. purpurella* Stephenson. He has also named as *O. prætermissa* var. *macrantha* a form with a long narrow extension of the lip, which probably occurs in Britain as well as in Holland. The Dutch plants appear to have a higher proportion of pale lilac flowers than with us.

One further point needs to be noted, namely the relation of *O. pulchella* to *O. purpurella* Stephenson. In Journ. Bot. 1920, p. 164, where we described and named *O. purpurella*, we noted and discussed its close connexion with *O. pulchella*, with which at that time we had only a very slight acquaintance; since then we have seen a large number of specimens and studied it in the field. There is no doubt that the two forms are very near to one another, genetically, *O. purpurella* being a dwarf spotted relative of *O. pulchella*, just as the Scandinavian *O. cruenta* seems to be a dwarf spotted relative of *O. incarnata*. *O. pulchella* is much more abundant in Britain than *O. purpurella*; in some Scottish stations the two forms are found growing together. In the two Welsh stations so far noted for the most characteristic form (*a*) of *O. purpurella*, there is no trace of *O. pulchella*, though it is recorded from Towyn, not very far from Aberystwyth where the former occurs. There is no reason to think that *O. purpurella* is a hybrid. The two forms, *purpurella* and *pulchella*, appear to be mutants; quite possibly, though not certainly, the spotted dwarf species has arisen from the larger unspotted species. We have discussed this point in the previous paper, and are confirmed in that position by all we have since observed.

In a very interesting paper in Rep. B. E. C. 1921, p. 432, Mr. T. A. Dymes has analysed the characters of the seeds of the British Dactylorchids. Some of his material has been kindly placed at our disposal, including preparations of the seeds of *O. pulchella*, which is not touched upon in the paper referred to above. Following his method of diagnosis, we find that there is a marked difference between the seeds of *O. purpurella* and *O. pulchella*. The seeds of *O. purpurella* are the smallest of the group, with an abruptly-pointed apex, indented at the base, whilst those of *O. pulchella* are longer, with a rounded apex, only a little narrowed from the middle of the seed. This is in form precisely like those of the typical *prætermissa*, but for being a little more slender in the specimens which we have seen. Moreover, the seeds of var. *pulchella* agree with those of the type in having rather long loose testal cells, and not the closer mesh of *O. purpurella*, whose small rather dusky seeds are easily distinguished from all others of the group.

The plate from a photograph (t. 566) shows two of the many types of *O. prætermissa*. We owe it to the kindness of Mr. Marriott, of Ely. The plants are from Norfolk. Frequently the spike is much larger and looser than in the specimens figured. Of the enlarged single flowers A represents a common form of the type, and is from an Aberystwyth plant; B will be near to, if not precisely like, var. *macrantha*. It is from South Wales.

DR. STIRTON'S NEW BRITISH MOSSES REVISED.

By H. N. Dixon, M.A., F.L.S.

(Concluded from p. 52.)

Orthotrichaceæ.

Anœctangium marinum Stirt. in Ann. Sc. N. H. xviii. 244 (1909). (Corran, near Onich; Aug. 1908; and Ardgour, near Onich; Sept. 1908.)—I have examined these and several others of the packets. They are all fairly well-marked forms of *A. compactum* var. *pellucidum*.

Zygodon teichophilus in Scott. Nat. No. xv. p. 36 (1887).—This, as I understand it, is Stirton's name for the moss described by Schimper as *Z. Stirtoni* and by Lindberg as *Z. aristatus*.

Ulota scotica Stirt. in Ann. Sc. N. H. xiv. 106 (1905). ("Near Arisaig; 31 Aug., 1904. Publ. 17 Nov., 1904." And, "on branches of hazel, Kinloid Road, Arisaig; 20 July, 1906. The best form.")—The slight distinctions drawn by Stirton between this and *U. phyllantha* do not seem to be borne out by the specimens. Thus Stirton says "No basal marginal row of pellucid cells as in *U. phyllantha*." But I have found these cells well marked in the specimens. It is true that many leaves do not show them, but that is frequently or usually the case with this species. I can see nothing but a slight form of *U. phyllantha* at most. Stirton writes of the Kinloid Road plant "18 capsules, pale, short, with pink teeth"; and in Ann. Sc. N. H. xvi. 171, he describes the fruit at some length. But an examination of these capsules shows that they are entirely due to an intermixture of *Orthotrichum pulchellum*, and there are no capsules of the *Ulota* present. One would have thought that the pink colour of the teeth, to which Stirton refers, would have led him to their identity, but no doubt the somewhat crisped leaves misled him. Still an almost cursory examination shows the difference of foliation from the *Ulota*.

Orthotrichum prænubilum Stirt. in Ann. Sc. N. H. xix. 242 (1910). (Onich; 13 Aug., 1908.)—Stirton describes it as barren, but it has immature fruit. He relies on the strongly revolute margin and irregular apex of the leaves as the specific characters, but both apply exactly to either *O. affine* or *O. stramineum*; and the calyptra and vaginula show it to be the latter species.

O. prasinellum Stirt. in Ann. Sc. N. H. xix. 241 (1910). (Onich; Sept. 1908, on Elder.)—There is only one tuft, with a single imperfect capsule, of this. A further specimen is labelled "Onich; Sept. 1909. Type." But it is not type according to the data in the published description cited above. However, both specimens undoubtedly belong to the same species. Stirton compares it with *O. tenellum*, stating that the capsule is larger—which apparently is the only distinguishing character; I do not, however, find it so, and can see no difference at all from ordinary *O. tenellum*.

Timmiaceæ.

Timmia scotica Stirt. in Ann. Sc. N. H. xix. 238 (1910). (Ben Lawers; July 1855.)—Most of the plants are very small, and at first sight seem different from *T. norvegica*, to which, as Stirton recognized, it is closely allied, and to which he at first referred it. There do not, however, appear to be any distinguishing structural characters, and as there are forms intergrading with the typical plant among Stirton's specimens, I do not think it can be considered anything more than a stunted form of *T. norvegica*.

Bartramiaceæ.

Conostomum (?) *extenuatum* Stirt. in Ann. Sc. N. H. xi. 112 (1902). (Ben Lawers; 1864.)—It is certainly not a *Conostomum*. It is a *Ditrichum*, a very slender and fragile plant, and clearly belongs to *D. zonatum*.

Bartramia subvirella Stirt. in Ann. Sc. N. H. xvi. 176 (1907). (Onich, side of Hill Road; Sept. 1908. And Kyleakin, Skye; Aug. 1910.)—Stirton speaks of this as a frequent moss in Scotland, distinct from *Breutelia arcuata* in colour, arrangement of leaves, &c. He has placed specimens of the two side by side, and at first sight they certainly appear distinct; *B. subvirella* having yellowish leaves, more closely set, not widely spreading, rather patent than squarrose, while *B. arcuata* is bright green with more distant leaves strongly horizontally squarrose. In looking through a good series of *Breutelia arcuata*, however, I find the *subvirella* form quite frequent and widely distributed, and clearly intergrading with the other form; and I have many plants which I should not know how to place, were the two separated. The few structural characters given by Stirton are not borne out by the plants; the basal cells are certainly no different, the leaf-base is scarcely if at all different, and there is no difference, as suggested, in the plication. *B. subvirella* can only be looked upon as a slight and ill-defined form of *B. arcuata*.

Philonotis heterophylla Stirt. in Ann. Sc. N. H. xvii. 173 (1908).—No specimens are so-named, but "*Bartramia* from summit of Ben Lawers, like *B. adpressa* (new)," is evidently the original, though the date on the packets is 1865, while in the description it is 1867. There are no other packets of *Philonotis* from Ben Lawers which could possibly apply to this, and a small bit enclosed in one of the packets is labelled "Ben Lawers, July 1867," and is certainly the type. In none of the specimens can I see the slightest difference from *P. adpressa*, nor in the description; though Stirton says "the distinctions are manifest." The distinctions noted between the form and areolation of the lower and upper leaves merely reflect the true nature of *adpressa* as a derivative of *P. fontana*, and are quite usual.

Bryaceæ.

Pohlia tenerrima Stirt. in Ann. Sc. N. H. xvii. 174 (1908). (Back of Keppoch, near Arisaig; Sept. 1906.)—Stirton has been taken in by the sterile form of *Archidium alternifolium*. As in the

case of the *Diphyscium*, it is "the sort of thing that might happen to anyone."

Bryum elegantulum Stirt. in Scott. Bot. Rev. i. 92 (1912). (Lovedale, near Gairloch, Ross-shire; Aug. 1911.)—Stirton compares this with *B. argenteum*, but a glance at the tufts shows that it has no close affinity with this. It is pale green, with very close, slender stems and large axillary gemmæ in their upper part. It is, I think, practically identical with *B. Barnesii*, and I should refer it, with that, to *B. atropurpureum* var. *gracilentum* Tayl. (which, it must be confessed, is a somewhat heterogeneous collection!). It differs from the ordinary forms of that—like *B. Barnesii*—in the point of the upper leaves being longly acuminate, but in other characters it comes very near *B. atropurpureum*.

B. intortulum Stirt. in Trans. Bot. Soc. Edinb. xxvi. 428 (1915). (Near Plockton, Ross-shire; Sept. 1914.)—This is one of the forms of the very variable *B. pseudo-triquetrum*; the ♂ plant, tall, luxuriant, with narrow, rather flaccid leaves—with, in fact, more of the habit that one associates with *B. bimum*, but it is, according to Stirton, dioicous. Such forms may be seen in most large collections. Spruce, Musc. Pyren. 129, is a very similar one. It may be the var. *angustifolium* Lindb., which I have not seen. It is quite a marked plant in habit, but only departs from type in habit and narrowness of leaves.

B. leptaleum Stirt. in Ann. Sc. N. H. xii. 113 (1903). (King's Seat, near Killin; D. Haggart, 1901.)—Stirton compares it with *B. barbatum*, which he says has much larger leaves and larger cells; this is to some extent true, but the difference does not go much beyond that. It is certainly only a rather better marked form of *B. capillare* var. *elegans* than *B. barbatum*. The areolation is sometimes very regularly and prettily hexagonal.

B. obrutum Stirt. MS. in herb. Two specimens under this name are rather interesting; the first (Ben Voirlich by Loch Lomond, 1864) appears to be a form of *Webera Ludwigii*; but it may possibly be a slightly altered form of the second (Ben Lomond; July 1864) which is, I think, without doubt a robust form of *Webera cucullata*; the perichætial leaves, which are present, narrow and with narrow cells, seem to belong here, while the leaves have the catenulate arrangement, wide, subcucullate apex, and thin-walled cells characteristic of the species.

B. parasemum Stirt. in Ann. Sc. N. H. ix. 178 (1900). (Sands near Stevenson; 1863.)—The leaves show a good deal of variation in apex, mostly very cucullate and obtuse; large single gemmæ very frequent in the leaf-axils. It has every appearance of being an abnormal form of some common species, either *B. argenteum* or *B. atropurpureum*; the stems are less than 1 cm. high.

B. perpusillum Stirt. in Glasgow Nat. vi. 38 (1914). (Lovedale Woods, near Gairloch; July 1911.)—This is a *B. argenteum* form; stems an inch in height, dark green; leaves chlorophyllose almost or quite to the apex, highly cochleariform, mostly apiculate or cuspidate. It would come under var. *majus*.

B. rubicundum Stirt. in Trans. Bot. Soc. Edinb. xxvi. 246 (1914).

(Plockton, Ross-shire.)—This is a very beautiful plant, whatever its position. It is in very dense, compact tufts, tomentose below, and beautifully variegated with green and deep vinous red. The leaves have much of the character of *B. obconicum*, but are narrower, often extremely narrowly and longly acuminate, with the nerve excurrent in a long glossy arista, usually about half the length of the leaf, occasionally equalling the whole length. The leaves when dry are shrunken, and somewhat twisted, but not as a rule spirally contorted; here and there, however, a stem has them distinctly spirally twisted, and the relationship to *B. capillare* is thereby marked. The areolation is also much like that of *B. obconicum*, but the border is extremely wide, of strongly incrassate cells, and is therefore very conspicuous. I think the plant may well take rank as a subspecies of *B. capillare*, but its affinity with that, and especially with the subsp. *B. obconicum*, is too close, I think, to allow of independent rank. I have what must be considered the same plant from Llangollen, coll. Prof. Barker; the leaf-form and structure are identical, but the colouring is not marked.

B. rubricosum Stirt. in Ann. Sc. N. H. vi. 121 (1897). (Summit of Ben Lawers; July 1864.)—This is *Bryum pallens* var. *speciosum* Schimp.

Mnium gracilentum Stirt. in Ann. Sc. N. H. xvii. 173 (1908). (Ben Lawers; July 1863; very near summit.)—Stirton considers this near *M. orthorrhynchum*, and quite correctly; it is a small dense form of *M. lycopodioides*, such as one might expect at that altitude and exposure.

Leucodontaceæ.

Pterogonium gracile var. *punctellum* Stirt. in Ann. Sc. N. H. ix. 181 (1900).—Numerous specimens occur in the herbarium of this, which is based on the presence of spicules or papillæ on the back of the leaf. But this is not, as Stirton supposed, a peculiarity of the Scottish plant. I have found them normal in all the specimens I have examined from all parts of Britain; and, though they were overlooked by Schimper and other continental authors, the later writers (Hagen, Limpricht, Brotherus) describe the leaves as normally papillose or spiculose. It is, in fact, a specific—or rather a generic—character.

Hypnaceæ.

Climacium epigæum Stirt. in Ann. Sc. N. H. xix. 240 (1910). (Ben Lawers; July 1855.)—Stirton compares it with *C. americanum*. But that is distinguished by the dilated auricles and leaves markedly plicate, and this has neither!

There is only one poor stem, an inch and a half high, with about five short branches. It appears to me to differ in no way from *C. dendroides*.

Isothecium interludens Stirt. in Ann. Sc. N. H. ix. 178 (1900). (Ben Ledi; 1864. A. McKinlay.)—This is my *Eurhynchium myosuroides* var. *brachythecioides*. Stirton has indeed identified a specimen of that var., which I sent him, with his species. Had I

known of the identity at the time, I should have adopted his name for the variety.

He has it from numerous localities in the Western Highlands, keeping its characters well.

I. persimile Stirt. in Ann. Sc. N. H. xiv. 107 (1905). (Ben Sleoch, Loch Maree; July 1870.)—This plant gave me a great deal of trouble, as it had a close resemblance to some of our species, not only to *Isothecium myurum*, with which Stirton compares it, but also, in habit, and indeed in nearly all characters but the smooth cells, with *Pterigynandrum filiforme*. An examination of the single fruit, however, and especially of several perichætia found on the stem, revealed its identity without any doubt. It is a New Zealand moss, *Camptochæte gracilis* (H. f. & W.) Par. Its presence in Scotland would be quite unthinkable, and there can be no question that the labelling has been confused. If any confirmation were needed of the true origin of the specimen, it would be found in the fact that the specimen is mounted on a square of thick, rather peculiar paper. Now I have not found any of Stirton's specimens so mounted with the exception of one, "*Brachythecium intermixtum*," which is mounted on a similar piece of paper of precisely the same material, and that plant, on examination, proves also to be a New Zealand species. (See under *Hypnum intermixtum*.)

I. subglaciale Stirt. in Ann. Sc. N. H. ix. 179 (1900). ("*Isothecium myosuroides* * *subglaciale*. Ben Ledi; 1862.")—I quite subscribe to Stirton's later view of subordinating it to *Eurhynchium myosuroides*; but I cannot see in it more than a form of that species.

I. symmictum Stirt. in Ann. Sc. N. H. ix. 179 (1900). (Ben Lawers; July 1864.)—This is a rather stout form of the ubiquitous and polymorphous *Brachythecium plumosum*.

Brachythecium. See under *Hypnum*.

Plagiothecium annotinum. See *Hypnum annotinum*.

P. Kinlayanum Stirt. in Ann. Sc. N. H. xiv. 104 (1905). (Ben Lawers; July 1864.)—Is *P. denticulatum* var. *obtusifolium*.

P. Muellerianum c.fr.—(*a*) Onich; Sept. 1909. This is *P. pulchellum*.—(*b*) "Near Plockton, Ross-shire; Aug. 1912. 3 young capsules enclosed in white paper." No capsules were enclosed, but the plant is *P. striatellum*.—(*c*) "Plockton, Ross-shire; Sept. 1913. A form of *P. Muellerianum*." This is *P. elegans*. Stirton evidently did not know *P. Muellerianum*, and the fruit of that species still remains to be found in this country.

P. piliferum c.fr. Stirt. in Ann. Sc. N. H. xv. 112 (1906).—The specimen in Stirton's herbarium from Ben Voirlich under this name, however, is not *P. piliferum*. The leaves are not concave, they are rather gradually acuminate, and the margin though usually entire has occasionally a fine tooth at base of acumen, just as in *P. elegans*. It is certainly that species.

P. rufo-virescens Stirt. in Ann. Sc. N. H. xix. 242 (1910). (Near Arisaig; Sept. 1907. Old forest.)—I do not think this can be separated from the highly variable *P. denticulatum*. It is an erect, robust, yellowish form, with shortly pointed leaves, strongly

recurved margins, and wide cells. It is probably *P. Ruthei* var. *rupincola* Limpr., which seems referable to var. *majus* Boul.

P. trichodeum Stirt. in Ann. Sc. N. H. xv. 113 (1906). (Ben Lawers; 1864.)—A small form of *P. denticulatum* with rather narrow leaves, somewhat more longly acuminate than usual. I can match it quite well with plants from the Midlands and elsewhere.

Amblystegium geophilum Stirt. in Ann. Sc. N. H. xvii. 175 (1908). (Port-na-Murrich, near Arisaig; 4 Sept., 1907.)—This is a small, erect, dense form of *Hypnum chrysophyllum*; quite a marked form and worth varietal rank, but it must undoubtedly, I think, be placed under var. *erectum* Bagn.

A. perminimum Stirt. in Ann. Sc. N. H. xvii. 175 (1908). (Rudh-point, near Arisaig; 26 Sept., 1906. Type-specimen.) (Loch Killisport; Sept. 1899.)—Stirton gives no locality in his description; only "in three localities"; "in sandy ground near the sea." The Arisaig plant must therefore be taken as the type. It is a very well-marked plant of *A. serpens* var. *depauperatum* Boul., a pretty form, with branches and leaves very homogeneous and regular. This variety, however, seems better sunk in var. *salinum* Carr. The Loch Killisport plant is a slightly different form of the same thing, and is nearer to the original form of var. *salinum*.

Hypnum amœnum Stirt. in Ann. Sc. N. H. ix. 180 (1900). (Ben Lawers; July 1886.)—Is an alpine form of *Brachythecium rivulare*; perhaps var. *latifolium* Husn. or approaching it.

H. annotinum Stirt. in Trans. & Proc. Bot. Soc. Edinb. xi. 75 (1873). (Ben Lawers; July 1863.)—Is *Plagiothecium denticulatum* var. *obtusifolium*.

H. anomalum Stirt. in Ann. Sc. N. H. xv. 112 (1906). (Ben Lawers; July 1864.)—Stirton compares this with *H. distans*, i. e. *Eurhynchium Swartzii*. It is quite indistinguishable from that species. The only character he suggests, which appeared to him anomalous, that of the asymmetry of the leaf-base, is quite normal for the prostrate branches of *E. Swartzii*. Several leaves of this form will be found among those figured on the two plates (524, 525) of *Eurh. prælongum* (i. e., *E. Swartzii*) in the Bry. Eur.

H. corrugatulum Stirt. in Ann. Sc. N. H. xvi. 180 (1907). ("On poplar trees, about 6 to 8 feet from the ground; Loch Awe; Sept. 1896." As *H. triquetrum* var. *corrugatulum*.)—The corrugation of the leaves is very marked on some branches, very light on others. It is probably a form or state, possibly pathological, rather than a stable variety; it is a character not infrequent, sporadically, among various pleurocarpous mosses. Cf. *H. intortum* below. A second specimen (Rhu Road, Arisaig; 24 Sept., 1906) shows the same inconstancy of the character.

H. deflectens Stirt. in Ann. Sc. N. H. xix. 243 (1910). (Near Arisaig; Aug. 1907; on a large ash tree.)—This is a rather striking form of *H. cupressiforme*, of an unusual habit; but certainly nothing more.

H. intermixtum Stirt. in Trans. & Proc. Bot. Soc. Edinb. xi. 75 (1873). (*Brachythecium intermixtum*; Ben Lawers; 1866.)—This is without any doubt *Brachythecium paradoxum* (H. f. & W.)

Jaeg. from New Zealand, which Stirton has got mixed up with his Scotch specimens. *Cf.* note on *Isothecium persimile* above.

H. intortum Stirt. in Trans. & Proc. Bot. Soc. Edinb. xxvi. 246 (1914). (Plockton, Ross-shire; Sept. 1913.)—I do not understand on what characters this is based, except on the long corrugated leaf-points. It seems to me a very ordinary form of *H. molluscum*, which frequently has the subula crinkled—much more so, very often, than here.

H. provectum Stirt. in Ann. Sc. N. H. xi. 110 (1902). (Killin (near); Sept. 1901). (Var. *minusculum*; Ben Lawers; 1864. And many others.)—These are all forms of *H. molluscum*, some or most being var. *condensatum*.

H. recurvulum Stirt. in Ann. Sc. N. H. ix. 180 (1900). (Largs, Ayrshire; 1869; on boulders near sea.)—This is a lax form of *Ceratodon purpureus*. There is a single pure tuft, so that there is no question of a mixture of plants. The description, it will be found, is quite applicable.

H. teichophilum Stirt. in Ann. Sc. N. H. xvi. 177 (1907). (Garscube, near Glasgow; 5 Nov., 1906.)—This cannot be separated from *H. cupressiforme*.

SUDRE'S 'RUBI EUROPÆ'*.

By the Rev. H. J. Riddelsdell, M.A.

Several points leap to the mind at once, on a first glance at this volume. One is, of course, the beautiful get-up. Making allowances for an inevitable bulkiness—it is no hand-book—the absolute clearness of print and of arrangement, and the delightful drawings (which constitute more than half the bulk) immediately bespeak favour. There is a completeness about it which in no way detracts from its ready usefulness.

Then, again, the diligence that lies behind such a piece of work is staggering to the imagination. The introduction is not dated; but the volume (which is not dated) was published in parts at intervals from 1908 to 1913. If the introduction was written in 1908, then it was in 1893 that Sudre began the study of *Rubus*: and the whole volume is the result of only twenty years' work. Dried specimens were diligently amassed from nearly all the countries of Europe; he must have examined enormous numbers of them; seeds were planted and grown on; the literature of the subject was worked through; and numerous preliminary studies published.

Once more, there can be no doubt of the originality of Sudre. He was never content to accept a view. He was never afraid to give his own opinion. And, moreover, there is much to say for his arrangement and grouping of the European forms. He has got hold of some good leading ideas, *e.g.* the condition of the pollen in a given form, the area of its distribution, and so on; and used them to

* *Rubi Europæ, vel monographia iconibus illustrata Ruborum Europæ.* Paris, 1908–1913. Pp. 305, 215 plates.

decide which are to be accepted as central or leading forms in every group. One cannot help feeling that here at least logic and cold intellect have done their best.

And yet, on closer study, doubts persistently recur. The numerous misprints, though a disfigurement, are perhaps inevitable. But the drawings!—no living bramble ever looked so neat and perfect in arrangement. The ring of stamens, all absolutely on a level; the tidy sepals all exactly in place; the whole look of it is not that of a living thing. The pictures would do well for a stained-glass window: they are artistic, but in spite of accuracy of detail, they are not scientific.

Again, the diligence and the logic seem to be more than a little misplaced. Students of brambles are constantly reminding us that the subject can only be properly studied in the living plant; and the fact that Sudre depends wholly on exsiccata for our British forms at once makes one extremely shy of taking his view in preference to Focke's, for the latter has seen a very large proportion of our forms in the life. Sudre's circumstances may have prevented him from travelling outside France—at any rate, he does not appear to have done so; and the fact at once makes one doubtful of many of his conclusions.

Again, as I have gone through the book page by page, I have almost come to the conviction that he has often described new forms from a single dried specimen. This, of course, I cannot prove; but the suggestion is almost overwhelming; and how unsafe the procedure is, even elementary study shows. I am sure that I could present him with specimens taken from one bush in different years to which he would give different names. I should therefore venture seriously to doubt whether he is justified in saying that a given sheet published in the British Rubi contained more forms than one. And, again, there are clear cases where he describes as a distinct variety—*e. g.*, var. *laxus*—what is only a shade-grown specimen. And, above all, Sudre is far too ready to assign, without hesitation, a definite hybrid origin to distinct forms. The results produced are sometimes amusing: e. g., *R. raduloides* Rog. is, in Sudre's opinion, *echinatoides* × *apiculatus* (i. e., *anglosaxonicus*), regardless of the fact that it grows, *e. g.* here in N. Oxfordshire, in fine typical form, in spots where neither of its parents is known. *Marshalli*, again, is *Babingtonii* × *fusco-ater*, though very good *Marshalli* occurs in counties where neither of the latter exists. In the many cases where he has seen probable hybrids growing in France, and so records them, he is on far safer ground.

On comparing his results with Focke's (published in 1914), and especially his views of British plants, one cannot help feeling that Sudre's suffer not only because he has not seen our plants in the living state, but because his mind is mediæval. He has tried completely to reduce the subtleties of nature to paper classification. Every variation merits a description and receives a name (of course, this is true only so far as his materials go). And it will not work.

Focke admits that it is impossible yet to get at the complete harmony which will include both his work and Sudre's; there is not

sufficient material for it. And there is another consideration to be borne in mind. The two savants start from different centres, and group their experience each round his own centre. Of course, both methods are worth studying, but they cannot produce the same results—and neither can be final.

Britain is, of course, in close relation with both France and Germany; and if I prefer Focke's results to those of Sudre, it is not due to any reasoning from the nature of the case, but partly to Focke's sounder methods and more slowly developed experience, and still more to the results of such tests as I am able to apply. To take an example: Sudre disallows *R. scaber* Whe. & Nees as a British plant, though he sees that Focke knows the species. Focke, however, saw the plant growing in England, on the very spot from which No. 124 in the set of British Rubi was gathered, and named it *scaber*. Sudre, from the *dried* specimen (No. 124) places our English form in an entirely different subsection (under *foliosus*), as *R. conspectus* Genev.! I have, moreover, in my herbarium one of Focke's own Minden specimens named *scaber* by him, and it is identical in every respect with a Middlesex gathering of my own.

R. nemoralis P. J. Muell. is an exactly parallel case, and I own myself entirely at a loss to understand why he identifies *R. affinis* var. *Briggsianus* Rogers with *R. holerythros* Focke.

This sort of detail could be greatly amplified. But it is more profitable to say in conclusion that while I am sure that, as Moyle Rogers himself asserted, our British *Rubi* need some rearranging in themselves, and, still more, need to be correlated more completely with Continental forms, Focke is a far safer guide to British students than Sudre.

SPITSBERGEN LICHENS *.

By Robert Paulson, F.L.S.

The following notes refer to lichens collected by Mr. Victor S. Summerhayes during the months of June and July on the occasion of the Oxford University Expedition to Spitsbergen 1921.

The specimens represent 27 genera and 68 species. With the exception of a very small number, which were crushed owing to their excessive brittleness when thoroughly dry, the collection is in excellent condition. It exhibits no traces of mildew, and no decided loss, or change in colour, due to the process of drying. Owing to the fact that two or three species of lichen are often attached to one stone, it has not been possible to place each of the species upon a separate mount for herbarium purposes.

Most of the lichens are healthy, well-developed specimens and many are abundantly fertile as, for example, *Lecanora epibryon*, *Lecidea lapicida*, *Buellia disciformis*, and *Microglæna sphinctrinoides*; but the most interesting feature respecting the healthy development is that of the numerous examples of sporulation that one meets with in the gonidia of several species. From what we already

* Results of the Oxford University Expedition to Spitzbergen, No. 26.

know of the formation of spores in the algal symbiont, we should expect that, if it took place at all in lichens growing in the higher latitudes of the north, it would exhibit itself as being most active in material collected at the end of June.

In addition to observing various phases of sporulation, we have noted in several thalli a greater number of empty gonidia than we find in similar British species at the period when multiplication of the algal cells is most active, but we have failed to discover frequent cases of hyphæ within colourless (empty) cells, or any case of penetration of hyphæ into living gonidia.

The principal lichen habitats on which the material was gathered are summarised below :—

Bear Island, 74° 35″ N. and 19° 0″ E.

(*a*) Small mounds, upon limestone, situated at heights varying from 50–400 feet, and covered with a closed dry vegetation consisting of many phanerogams and mosses.

(*b*) A thick moss carpet of *Hypnum uncinatum* Hedw. with *Salix polaris* in slight depressions, the altitude being from 200–300 feet.

(*c*) A *Rhacomitrium lanuginosum* heath about 70 feet up, near boulders. It consisted of a dry thick mat of mosses with many lichens.

(*d*) The exposed surfaces of large boulders piled up into screes. The lichens were mostly at a height of 1200 feet on Mt. Misery (Spirifex limestone).

Prince Charles Foreland, between 78° and 79° N. and 12° to 13° E.

(*e*) The bare shingle of a raised beach with practically no soil and with very few phanerogams, 30 feet above sea-level.

(*f*) A part of the above beach where much sand was deposited; *Cetraria islandica* f. *tenuifolia* and *C. hiascens* were abundant.

(*g*) Wet mossy slopes, on a hill, with few flowering plants; the lichens grew at the top of moss hummocks.

(*h*) The mossy edge of "polygon areas" * at a height of 70–80 feet. Most of the lichens were at the top of small moss ramparts.

(*i*) From all sorts of places on mountain slopes, collected by Mr. Julian Huxley at a height approximately 1250 feet.

The genus *Cladonia* ranks high, not only in respect of the quantity of material collected but also in the number of species represented. *C. pyxidata* is possibly the commonest *Cladonia* found in high northern latitudes, as shown by the results of this, and of former arctic expeditions †. The specimens, however, are deformed, discoloured, and starved to a much greater degree than any other lichen in the collection. *C. furcata* var. *spinosa* Leight., not hitherto recorded from Spitsbergen, is considerably discoloured and is sometimes almost black. *C. rangiferina* and *C. sylvatica* are evidently abundant in Bear Island and on the damp slopes of Prince Charles Foreland, but from the present collection it is not possible to state

* Holmsen, G., "Spitsbergens Natur og Historie," reprinted from Ymer H. I. 1909.

† "Report of the Second Norwegian Arctic Expedition in the 'Fram,' 1898–1902, No. 21," Otto v. Darbishire, pp. 27, Kristiania, 1909.

definitely which of the two is the more common. From the evidence of several of the packets, it would appear that *C. sylvatica* is the more frequent, for it often occurs in small quantity associated with the principal lichen of the sample. This being the case, the condition is similar to that which exists in Norway, for it has been recently stated that in the northern part of this country *C. rangiferina* is not so common as *C. sylvatica*, and also that *C. alpestris*, which is the lichen most generally harvested for reindeer fodder, is a lowland species compared with the other two *. We note that this last-named lichen is not among the material of the collection.

The genus *Cetraria* is represented by well-developed specimens of *C. nivalis*, *C. islandica*, *C. hiascens*, and *C. aculeata*. They form a most conspicuous feature of the lichen flora of Bear Island and Prince Charles Foreland. The examples of *C. islandica* are not so luxuriant as those of the other three species, they are small as regards height and never broadly sub-foliaceous. It is the form *tenuifolia* of this lichen, and the narrow cespitose *C. nivalis* and *C. hiascens* that grow frequently and in abundance.

Lecanora tartarea is almost ubiquitous. It appears not only in large broad patches covering other plants but also in snow-like flakes on mosses and other lichens, the latter merely indicating new centres of growth. Its habit of developing fantastic forms by entirely incrusting small plants, mostly mosses, produces specimens that have proved puzzling to identify. So much has this been the case that a specimen of *L. tartarea*, collected in Newfoundland, similar in every respect to the growth from Spitsbergen, was named *Roccella Grayi*, nov. sp., 1883. It does not appear to have been noted since. It is possible to demonstrate by means of thin sections that the growths are in both cases the result of *L. tartarea* closely incrusting mosses. At certain points in the specimens there arise crowded whitish-green groups of irregularly spherical swellings, each with a diameter approximating ·5 mm., and from most of these are produced five to six slender, cylindrical, slightly curved branches averaging 5 mm. in length. These branches are pinkish white in colour, corneous in texture, and have frequently a darker core of foreign matter, moss, grass, etc. They are arranged in a pectinate form and the extremity of a branch is frequently compressed.

This growth is regular and frequent among the Spitsbergen material. It is an extreme spinulose form of *L. tartarea* var. *frigida*.

Among the specimens of *Solorina bispora* there is one (No. 13 *e*) in which the size of the spore, 100–104 μ, greatly exceeds the measurement recorded for those of the normal species, which is diagnosed as having spores 65–88 μ long × 33–42 μ thick.

It is perhaps not advisable to consider this lichen as representing a new species, seeing that only one small specimen has been collected; but a spore exceeding by 16 μ that of the greatest length usually recognised as belonging to *Solorina bispora* is not an inconsiderable character in determining a species. It is, for the present, designated var. *spitsbergensis*. Measurements taken at random from typical specimens of Spitsbergen material, collected on Bear Island and in

* "Studies on the Lichen Flora of Norway," Kristiania, Bernt Lynge, 1921.

Gips Valley, gave 88 and 68 as maximum and minimum lengths of spores respectively.

On a small fragment of moss (no. 14 *c*), Bear Island, a specimen of *Placodium cerinum* is growing. It resembles in its scanty membranous thallus and small apothecia *Placodium cerinum* var. *stilicidiorum*. There is, however, a difference in the yellow-orange colour of the apothecium, and the thallus can scarcely be described as leprose. This, the only fragment of its kind in the material, is an interesting specimen with 14 apothecia growing over the stem of a moss which is less than 2 cm. long.

I take this opportunity of thanking Miss A. Lorrain Smith for her valuable help in identifying the parasitic fungi upon the specimens, and for suggestions respecting the determination of critical species.

Systematic List.

The nomenclature is that of Miss Lorrain Smith's *Monograph of the British Lichens*. The number of lichens in the collection that are not included in the British flora is remarkably small, approximately 5 per cent.

An asterisk denotes that the lichen has not previously been recorded for Spitsbergen; localities are indicated by numerals:— 1, Bear Island; 2, Prince Charles Foreland; 3, Gips Valley; 4, Advent Bay.

Sphærophorus globosus Wain. 1, 2, on earth among moss.

Placynthium nigrum S. F. Gray 3, on rock.

Ephebe lanata Wain. 3, on rock.

Psoroma hypnorum S. F. Gray 1, 2, on moss.

Peltigera apthosa Willd. 1; *P. canina* Willd. 1; *P. malacca* Fr. 2; *P. rufescens* Hoffm. 1: all on earth.

**Solorina bispora* Nyl. 1, 3; *S. crocea* Ach. 1, 2, on earth.

Parmelia alpicola Th. Fr. 2, on rock; *P. omphalodes* Ach. 1, on moss.

Cetraria aculeata Fr. 1; *C. hiascens* Th. Fr. 1, 2; *C. islandica* Ach. 1, 2; *C. nivalis* Ach. 1, 2, 3: all, over earth with moss.

Usnea sulphurea (Koerb.) Th. Fr. (=*Neuropogon melaxanthun* Nyl.). Advent Bay, on rock.

Alectoria bicolor Nyl. 1, on rock; *A. divergens* Nyl. (Herdmansen Island), on earth; *A. nigricans* Nyl. 1, on rock; *A. ochroleuca* Nyl. 1, on earth.

Cerania vermicularis S. F. Gray 2, 3, and var. *taurica* A. L. Sm. 3, on earth. The variety has a well-developed thallus, which is markedly turgid, suberect, slightly recurved, cornute, and pointed at the apices.

Xanthoria parietina Th. Fr. 1, 2, 3, on rock.

Placodium cerinum Hepp. 1, on moss; *P. elegans* DC. 1, 3, on rocks; *P. murorum* DC. 3, on wood; *P. rupestre* Branth & Rostr. var. *calvum* A. L. Sm. and f. *incrustans* A. L. Sm. 1, on calcareous rock.

**Physcia pulverulenta* Nyl., over moss; *P. lithotea* Nyl. 3, on rock.

Rinodina demissa Arn. 3, on a stone=*Rinodina exigua*, saxicolous form.

Lecanora atra Ach. 4, on rocks; *L. epibryon* Ach. 1, 3; *L. galactina* Ach. subsp. *dispersa* Nyl. 2, on siliceous rock; *L. polytropa* Schær. and f. *alpigina* Leight. 2, on siliceous rock; *L. tartarea* Ach. var. *frigida* 1, 2, 3, over mosses and other lichens.

Gyrophora erosa Ach. 1, 4; *G. hyperborea* Ach. 1; *G. proboscidea* Ach. 2. We note the absence of *G. arctica* Ach. from the collection.

Stereocaulon alpinum Laur. 1, 2; *S. denudatum* Floerke 2, on siliceous rock; *S. paschale* Fr. 1, on earth among moss.

Cladonia bellidiflora Schær. 1, on earth; **C. cervicornis* Schær. 2. This agrees with Wainio's description of *C. verticillata* var. *cervicornis*, and as *C. verticillata* has not been recorded among Spitsbergen lichens, the asterisk is attached; **C. foliacea* Willd. 1; **C. furcata* Schrad. var. *spinosa* Leight. 1, 2, 3, and var. *surrecta* Floerke 2; *C. gracilis* Willd. 1; **C. lepidota* Nyl. 2—this lichen has probably been included in previous records under *C. degenerans* Spreng: the specimen is in excellent condition and is sufficiently distinct to be included under Nylander's species; *C. pyxidata* Hoffm. 1, 2, 3; *C. sylvatica* Hoffm. 1, 2; *C. rangiferina* Web. 1, 2; *C. rangiformis* Hoffm. 1, 2—these occur generally on earth and mixed with moss.

Lecidea confluens Ach. 1, 2, on stones; *L. goniophila* Schær. 2, on rocks; *L. lapicida* Ach. var. *declinans* Nyl. 1, 2, on a stone; **L. sanguineoatra* Ach. Sassen Valley, over moss.

L. vernalis Ach. 1, 2, over moss.

Bilimbia sabulosa Massal var. *montana* A. L. Sm.=*Toninia syncomysta* (Floerke) Th. Fr. (Th. Fr. Scand. p. 335) 1, on the ground with mosses.

Buellia disciformis Mudd. 2 and var. *trifragmia* Boist. 2, 3, on stones; *B. sororia* Th. Fr. 2, on stones.

**Rhizocarpum distinctum* Th. Fr. 2; *R. geminatum* Koerb. 2; *R. geographicum* DC. and var. *atrovirens* Koerb., all on rocks or stones.

Verrucaria nigrescens Pers. 1, on stones.

Thelidium pyrenophorum Massal. 2, 3, on calcareous rocks.

Polyblastia intercedens Lönnr. 2, on calcareous rocks.

Microglœna sphinctrinoides (Nyl.) Th. Fr. 1, 2, over moss on rocks.

Parasitic Fungi on the Lichens.

The following parasitic Fungi were found upon certain of the specimens:—

Discothecium gemmiferum Tayl. on *Lecidea confluens* Ach.

Epicoccum neglectum Desm. on *Lecanora tartarea* Ach.

Ticothecium pygmæum Koerb. on *Lecanora polytropa* Schær.

The number of species collected on Bear Island and Prince Charles Foreland collectively amounts to 53: of these 18 are common to both localities; 19 were gathered on the first only and 16 on the second.

A NEW VARIETY OF VIOLA ODORATA.

By E. S. Gregory.

This violet was first sent to me in February 1920 by Miss C. L. Peck, of Maidencombe, South Devon, who found it in an orchard between Maidencombe and Teignmouth, in the parish of Stoke-in-Teignhead.

On first examining it, I placed it among the supposed hybrids of *V. hirta* × *odorata*; but at the same time I noted certain striking peculiarities, perhaps the most prominent being the pure whiteness of the flower. This led to my calling it "immaculata" when, after cultivating and watching it for three years at Weston-super-Mare, I was asked to name it as a new variety. During these three years it has developed into a robust example of *V. odorata*, having gradually changed the direction of its petiole-hairs to correspond with the *depressed* hairs of the scented violet, and having also acquired the fine scent of that species.

It differs from *V. odorata alba* = *V. dumetorum* Jord. by its early and prolonged flowering (from mid-December till the end of March), by its tall erect growth, and by its long vigorous stolons; by its more distinctly herbaceous stipules; by the stolons of the year producing flowers and fruit—this character is shared occasionally by other varieties, and is a distinguishing feature of *V. alba* Besser; by the pure whiteness of the flower—even the spur, deep purple in the ordinary white violet, is in this only faintly mottled under cultivation, and is *always* recurved; and by the broader petals of the "wide-awake-looking' flower.

Messrs. Baker and Wilmott have seen specimens, and report:—"It is a white-flowered *V. odorata* L. Its nearest ally seems to be *V. incompta* Jord., from which it differs by its broader petals, longer stolons, and other small points."

I have grown it in two gardens and in a box on my (south) balcony, all in Weston-super-Mare. In one garden (Fairleigh) it has this year (1922–1923) had too rich a soil; the size of the leaf has increased, while that of the flower has slightly diminished. In the box on my balcony, plants grown in 1922 from cuttings had shorter and much more hairy petioles than the parent plants at Fairleigh, and the growth in other respects was more normal. This was probably due to poor soil and lack of space.

On Jan. 30th Miss Peck kindly sent me excellent examples from the original habitat. I find that in the wild state it is developing, though more slowly than under cultivation: the chief differences from its 1920 state are *depressed* petiole-hairs of the *odorata* type, and a broader, more "wide-awake," scented flower. In the wild plants the spur is darker than under cultivation.

A like case of atavism or reversion was noted by me about twenty years ago in another form of *V. hirta* × *odorata*, where there was a change of colour (purple to white) as well as to development of perfume.

Since the first planting in February, 1920, the development noticed has been towards a taller, more erect habit, with paler

foliage; a change in texture of the stipules from membranous to mostly herbaceous; leaves with a longer and broader lamina ($5\frac{1}{2} \times 5$ cms., increased to $7 \times 7\frac{1}{2}$ cms.); petioles with the characteristic hairs of hybrids or mutations of *V. hirta* × *odorata* to the short depressed hairs of *V. odorata*; flowers unscented in the first year (largest $3\frac{1}{2} \times 2\frac{1}{2}$ cms.), later with a fine scent (largest $2\frac{1}{2} \times 2\frac{1}{2}$ cms.); the spur pale in the wild state has become paler (only faintly mottled) under cultivation.

I am indebted to Mr. Spencer Moore for the following diagnosis, drawn up from my notes:—

Viola odorata L. var. immaculata mihi.

Varietas ob characteres sequentes distinguenda, nempe *petiolos* pedunculosque erectos, *stolones* longos et validos, *stipulas* magis herbaceas, stolones hornitonos flores et fructus præbentes (uti nonnunquam in speciebus aliis præsertim in *V. alba* Besser), *flores* omnimodo albos (calcar ipsum semper recurvum solummodo dilutissime maculosum) optime pansos petalisque latioribus gaudentes.

NOTES ON THEACEÆ.—II.

By T. A. Sprague, B.Sc., F.L.S.

Messrs. Fawcett and Rendle's "Notes on Jamaican *Ternstrœmiaceæ*" (p. 52) raise two general questions: (1) What are the qualifications for *nomina conservata*? (2) Should the incidence of generic names be determined by the type-method or by the method of residue?

Theaceæ or Ternstrœmiaceæ.

I do not agree with their suggestion that the name *Ternstrœmiaceæ* should be conserved. The object of a list of *nomina conservata* was not to reverse name-changes which had met with a large measure of acceptance, but to avoid making changes in cases where the technically valid name had not yet obtained as wide currency as the other. Exceptions to the Rules are justifiable only when they are definitely advantageous. If the two competing names have become equally well known, the case for conserving the later one fails; current practice must be taken into account as well as historic usage. The name *Theaceæ* is so widely adopted nowadays that it seems hardly worth while to suspend the operation of the Rules in favour of *Ternstrœmiaceæ*. It should not be forgotten that the conservation on insufficient grounds of numerous generic names has been a formidable obstacle to general acceptance of the Rules (see Journ. Bot. 1921, 290, 296; 1922, 114, 259).

Cleyera.

Messrs. Fawcett and Rendle cite Art. 51, 4, as justifying the rejection of *Cleyera* Thunb., "Everyone should refuse to admit a

name . . . . when the group which it designates embraces elements altogether incoherent, or when it becomes a permanent source of confusion or error." This should be interpreted by the examples supplied. *Elements altogether incoherent.*—"The genus *Schrebera* L. derives its characters from the two genera *Cuscuta* and *Myrica* (parasite and host) and must be dropped; and the same applies to *Lemairea* De Vr., which is made up of elements belonging to different families." The case of *Cleyera* is not comparable. The type-species of *Cleyera* comprised species of two genera, but both belonged to *Theaceæ*. The generic description applied exclusively to one of them, and was sufficiently characteristic to enable De Candolle, and Siebold and Zuccarini, to identify the genus. The specific description combined characters of *C. japonica* and *Ternstræmia gymnanthera*, but it is possible to exclude the latter from *Cleyera* on account of its non-agreement with the generic description. No one has proposed to set aside *Bignonia* L., although it comprised thirteen genera of *Bignoniaceæ* and one each of *Loganiaceæ* and *Vitaceæ*; nor to treat *Bignonia indica* L. as embracing elements altogether incoherent, although it included two species belonging to different genera. *A permanent source of confusion or error.*—"Linnæus described under the name of *Rosa villosa* a plant which had been referred to several different species, and of which certain identification seems impossible. To avoid the confusion which results from the use of the name *Rosa villosa*, it is preferable in this case, as in other analogous cases, to abandon the name altogether." But there is no doubt as to the identity of the genus *Cleyera* and of the species *C. japonica*, and no confusion has resulted from the use of these names.

The name *Ternstræmia japonica* Thunb. was a new combination for *Cleyera japonica*, and should be treated as a synonym of that species. As applied by Siebold and Zuccarini to the *Ternstræmia* erroneously included by Thunberg in *C. japonica*, it has proved to be "a permanent source of confusion or error," and should therefore be superseded by *T. gymnanthera* (Wight et Arn.) under Art. 51, 4.

Eroteum and Freziera.

The type-species of *Eroteum* is undoubtedly *E. theæoides*, as stated by Fawcett and Rendle. The type-method determines the incidence of a generic name once and for all: the generic name is always associated with the type-species. Hence if *Eroteum theæoides* is included in *Cleyera*, the genus *Eroteum* automatically becomes a synonym. Under the method of residue adopted by Fawcett and Rendle, the name *Eroteum* may be applied to *two different genera*, according to circumstances. "If it is agreed to pass over the original *Cleyera* Thunb., then *Eroteum* Sw. is the earliest name for the genus now generally known as *Cleyera*. If *Cleyera* is to be retained, then *Eroteum* Sw. must be used for the genus of which *E. undulatum* Sw. was the first described species; that is, the genus now

generally known as *Freziera*—unless *Freziera* finds a place in the list of *nomina conservanda*." This example illustrates the greater simplicity and convenience of the type-method.

The International Rules unfortunately refer only incidentally to the question of types. Articles 45 and 47, however, seem to indicate that the application of generic and specific names should be determined by means of the type-method. "The name *Æsculus* must be kept for the species *Æsculus Hippocastanum* L., as this is undoubtedly the type of the genus." "Several species (*Primula cashmiriana* Munro, *P. erosa* Wall.) have been separated from *Primula denticulata* Sm. (Exot. Bot. ii. 109, t. 114), but the name *P. denticulata* has been rightly kept for the form which Smith described and figured under that name."

Messrs. Fawcett and Rendle adopt the view that when a genus is divided into two or more genera, and the generic name cannot be used for the one which included the type-species, then it must be applied to one of the others. This is contrary to the type-method, and does not appear to be warranted by the Rules.

Under the type-method "the publication of a new generic name as an avowed substitute for an earlier one does not change the type of the genus" (*Science*, n. s. xlix. 334; 1919). Hence the type of *Freziera* is *Eroteum theæoides*. If it is desired to preserve the historic usage of *Freziera* for the genus typified by *Eroteum undulatum*, this may be effected by treating *Freziera* as a *nomen conservatum* with *E. undulatum* as a "substitute type" (see Journ. Bot. 1922, 112, 134).

The Editor has kindly given us the opportunity of adding a few remarks on Mr. Sprague's notes. We differ from Mr. Sprague in his view on the qualifications for *nomina conservanda* and the meaning of "confusion." The name *Ternstrœmiaceæ* is used in the Indian and Colonial Floras, in the latest edition of Gray's *Manual of the North American Flora*, and by Urban in his most recently-issued work on the West Indian flora (*Symbolæ Antillanæ*, viii. 1922) in place of *Theaceæ* used in his earlier work (see Engl. Bot. Jahrb. xxi. 521, 1896).

As regards the use of *Cleyera*, we see no reason to change our position. As to *Eroteum* and *Freziera*, we suggest that though it may be possible for present-day workers to fix on one species as a type for the genus, yet Swartz's genus undoubtedly included the two genera which are now regarded as distinct, in which case we are bound by the Rules to use the earliest name for one or other of them.

W. Fawcett: A. B. Rendle.

NEW TROPICAL AFRICAN RUBIACEÆ.

By R. D'O. Good, B.A.

Sabicea nobilis, sp. nov. *Frutex* tomentosus erectus; *foliis* integris cordatis rarius ovatis basique rotundatis acuminatis supra glabris nervis villosis exemptis subtus indumento denso griseo-tomentoso tandem deciduo obtectis; *petiolis* longis validis tomentosis; *stipulis* quam petioli multo brevioribus lanceolatis dense tomentosis; *inflorescentiis* densifloris tomentosis in axillis sessilibus; *bracteis* lanceolatis acuminatis floribus brevioribus tomentosis; *calyce* cupuliforme dense hirsuto lobis lanceolatis tubo multo longioribus; *corollæ* tubo calyce circiter duplo longiore ore dilatato villosulo lobis patentibus ovatis acutis dorso villosis; *staminibus* inclusis infra os affixis filamentis brevissimis; *stigmate* bifido; *ovario* 2-loculare.

Hab. Portuguese Congo, among young upgrowth and skirting the forests at Belize, Maiombe; *Gossweiler*, 7550! 7043!

A dark-green shrub up to 2 metres high. Branches horizontal, extremities copper-red before flowering. Leaves up to 23 × 16 cm., with 24–30 veins and having a dense felted indumentum on the under side. This indumentum is ultimately deciduous, and when it has fallen the nerves of the leaf form a prominent network. Stipules 2 cm × 8 mm. Petioles up to 8 cm. Calyx deeply 5-fid, lobes 5 mm. long. Corolla white, tube 8 mm. long, lobes about 2 mm. long.

This species forms an addition to those members of the group "Sessiles," subgenus *Eusabicea* (Wernham Monograph, 1914), which are exceptional in having an erect habit. This character, together with the felted inflorescences and bilocular ovary show affinity with *S. arborea* K. Schum, which, however, differs markedly in leaf and calyx.

Sabicea fulvovenosa, sp. nov. *Frutex* scandens crebre ramosus; *foliis* breviter petiolatis integris obovatibus acuminatis basi gradatim angustatis supra scabriusculis venisque pilosis subtus in nervis subtiliter pubescentibus fulvis; *stipulis* ovatis acuminatis hirsutis petiolo brevioribus; *inflorescentiis* sessilibus axillaribus 5-floris bracteatis hirsutis; *calycis* tubo piloso lobis inæqualibus late triangularibus acuminatis pilosis tubo brevioribus; *corollæ* tubo calycem multo excedente infundibulari extus dense sericeo-villoso lobis ovato-lanceolatis intrinsecus hirsutis; *staminibus* inclusis filamentis brevissimis; *stigmate* 4-ramoso; *ovario* 4-loculare.

Hab. Portuguese Congo; common in thickets and appearing in abandoned native plantations, at Caio-Rio, Lufo-Hombe region, Maiombe; *Gossweiler*, 7887!.

A much-branched climber. Branches brownish pubescent. Leaves 8–10 × 4–5 cm. with 16–18 veins. Petioles 1·5–2 cm. long. Stipules 6 × 4 mm. Inflorescence a 5-flowered cyme; each flower enclosed in a pair of hairy bracts; the whole within an outer pair of bracts. Calyx 6 mm. long. Corolla white, about 2 cm. long; lobes 3 mm. long.

The few-flowered sessile inflorescence places this species among the "Sessiles," subgenus *Eusabicea*. Within this group its affinities appear to be with the American species *S. glabrescens* Benth.

Urophyllum cauliflorum, sp. nov. *Frutex* a basi ramosus; *foliis* elliptico-lanceolatis acuminatis integris basi gradatim angustatis breviter petiolatis chartaceis utrinque glabris primo glaucis deinde olivaceis; *stipulis* petiolis subæquilongis lanceolatis striatis; *cymis* paucis multifloris e trunco brevi valido efoliato oriundis; *calyce* truncato cupuliforme; *corollæ* lobis tubo multo brevioribus; *staminibus* inclusis paullo infra os corollæ affixis filamentis brevibus antheris acuminatis; *stylo* incluso stigmate bi-ramoso; *ovario* subgloboso 4-loculare.

Hab. Portuguese Congo; in shady humid forests between the rivers Belize and Luali; *Gossweiler*, 7661! 7662!

Shrub 1 metre high. Main stem short, robust, 1·2 cm. in diam., swollen where the inflorescences are borne. Branches terete, straight, ascending, up to 1 cm. diam. Stipules 2 cm. × 7 mm. Corolla violet-blue, tube about 1·3 cm. long, lobes 3 mm. long. Anthers nearly 3 mm. long. Ovary 3 mm. in diam.

A very distinct species, easily recognised by the cauliflorous habit, unique in the genus.

Urophyllum biloculare, sp. nov. *Arbor* pyramidalis copiose ramosa; *foliis* breviter petiolatis integris lanceolatis acuminatis apice obtusis basi cuneatis utrinque glabris; *stipulis* petiolis æquilongis triangularibus acuminatis; *cymis* subsessilibus pluriflоris; *calyce* campanulato dentibus minutis prædito; *corollæ* tubo calyce duplo longiore ore villoso lobis patentibus tandem reflexis; *staminibus* exsertis sinubus loborum corollæ affinis; *antheris* subsessilibus subcordatis acutis; *stigmate* bilobo lobis ovatis obtusis; *ovario* 2-loculare.

Hab. Portuguese Congo; in mixed forest on the banks of the River Lufo, Hombe region, Maiombe, *Gossweiler*, 7683!

A tree up to 15 metres high. Branches short. Leaves up to 15 × 5 cm., with 12–14 veins, which are rather more crowded towards the base of the leaf. Stipules 5 × 3 mm. Calyx very slightly ribbed below the teeth, about 2 mm. long. Corolla yellowish-green; tube 5–6 mm. long; lobes 4–5 mm. long.

Gossweiler, 7660! from Belize, Maiombe, appears to be identical with this description, but has the habit of a shrub and purplish-red flowers. At present there seem no grounds for considering it as other than a form of *U. biloculare*.

This species is remarkable in having a bilocular ovary—a character isolating it from the rest of the genus; apart from this its affinity appears to be with the Asiatic species *U. glabrum* Wall. It is of interest to note that Hiern in Flor. Trop. Afr. iii. 72 describes *U. Afzelii* Hiern as having an incompletely 4-celled ovary, 2-celled at one end.

The specimens cited are in the National Herbarium.

GENTIANA SUECICA Froel.

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

In 1796 Froelich (*De Gentiana libellus*, 92) subdivided *G. campestris* L. into three varieties—*suecica*, *germanica*, and *neapolitana*; with the last we are not now concerned. The more important characters of the other two are here translated and contrasted:—

Suecica. *Stem* simple, becoming purple, with the second division longer than the rest. *Root-leaves* longer than upper stem-leaves. *Lower stem-leaves* linear, a little broader towards the apex, rounded or obtuse; *middle*, lanceolate, obtuse; *upper*, dilated below, ovate, rather obtuse. *Calyx* with the two large segments ovate, obtuse. *Corolla tube* as long as calyx; lobes ovate, obtuse.

Germanica. *Stem* simple or branched below, green or bluish-green, becoming purple at the base. *Root-leaves* much smaller than stem-leaves. *Lower stem-leaves* ovate obtuse, narrow at the base; *upper*, sessile free at the base, ovate, acute. *Calyx* with the two large segments subcordate or ovate, acute. *Corolla tube* a little shorter than calyx; lobes ovate, rounded at apex.

In 1892 S. Murbeck (Act. Hort. Berg. ii. no. 3, 10) adopted these two varieties and raised them to the rank of subspecies with the following diagnoses:—

Suecica. "*Caulis*, adjecto pedunculo floris terminalis, *ex internodiis* 3–5 *constructus*; internodia foliis plerumque *multo longiora*; rami plerumque stricte erecti, uni- vel pauciflori. *Folia* caulina media et superiora *lingulata* vel *oblonga*, vel suprema ovato-lanceolata, in apice *rotundata* vel *obtusa*, modo summa acutiuscula; caulina media erecta vel erecto-patula. Stigmata ovata. Floret a medio mense Junio ad finem Julii, in regionibus alpinis maximeque septentrionalibus etiam Augusto."

Germanica. "*Caulis*, adjecto pedunculo floris terminalis, *ex internodiis* 4–8 *constructus*, internodia foliis *subbreviora vel paullo longiora*; rami erecti vel suberecti, pauci- vel pluriflora. *Folia* caulina media et superiora *lanceolata* vel *ovato-lanceolata*; in apice plus minus *acuta* vel summa acutissima. *Stigmata* lanceolata.—Floret a fine mensis Julii usque in Septembrem."

W. H. Beeby, in Journ. Bot. 1894, p. 1, called attention to Murbeck's valuable article, and gave a *résumé* of his studies: *suecica* is noted by Beeby as "not known as British," but he mentions that "one of [his] Shetland gatherings approaches it in its very long internodes."

In 1896 R. Wettstein (Denksch. Mathemat.-Naturwiss. Kaiserl. Akad. Wissensch. lxiv. 322), in his Monograph on the European forms of the Endotricha section of *Gentiana*, wholeheartedly follows Murbeck as regards the two plants under discussion, and repeats his diagnosis practically word for word; but he omits entirely the contrasting characters respecting the erectness of branches and their flower-bearing capabilities.

Dr. Murbeck recently examined some British examples of Gentians that I had collected, and has determined as *G. suecica* some speci-

mens gathered in v.c. 89 East Perth, near the Spital of Glen Shee in July 1912. Gatherings in 1902 in v.c. 97 Westerness, near Banavie (Inverness) and on the shore of Loch Eil (Argyll), are, he considers, intermediate between *suecica* and *germanica*.

In Beeby's herbarium at the South London Botanical Institute, specimens collected by him in v.c. 112 Shetland, at Hillswick Ness, Northmaven, in 1896, have been determined by Wettstein as *G. suecica* var. *islandica* Murb. Murbeck's original description (*l. c.*) runs: "Planta 4–10 cm. alta; folia caulina media oblonga, quam in typo minus obtusa, caulina superiora ovato-lanceolata, acutiuscula vel acuta." This plant is not included by Dr. Druce in his "Flora Zetlandica" (Rep. B. E. C. vi. pp. 3, 457–546; 1921). The Continental distribution of *G. suecica* includes Iceland, Faroe Islands, Norway, Sweden, Finland, Denmark, and Germany, whilst the var. *islandica* occurs in Iceland and the Faroes. Perhaps botanists will examine their herbaria and report whether *suecica* lurks unsuspectedly therein. Having first satisfied themselves that their plants come under *G. campestris* and not *G. baltica*, on account of the biennial (not annual) habit, the spathulate broader above the middle basal leaves—not ovate or lanceolate broader at or below the middle; the usually longer corolla with tube more exserted, etc., they may then look for the more obvious characters of *suecica*—the long internodes and the more obtuse and strap-shaped stem-leaves.

Just as *G. Amarella* L. has two forms—*G. lingulata* C. A. Agardh, only represented in Britain by its var. *præcox* Towns. (summer flowering with few internodes and blunt stem-leaves) and *G. axillaris* Schmidt (autumn flowering with many internodes and acute stem-leaves), so also has *G. campestris* analogous forms—*suecica* and *germanica*—with similar characteristics.

Murbeck (*op. cit.* 14) proposes the name *G. Wettsteinii* for the plant of our chalk downs usually known by Willdenow's name *germanica*, but this suggestion has been generally adopted.

I should be pleased to examine any doubtful *G. campestris* forms which may be sent me.

SHORT NOTE.

Cerastium tetrandrum Curt. Curtis in his original description of this species (Fl. Lond. fasc. vi. 31; 1796–8) mentions that its stems, peduncles, and calyx are all more or less viscid. Syme (Eng. Bot. ed. 3, ii. 78; 1864) describes the whole plant as "very viscous, thickly covered with short spreading hairs, each terminated by a sticky gland." Murbeck in his valuable paper dealing with several critical species of this genus (Bot. Notiser, 1898, 257) ascribes to *C. tetrandrum* the character "mer aller mindre klibbhårig" (more or less glandular-hairy). Ascherson and Graebner (Syn. Mitteleur. Fl. v. Abth. i. 666; 1918) describe it as "drüsig behaart"; Druce (in Cambr. Br. Fl. iii. 52; 1920) gives "shoot very viscid

with glandular hairs." There is thus a general consensus of opinion, at home and abroad, that *C. tetrandrum* should be provided with glandular hairs in more or less abundance; and it was only when Colonel H. H. Johnston sent me, last year, a fine series of what was undoubtedly this species from the Orkneys, that I saw that this diagnosis could not cover some of his gatherings. These plants, which are often of a different shade of green from ordinary *tetrandrum* (owing to the non-adherence of dust, particles of sand, etc.), may, I think, be separated as var. EGLANDULOSUM with the following diagnosis:—

Caules pedunculi calycesque hirti non glandulosi; cætera ut in typo.

As if to make up for the loss of the glands, those plants that lack this protection seem to produce as a rule a greater abundance of longer simple hairs than in the type. The variety is probably not uncommon; I have seen specimens from the following localities:— v.c. 2. *Cornwall, E.*; wall top, Tregantle, near Antony. *T. R. A. Briggs.* v.c. 3. *Devon, S.*; wall near the Hoe, Plymouth; near Mount Batten, Plymstock; Blaxton, Tamerton Foliot. *T. R. A. B.* v.c. 10. *Isle of Wight*; Ninham Heath. *A. G. More.* v.c. 45. *Pembroke*; Newgate Sands. *H. N. Ridley.* v.c. 109. *Caithness*; coast between Dunbeath and Berriedale. *G. Lillie.* v.c. 111. *Orkney*; many stations. *H. H. Johnston.* v.c. 112. *Shetland*; Glus Voe; Ness, North Yell; Point of Sataford, Unst. *R. Tate. Ireland.* Cork; wall near Cork. *I. Carroll.*

With the exception of the plants from v.c. 109, all the above are in Hb. Mus. Brit.—C. E. SALMON.

REVIEWS.

A Supplement to F. Hamilton Davey's Flora of Cornwall. By EDGAR THURSTON, C.I.E., and CHAMBRÉ C. VIGURS, B.A., M.D. Cantab. Reprinted from Journal of the Royal Institution of Cornwall, vol. xxi. 8vo, pp. xx, 172. Truro, Blackford, 1922 [not priced].

IN this Supplement is brought together all that has been published and observed since the issue of the Flora in 1909—which was reviewed at some length in this Journal for that year—and bears testimony to the energy of the compilers and of those who have rendered it possible to produce so considerable a list. The actual additions, as tabulated in the introduction, include a species formerly recorded as doubtful and 23 unrecorded, with 142 "varieties or forms" and 110 "aliens (species or varieties)" mainly derived from the Reports of the Botanical Exchange Club, which devote much space to such records: many of the former, we think, are of doubtful value, and we fail to see what is gained by publishing casual occurrences on "fowl-runs" and "ballast-heaps." It is interesting to note that *Diotis*, recorded in the Flora as extinct, still occurs in two localities.

Turning over the extravagantly printed pages, one or two points suggests themselves for comment. The species of *Fumaria*—a genus

in which Cornwall seems to be especially rich—are greatly increased, mainly from Mr. Pugsley's *Fumaria* Supplement to this Journal for 1912; we note that *F. major* Badarro is retained for *F. paradoxa* Pugsley, which is placed as a synonym; the distinctness of the two plants is established by Mr. Pugsley in the *Supplement* (p. 35), and his identification (in Journ. Linn. Soc., Bot. xliv. 283; 1919) of *F. paradoxa* with *F. Martinii* Clavaud has been overlooked; *Viola* has also received many accessions in connexion with Mrs. Gregory's monograph and Dr. Drabble's Supplement to this Journal for 1909—*V. epipsila*, Dr. Vigurs thinks, will prove to be the common Cornish marsh violet; and *Euphrasia* has been elaborated in accordance with Bucknall's monograph (Journ. Bot. Suppl. 1917) and recent observations: "strica" (for *stricta*; p. 103) is one of the few misprints in the book. A slip of another kind is that which credits Messrs. Baker and Salmon (Journ. Bot. 1920, 121) with the division of *Erodium cicutarium* into "five *new* species" (p. 37). There is an interesting note on *Atropis festucæformis*, with regard to which confusion had arisen; the plant so recorded from Ireland proves not to be that species, but specimens, authenticated by Dr. Stapf, were found by Mr. Thurston in Egloshayle Marsh in 1918. "The Egloshayle plants are recorded as *Glyceria maritima* Wahl. var. *hibernica* Druce in B. E. C. 1919, p. 690"—apparently on the assumption of their identity with the Irish plant.

We learn from the introduction, which is followed by a biography by Dr. Vigurs, that Davey's herbarium was acquired at his death by the Royal Institution of Cornwall, and is now placed in the Truro Museum, where also R. V. Tellam's herbarium is preserved. So much care has evidently been spent upon the little volume that we are surprised that a reference to the page of the *Flora* is not prefixed to the additional records of the species included therein, thus greatly facilitating collation.

Practical Plant Biochemistry. By Muriel Wheldale Onslow. 2nd edition. Cambridge University Press, 1923. 8vo, pp. 194. 12*s.* 6*d.* net.

As our knowledge of the chemistry of plants advances, it is essential that an attempt should be made to render the practical aspects of the subject available to the ordinary student of Botany and Chemistry. As is aptly pointed out in the author's preface to the work under consideration, such knowledge is at present acquired partly in chemical and partly in plant physiological laboratories, with the result that there is a gap in the teaching which it is the author's purpose to fill. There can be no doubt that Miss Onslow has achieved this object with success, and has produced a book which not only provides much valuable information in a concise form but at the same time gives the necessary instructions for performing a large number of well-selected experiments.

After an introduction and a brief section on colloids, successive chapters deal with plant enzymes, chlorophyll, carbohydrates, vege-

table acids, fats, aromatic compounds, proteins, glucosides, and plant-bases. A general account of the chemistry and distribution of each type of substance precedes the actual experimental details, which are lucid but unfortunately printed in small type. In most cases the study of the pure product is first undertaken, to be followed by its detection in or extraction in a pure form from the plant; and for this latter purpose a number of alternative materials are usually enumerated. One is inclined to feel that in the experimental part the author has adhered too strongly to the purely chemical side. Although the optical properties of carbohydrates are referred to in the general description, there are no practical instructions for testing them. Spectroscopic examination of some of the pigments studied might also be undertaken, whilst in the chapter on colloids, which might well be extended, more than a passing reference to the ultra-microscope seems advisable. Inclusion of such matters would considerably increase the usefulness of the book.

In the sections dealing with the physiological processes of the plant one could sometimes wish for a slightly more conservative attitude. The vagueness of our knowledge regarding the stages leading to the production of carbohydrates in photosynthesis and the synthesis of fats is scarcely sufficiently emphasized. In the latter part of the book there are some unnecessary repetitions (*e. g.*, pp. 140, 147; pp. 139, 141, 149). The only topographical error noticed is "native" for "natural" on p. 141 (line 8).

F. E. F.

A Plain Plantain: Country Wines, Dishes and Herbal Cures from a 17th Century Household MS. Receipt Book. Arranged, with various details, by Russell George Alexander. Printed and published at S. Dominic's Press, Ditchling, Sussex: A.D. MCMXXII. F'cap 8vo, pp. viii, 96. Price 5*s.*, wrapper, 7*s.* 6*d.* cloth.

This little volume, which by its typography appeals to the lovers of well-printed books, is taken from "a manuscript inscribed *Madam Susanna Avery, Her Book*, May ye 12th Anno Domini 1688." Apart from its interest as a collection of seventeenth century receipts —often of a very elaborate character—for wines, cakes, puddings, salves, waters, and the like, the book is noteworthy for the care which has been bestowed upon it. Besides an introduction on the contents of the herb garden and the gathering of the medicinal herbs which, as stated by a leaflet issued during the War by the Board of Agriculture, should be grown in this country, there is a brief bibliography of "books on plants, gardens, and domestic economy which may be consulted with advantage," and notes on the plants mentioned in the receipts. Among the former we note John Wesley's *Primitive Physic* (1769) in which "he chiefly deals with medicines made from native English plants"; and a more recent volume by Dr. W. T. Fernie—*Herbal Simples approved for modern uses of cure* (1895–7) wherein "the author justifies the use of herbs as the basis of chemical analysis."

The notes on the plants are so well intentioned and so interesting

that we cannot but regret that they were not submitted to a botanist before publication. Although "intended to be of general not scientific interest," the author would, we are sure, desire that they should be correct, and this unfortunately is not always the case. The fact that two very different plants bear the same English name is sometimes responsible for this: thus Pellitory (*Anacyclus Pyrethrum*) and Pellitory of the Wall (*Parietaria*) are treated as identical; Saffron is defined as "the reddish product of the Meadow Saffron or Autumnal Crocus." "Rosa Solis 'Rose of the Sun'" is surely a misprint or a misreading of *Ros Solis*, the name of the Sundew; and we venture to doubt whether "the cordial Rosa Solis was originally made from or flavoured with the juice of" that plant. We suspect too that Madam Avery's MS. has not always been accurately transcribed, although due allowance must be made for what Mr. Alexander calls the writer's inconsequential spelling: "Tornentina" (p. 34) and "Featherfeu" (p. 35) and on the former page, "Balmea [Balnea] Mariæ" are examples of what we mean; "Pragnie" (p. 35) as the name of a plant is new to us. The title of the book is explained by a reference to *Love's Labour's Lost*—"Or, Sir, a plantain, a plain plantain."

BOOK-NOTES, NEWS, ETC.

At the meeting of the Linnean Society on Jan. 18 Mrs. Helena Bandulska read a paper on "The Cuticular Structure of certain Dicotyledonous and Coniferous Leaves from the Middle Eocene Flora of Bournemouth." Since few Angiosperms are preserved as petrifactions, the systematic position of many leaf-impressions characteristic of some of the British Tertiaries is still open to question. Certain Eocene leaves possess cuticles, and it is hoped that their cuticular structure combined with their external form may aid identification. In the first part of the paper the name *Dictophyllum* was proposed for dicotyledonous leaves of uncertain affinity, and three new species—*D. Stopesii*, *D. spiculatum*, and *D. sinuatum*—were described from their cuticular structure. The second half of the paper deals with the cuticles of certain fossil conifers which are compared with known recent and fossil forms; thus *Araucarites Goeppertii* Sternberg is compared with Araucarias and Sequoias, and is thought to be a true but specifically distinct *Araucaria*, the evidence being based on its cuticular structure. *Sequoia Tournalii* Sap. is shown to be less like *S. sempervirens* in its cuticular structure than its external form would lead us to suppose, and is certainly specifically distinct. *Taxodium europæum* Sap. appears to resemble both *T. distichum* and *Glyptostrobus* in its cuticular structure, which is very unlike that of the Sequoias. It would seem to be a specifically distinct but true *Taxodium* whose cuticle is of a synthetic type.

At the meeting of the same Society on Feb. 1, Sir Nicholas Yermoloff read his "Notes on *Chætoceros* and allied genera, living and fossil," of which the following is an abstract:—The Diatom genus *Chætoceros* shows several peculiar features. It has been highly differentiated for pelagic life, and occurs in the planktons of the colder seas, sometimes, especially in spring, in colossal numbers.

Some hundred living species have been described, but only six or seven are common in the planktons. The parent cells, each consisting of two valves with a hoop between them, form colonies, holding together by means of long setæ; the structure of the colony endows it with great floating capacity. Two features of the genus are especially puzzling: one is that several of the species, though not all, have the capacity to develop inside the mother-cells peculiar internal organs, covered with a thick siliceous wall; these organs are called *statospores*. No one has ever seen them germinate, and whether they are organs of reproduction, or something like endocysts, or something else, is not known. The other strange feature is, that although it is so infinitely numerous in the planktons, the mother-cells, or colonies, as such, never appear in any fossil marine deposits. On the other hand, the spores do appear fairly often as fossil remains: fossil spores of *Chætoceros* are to be found frequently enough in miocene diatomaceous earths; the most common form is *Syndendrium* Ehr., which is the spore of *C. diadema* Gran, very common in the planktons. Why it is that the vegetative form cannot stand fossilization whilst the spore can do so, is not known.

In the *Lancashire and Cheshire Naturalist* for December–January, Mr. W. H. Pearson gives an interesting account of his visits to Dolgelley, the first of which occurred fifty years ago, the last, in company with a party of bryologists, in August last. In the course of his paper Mr. Pearson has the following paragraph relating to Carrington and their fasciculi of *Hepaticæ*, which we think may interest some of our readers:—"About this time [1874] the Eccles Co-operative Society inaugurated a scheme for the education of the masses, and Dr. Carrington became the teacher of a class on Botany, which [W. H.] Stansfield and I joined. Although such a distinguished cryptogamic botanist, he was of a shy, retiring nature, with little ability to teach general Botany, and in the course of a few weeks the class, which began with a membership of 40 to 50, dwindled down to two, Stansfield and myself. Then Stansfield ceased to come. Dr. Carrington, I think admiring my perseverance, invited me to his house, and I began to take an interest in Hepaticæ. He then suggested that I should help him in issuing a Fasciculus of Hepaticæ, and as time and labour were of little moment then, we brought out Carrington and Pearson's 'Hepaticae Britannicae Exsiccatae,' when I call to mind that we issued 60 copies of each Fasciculus, and each Fasciculus contained 75 specimens, four fasciculi were published, and 18,000 specimens packeted and labelled. We presented half the copies to friends who had contributed specimens, and to other hepaticologists, and the cost of binding and printing left a few pounds to divide between us, as I find in looking over some old memoranda. The Fasciculi have no doubt been of service to students, but there are numerous mistakes, which I suppose some authority will take the trouble to point out some time or other."

At the meeting of the British Mycological Society held on January 20 at University College, the papers were: Dr. H. Wormald, "Crown Gall in Nursery Stock," which dealt with the tumours of the crown gall type found on numbers of cultivated plants in this

country; Miss W. Ridler, "The Fungus present in *Lunularia cruciata*," describing the occurrence, distribution, and behaviour of a fungus (? *Phoma*) often present in the thallus of this Liverwort; Dr. A. S. Horne and Dr. W. Brown dealt with a number of strains or species of *Fusarium*, the former from the systematic side, the latter from a physiological angle; and Mr. J. Ramsbottom on "Berkeley and Broome," traced the manner in which these mycologists began the study of fungi and entered into collaboration.

The *Annals of Botany* for January contains papers on "The Distribution of Plants," by Mr. H. N. Ridley; "The Squamulæ Intravaginales of the *Helobieæ*," by Dr. Agnes Arber; "The Conduction of Geotropic Excitation in Roots," by R. Snow; "Reaction to Gravity in Fronds of *Asplenium bulbiferum*," by F. M. O. Waight; "Direct Nuclear Divisions in the Vegetative Mycelium of *Saprolegnia*," by F. E. V. Smith; "The Effect on certain Plants of altering the Daily Period of Light," by J. Adams; "Growth of Fungi on Culture Media," by W. Brown; "The Attachments of *Porphyra umbilicalis*," by V. M. Grubb (1 pl.); "*Dimorphococcus Fritschii*, sp. n.," by W. B. Crow; "Teratological Phenomena in Inflorescences of *Fagus sylvatica*," by L. W. Cole; "Reproduction of *Rhodymenia palmata*," by V. M. Grubb; "Disease of Cocoa and Coffee Fruits caused by *Trachysphæra* (gen. nov.) *fructigena*," by R. J. Tabor and R. H. Bunting.

In certain lichens belonging to widely different groups, there are developed on the surface or edges of the thallus, small outgrowths termed isidia, of fairly constant specific form. They are of service to the plant in increasing the assimilating surface, and being easily rubbed off they aid in propagation. Linbrola has already published careful studies of a northern lichen, *Peltigera lepidophora*, which bears isidia-like scales on the surface, and now (Ann. Soc. Zool. Bot. Fenn. i. pp. 65–90) writes on the isidia of *P. prætextata*. These are densely massed along the margins of the thalline lobes, and they also occur on the edges of wounds. The author considers the latter a unique position; he finds that they have no relation to the formation of soredia, nor are they induced by changes of environment. As the isidia are constant on the plant, he prefers to give it specific rank; Nylander had classified it as a variety of *P. rufescens*.—A. L. S.

The *Journal of Indian Botany*, hitherto issued as a private venture, now appears as the official organ of the Indian Botanical Society. The numbers issued in December last contain papers on "The Ecology of Plant Communities in the Savannah Formation" (with two plates), by D. H. Dastur and W. T. Saxton; "Observations on the Anchoring Pads of *Gymnopetalum cochinchinense*," by P. M. Debbarman (1 pl.); "The Indian Ophioglossums" (*O. Aitchisonii*, sp. n.: 1 pl.), by W. T. Saxton, who also writes on "Autonomous Movements in *Eleiotis Sororia*"; on "The Life History of *Aneura indica*," by Shiv Ram and Shiva Kant Pande: the editor, Mr. P. F. Fyson, gives a list of the Indian species of *Eriocaulon* in the principal Indian herbaria; and there is a note on foreign plants that have recently established themselves about Lahore.

In *Bot. Tidsskrift*, xxxvii. part 5 (1922), Mr. J. Clausen concludes the "Studies on the Collective Species *Viola tricolor* L.," the first part of which appeared in part 3. In this paper (which is written in English) he discusses at length the varying characters of *V. tricolor* and *V. arvensis*; he concludes that the two are distinct species, and discusses what is typical for each, with interesting notes, based on his own observations, on the geographical distribution in Denmark. The paper is illustrated with numerous figures and should interest British botanists: Mr. Clausen is apparently unacquainted with Dr. Drabble's paper on "The British Pansies," issued as a supplement to this Journal for 1909. The preceding part (4) of the *Tidsskrift* contains descriptions of new Danish *Hieracia*, by H. Dahlstedt, and an exhaustive study (in Danish) of *Empetrum nigrum* by O. Hagerup.

The *Journal of the Royal Horticultural Society*, xlviii. part 1 (Jan.), contains an interesting paper on "The Wilt Disease of Michaelmas Daisies," by Mr. W. J. Dowson, Mycologist to the Society. The disease is caused by *Cephalosporium Asteris*, which is described as a new species. It acts by the production of toxic substances and not by the mechanical blocking of the vessels and tracheids by mycelium. The mycelium of the parasite is localized in the base of the plant during spring and early summer, and does not occur in the suckers. By striking cuttings taken from the tips of the suckers it was found possible to raise healthy plants from diseased stock.

The latest fascicle of the *Flora Batava* (f. 410 e–413 e Aplevering; M. Nijhoff, 's Gravenhage, 1922) is mainly occupied with coloured figures and descriptions (in Dutch and French) of fungi, of which the most interesting appears to be *Lepiota odorata* Cool, a species discovered in 1916 in three places in Holland. There are also figures and descriptions of *Rubus hirtifolius*, *R. sulcatus*, and *R. Lindleyanus*, and of *Boltonia asteroides* L'Hérit. and *Nicotiana affinis* T. Moore, whose claims to insertion rest on the finding of specimens near a flour-mill and an oil-mill respectively; the history of the latter, a plant of garden origin, is discussed at some length.

In the *Gardeners' Chronicle* of Dec. 23, 1922, Mr. R. F. Brotherston gives a sketch of the life and work of Mrs. Loudon (1807–1858); this is supplemented by Mr. Britten in the issue for Feb. 10, who speaks of her as "one who in her time did much to advance both botany and gardening, and whose memory may well be recalled."

In his recent "Additions to the Flora of South Australia" (Trans. R. Soc. S. Australia, xlvi.: 1922) Mr. J. M. Black figures and describes a new genus of Umbelliferæ Hydrocotyleæ—a curious little plant with the habit of *Didiscus*—to which he gives the name *Uldinia*, from the native name for Ooldea, where it was found.

The *Quarterly Summary* of the Royal Botanic Society for January contains the first part of a lecture on the flora of our new Tropical African possessions, delivered by Prof. R. R. Gates before the Society in November last.

THE

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BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.C.S.G., F.L.S.

LATE SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM.

The Journal of Botany was established in 1863 by Seemann. In 1872 the editorship was assumed by Dr. Henry Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

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THE

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BRITISH AND FOREIGN

EDITED BY

JAMES BRITTEN, K.C.S.G., F.L.S.

LATE SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM.

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STATICE VESTITA C. E. Salmon

NOTES ON STATICE*.

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

XV. Statice vestita, sp. nov.

(Plate 567.)

In 1916 Dr. A. Ginzberger and others published, in Denksch. Kaiserl. Akad. der Wissensch. Band 92, pp. 261–404, lt. viii, an extremely interesting account of the Natural History of the Smaller Islands and Rocks of Southern Dalmatia, which had been explored in 1911 and 1914. The particular ones examined extended from Pomo in the west to the numerous rocky islets lying just east of Lagosta, and the excellent photographs accompanying the paper give one a good idea of the general character of this interesting group.

In 1921 Dr. Ginzberger, in Österr. bot. Zeit. 233–248, gave the results of the botanical researches in this region, the Statices that had been gathered having previously passed through my hands. At that time, with the material sent, I could not discover anything beyond *S. cancellata* and some forms which I then considered mere states of that species. Since then Dr. Ginzberger sent me a fuller series, and I then saw that a remarkable plant from the Rock of Pomo and that of Kamik (20 kilometers to the east) was clearly separable from *S. cancellata* in several particulars; this I now propose to describe and name.

Statice vestita, sp. n. Planta comparate nana, *puberula*. Folia *majuscula* ±arcte rosulata, coriacea, subtus sæpe leprosa, *obovato-rotundata* in petiolum laminam æquantem vel fere æquantem attenuata, *apice rotundata*, ob marginem revolutam in sicco apice interdum leviter pseudo-retusa. Scapus 4–8 (13) cm. altus, *valde anfractuosus*, a basi vel infra medium ramosus; *rami numerosi, intricati*, ascendenti-patentes, *omnes floriferi* vel infimi steriles. Spicæ satis densifloræ et ±elongatæ vel breviores et laxifloræ, ascendenti-patentes. *Spiculæ unifloræ*. Bracteæ *omnes puberulæ*; media quam exterior *paullo longior*; interior quam exterior *fere* 3-*plo* longior; calyx $4\frac{3}{4}$–5 mm. longus; corolla circa 4 mm. diametro.

Root perennial, woody, evidently long-lived, branching at the crown into several more or less short divisions bearing below the remains of former leaves and above the fresh rosettes more or less close together forming a cushion-like clump. *Plant* rather dwarf, puberulous. *Leaves* rather large (compared with scape), 1-veined, coriaceous, "spongy" above when dry, often scurfy beneath, obovate-rotundate tapering into a petiole shorter than or equalling lamina, apex rounded, when dry sometimes slightly pseudo-retuse on account of the revolute margin; leaf-rosettes recalling those of *S. panormitana* Tod. *Scape* 4–8 (13) cm. high, ±erect, noticeably zig-zag, branched from near the base or below the middle. *Branches* many, ascending-patent, entangled, all floriferous or the very lowest almost simple

* See Journ. Bot. 1903, 65; 1904, 361; 1905, 5, 54: 1907, 24, 428; 1908, 1; 1909, 285; 1911, 73; 1913, 92; 1915, 237, 325; 1917, 33; 1922, 345.

and sterile. *Spikes* rather dense-flowered and more or less elongated or shorter and lax-flowered, ascending-patulous. *Spikelets* 1-flowered. *Outer bract* $1\frac{1}{4}$ (rarely $1\frac{1}{2}$) mm. long, c. 2 mm. broad, triangular-ovate, ±obtuse, herbaceous, except for its rather narrow membranous margin, with an apiculus sometimes exceeding the margin; herbaceous portion puberulous. *Middle bract* $1\frac{1}{2}$ (rarely $1\frac{2}{4}$) mm. long, c. $1\frac{1}{4}$ (rarely $1\frac{1}{2}$) mm. broad, oblong-ovate, apex ±rounded and notched, hyaline with two veins running to apex, finely puberulous particularly on veins, only slightly exceeding outer bract. *Inner bract* c. $3\frac{1}{2}$ mm. long, c. $2\frac{1}{2}$ mm. broad, oval or obovate, ±obtuse with rather narrow membranous margin, herbaceous portion apiculate (apiculus sometimes exceeding margin); bract finely puberulous including (usually) part of the membranous margin, almost three times longer than outer bract. *Bracteole* 0. *Calyx* $4\frac{3}{4}$–5 mm. long, very slightly curved, infundibuliform, pedicel very short glabrous, membranous and dilated c. $3\frac{1}{2}$ mm. from base; calyx-lobes c. $1\frac{1}{4}$ mm. long, narrowly ovate, acute, with acute tube-veins not reaching apex; calyx rather regularly and densely hairy on ribs and spaces with spreading-ascending hairs up to base of lobes and usually upon veins in lobes. *Corolla* c. 4 mm. in diameter.

S. cancellata Bernh., which, in common with our plant, is clothed with a fine pubescence, differs noticeably in its smaller less orbicular leaves and in the branching of the scape; its spikelets, too, are usually two-flowered with more acute bracts and other smaller distinctions can be noted.

Distribution. Jugo-Slavia; Dalmatia. Scoglio Pomo! June 1911. Scoglio Kamik westl. von Lissa! June and July 1911 and 1914; *A. Ginzberger* and *A. Teyber.*

Dr. Ginzberger (in Densksch. K. Acad. already mentioned) shows (T. i.) excellent photographs of the extremely precipitous Rock Pomo, its circumference only 0·7 km. and its height 96 m. Figures 3 and 4 on T. ii. show the smaller Rock Kamik, 0·4 km. in circumference, with steep precipitous coast. Dr. Ginzberger has kindly sent me the following additional information.

Kamik consists of white-grey coloured Upper Cretaceous Dolomite breccia *. The *Statice* was found there south-eastwards, all along the slope between 13·5 and 23·8 metres above sea-level. It was accompanied by *Crithmum maritimum*, *Lotus Allionii* Desv., and *Suæda fruticosa* Forsk. Pomo consists of a dark green-grey coloured igneous rock of the Upper Trias, "an Augite-diorite." The *Statice* occurred on the eastern side growing with *Crithmum maritimum*, *Daucus* sp., *Alyssum leucadeum* Guss., *Centaurea crithmifolia* Vis., *C. Jabukemis* Ginz. & Teyb., and × *C. pomoënsis* Teyber. The growth began about 11 metres above sea-level (measured perpendicularly) where the smooth steep rock (shown on T. i. f. 4, on the right) changes into a slope of about 30°, which is covered with rubbish and earth. On this slope the plant extends to a height of about 20 metres above sea-level. He remarked that it was very

* Miss M. C. Crosfield, F.G.S., tells me that a "breccia" is a formation consisting of angular blocks, like a "scree," hardened into rock.

interesting that Kamik and Pomo have this *Statice* in common (which is wanting in the other islands), notwithstanding the great difference of the stone. This applies to *Atropis rupestris*, which, with the hybrid *Centaurea pomoënsis* (*C. crithmifolia* Vis. × *Friderici* Vis.), was described by A. Teyber, who gives a figure of the grass, in Osterr. bot. Zeit. 1911, 457.

Explanation of Plate 567.

1. *Statice vestita* C. E. Salmon. (*a*) from Pomo; (*b*) from Kamik; 2, outer bract; 3, middle bract; 4, inner bract; 5, calyx—all enlarged four times.

THE CAULESCENCE OF BELLIS PERENNIS.

By C. C. Lacaita, M.A., F.L.S.

Few species have been worse treated by botanists than the ubiquitous Daisy. Linnæus's definition is *Bellis scapo nudo*, nothing more. This is obviously wide enough to include the very different *Bellis silvestris* Cir., to which the synonym of Dodoens quoted by Linnæus should probably be referred. *Bellis annua*, the only other Linnean daisy, is then defined as *Bellis caule subfolioso*, the distinction clearly implying that *B. perennis* is stemless, as on a superficial view it seems to be, and as it is described in many floras.

It will make matters clearer to point out that *B. annua* is always annual and usually very obviously caulescent; *B. silvestris* is perennial and hardly, if at all, caulescent; *B. perennis* is perennial and caulescent, for it always possesses a stem (not to be confused with the rhizome), although in the common English plant the internodes of the stem are exceedingly short and the peduncles look like radical scapes.

The earliest hint of the caulescence of *B. perennis* that I have been able to trace is in Relhan's Fl. Cant. 321 (1785)—"scapi uniflori, interdum subfoliosi." Caulescence has been regarded by the later authors who have mentioned it as an occasional, rather exceptional, feature. It has sometimes been treated as a variation without a name; sometimes as a variety with a name; sometimes as constituting a distinct species, such, for instance, as *B. integrifolia* DC. in Lam. Dict. or as *B. hybrida* Ten. By most of such authors the flowering peduncles have been wrongly described as axillary, or sometimes as axillary and terminal. Again the rhizome and stem have been frequently confused; Babington speaks of the rhizome as equivalent to a stem; Rouy says that the stems are short and almost always subterranean, only allowing a partially aerial stem to "var. *caulescens*."

These statements are partly due to superficial and careless observation, partly to the extremely artificial conditions of life under which the daisy is usually seen on our lawns, where it is deformed by continual mowing and rolling. Freely growing *B. perennis* is by no means so plentiful or so luxuriant in England as it is in those districts

of southern Europe where there is sufficient rainfall. There the daisy can have its natural unimpeded development, becoming caulescent and more or less branched in the later stages of its yearly growth, especially where the soil is free. It is under such conditions that Dr. Enrico Carano of the Botanic Institute of Rome, assisted by a lady colleague, Dr. Valeria Bambacioni, has during the last few years submitted the daisy to a thorough scientific investigation, including experimental hybridisation with the allied *B. annua* and *B. silvestris*, and with special reference to the supposed species or subspecies *B. hybrida* Ten. A brief summary of their results appeared in the Atti R. Acc. Lincei of Rome, xxxi. ser. 5, in August 1922, under the title "Sopra alcuni risultati di ricerche colturali e di esperimenti di ibridazione nel genere *Bellis*"; a full account of their researches has now been published in Annali di Botanica, xvi. fasc. 1 (Jan. 1923), as "Ricerche sul genere *Bellis* L. con speciale riguardo alla *B. hybrida* Ten."

The following are the principal conclusions arrived at, which, I may say, are in almost complete agreement with opinions which I had already formed from a much more superficial observation of living as well as dried specimens from different countries:—

(1) If we examine the rosettes of leaves (excluding those of seedlings) at the commencement of the year's growth, two apparently different conditions become apparent. In the one, several rosettes are connected by a subterranean and often much branched rhizome; in the other the rosettes are isolated, each with its own tuft of roots, among which, however, may easily be seen the cicatrix of an old rhizome, that has rotted away after yielding up its reserve of nourishment to the separate individuals thus formed. The rhizome itself does not originate underground, but, as the cicatrices of former leaves that can be traced on it show, is formed by surviving portions of the aerial stem or stems of previous years, which by some agency have become buried in the soil.

(2) The first flower to be thrown up by each rosette is central and terminates the scape or peduncle that carries it. Ramification then proceeds by the development of vegetative shoots from the buds in the axils of the rosette leaves. These shoots are markedly plagiotropic, and so tend to grow more or less horizontally, spreading in a circle, with noticeable internodes, in contrast to the exceedingly short stem of the primary central rosette. Each of the axillary shoots carries in turn at its extremity a second rosette of leaves, from the centre of which springs a single terminal flowering peduncle. Then from the axils of these secondary rosettes there issues, in strongly developed plants, another set of axillary shoots, ending in their turn with a rosette of leaves and a central flowering peduncle; this process may continue indefinitely, according to the vegetative vigour of the individual. In the loose but rich volcanic soil of the Roman Campagna and of the neighbourhood of Naples—districts both of them blessed with a high rainfall—this process is far more striking and more easily observed than in drier or closer soils, or in less stimulating climates. Such are the plants in which Tenore thought that he saw a distinct species to which he gave the name *B. hybrida*, fancying it

not impossible that they might have originated from a cross between *B. perennis* and *B. annua*.

(3) Careful observation has convinced these authors—and in my opinion is conclusive—that *B. hybrida* (and *a fortiori* the less conspicuously developed plants usually known as *B. perennis* var. *caulescens* or var. *subcaulescens*) have no elaim to specific rank, and indeed do not so much as form a variety in the sense of hereditary race or strain, but are merely states attained to by the Daisy in the latter part of its flowering season, when outward conditions are favourable.

(4) Between the most riehly braneling individuals and those in which development has been arrested by lack of nutrition, or by such artificial interferenee as occurs in our lawns, there is no substantial difference. Many eultural experiments with achenes from plants of very different appearance have established that by suitably varying the conditions, plants with long branches may be obtained from achenes of eompact forms, while, on the other hand, those of *B. hybrida* may give rise to plants so compact that no one could regard them as other than ordinary *B. perennis*.

(5) The possibility of a hybrid origin for the plants usually referred to *B. hybrida* is excluded : (A) because the system of ramification is different from that of *B. annua*, and, apart from the much greater length of the internodes, is identical with that of ordinary *B. perennis*; (B) because artificial hybrids between *annua* and *perennis* show no resemblance to *hybrida*—moreover, the few certain natural crosses between those species that have been observed in the Roman Campagna are similar to the artificial crosses, and like them bear no resemblanee to hybrids; (C) because artificial crossing of *B. silvestris* and *B. perennis* produces hybrids elosely resembling *silvestris* and quite unlike *hybrida*.

Dr. Carano's work may therefore be eonsidered to have finally solved the problem of *Bellis hybrida*. What follows relates to the great divergence of opinion on the subject that has prevailed in the past. Tenore in his *Flora Medica* (ii. 64; 1823) gave this name to a perennial May-flowering daisy, growing in shady moist spots along the road from Pozzuoli to Fusaro (near Naples), at Castellammare, and in the damp hedge-banks round the botanie garden at Naples. I translate the whole of his account, in spite of its length :—"From the same root issue many branched, ascending, leafy stems, whose last ramifications are prolonged into flowering peduncles a foot and more long; radical leaves elliptic-oblong, 3 inches long and one inch broad, cut into acute, deep, distant teeth; stem-leaves carried on petioles about two inches long, oval or spathulate, always with acute teeth; flowers altogether white in the ray and yellow in the disk, of a size intermediate between those of the two preceding species (*B. perennis* and *B. annua*); the plant is slightly hairy. Is it *B. perennis* var. *caule elongato* DC. Fl. Fr.? I have long deferred recognising this new speeies, but after mature examination I have convinced myself that from its habit, its time of flowering, its duration and the rest of its characters, it is intermediate between the two preceding kinds, but it eannot be confused with or thought to be a variety of either.

Having the branched leafy stems of the annual daisy and the duration and stature of the perennial daisy, it may be considered a bastard born from the crossing of these two species."

In Fl. Neap. Prodr. Appx. iv. 32, also published in 1823 and reprinted in folio form in vol. v. of the *Flora Napolitana*, Tenore gives a shorter Latin diagnosis: "caulibus adscendentibus basi ramosis foliosis: pedunculis floriferis axillaribus longissimis; foliis radicalibus elliptico-oblongis remote profundeque dentatis, dentibus acutis; caulinis ovalibus vel spathulatis dentatis. Ten. Fl. Med. t. 2. p. 64." This is repeated, word for word, in the *Sylloge* of 1831, p. 436. Tenore evidently describes a much more extreme plant than is met with in England or Central Europe. The time of flowering agrees with Dr. Carano's experience that such developed ramification is only completed late in the season, *B. perennis* being a very early flowerer in the south. The statement that the flower-stalks are axillary is incorrect, as has been explained above; so is the remark about the size of the flower-heads, which are precisely those of *perennis*, varying in width from $1\frac{3}{4}$ to nearly 4 cm. The deep and acute dentation claimed is the exception rather than the rule, and varies in the same individual; though south Italian examples fall naturally into a broad-leaved and a narrow-leaved group.

Tenore's suggestion of hybridity, though quite untenable, is a remarkable one, for he does not mean hybrid individuals, but an established hereditary race originally derived from the crossing of many individuals of the presumed parent species. This was a very unusual conception in his days; both in his works and in Gussone's it is suggested in respect of some puzzling intermediates in other genera, but in an amorphous way without propounding any theory. We may at once put aside any notion that the great mass of *hybrida* plants could be individual crosses, although both *perennis* and *annua* are present in the immediate vicinity of Naples, because in some other districts where *hybrida* is very plentiful, *annua* is entirely absent. Nor will the supposition of a hybrid race hold water in this instance, for, apart from the last-mentioned difficulty, Tenore's *hybrida* shows no resemblance at all to *annua* except in being a branched form; the statement as to intermediate size of the flower-heads is incorrect.

Tenore knew better than to propose a cross of *silvestris* with *perennis* as the origin of his *hybrida*: how could the parentage of a practically stemless species like *silvestris* produce the required result? This preposterous notion is due to Decandolle, who (Prodr. v. 305) reduces Tenore's species to a variety, not of *perennis* but of *silvestris*, with the remark "omnino media inter *B. perennem* et *B. sylvestrem* et forte vere hybrida?" This absurdity was severely criticised long ago by J. Gay in a MS. note on a specimen received from Tenore and now in Herb. Kew.; "fleurit au printemps comme le *B. perennis*, dont il me semble à peine pouvoir être distingué comme variété. C'est donc à tort, suivant moi, que DC. le rapporte comme var. au *B. sylvestris* Cyr., qui fleurit en automne et qui est remarquable pour son involucre à grandes folioles herbacées. Août 1839." Loret is equally decided in his Obs. crit. sur quelques plantes Montpelliéraines

in Rev. Sci. Nat. iii. 558, where he suggests that the plant under Decandolle's eye was not *B. hybrida* at all. It may here be remarked that although *B. silvestris* begins to flower about the end of September, its flowering season overlaps the beginning of *perennis*, so that hybridism between the two is not absolutely excluded by the great difference in the usual date of flowering. So-called summer flowering of *silvestris* is confined to the upper mountains in southern and central Italy, and is marked by smaller less characteristic individuals than are seen lower down in autumn and winter, but there is nothing to suggest that these are hybrids.

To return to Decandolle's error; there may be another explanation than that hinted at by Loret. It is not impossible that Decandolle may have misapprehended Bertoloni's remark (Mant. Pl. Alp. Apuan. 59, 1832) "magnitudine partium media inter *Bellidem perennem* et *Bellidem sylvestrem*," which is true as far as mere size is concerned, but not otherwise. In that work Bertoloni regarded not only *B. hybrida*, but even *B. silvestris* as a variety of *B. perennis*. Then in the *Flora Italica* (ix. 517–519; 1853) he reinstates both *silvestris* and *hybrida* as independent species, but says of the latter "media inter *B. perennem* et *B. sylvestrem*," omitting the words "magnitudine partium," and thus committing himself, intentionally or unintentionally, to Decandolle's mistake. These passages may have contributed to form Bentham's untenable view as to the specific identity of *silvestris* and *perennis*, on which he dwelt in his well-known address to the British Association in 1861 (see Nat. Hist. Review, i. p. 133).

The authors who have taken up *B. hybrida* as a separate species, besides Tenore, are Gussone, Fl. Sic. Syn. ii. 508 (1843) and Fl. Inar. 164 (1855), Bertoloni, *loc. cit.* (1853), Caruel, Prodr. Fl. Tosc. 335 (1860), Arcangeli, Comp. Fl. It. 342 (1882), and Halacsy, Fl. Gr. ii. 12 (1902). They add nothing to our knowledge, except Gussone's remark that *B. annua* is not found in the island of Ischia, for which he records *B. perennis* and *B. hybrida*, thus reinforcing the objections to the hypothesis of a hybrid origin.

B. hybrida has been distributed in the Fl. Italica Exsiccata, no. 1151. The specimens were collected by me at a spot where I have long been familiar with this daisy, at Ravello in the province of Salerno, in rich turf on limestone, not volcanic soil. Although all gathered within a few yards of each other, they vary from plants exhibiting the extreme form described by Tenore to others that match English and French "subcaulescent" specimens. I have three examples in my herbarium, one from Rome, one from Ravello, and one from southern Calabria, in which the rhizome bears many stems, most of them branched and some carrying as many as six to eight flower-stalks. Caulescent plants predominate in rich moist situations in all parts of Italy where the rainfall is considerable, especially if the soil is free. In drier districts or stiffer soils marked caulescence is rarer. The fully developed *hybrida*, not only caulescent, but conspicuously branched, is less plentiful; its luxuriance is obviously due to copious moisture and nourishment in a mild climate. Remarkably caulescent plants, though not attaining to such luxuriance, occur in other parts

of the continent and are not infrequent even in England, especially in fields of Trifolium on light soils. Sundry authors, for example Rouy, want to distinguish these from *hybrida*, partly on account of the more developed ramification in the Neapolitan plant, partly because of Tenore's description of the deep and acute toothing of the leaves of his species. Gola (Piante rar. Fl. Piemonte, in Act. Sci. Turin, 1908–1909, 238) holds the same opinion and even doubts whether any of the caulescent examples from upper and central Italy should be referred to Tenore's *hybrida*. On the other hand, Loret (*loc. cit.*) considers the specimens signed by Tenore himself that he has examined to be identical (ressemblent complètement) with the var. *caulescens* Rochebr. that grows in ditches near Montpellier, adding, "les seuls mots *profunde dentatis* ne sont pas applicables à toutes les feuilles inférieures (of the Montpellier examples), mais nous les avons vues varier sous ce rapport et se montrer assez souvent profondement dentées." Loret has also annotated a French specimen in Herb. Kew.; "la plante de Tenore est exactement la nôtre. C'est une simple forme du *perennis* qui s'allonge dans les fossés humides. On a tous les intermédiaires en passant de la verge au fond du fossé." If *Bellis perennis* were really a stemless plant this phenomenon could not occur as a mere consequence of better nutrition.

It thus appears that the general conclusion of Dr. Carano's paper has been anticipated, though he and his lady colleague have been the first to base that conclusion on a sure foundation. Yet, while reducing *B. hybrida* to a mere state of *perennis*, these authors recognise as true varieties or subspecies of *perennis* such remarkable forms as var. *fagetorum* Lacaita in Bull. Ort. Bot. Nap. iii. 281 (1913) with thin, almost transparent, glabrous leaves, that inhabits the mountain beech-forests above 1500 metres in the provinces of Avellino and Salerno, where the rainfall is very high, or var. *margaritæfolia* Huter Porta & Rigo (pro specie) from southern Calabria and Sicily: remarking, nevertheless, that in favourable conditions these varieties, just like ordinary *perennis*, are capable of producing strongly caulescent plants.

"THE THAMES-SIDE BRASSICA."

[The following note from Prof. L. H. Bailey's paper on "The Cultivated Brassicas" published in *Gentes Herbarum* (see p. 125), will be interesting to British botanists, especially to those who possess the volumes of this Journal to which reference is made. It appears under *Brassica Rapa*.—Ed.]

"If the turnip ever self-sows or runs wild, we should expect the plant to be potentially biennial, making radical leaves in autumn from seeds discharged that year and sending up its flower-stalks the following season. This is what we find in the 'Thames-side Brassica' that grew along the Thames river, England, many years ago, and was the subject of careful observation by Hewett C. Watson and reported in Seemann's *Journal of Botany* in 1869 (vols. vii. [346] viii. [369]).

"This plant still persists, and I have recently collected it along the

Thames in Surrey. Watson writes: 'My conviction is, on a familiarity with the plant during thirty years, that the Thames-side Brassica is simply the wild stock of the true turnip.' 'As we see [the species] by the Thames side the seeds germinate and become plants early in [the] autumn. These live through the winter and flower in the succeeding spring or summer. They have a tuft of green and rough radical leaves, which are more lyrate-pinnatifid than the leaves of the annual form [*B. campestris*]. As the flowering stem rises from this winter tuft in the following spring,' the leaves produced on it are smooth, and become glaucous in hue, especially upwards. The plant as I have taken it along the Thames has a hard woody taproot sometimes thicker than the stem. I follow Watson in supposing that it represents a feral form of the turnip species, but I should call it *Brassica Rapa*, with which its foliage also more closely identifies it. Watson calls it *B. campestris*, using the name inclusively, but I prefer, for purposes of identification, to keep the names and the plants distinct. Whether the plant represents an aboriginal form from which the cultivated turnip is derived or a run-wild race of the turnip, I am unable to say. The fact that it has persisted through so many years raises doubt whether it is merely a run-wild turnip, and the fact that it so long remains as a biennial indicates that it is not merely an incidental form of *B. campestris*. It may be significant that Linnæus, who marks *B. Rapa* as biennial, assigns it to 'habitat in arvis Angliæ, Belgii': did he know such a feral or spontaneous plant? I have seen nothing like this Thames-side plant in North America, but I have taken it, with woody root, on the island of Barbados: if the cultivated turnip runs wild and persists, we should expect its deliverance to occur in this country as well as elsewhere: material is needed" (p. 86).

CRYPTOGAMS FROM THE ANTARCTIC.

By O. V. Darbishire.

(The University, Bristol.)

These Cryptogams were collected on the British Antarctic Expedition 1907–1909 and on the expedition of 1914–1917, both led by the late Sir Ernest Shackleton.

The Lichens comprise fifteen species which could be satisfactorily named, among which there was one new species, *Buellia pernigra*, of which a description is subjoined. Including this the total number of lichens known from the Antarctic Continent is now 209. The species enumerated were all collected on the slopes of Mount Erebus (South Victoria Land), except two gathered on Elephant Island. An asterisk indicates a new locality:—

1. *Rhizocarpon geographicum* (L.) DC. Mount Erebus.
2. *Gyrophora anthracina* (Wulf.) Kbr. Mount Erebus.
*3. *Gyrophora vellea* (Linn.) Ach. Elephant Island.
4. *Placodium elegans* (Link.) Nyl. Mount Erebus.
*5. *Placodium miniatum* Hffm. Mount Erebus.
6. *Caloplaca citrina* (Hffm.) Th. Fr. Mount Erebus.

7. *Lecanora polytropa* (Ehrh.) Th. Fr. Mount Erebus.
8. *Parmelia quarta* Darbish. Mount Erebus.
9. *Neuropogon melaxanthum* (Ach.) Nyl. Mount Erebus.
*10. *Physcia nitescens* Hue. Mount Erebus.
*11. *Buellia Charcotii* Hue. Mount Erebus.
12. *Buellia frigida* Darbish. Mount Erebus.
*13. *Buellia pernigra*, sp. nov. Mount Erebus.
14. *Acarospora chlorophana* (Wnbg.) Mass. Mount Erebus.
*15. *Verrucaria Racovitzæ* Wain. Elephant Island.

It will be seen that four species are new to South Victoria Land, and none, to my knowledge, have been recorded previously for Elephant Island.

Buellia pernigra, sp. n. Thallus crustaceus, sed bene evolutus, convolutus, et tuberculatus, parmeliam quartam simulans. Protothallus nigerrimus, sed vix visibilis, superficiem minute rugosus. Metathallus nigerrimus, tuberculatus, convolutus, densissime apotheciis spermogoniisque instructus. Apothecia nigerrima, rotundata, ad 0·5 mm. lata; epithecium carbonaceum, planum, aut rarius paullo

Fig. 1.—*Buellia pernigra*, sp. nov. Vertical section of thallus, showing structure of thallus, mature and immature apothecium, and spermogonium magn. 75.

convexum; parathecium carbonaceum; hypothecium hyalinum; sporæ octonæ bicellulares aut rarius unicellulares, fuscescentes, 0·010–0·012 × 0·006–0·008 mm. magnæ. Spermogonia bene evoluta, ostiolis instructa nigerrimis; spermatia recta, 0·003 × 0·0005 mm. magnæ.

Habitat ad saxa antarctica Montis Erebus.

The metathallus is very black in colour, and it arises from the substratum abruptly to a thickness of 1 to 2 mm. It is more or less convolute or almost fruticulose. There is no clearly visible protothallus at the margin, though immediately below the edge of the overhanging thick metathallus there may be seen a very thin black portion of the lichen which would be the protothallus. The small tubercular portions can be seen to arise from this part The few plants observed did not exceed 1 cm. in diameter. Externally apothecia and sterile portions of the metathallus are equally quite black. But the sides of the upright pillars of the metathallus may occasionally appear somewhat lighter. The structure of the metathallus is of the kind usual in species of *Buellia*. There is a loose medulla of thickish hyphæ in close contact with the substratum. It is white in

colour. On the upper surface the metathallus is quite black. The surface is covered with remnants of the primary cortex and old secondary cortex which too is light in colour. It is, however, sufficiently continuous not to produce a flaky or pruinose impression. The blackness of the metathallus is due to the outermost cells of the living cortex. The outer walls of these cells gradually become thicker and darker, and ultimately the whole cells become quite black and disorganised. Finally, these black cells reach the outer surface, and by that time they are quite disorganised and they have become quite white in colour again. Both apothecia and spermogonia occur on the same plant, the former originating in the gonidial layer though quite free of the latter when mature. They reach a diameter of about 0·5 mm. Epithecium and parathecium are black and carbonaceous. The hypothecium is light in colour. The eight brown spores measure 0·010 to 0·012 by 0·006 to 0·008 mm. The spermogonia

Fig. 2.—*Buellia pernigra*, sp. nov. Section through cortex, showing the blackening of the outer cells of the new cortex magn. 1000.

have small black ostioles, and the inner cavity consists of a complicated system of passages lined with sterigmata. The single spermatia measure about 0·003 by 0·0005 mm.

No mention is made here of any previous Reports on the Lichens of the Antarctic, as all references to the literature of the subject will be found in the Report on the Lichens brought back by the National Antarctic Expedition ('Terra Nova') of 1910, published by the Trustees of the British Museum (Natural History).

Two algæ brought back from Elephant Island were submitted to Mr. Gepp, who kindly identified one as *Plocamium secundatum* Ktz. (Tab. Phyc. xvi. Tab. 42; Kuetzing, Spec. Alg. p. 883), and the other as a decayed scrap of one of the Phæophyceæ, which could not be identified specifically.

Two mosses were also collected on Elephant Island, and Mr. H. N. Dixon was good enough to name these:—

Amblystegium subvarium Broth. in Deutsch. Suedpolar-Exped. Bd. 8, p. 93 (fig.) (1906). First found on Kerguelen.

Bryum antarcticum Hook. fil. & Wils. in Hooker, Flora Antarctica, ii. p. 414, tab. 153. fig. 6 (1847). First found on Cockburn Island.

THE NAME FORSTERA Linn.

By B. Daydon Jackson, Ph.D., Sec.L.S.

Some months ago I found in the Smithian herbarium four sheets from the Linnean collection bearing impressions of the plants which had been taken off the sheets, leaving only the impress of the plants. Enough remained to determine their true position with the exception of one sheet, which had previously had a grass-like plant glued down, with the legend in Linné's handwriting "*Forstera vaginalis* Sp." ; on the back is "*Forsteria* Sparrm. Act. Angl." in the same handwriting.

I could find no *Forstera vaginalis*, and the marks left on the paper were clearly not of the received Stylidiaceous genus ; I therefore turned to the literature which might explain the mystery of the Linnean statements. The genus is usually attributed to "Linn. f. in Nov. Act. Soc. Sc. Upsal. iii. (1780) 184, t. 9," with one species, "*F. sedifolia* Forst." The title of the paper throws doubt upon the correctness of this ascription—"Decas plantarum novarum, ex insulis maris australis, transmissa a Georgio Forstero, Anglo," which may be rendered "Ten new plants from the islands of the South Sea sent by George Forster, the Englishman." Yet, apparently on the fact of its being *sent* by the younger Forster, the father of the sender is charged with naming the plant after himself, in Linn. f. Suppl. 59 ("Forstera. Forst. Act. Ups. v. 3, p. 184"), and the species on p. 407 with almost the same citation ("Forstera. *sedifolia*. Forst. Act. Ups. v. 3, p. 184, t. 9").

Upon turning to the Uppsala publication, we find that the descriptions are preceded by two pages written by an anonymous author, from internal evidence undoubtedly the younger Linné. He explains that the two Forsters on their return from [Cook's second voyage] round the world in the year 1775, sent descriptions of some plants to Linné, who showed them at a meeting of the Royal Society of Sciences, Uppsala, promising that the Society should have the opportunity of publishing the paper. But Linné's health was then broken, and his death took place without the written descriptions reaching the Society. It fell, therefore, to his son and successor to fulfil the obligation ; the name *Forstera* had been applied to an unnamed plant by his father, in honour of the naturalists, with an engraving from a coloured drawing by George Forster. By letters the elder Forster had informed Linné that descriptions of *Gahnia*, *Drimys Winteri*, *D. axillaris*, and *Forstera* had first been drawn up by Anders Sparrman, a friend of the Forsters, and their companion from the Cape to New Zealand and back ; the rest [details ?] were added by George Forster, and the final revision by J. R. Forster.

In the preface to the *Characteres generum plantarum* (Lond. 1775) the authors state that Sparrman described the plants, and George drew them, while the elder Forster devoted himself to zoology. When Sparrman had completed his descriptions, the Forsters were consulted, the younger digested them in another volume and the father revised and copied them into yet another volume, in the order of the Linnean system.

It seems clear that the plant chosen by Linné to bear the name *Forstera* was not that which is now so named; was it one of the ten? Could it have been a small specimen of *Gahnia*?

The question here raised will probably not readily be answered, but my attention having been accidentally drawn to them, they seem sufficiently curious to be submitted to the notice of others.

A NEW GENUS OF LAURACEÆ FROM NEW GUINEA.

By Spencer Le M. Moore, B.Sc., F.L.S.

Dryadodaphne, *Lauracearum* e tribu *Perseearum* genus novum. *Flores* unisexuales, tetrameri, ♂ solum obvii. *Perianthii* tubus turbinatus, anthesi peracta ovoideus; limbi segmenta 8, biserialia, æstivatione imbricata, exteriora quam interiora paullo majora. *Stamina* perfecta 4, seriem extimam constituentia; antheræ latæ, 2-locellatæ, extrorsæ. *Staminodia* serr. II et III subulata hæc quam illa manifeste minora additis aliis serr. IV et V minimis, omnia uti stamina eglandulosa. *Arbor* magna, glabra. *Folia* opposita vel subopposita, coriacea, penninervia. *Flores* pedicellati, basi bibracteati, in cymas axillares breves paucifloras digesti.

D. celastroides, sp. unica; *ramulis* tetragonis bene foliosis cortice brunneo obductis; *foliis* ovatis vel ovato-oblongis obtusis vel apice rotundatis basi in petiolum latum ±7 mm. long. cuneatim angustatis margine undulato-crenulatis pag. sup. nitidulis pag. inf. opacis 4–6 × 2–3 cm. costis lateralibus inconspicuis reticulo (pag. inf. solum viso) maxime laxo; *cymis* circa 3 cm. long.; *pedunculis* circa 1 cm. long. pedicellos duplo excedentibus; *bracteis* ovatis obtusis concavis 2 mm. long.; *receptaculo* sub flore 1·5 × 1·7 mm. postea 4 × 3 mm.; *floribus* sec. cl. detectorem viridibus; *perianthii* segmentis ext. ovatis obtusis 3 mm. long. int. ovato-oblongis obtusis 2·5 mm. long.; *antheris* ovatis apice attenuatis ipso obtusis basi latis carnosulis; *staminodiis* ser. II 1·25 mm. ser. III 1 mm. long.

Mt. Woriwori, ±5000 ft. H. O. Forbes, 724.

This very distinct genus is evidently related to *Endiandra*. The opposite (sometimes subopposite) leaves and tetramerous flowers, with several series of small eglandular staminodes behind the stamens, are the distinguishing features. As the specimens lie upon the sheet their appearance is that of a celastraceous plant.

A WORLD-CODE OF PLANT NOMENCLATURE.

An attempt to combine the best features of the International Rules and the Type-basis Code has been published by Mr. Sprague in *Science*, n. s. lvii. 207 (Feb. 16, 1923), under the heading "Suggestions for a World-Code of Plant Nomenclature." His proposals may be summarised as follows:—

1. Acceptance of the type-concept, with provision for the recognition of "substitute types."

2. Acceptance of a list of generic "nomina conservata" to be

prepared by a joint committee, the present list being taken as a general basis.

3. Treatment of generic homonyms as non-valid, with the exception of such as may be placed on the list of "nomina conservata."

4. Treatment of all specific homonyms as non-valid.

5. Abandonment of priority of position.

6. Abandonment of an obligatory Latin diagnosis of new groups; with a recommendation, however, that a Latin diagnosis should be supplied, especially in cases where descriptions are published in languages which do not employ Roman characters.

7. Treatment of generic names as non-valid unless they are accompanied by a generic description or a reference to a former description (generic or sectional).

8. Treatment of generic names as non-valid unless they are associable with a simultaneously or previously published binomial specific name. Provision, however, to be made for the typification of important genera which would otherwise be invalidated under this rule.

9. Acceptance of duplicate binomials.

FRESHWATER PLANKTON ALGÆ FROM CEYLON.

By W. B. Crow, M.Sc., Ph.D.

Introduction.

The material which is reported upon in the following pages was collected by Prof. F. E. Fritsch in Ceylon, Aug. 21–Nov. 10, 1903, and forms part of a larger collection. It was handed to me for investigation early in 1919, and for some months the work was carried out under the supervision of Prof. Fritsch, to whom I am greatly indebted both for advice on several doubtful points, and for allowing me free access at all times to his magnificent collection of figures. I must also acknowledge the help of a Government grant, made by the Committee of the Privy Council for Scientific and Industrial Research.

The general characters of the Cyanophycean and Chlorophycean Flora of Ceylon have already been dealt with by Fritsch in a paper (Proc. Roy. Soc. B. lxxix.) in which, however, a consideration of the plankton was not included. The systematy of the freshwater algal flora forms the subject of a small contribution by Lemmermann in Zool. Jahrb. xxv. and an extensive list by W. & G. S. West in Trans. Linn. Soc. B. Ser. 2, vi., the latter not dealing with the plankton species. The collection dealt with here consists mainly of Plankton. Much of it is from the so-called "tanks"—large reservoirs of artificial origin in which, however, the algal flora lives under practically natural conditions. Most of the collecting was made from the shore by means of a plankton net. Apart from this normally littoral forms in some cases may have been carried out as tycholimnetic plankton, and have thus been included. The material is preserved in tubes of dilute formaldehyde, and for the most part the specimens are in an excellent state of preservation.

In the following account, only the *Cyanophyceæ* and *Chlorophyceæ* (excluding *Heterokontæ*, but including *Akontæ*) are described. The very numerous Diatoms of European fresh waters appear to be rare, whilst numerous tycholimnetic forms occur in some of the tubes. The *Heterokontæ* were practically absent. A rich zooplankton, mostly Crustacea, also occurs in some localities, but it was not investigated. The character of the material and the limitation of the investigation to certain classes of organisms of the phytoplankton precludes any account of the plankton as an association. On the other hand, the material has been dealt with from a systematic point of view. Where ecological topics have been touched upon, it has been with reference to individual species or other systematic groups. Fifty genera, including 138 species, are recorded : of these, seventeen genera, including 50 species, belong to *Cyanophyceæ*, and 33, including 85 species, to *Chlorophyceæ*. The actual relative proportions in number of species of each of the main groups in the habitats represented is, at the season at which the collections were made, probably something like the proportion shown by the following lists, since although a number of doubtful forms are not listed, these were distributed throughout the various families, and mostly consisted of rare forms, of which specimens were insufficient in number or unsuitable for identification. The proportion in number of species given above for *Cyanophyceæ* and *Chlorophyceæ* is however quite unlike the proportion in number of individuals ; and there is no doubt that, as in the terrestrial algal flora (see Fritsch), the former group is much the more important component.

Four new species were met with. The two new species of *Microcystis* and *Dimorphococcus Fritschii*, sp. n., are described elsewhere. Thirty-six species recorded here have not previously been found in Ceylon ; a large number of the latter, however, are not uncommon in the tropics. Many of the Cingalese species have not only been found in other parts of the Indo-Malayan region, but a high percentage have been frequently recorded from Europe.

In order to show the geographical significance of the following lists, reference is given to the previously recorded geographical distribution of each species. These records, although no doubt incomplete, indicate a very wide range of localities for many of our types. The fact that several tropical species also occur in the polar regions is by no means fully explained. It is well known that the majority of organisms of the freshwater plankton have a very wide area of distribution. Our records should be compared with those of W. and G. S. West; these authors did not deal with the limnoplankton, and their records contain many species of limited range. On the other hand, we have dealt chiefly with the limnoplankton, which is to a large extent made up of the same species as occur elsewhere.

The localities are referred to by numbers, as given in the following table :—

1. Large brackish pond about 3 miles from Hambantota, 10 Sept.
2. Four small tanks near entrance to Botanical Gardens, Anuradhapoora, 2 Oct.
3. Small, shallow bay of Nuwarawewa, near Anuradhapoora, 2 Oct.

4. Rock-pool connected with Kalawewa-tank, 29 Sept.
5. Lake Cantelai, —.
6. Tank Andankulam, 4 miles from Trincomalie, 2 Oct.
7. Small pond in Bot. Gardens, at Anuradhapoora, 3 Oct.
8. Tank Basawak-kulam, 3 Oct.
9. Tank Andankulam, 3 miles from Trincomalie, 18 Sept.
10. Tank Madakana-wewa, between milestones 65 and 66 on road from Anuradhapoora to Dambulla, on the left side, —.
11. Lake Madampe at Ambalangodda, near the sea, 13 Sept.
12. Tank Andangawa-mahawewa, on small jungle-footpath from Habarane to Sigiri, 11 Oct.
13. Tank Balaluwewa, 29 Sept.
14. Lake at Candy, 24 Sept.
15. Lake at Colombo (taken near boat-house), —.
16. Tank Mineri, 12 Oct.
17. Tank Tissawewa, near Anuradhapoora, 3 Oct.
18. Small rock-pool in the wet season of the year certainly connected with tank Punchi-kekirawa close by, 28 Sept.
19. Perithpan-pokuna, near Isurumunija-temple at Anuradhapoora, 3 Oct.
20. Tank Nuwara-wewa, at Anuradhapoora, 2 Oct.
21. Tank at Dambulla, 9 Sept.
22. Lake Madu Ganga, near Balapitya, 14 Sept.
23. Tank Neraviea-wewa, situated in the big rock about 300 ft. above Dambulla, 9 Oct.
24. Canal leading from river to lake near Bentottle, 6 Sept.
25. Outflow of tank Nuwarawewa, near Anuradhapoora, 2 Oct.
26. Tank Kalawewa, taken from South End, 29 Sept.
27. Lake at Panadure, 16 Sept.
28. Tank at Haberane, 10 Oct.
29. Tank Magaswewa, between 56th and 5th milestones on the road from Bambulla to Trincomalie, 11 Oct.
30. Small pools near Tirappanewewa, 8 Oct.
31. Tank Punchi-kekirawa, 28 Sept.
32. Tank at Kekunadure, about 5 miles from Matara, 8 Sept.
33. Fourth backwater of Mahavilla-ganga, below Gampulla, 22 Sept.
34. Salt lagoon at Hambantota, 10 Sept.
35. Tank Madokotai-kulam, about 3 miles along Trincomalie-road from Vavoniya, 5 Oct.
36. Rock-pools, near tank Balaluwewa, 29 Sept.
37. Tank Malawewa, near Kekirawa, 30 Sept.
38. Tank Yaha-anaguhu-wewa, near Haberane, 12 Oct.
39. Pond near Director's bungalow, Peradeniya Gardens, 31 Oct.
40. Small salt lagoon lying between milestones 4 and 5 on the coast road from Trincomalie, 19 Oct.
41. Tank Senadiniya-gawawewa, near Haberane, 12 Oct.
42. Tank Walikulam, near Kekirawa, 30 Sept.
43. Tank between milestones 102 and 103 on road from Vavoniya to Madawachy, 5 Oct.
44. Tank Mahakekirawa, near Kekirawa, 28 Sept.

45. Outflow of N. end of tank Kalawewa, 29 Sept.
46. Trincomalie harbour, near commencement of lake Tamblegam, 17 Oct.
47. Tank Namoluwewa, between milestones 48 and 49 on road from Dambulla to Trincomalie, 10 Oct.
48. Tank Tirappanewewa, 8 Oct.
49. Small pool near the roadside near Kekirawa, 30 Sept.
50. Tank Wendrenkulam, about 1 mile from Kantelai, 14 Oct.
51. Tank Mahakadawella, 8 Oct.
52. Tank Mancadawa-wewa, near Kekirawa, 1 Oct.
53. River Nalande Oya, near Nalande, 28 Sept.
54. Outflow of rock-tank near Nalande, 26 Sept.
55. Tank Tibbotu-wewa, 30 Aug.
56. Tank Borlasgama, near Colombo, 8 Oct.
57. Tank Ekiniyea-wewa, near Kekirawa, 30 Sept.
58. Tank Periza-kulam, near Trincomalie, 20 Oct.
59. Tank Vilankulam, at Vavoniya, 4 Oct.
60. Lake Tamblegam, 17 Oct.
61. Small pool (at times a much larger stretch of water) about 3 miles from Hambantottle, 10 Sept.

I. CYANOPHYCEÆ.

The most important constituents of the freshwater plankton of Ceylon are evidently the *Cyanophyceæ*. But besides the typical limnetic forms such as species of *Microcystis*, *Cœlosphærium*, *Anabæna*, and certain Oscillatoriaceæ, our lists include tycholimnetic forms, and the Oscillatoriaceæ on the average have large filaments of the benthic type. Most of the species recorded are well known in the temperate regions, but many favour warmer periods here, and their abundance in tropical waters is not surprising. A curious feature is the apparent absence of *Aphanizomenon*, the rarity of *Gomphosphæria*—a few doubtful colonies, not recorded below, being all that was observed of this genus,—and the lack of several of the species of *Chroococcus*, which are so abundant in temperate waters.

Chroococcaceæ.

A discussion of the relative taxonomic value of the different characters of the Chroococcaceæ has been given in New Phyt. xii. As there has been considerable difference of opinion with regard to the limitations of certain species, some attempt has been made to enumerate the essential features which a study of the Ceylon material has made possible, except in the case of *Microcystis*, which is fully described elsewhere. In many respects we have followed Lemmermann in our treatment of the family.

Chroococcus Naeg.

This genus evidently does not play such an important part in the plankton of Ceylon freshwaters as in that of the lakes of Central Europe. A few unidentified species were found besides those recorded below, but these were rare.

C. MINUTUS (Kuetz.) Naeg. Cells in groups of two, four, or eight, not united into large mucilage masses. Sheath not stratified. Cells show very clearly that division is by constriction. Lemmermann regards *C. helveticus* Naeg. as synonymous with *C. minutus* (Kuetz.) Naeg., there being no essential difference between the descriptions of these. Our specimens varied very much in size—length 5–14 μ, width 3·5–10 μ, sheath 1–2·5 μ in thickness—but were otherwise constant. The larger specimens exceed the normal type, and would fall into *C. helveticus* f. *major* De Toni.

Amongst *Spirogyra* and in association with *Spirulina tenuissima* Kuetz. Tycholimnetic. *Loc.* 1. *Distr.* Eur., S. Afr., S. Amer., Antarctica.

C. MINIMUS (v. Keissler) Lemm. Cells numerous in free floating mucilage masses. Sheath spherical to ellipsoidal. Originally described by v. Keissler as *C. minutus* var. *minimus*, this was separated as a distinct species by Lemmermann. The Ceylon specimens are all typical plankton organisms forming very definite free-floating colonial masses, in this respect quite distinct from typical *C. minutus* (Kuetz.) Naeg. Since this is the case, there seems to be no reason for supposing *C. minimus* closely related to *C. minutus*, and the species has more similarity with *C. limneticus* Lemm. and other plankton forms. Besides the spherical and ellipsoidal forms of colonial sheath, as in the figures of v. Keissler, many of the Ceylon specimens showed a tendency to greater elongation and lobing. Colonies 100–200 μ in length, 30 μ in width. Cells 2·5–3·5 μ diam., cell-sheath 1 μ in thickness. *Loc.* 2, 3. *Distr.* Eur., S. Afr., Antarctica.

(To be continued.)

GEORGE CLIFFORD'S HERBARIUM AND THE 'HORTUS CLIFFORTIANUS.'

By A. B. Rendle, F.R.S.

There has always been some doubt as to the connexion between George Clifford's Herbarium, which was bought by Sir Joseph Banks in 1791, thirty years after Clifford's death, and the *Hortus Cliffortianus*, published at Amsterdam in 1737—the systematic account by Linnæus of the plants in Clifford's garden and herbarium. The latter, which passed to the British Museum with the Banksian collections in 1827, is referred to by Robert Brown in his memorandum on the Banksian herbarium as "the principal authority for the plants described in one of Linnæus's earliest and most celebrated works"—*i. e.* the *Hortus*. It was at that time kept separate from the general herbarium, but was subsequently incorporated with it during the keepership of Mr. Carruthers.

The specimens are on the original sheets, in the same condition as they were when bought by Banks. In many cases, as will be remembered by botanists who have consulted the herbarium, they are mounted, in accordance with the custom of the period, as if growing

from an ornamental vase, accompanied by a label in memorial tablet style, the writing on which is evidently contemporary, but not that of Linnæus. By means of the citation on the labels, it is generally possible to coordinate the specimen with the description in the *Hortus*; the number attached to the species in the book is also often written on the sheet. The binominal subsequently assigned to the plant by Linnæus was also written on the sheet in a somewhat later hand before the herbarium came into Banks's possession.

Although there was thus evidently a close connexion between the specimens in Clifford's herbarium and Linnæus's descriptions in the *Hortus*, there was nothing to prove that Linnæus had any direct personal association with the specimens; but a sheet has just been found which definitely establishes this association. This is the specimen of *Grislea* (Hort. Cliff. 146) and the sheet bears the name in Linnæus's hand, written just below the specimen in the characteristic Linnean manner; the later writer has added "Grislea secunda." The sheet also bears a note by Dryander: "In the Great Herbarium under *Combretum*." The sheet is therefore of great interest, for, as has been already said, it indicates a personal association between the specimens in Clifford's herbarium and Linnæus as the author of the *Hortus Cliffortianus*; and the specimen is the type of the genus.

It is unfortunate that a specimen of such historical interest should give rise to a difficulty in nomenclature. The note of Dryander quoted above indicates the source of the trouble, and explains why the specimen of *Grislea* has been so long overlooked. There is no doubt that it is a *Combretum*, and, if not actually *C. farinosum*, is a very closely allied Mexican species.

In Sp. Plant. (ed. 1, 348) under *Grislea*, Linnæus gives the trivial name *secunda*, with a reference to Hort. Cliff., but adds no diagnosis nor synonym. The description of the genus in Gen. Plant. 1737 is evidently from the same plant, and is copied word for word in the edition of 1754. Neither fruit nor seed is mentioned, and the specimen possesses neither. The original of *Grislea* L. is a *Combretum*, and *Grislea* is thus the first name for that genus.

In 1758 Linnæus edited the *Iter Hispanicum* of his favourite pupil Pehr Loefling (†1756), which contains an account of the travels of the latter in Spain and America, and descriptions from Loefling's manuscript of some of the plants collected. On p. 245 is a full description of *Grislea secunda*, but this is not the original *G. secunda*, of which Linnæus apparently retained no specimen (there is none in his herbarium), but of the plant to which the name has since been applied, found by Loefling in tropical South America in February 1755. At the end of the volume, in an "Appendix ultimus absoluto opere missus" (p. 308) *Combretum* is described. In *Systema*, ed. x. p. 999 (1759), Linnæus includes the two genera, quoting both from Loefling with no reference to his own original description in Hort. Cliff. or in Sp. Pl. ed. 1.

The position raises an interesting point in nomenclature. It is evidently desirable that *Combretum* should be included in the list of *nomina conservanda*; but botanists may find difficulty in retaining the name *Grislea* for the plant to which it has been applied since

1758. The accurate Dryander noticed the discrepancy; he not only (as has been shown) referred the Hort. Cliff. *Grislea* to *Combretum*, but to a specimen of the plant generally called *Grislea*, collected in Caracas by a Dr. Mærter, has added the note: "*Grislea secunda* Loefl.; diversa a *Gr. secunda* Sp. Pl. ed. 1, quæ *Combretum*." So far as I am aware, the confusion has not since been noted.

I have discussed the matter with Mr. Sprague, who suggests that the name *Grislea* cannot be retained for the Lythraceous plant which usually bears it. Loefling certainly used the name *Grislea* which was already occupied, but we may assume that he gave the name independently. It is interesting to note that neither in the *Iter*, nor in the *Systema*, ed. x., where *Grislea* and *Combretum* appear side by side in their modern usage, is there any reference to the earlier publications of Linnæus. If we could agree to start again here, and quote "*Grislea* Loefling non Linn. Hort. Cliff. & Sp. Pl. ed. 1," the difficulty would be removed.

THE WELSH SALUSBURYS.

By A. A. Dallman, F.C.S.

In the noteworthy volume on *Early British Botanists* recently printed by the Oxford University Press and reviewed in this Journal for 1922 (p. 365), Mr. R. T. Gunther, who has earned our gratitude for this valuable and scholarly work, gives an account of two members of the Salusbury family, which is of special interest to students of Welsh Botany. There are, however, certain points in connexion with the sketch of the two Salusburys (pp. 238–45) and the Lleweni garden (pp. 306–09) which call for comment, supplement, or correction.

William Salusbury (1520?–1600?).

In regard to his botanical work I may quote from the MS., written in 1917, of my forthcoming *Flora of Flint and Denbighshire*:—

"Some years ago when turning over the pages of an old volume of *Y Traethodydd* [The Essayist] (xxiii. 1873), the writer came across an interesting article entitled 'William Salesbury fel Llysieuwr' (='William Salesbury as a Botanist'). In the course of this erudite paper (pp. 156–81), the author, the late Rev. John Peter (Joan Pedr) of Bala, deals at some length with an old Welsh botanical manuscript or herbal then in his possession. This Botanology, which had no title, was copied from an earlier MS in 1763 by an Evan Thomas. The original seems to have been lost, but from various evidence, direct and inferential, afforded by the transcript, Joan Pedr convincingly assigns the authorship to William Salesbury, famous as the first translator of the New Testament from the original Greek (compared with the Latin Vulgate) into the Welsh language. Although undated, the earlier MS would appear to have been written during the later part of the sixteenth century. A perusal of Joan Pedr's article showed that this MS was of great interest from several

points of view, so I took steps to try and ascertain the whereabouts of the Botanology, as the Rev. John Peter died in 1877. In response to a letter of enquiry which was published in various Welsh newspapers and journals circulating in the Principality, in February 1912, the MS was located at the National Library of Wales at Aberystwyth. After the death of Joan Pedr it had been purchased by Principal Charles Edwards and subsequently presented by him to the Library of University College, Aberystwyth. In 1905 it was presented by the University authorities to the National Library, where it now remains. . . . ."

Originally I had merely wished to collate the various Flint and Denbighshire records which occur in this MS for inclusion in the *Flora*, but having regard to the wider interest and importance, it seemed a pity that the whole could not be published. I brought the matter to the notice of my friend the late Mr. John Morris (of Liverpool and Llansannan), who enthusiastically fell in with my suggestion and generously undertook to defray the cost of transcribing and publication. I undertook to assist with the botanical aspects of the work, and through Mr. J. H. Davies the services of an Aberystwyth student were secured. After the death of Mr. Morris in January 1915, I failed to receive any copy of the transcript, and communications to the transcriber brought no response. The work, which was reviewed in this Journal for 1917 (p. 259), duly appeared in 1916, but without any mention or acknowledgement of the circumstances which led to its publication. Owing to these peculiar circumstances, it is scarcely surprising that Mr. Gunther should have been misled into assuming that I was unaware of the work and in no way associated therewith; it is due to both of us that these facts should be placed on record.

I am inclined to agree with Dr. Gunther that Salusbury's botanical attainments have been perhaps rather overstated by his biographer, and reference to his herbal gives evidence of this. A good deal of mystery surrounds his later life; the year and place of his death are unknown, nor do we know his last resting-place. There is a tradition current among Llansannan people that he was buried in the churchyard of that remote hamlet, but we have been unable to solve the problem. A very beautiful memorial on the roadside at Llansannan helps to commemorate William Salusbury in the country he loved so well; the monument, which was unveiled in 1899, consists of a figure in bronze of a Welsh maid holding in her hands a wreath.

Sir John Salusbury of Lleweni (1567–1612).

The discovery by Mr. Gunther of an annotated copy of Gerard's *Herbal* in the Library of Christ Church is of special interest, not only from the early records which it affords for Flint and Denbigh plants, but also as revealing a hitherto unknown local botanist. There is, I think, little doubt that the volume in question is a relic of the rich library which was formerly at Lleweni, the dispersal and disappearance of which has been a matter of regret to all historians. John Williams (*Ancient and Modern Denbigh*, 1856) states (p. 165):—

"The original house, *i. e.* Lleweni, was built in A.D. 720. This venerable and interesting mansion was taken down for materials to build Kinmel Palace. The old Lleweni Library (a collection of ancient, curious, and rare works, valuable MSS connected with the history of the Salusbury family, and the annals of Denbigh Castle, paintings of old masters, &c.) became either scattered or lost."

Mr. Gunther rightly attributes the annotations by the former owner of the *Herbal* to Sir John Salusbury of Lleweni, but errs by confusing him with an entirely different person of the same name—this is to some extent due to his quoting from the incorrect material in Dict. Nat. Biog. The Sir John Salusbury ("Sion y Bodiau," *i. e.* ="John of the Thumbs"), to whom Mr. Gunther refers and more or less confuses with his namesake, died March 18, 1578, and therefore could not be the botanist who annotated the copy of Gerard in 1606–08. This Sir John acquired the popular surname of "Bodiau" or Thumbs, so we are told, from the fact that he had an extra thumb on each hand and two great toes on each foot. His tomb, with a remarkable monument to the joint memory of his spouse and himself, is one of the features of the parish church (*i. e.* Whitchurch or Eglwys Wen) of Denbigh.

His eldest son was John Salusbury (M.P. for Denbigh, 1554), who married Catherine Tudor of Beren, and died in his father's lifetime. Catherine had two sons by this marriage, Thomas (executed for treason, 1586), and John (according to several writers surnamed "the Strong"), who succeeded to the Lleweni estate after his brother's tragic end. The botanist was consequently grandson to Sir John y Bodiau, and also related (? cousin) to the William Salusbury mentioned above. He was parliamentary representative for the county of Denbigh and received the honour of knighthood. Dwnn (*Heraldic Visitation of Wales*, 1846, ii. 331) gives the year of the botanist's death as 1613; but there is a very definite record in *Y Cwtta Cyfarwydd* (1883), p. 35, showing that he died at Lleweni on July 24, 1612. Whether the title "the Strong" is correctly applied to the botanist is possibly open to doubt; it is not clear that he was of remarkable strength, and there may be some confusion of persons. Both Dwnn and Lloyd (*History of Powys Fadog*, iv. pp. 330–9, 1881) attribute this designation to him; but John Williams indicates (*Records of Denbigh*, 1860, p. 126) that the title applies to "John y Bodiau"; elsewhere and earlier, however (*Ancient and Modern Denbigh*, p. 167), the same writer regards the two appellations as applying to different persons. It is probable that there has been some confusion between the two Sir Johns, grandfather and grandson. The family name is variously spelt Salesbury, Salusbury, Salisbury, and Salisberi(e); in some cases father and son employed a different spelling.

REVIEWS.

The Old English Herbals. By Eleanour Sinclair Rohde. Sm. 4to, cloth, pp. xii, 243, with coloured frontispiece and 17 illustrations. Longmans, 1922. Price 21*s.* net.

In this well-printed and generally attractive volume we have a comprehensive and admirably written account of our English herbals, beginning with the Anglo-Saxon Herbals to which the first chapter is devoted, and ending with the Culpeper and William Coles of the seventeenth century.

The account of Anglo-Saxon manuscripts, to which, as Miss Rohde says, "we look chiefly for our knowledge of Anglo-Saxon plant lore—the *Leech Book of Bald*, the Lacnunga and the Saxon translations of the Herbarium of Apuleius, and the so-called Περὶ Διδαξέων"—is exceedingly interesting, and contains much that will be new to most readers. She has a happy gift of assimilating information and of conveying it in readable fashion, and this characterises the book throughout. In compiling this chapter she has consulted the original MSS. at the British Museum, at the Universities and elsewhere; of the actual condition of the *Leech Book of Bald*, dating from about 900–950, she gives a detailed description, followed by a sketch of its history, so far as known, and its contents: "Unlike some other MSS. herbals, of which only a few tattered pages remain, this perfect specimen of Saxon work has nothing fragile about it; the vellum is as strong and in as good condition as when it first lay clean and untouched under the hand of the scribe—Cild by name—who penned it with such skill and loving care." The author tells us that "the Anglo-Saxons had names for, and used, a far larger number of plants than the continental nations." In the *Herbarium of Apuleius* alone 185 plants are mentioned; in the *Herbarius* of 1484, the earliest herbal printed in Germany, only 150 are recorded, and in the German *Herbarius* of 1485, 380; "but it has been computed that the Anglo-Saxons had names for and used at least 500 plants." Miss Rohde regrets that so many of these names have fallen into disuse, but a reference to the *Dictionary of English Plant-names* or *The English Dialect Dictionary* would have shown her that there is less ground for her regret than she seems to suppose. "Waybroad," for example, for which she refers to Turner's *Herbal*, appears there as "Weybrede" or "Waybrede," and in various spellings (but not as Way*broad*) in numerous glossaries, and is still in common use for *Plantago major*; "Maythen is surely preferable to Camomile," but although it seems to have been thus employed in Saxon times it is nowadays applied to *Athemis Cotula* throughout the southern counties, as it is by Lyte and Gerard. We fear that in citing "joy of the ground" as "a delightful name for periwinkle," Miss Rohde has misread her text: the name appears as "juy of grownde" in the fourteenth century medical MS. printed in *Archaeologia*, vol. xxx., with the explanation:

> "Ye lef is thicke schinêde & styf
> As is ye grene juy [ivy] leef."

The mention of sun-flowers among "the plants commonest in the Saxon Gardens" is, of course, a slip.

Were it not that other chapters call for notice, it would be tempting to linger over the *Leech book* and the other Saxon herbals, and to follow Miss Rohde in her excellent summary of the early popular beliefs which they present with regard to the origin of diseases and the charms and other means used to combat them. These she illustrates by copious quotations from the translations by Oswald Cockayne, published by the Rolls Society in three volumes (1864–66) under the title *Leechdoms, Wort cunning, and Starcraft in Early England*. The absence of any acknowledgement of this indebtedness, or indeed of any mention—either in preface, text, or bibliography—of Cockayne's work led to inquiry, in response to which Miss Rohde explained that she had assumed that everyone must know of it and hence did not think it necessary to mention it. Subsequently, however, in a letter to the *Times Literary Supplement* (Jan. 4), wherein attention had been called to the omission, Miss Rohde, having stated that "Cockayne's translations are the standard and only complete translations of the Saxon manuscripts," allows that "there should have been a footnote with the first quotation," and adds: "That the omission was accidental is obvious, I hope, from the fact that the extracts are in quotation marks and his section numbers are given"; this, it seems to us, is hardly "obvious," in view of the fact that neither author nor the book were anywhere mentioned. We are not sorry to have this opportunity of calling attention to Cockayne's volumes which—*pace* Miss Rohde—are not by any means well known, at any rate by British botanists; the notes on the text contain much plant-lore, and in the third volume (pp. 311–350) is a valuable list of "Saxon Names of Worts and Trees from Various Sources" with notes and identifications, which are for the most part correct.

The second chapter on "Later Manuscript Herbals and the Early Printed Herbals" yields little in interest to that just considered. It is largely occupied with an account of *De Proprietatibus Rerum* by Bartholomæus Anglicus—"the only original treatise on herbs written by an Englishman during the Middle Ages." The little that is known of the writer is given; the exact date of the book is not known, but there is a copy at Oxford dated 1296, and "other manuscript copies both in France and in England date from the latter part of the thirteenth and the early part of the fourteenth centuries . . . ." it was translated into English in 1398 by John de Trevisa, Chaplain to Lord Berkeley. The seventeenth chapter is on herbs and their uses; "the descriptions of the plants themselves are original and charming, as is shown by examples, and Miss Rohde adds variety to her pages by citing some of the "fleeting yet vigorous pictures of the homely everyday side of mediæval life," of which the book is full. Scarcely less noteworthy is the anonymous work known, from the name of the printer, as "Banckes's Herbal"—"to speak strictly the first printed English herbal,"—published in 1525, of which numerous forms and editions are enumerated in the bibliography appended to the volume. An account of the *Grete Herball* (1526)

concludes the chapter, and leads on to a consideration of Turner's *Herbal*, followed by a chapter on Gerard. Here we are on more familiar ground; but we take the opportunity of again commending Miss Rohde's skill in presenting an interesting summary of the lives and works of both authors. The note on the woodcuts of Turner (to which the reduced reproductions hardly do justice) and other sixteenth century herbals, with its tribute to Fuchs, might have been amplified by a reference to Dr. Arber's volume on *Herbals*, which, curiously enough, Miss Rohde nowhere mentions; the history of the old cuts through their various reproductions is given by Stokes in his (the second) edition of Withering's *Arrangement*. The extracts from both authors are, as always, admirably chosen. We venture to point out that Turner does not "contend that our English hyssop is the same plant as that mentioned in the Bible"; it seems a little rash to say that "he also describes a species which does not now exist" in view of the reference to "another plant which seems to have disappeared"; this latter the excellent description cited by Miss Rohde unmistakably identifies with *Crambe maritima*. The chapter ends with notes on Dodoens and Lyte; one could have wished that space would have allowed Miss Rohde to treat the latter at greater length. She says that "all the commendatory verses at the beginning of Lyte's herbal are in Latin," save those by William Clowes; but on her preceding page she quotes lines from an English poem by "T. N." (=Thomas Newton) which also appears there. It may be noted that the curious misprint of "Dodeon" for Dodoen, which she notes as occurring in the preface to *Rams Little Dodeon* (sic) also appears twice on the titlepage.

The chapters on Gerard's *Herbal* and, later, that on John Parkinson—"the last of the Great English Herbalists"—are on the same lines as that on Turner and are equally well done. To the two passages cited from the *Herbal* as affording glimpses of Gerard's boyhood may be added a third (p. 203), where he tells us that *Cardamine pratensis* was called "Ladie Smockes" "at the Nampt-wich in Cheshire where I had my beginning." In her note on the illustrations to the *Herbal*, Miss Rohde points out that they include "the first published representation of the 'Virginian' potato." With regard to this figure, attention may be called to a paper by W. Stephen Mitchell, published in the *Antiquary* for April 1886, in which its source is discussed at length and its continental origin is suggested. Mitchell says: "Platninus [Platinus] the publisher was a friend of both Clusius and L'Obel, and L'Obel was for a time at least helping Gerard with his book: there would be no difficulty about obtaining a drawing were it needed." In this connexion it may be interesting to add that, when visiting the Musée Plantin at Antwerp about thirty years ago, we saw among the exhibits a coloured drawing which seems to have been the origin of the figure given by Gerard: Mitchell mentions that "in 1590 Bauhin had seen 'iconem suis coloribus delineatus.'" There seems little doubt that the cut was made expressly for the *Herbal*, and it is so good that one wonders, with Mitchell, "why it was superseded by another [from Clusius] in the Johnson edition: was the block lost? Just possibly

Gerard may have valued it as a relic" ; the fact that in his portrait prefixed to the *Herbal* he holds in his hand a partial reproduction of it may possibly lend support to this suggestion.

We must leave unnoticed the chapter on "Herbals of the New World," though here again is much that calls for appreciative comment, noting however in passing that "the Sloane Collection" is not "in the Victoria and Albert Museum," but, as our readers know, in the Museum of Natural History. The "Later Seventeenth-Century Herbals" of Culpeper and William Coles are of less importance than those of earlier date, though by no means lacking in interest; with them are considered "the quaint old still-room books, the real descendants, so to speak, of the herbal," of which Miss Rohde's account, with well-chosen extracts, is delightful reading. The well-selected illustrations—twenty in number—from the Saxon herbals and other works noticed demand a word of praise: the frontispiece (in colour) from a twelfth-century MS. in the Library of Eton College calls for special mention.

The student will be especially grateful for the Bibliographies which occupy the last fifty pages of the volume; nothing approaching this in completeness has hitherto appeared. In her preface Miss Rohde acknowledges the help of the librarians of various colleges of Oxford and Cambridge, Durham University, and of Trinity College, Dublin; of the deans of cathedrals in whose libraries MS. herbals are included; of owners of private libraries, and of others. She is thus fully justified in saying that "no pains have been spared to make the bibliographies as complete as possible." They are grouped under three heads—Manuscript Herbals, Treatises on the Virtues of Herbs, etc.; English Herbals (printed books); and Foreign Herbals: each group is arranged chronologically, the dates of the English herbals ranging from 1495—the *De proprietatibus rerum* of Bartholomæus Anglicus, already referred to—to Lindley's *Flora Medica* (1838). In each instance the title is given in full, and in the first section, which is of especial value, the libraries containing the various works are specified; in many cases useful and interesting comments follow the titles. There was doubtless some reason—possibly the exigencies of space—which arrested the list at 1838, but one would like to have seen included Flückiger and Hanbury's *Pharmacographia* (1874; ed. 2, 1879), which contains much information cognate to the subject of herbals.

We cannot, however, conclude without expressing our regret that Miss Rohde has not included in her book references to the earlier work of others in the same field. We have already mentioned this omission in relation to Cockayne's *Leechdoms* and Dr. Arber's *Herbals*; but at least as remarkable is the absence of any allusion anywhere to the singularly attractive little volume on *English Plant Names from the Tenth to the Fourteenth Century* by the Rev. John Earle (Clarendon Press, 1880). This not only contains lists from nine vocabularies (including Ælfric and Apuleius), but a very readable as well as learned introduction of more than a hundred pages in which the significance and identification of the old native plant-names are discussed; the notes show the learning we should expect

from the Professor of Anglo-Saxon in the University of Oxford, as well as a knowledge of plants and of the history of botanical nomenclature. It seems impossible that Miss Rohde should have overlooked these works—indeed, she quotes from Dr. Arber by name on p. 67, but without any indication of the book whence her extract is taken: in any case, we hope that in the second edition of her attractive book, which will assuredly be called for, the omissions we have felt it our duty to indicate will be duly supplied.

The Romance of the Apothecaries' Garden at Chelsea. By F. Dawtrey Drewitt, M.A., M.D., F.R.C.P. Crown octavo, cloth; pp. xii, 106; 11 illustrations. Price 7*s.* 6*d.* net. Chapman and Dodd, 1922.

It was a happy inspiration which moved Dr. Drewitt, who represents the College of Physicians on the Managing Committee of the Chelsea Physic Garden, to produce this delightful little volume. He justifies its title on the ground that "it is indeed a romance" that, notwithstanding the continual destruction of its old life by modern London, "the peaceful Garden of the Apothecaries should still be teaching its students the names and nature of plants, as it did in the days of the Stuarts"; and he traces its history from its foundation in 1617 to its relinquishment by the Apothocaries' Company to the Charity Commissioners in 1893, and so on to its present position under a Managing Committee, of which, as has been said, Dr. Drewitt is a member. The Garden has thus had so long a history that it must have been difficult to condense into reasonable compass an account which should combine a record of facts with a narrative style which should appeal to the general reader; but in this Dr. Drewitt has been eminently successful.

The first book on the Garden (apart from lists of its contents) by Henry Field, a member of the Court of the Society of Apothecaries, was printed in 1820 at the expense of the Society for distribution to its members; a greatly enlarged edition by Dr. R. H. Semple, published in 1878, continues the history of the Garden to that period, and on this Dr. Drewitt has "chiefly depended"; in acknowledging this, however, he adds that "other works of interest have been consulted," and the numerous evidences of this increases the attractiveness of the volume.

An excellent sketch of the life of Sloane deservedly occupies many pages, for it was he who, as owner of the Manor of Chelsea, presented the Physic Garden, where he had learnt botany, to the Apothecaries' Company; Dr. Drewitt thinks that Sloane Street, which bears his name, well represents his life: "those who walk all the way down it know that it is very long, obviously prosperous, and perfectly straight!" Among those connected with the Company or with the Garden, Thomas Johnson, Petiver, Rand, Philip Miller, Wheeler, and Forsyth receive special attention; among the visits to the Garden, those of Linnæus and Kalm are treated at some length—we note that Dr. Drewitt accepts the tradition which connects Linnæus with the furze on Putney Heath. There is a pathetic account of

"the Garden's decline" in 1853, when "Lindley's services [as Professor of Botany] were dispensed with; summer lectures ceased; permanent labourers were discharged; a greenhouse was sold; tender plants were exchanged for hardy ones, and no fires were lit in the hothouse where Miller had grown some of the first tropical orchids seen in England." The present position of the Garden has already been mentioned, and with a summary of its present work the book concludes.

It remains to be said that the book is suitably illustrated and well printed—the frontispiece, reproduced from Field and Semple, shows the Garden from the river before the building of the Chelsea Embankment in 1874; the portrait in the titlepage of Johnson's Gerard, here reproduced in reduced facsimile, is not however of Johnson, as stated in the lettering of the plate, but that of Gerard in the original edition of the *Herball*. The contents of the volume are rendered accessible by a full table of contents and a good index, and the headings of the pages are suitably utilised—of how few books can all these things be said!

Carotinoids and related Pigments: The Chromolipoids. By L. S. Palmer. American Chemical Society Monograph Series. The Chemical Catalogue Company, New York, 1922. 8vo, pp. 316, two plates. $4.50 net.

Carotinoids (chromolipoids) comprise certain of the red, orange, and yellow pigments of plants and animals, some being hydrocarbons (carotins), others oxy-hydrocarbons (xanthophylls). The work under notice is an exhaustive account of the present state of our knowledge of these wide-spread substances, and also indicates clearly the numerous lines along which further research into their nature and occurrence is necessary. The earlier chapters are devoted to a comprehensive consideration of the distribution of carotinoids in plants and animals, in which the only omission noted is that of the yellow snow algæ, where pigments of this type probably occur; the latter chapters deal with methods of isolation, properties, quantitative estimations, and the like. A particularly interesting section is that in which the biological relations between plant and animal carotinoids are reviewed, with the conclusion that all animal chromolipoids are probably derived from the carotinoids of the food, either unchanged or slightly modified. The probable functions of these pigments are dealt with in the last chapter, and it becomes evident that in this respect our knowledge is very imperfect. A valuable bibliography and a good index are given.

F. E. F.

BOOK-NOTES, NEWS, ETC.

At the meeting of the Linnean Society on February 15th, Mr. R. Paulson exhibited 68 species in 27 genera of Lichens collected by Mr. V. S. Summerhayes, of the Oxford University Expedition to Spitsbergen in 1921, of which a list was given in our last issue. Canon Bullock-Webster showed a collection of thirty varieties of *Chara hispida*, explaining that in that genus varietal names are discarded, as the variation is so great and so frequent, that confusion would be the result, were it attempted. Dr. Daydon Jackson exhibited a small volume for which he had been searching for thirty-eight years—C. A. Agardh's *Aphorismi botanici*, Lundæ, 1817–26,—as confirming in a striking degree the practice formerly prevalent in Scandinavia down to the middle of the previous century, the Præses being the actual author and the Respondentes little better than dummies. In this volume the text runs on, with 16 title-pages, having the names of as many graduates . . . . , interposed between each sheet of 16 pages; in no fewer than twelve instances a word is cut in two and shared between two Respondentes.

The second fascicle of Prof. L. H. Bailey's *Gentes Herbarum* (Ithaca, N.Y.: 2 dollars), intended for the publication of studies from his garden and herbarium, is mainly devoted to a study of "The Cultivated Brassicas." "These plants are usually regarded by botanists as difficult of close determination, and the common knowledge of them is singularly confused." Prof. Bailey has been studying the genus for more than thirty years; he has grown great numbers of them from seeds obtained in widely separated places, and has "taken freely specimens in the wild and in cultivation in different countries." The first part of the paper deals with "the problem" as to the native centre of these plants, which has not yet been found: next are considered the genera, "with a general point of view on generic segregation"—*Brassica* and *Sinapis* are treated together. "The historic species, with comments on Linnean types" is followed by a description of the species as now recognised, the paper concluding with an index or "finding-list of Latin names": nineteen species are described, four of which are new. The descriptions are very full and detailed, and the various forms in cultivation are enumerated at great length: Miller's name—*B. Napobrassica*—is revived for the Rutabaga or Swede; it is pointed out that "Miller was confused on the plant," but if one prefers not to cite [him] for the plant, one may fall back on the same combination in Kerner, Oekon. Pfl. iv. 7. t. 312 (1791). The paper is fully illustrated, and adds one more to the valuable series of studies of cultivated plants with which the author's name has so long been associated. We reproduce (p. 104) the note on "The Thames-side Brassica," which will be of special interest to British botanists.

We are glad to learn that the useful series on the "Weeds of South Africa" by K. A. Lansdell which is appearing in the *Journal of the Department of Agriculture*, Pretoria, will be brought together in a volume which will include an illustrated glossary on the morph-

ology of Weeds. The plant described in the February issue is the "Upright Star-fruit"—*Acanthospermum hispidum*, a native of Brazil, the Argentine, and Tropical America, which has recently been introduced into South Africa and is troublesome to sheep-farmers on account of its burs, which are disseminated in various ways. The description is accompanied by excellent figures, showing the plant and its germination, with details of root and leaves. A similar series, on the *Poisonous Plants of South Africa*, is issued as an independent publication by the Department: the first is devoted to "Tulp"—a name applied to various species of *Homeria* and *Moræa*—with a coloured figure of *H. pallida*; the second to "Slangkop"—*Urginea Burkei* and *U. macrocentra*, both of which are similarly figured.

The *Botanical Magazine*, now published quarterly for the Royal Horticultural Society and edited by Dr. Stapf, contains in its February issue figures and descriptions of eleven interesting plants, three of which—*Euphorbia anoplia*, *Amorphophallus coffeatus*, and *Lachenalia convallariodora*, all of Stapf—are new. The new artists—A. Keller and L. Snelling—have not yet acquired the facility of Miss Smith, as will be seen by comparing their work with her plates in the present number; Dr. Stapf's notes appended to each species are somewhat longer than we have been accustomed to, and contain much interesting information as to the distribution and the like.

The *Gardeners' Chronicle* of Feb. 24 contains an article by Mr. W. Roberts giving a full description, with reproductions from photographs of the title and last pages, of *The Orchard and Garden*, published anonymously in 1596. The work, which was reprinted in *The Journal of Pomology* for August 1921, is of course mainly of horticultural interest, but horticulture and botany have many things in common, and gardening books of early date usually contain information which concerns both; it is interesting to note that Adam Islip (†1639), the printer of *The Orchard*—of which the copy described by Mr. Roberts is believed to be unique—was one of the three printers of Johnson's edition of Gerard's *Herbal*. In the *Chronicle* for March 3 Mr. R. P. Brotherston gives—also, it would appear, from a unique copy—a full account of *The Planters' Florists' and Gardeners' Pocket Dictionary*, by James Gordon, an Edinburgh nurseryman, for whom it was printed in 1774: "there is a very interesting note on flowers produced from seeds; Gordon believed that double flowers were degenerates, and notes that stocks, wallflowers, marigolds, larkspurs, and others, from seeds self-sown on gravel walks, gave more doubles than elsewhere in the garden."

The *Bulletin de la Société Botanique de France* (lxix. 7, 8; 20 Jan.) contains "Semi-hermaphroditisme chez le *Mercurialis annua*," by A. Reynier; "Étude sur la végétation des vallées en Provence," by J. Arénes; "*Phyllostachys aurea*, sa fructification," by J. Daveau; "Un nouvel hybride de *Salix* (*S. negata*: *S. fragilis* × *cinerea*), by P. Fournier; "Étude morphologique des inflorescences du *Humulus Lupulus*," by M. & Mme. Fernand Moreau; "Une anomalie chez la Violette," by E. L. Gerbault; "Étude biochimique de la chute des feuilles," by R. Combes & D. Kohler; "*Puccinia*

brigantiaca, sp. n.," by H. Heim; the conclusion of R. Souéges's "Recherches sur l'embryogénie des Solanacées"; "Quelques plantes alimentaires préhistoriques de Provence," by J. Gattefossé; on Pseudovossia, by A. Camus; and an interesting "Historique de l'école analytique," by M. Gandoger, to which we may return.

Mr. J. S. Gamble's *Flora of the Presidency of Madras* continues to make steady progress; part v (Adlard & Son, 10*s*. net) includes the orders from *Ebenaceæ* to the middle of *Scrophulariaceæ*, and extends to two hundred pages. As we have remarked when noticing previous parts, the work is well printed, in small but very clear type, and is convenient in size for the pocket; we think, however, that the volume, which already extends to 962 pages, will when completed be somewhat inconvenient to handle.

We are glad to note that Mr. John Isaac Briquet, who succeeded Emile Burnat as Director of the Conservatoire and Botanical Garden of Geneva, has been elected a Foreign Member of the Linnean Society. M. Briquet's work in connexion with the flora of the Maritime Alps, extending over nearly forty years, constitutes only one of his claims to this recognition.

At a representative meeting of botanists held at the Linnean Society's rooms on Friday, March 2, it was decided to hold a Conference of British and Overseas botanists next year about the beginning of July. An executive Committee was appointed with Sir David Prain as Chairman, Mr. F. T. Brooks as Hon. Secretary, and Dr. A. B. Rendle as Treasurer. An invitation to attend the Conference will be sent at once to Overseas botanists.

The *Kew Bulletin* (Feb.) contains a monograph of the British species of *Cytospora*, alphabetically arranged, by W. B. Grove (*C. Loniceræ*, sp. n.; *C. stictosoma*, described in this Journal for 1916 (p. 190) is now referred to *Phomopsis*). There are biographies of Isaac Bayley Balfour and Henry John Elwes, the latter from the *Gardeners' Chronicle*, and a list of donations to the Gardens, Museum, and Herbarium during 1922.

The whole of the eight papers in the last number of *Annales Mycologici* (xxi. nos. 1 & 2, 1923) are concerned with systematic mycology. The usual number of new genera are proposed, some of which seem rather thin. Fautrey has now met a similar fate to that of Hennings, who, in the words of Magnus, died twice—the first time naturally, the second murdered by von Hoehnel. Fautrey in various papers (1889–1899) described a number of new species, and Keissler herein publishes a revision of these; five out of forty are allowed to stand. Presumably about the same proportion of the thousand or so new genera which have been "made" during the last ten years will meet with like revision.—J. R.

The *Bulletin of the Torrey Botanical Club* (February) contains a continuation of Dr. Rydberg's notes on Rosaceæ, in which the confusion relating to Lindley's *Rosa Woodsii* is referred to but hardly cleared up; J. H. Schaffner writes on "Sex Reversal in the Japanese

Hop (1 pl.)": G. E. Osterhout discusses the identity of *Geranium cæspitosum* James; and F. M. Andrews describes and figures "Abnormal elaters of *Porella platyphylla*."

The Bulletin of the Torrey Botanical Club for January contains papers on "The Histology of certain Orchids with reference to mucilage secretion and crystal formation," by Edna N. Smith (1 plate); "Apogamy in *Phegopteris polypodioides*," by E. D. W. Brown; and a continuation of Dr. Britton's "Studies of West Indian Plants," containing numerous new species from Cuba and Trinidad.

Torreya (Nov.–Dec. 1922) contains a paper by Bayard Long on *Sonchus uliginosus*—a plant of eastern Europe and Asia—which was first noticed in Pennsylvania in 1917 and is spreading throughout the Philadelphia area.

In *Rhodora* for January M. L. Fernald names as var. *Hookeriana* the "Southern variety of *Thelypteris fragrans*," and describes a new variety (*torræ-novæ*) of *Tanacetum huronense*; R. H. Wetmore gives a list of the "Plants of the Hamilton Inlet and Lake Melville Region, Labrador"; E. M. Gress notes the occurrence in Pennsylvania of *Falcaria Rivini*.

The *Annales du Jardin Botanique de Buitenzorg* (vol. xxxii. pt. 2) contains "Periodischer Laubfall bei *Breynia cernua*," by J. J. Smith; "Periodische Blütenbildung bei einigen Orchideen," by P. Aneus; "Der Ambrosia-Pilz der Termiten," by A. Raat (4 plates); and a long and interesting paper (in English) by W. D. van Leeuwen on "The Vegetation in 1921 of the island of Sebesy, situated in the Sunda Strait near the islands of the Krakatau group"; a list of the vascular plants of the island (2 plates) is appended.

The *Transactions and Proceedings of the Perthshire Society of Natural Science* (vol. vii. pt. 4; 1922) contains a paper by Mr. J. R. Matthews, illustrated by maps, on "The Distribution of the Perthshire Flora" and a notice by James Menzies of Charles M'Intosh (1839–1922), of whom some account appeared in the last volume of this Journal (p. 188).

In *Arkiv för Botanik*, 1, xix. no. 11, Mr. Thore C. E. Fries has a long paper, containing descriptions of many new species, on "Die *Alchemilla*-Arten des Kenia, Mt. Aberdare and Mt. Elgon," largely based upon specimens collected by him in the spring of last year in the regions named.

The *Orchid Review* for March contains a paper by Mr. Ramsbottom on "The Capacity of Orchids to survive in the Struggle for Existence," in which he controverts a theory propounded by Mr. Oakes Ames in the same journal for August last as to the occurrence of orchids in Krakatau, as to which he sees no special difficulty.

The *New Phytologist* (20 Feb.) contains a continuation of the paper on "Permeability," by Walter Styles and of the conclusion of the "Physiological Studies in Plant Anatomy," by J. H. Priestley and J. Ewing.

THE

JOURNAL OF BOTANY

BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.C.S.G., F.L.S.

LATE SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM.

The Journal of Botany was established in 1863 by Seemann. In 1872 the editorship was assumed by Dr. Henry Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

Without professing to occupy the vast field of General Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains.

Until the beginning of the late War the Journal paid its way and even allowed a slight margin of profit; but during that period the subscribers were reduced in number, and the continental circulation almost ceased. It has now regained its position, but the increased cost of production, which has not as yet been substantially reduced, has resulted in an annual deficit which at one time became so serious that the continuance of the Journal was threatened. By the generosity of those who felt that its cessation would be a misfortune, especially for British botanists whose principal organ it has always been, the deficit has been met and an appeal is now made for an increased number of subscribers.

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APIUM LEPTOPHYLLUM.

By T. A. Sprague, B.Sc., F.L.S.

The native country of an annual weed of cultivation is often difficult, if not impossible, to ascertain. The problem may be attacked in two ways—by study of the natural habitats (if any) in which the species occurs, and by consideration of the geographical distribution of closely allied species. Both these criteria indicate that *Apium leptophyllum* is a native of America. It is common in woods and in sandy soil in Texas, and occurs in Florida in rich thickets and in dry ground containing shell. Türckheim found it in Santo Domingo in pine-woods at about 3900 ft. In Mexico it has been recorded from pastures and mountain bluffs, and was collected by Galeotti on Mt. Orizaba at an altitude of 10,500 ft. Pennell found it in gravel by riversides at 8500 ft. in Colombia, and according to Mandon it is common everywhere near Mt. Sorata, Bolivia, at 8500–9000 ft. Other more or less natural habitats in which *A. leptophyllum* has been recorded are dry bushy places, and moist places by the sea in Brazil; grassy campos in Uruguay; and moist meadows in Paraguay. It occurs also as a weed of cultivated and waste ground and by roadsides in Bermuda, the West Indies, Mexico, Central America, the Andes, Brazil, and Paraguay. Two closely related species *A. gracile* and *A. laciniatum* are natives of Western South America.

Apium leptophyllum is now widely distributed over the world as an alien. In some areas, such as middle and southern Europe, it appears to be a mere casual, but in eastern Australia and elsewhere it has become thoroughly established. Its fruits have been introduced with earth accompanying living plants (1), with ships' ballast (2, 3), wool (4), and guano (5), and probably with agricultural seeds. By some means or other it appears to have been transported to Italy in the sixteenth century, for a specimen in the Herbarium "A" of Gherardo Cibo, 1512–1600 (6), has been identified by Penzig (7) as *A. leptophyllum*. Possibly it may have been introduced intentionally from the West Indies or continental America in the erroneous belief that it was the true *Ammi* of Dioscorides (*Sison Ammi* L.) a drug then held in high esteem. However this may be, the first printed record of *A. leptophyllum* was as a plant cultivated in the Vienna Botanic Garden and figured by Jacquin (8) in 1773 as *Sison Ammi*. Savi (9) discovered it in 1804 by roadsides near Pisa; he identified it with *Sison Ammi* from Jacquin's figure, and transferred it to the genus *Seseli*. It was not until the following year that it was described as an independent species, *Pimpinella leptophylla* Pers. (10), from a specimen collected in Santo Domingo.

Nuttall (1) recorded it in 1818 (as *Æthusa leptophylla*) from the vicinity of New Orleans, whence it was accidentally imported to Philadelphia in a box of earth with other plants. In the early part of the nineteenth century *A. leptophyllum* appears to have been fairly common in European Botanic Gardens under various misapplied names, including *Sison Ammi*; and in 1821 it was described by Link (11) from cultivated specimens as a new species, *Pimpinella*

lateriflora. Sieber collected *A. leptophyllum* in New South Wales in 1823 (12); and it is now a common weed in Eastern Australia (13), whence it has been introduced in wool to Europe. In 1826 Chamisso and Schlechtendal (14) recorded it from Chile, Brazil, and Santo Domingo under the name *Sison Ammi*. Its occurrence in Hungary and Poland in the early part of the nineteenth century is attested by a specimen sent by Prof. Jan of Parma to J. Gay in May 1828 as *Pimpinella dichotoma* (Herb. Kew.), this being the only record from these countries. It re-appeared in Italy in 1829, in cultivated ground on a mountain near Naples, where it seems to have been discovered by Gussone (15), and was identified by Tenore (16) as *Sison Ammi*. Thus by the end of the year 1829 *A. leptophyllum* had been recorded under three different names: as *Sison Ammi* in the Vienna Botanic Garden, near Pisa and Naples, and in Chile, Brazil, and Santo Domingo; as *Pimpinella leptophylla* (*Æthusa leptophylla*) from Santo Domingo and Louisiana; and as *P. lateriflora* in the Berlin Botanic Garden.

A. P. De Candolle (17) pointed out in 1830 that *P. leptophylla* and *P. lateriflora* were conspecific, and gave a clear account of the synonymy and geographical distribution of the species under the name *Helosciadium leptophyllum*. He was, however, unaware of Savi's and Tenore's Italian records under *Sison Ammi* and *Seseli Ammi*; and was in doubt as to whether *H. leptophyllum* was identical with *Sison Ammi* L. or not. In 1837 Bertoloni (18) recognized that the species found at Pisa and Naples differed from *Sison Ammi* L. as described by Smith (19). He pointed out that it agreed in all respects with the description of *Helosciadium leptophyllum* DC. But as Bertoloni, like Savi and Tenore, regarded it as indigenous in Italy, he did not venture to identify it with *H. leptophyllum*, which is a native of America; having matched it with plants raised in the Botanic Garden, Bologna, from seeds of *Pimpinella lateriflora* Link received from Berlin, he gave it the name *Sison lateriflorum*.

Apium leptophyllum has apparently disappeared from Tuscany and Campania (15, 20), but was recorded in 1897 from Liguria (21). It was noted as having been found in Görz by Fleischmann (22) at Monfalcone and between Vipacco and Aidussina (Wippach and Heidenschaft) between 1819 and 1842. It soon disappeared, however; Tommasini failed to find it (23), and suggested (24) that Fleischmann had obtained his specimens from the Botanic Garden, Laibach, where he was employed as a gardener; Tommasini stated that a specimen of *A. leptophyllum* in the Herbarium of Hladnik, founder and former director of the Laibach Botanic Garden, was labelled "Planta Americæ meridionalis, spontanea in horto botanico labacensi." According to Nyman (25), the species distributed under *Apium leptophyllum* in Reichenbach Fl. Germ. Exsicc. no. 2215 was *Ptychotis Ammoides* Koch, but the specimen under that number in the Kew Herbarium is *A. leptophyllum*. Possibly Fleischmann may have collected *P. Ammoides* at Monfalcone and between Vipacco and Aidussina, and supplemented his material with specimens of *A. leptophyllum* from the Botanic Garden, Laibach; he did not include *P. Ammoides* in his flora. According to Pospichal (26)

P. Ammoides appeared almost yearly towards the end of the nineteenth century in the new harbour at Trieste. In the circumstances no reliance can be placed on Fleischmann's record of *A. leptophyllum*; nevertheless it is not inherently improbable, as is shown by the history of the appearance and disappearance of the species in various parts of Italy.

Apium leptophyllum appeared in 1867 as a casual at Bernburg, Anhalt, probably introduced with guano from South America (5); and was found by Alpers in 1898 at Döhren, near Hanover, apparently introduced with wool (4). In 1913 it was discovered in Scotland by Miss I. M. Hayward, on the banks of the Tweed, between Galashiels and Melrose (27); and two years later Aellen found it in Switzerland, at Basel (28). It also occurs as an alien in the North-eastern United States, West Africa, Mauritius, Eastern Asia, Australasia, and Polynesia.

In 1866 F. Mueller (29) transferred *Pimpinella leptophylla* to the genus *Apium* as *A. leptophyllum*, and the latter name should be adopted (in the genus *Apium*) under International Rules (Art. 15). Caruel (30) at first followed Lagasca (31) in regarding *Sison Ammi* Jacq. as the type of an independent genus *Cyclospermum*, and the same view was taken by Nyman (25) and Calestani (32); in 1889, however, Caruel (15) accepted the name *Apium leptophyllum*, and gave an excellent summary of the occurrence of the species in Italy and Görz; he seems to have been unaware of the detailed account of *A. leptophyllum*, which Urban (33) had given ten years previously under the new combination *Apium Ammi* (Jacq.). Those who follow Lagasca and Calestani in treating *Pimpinella leptophylla* Pers. as the type of an independent genus should use the name Cyclospermum leptophyllum (comb. nov.). The combinations *Apium Ammi* (Jacq.) and *Cyclospermum Ammi* (Jacq.) are invalid, being based on a wrong determination. Coulter and Rose (34), Small (35), Britton (3), and Urban (36) subsequently adopted the name *Apium Ammi* (Linn.) on the erroneous supposition that Jacquin's *Sisum Ammi* was identical with that of Linnæus. As I pointed out in 1922 (37), *Sison Ammi* L. is *Carum copticum*. The more important synonyms, descriptions, and illustrations of *Apium leptophyllum* are cited below, together with a summary of its geographical distribution: for details regarding the varieties Urban's account (33) may be consulted.

Apium leptophyllum (Pers.) F. Muell. ex Benth. (1866).—*Pimpinella leptophylla* Pers. (1805). *Æthusa leptophylla* Spreng. (1813). *Helosciadium leptophyllum* DC. (1830). *Selinum leptophyllum* E. H. L. Krause (1904). *Cyclospermum leptophyllum* Sprague (1923). *Sison Ammi* Jacq. (1772) non Linn. *Seseli Ammi* Savi (1804). *Æthusa Ammi* Spreng. (1813). *Cyclospermum Ammi* Lagasca (1821). *Apium Ammi* Urb. (1879), non Crantz (1767). *Helosciadium Ammi* Britton (1918). *Pimpinella lateriflora* Link (1821). *Helosciadium lateriflorum* Koch (1824). *Sison lateriflorum* Bertol. (1837).

Vernacular Names: Anisillo (Colombia); Culantrillo (Peru); Eneldo (38), Perejil cimarron (Uruguay); Apio silvestre (39) (Argentine).

Selected Descriptions: Jacq. Hort. Vindob. ii. 95 (*Sison Ammi*); DC. Prodr. iv. 105 (*Helosciadium leptophyllum*); Bertol. Fl. Ital. iii. 283 (*Sison lateriflorum*); Benth. Fl. Austral. iii. 373; Mart. Fl. Bras. xi. pars 1, p. 341 (*Apium Ammi*).

Illustrations: Jacq. Hort. Vindob. t. 200 (*Sison Ammi*); Mart. Fl. Bras. xi. pars 1, t. 91 (*Apium Ammi*); Reichenbach, Ic. Fl. Germ. Helv. xxi. t. 19 (t. 1860), ff. 1–8 (*Helosciadium leptophyllum*); Fiori et Paoletti, Iconogr. Ital. f. 2277; Britton and Brown, Ill. Fl. ed. 1, ii. 534, f. 2689; Hayward and Druce, Adventive Fl. Tweedside, 75, f. 17 (*Apium Ammi*).

Distribution: Southern United States, from North Carolina to Florida, westward to Texas; Bermuda; Mexico, Guatemala, Costa Rica; West Indies; Galapagos Islands; Colombia, Venezuela, Ecuador, Peru, Bolivia; Brazil, Paraguay, Uruguay, Argentine, Chile. Also, as an introduced plant, in the north-eastern United States; Europe (Scotland, Germany, Switzerland, Italy, Poland, and Hungary); West Africa (Prince's Island and Angola); Mauritius; Japan (40); China (41) (Shanghai, Hongkong); Australia (Queensland, New South Wales, Victoria); New Zealand; Norfolk Island (42); New Caledonia, Fiji, Vavau, Rarotonga.

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(2) Trans. N.Z. Inst. 1895, xxviii. 504 (1896).
(3) Britton et Brown, Ill. Fl. ed. 2, ii. 660 (1913).
(4) Jahresb. Naturw. Ver. Lüneberg, xiv. 62–70 (1898); Just. Jahresb. 1898, i. 415.
(5) Verh. Bot. Ver. Brand. 1867, ix. 135 (1868); Aschers. et Graebn. Fl. Nordostdeutsch. Flachl. 520 (1899).
(6) Ann. di Bot. i. 49 (1904).
(7) Penzig, Contrib. Storia Bot. 21 (1905).
(8) Jacq. Hort. Vindob. ii. 95, t. 200 (1773).
(9) Savi, Due Cent. Fl. Etrusc. 71 (1804).
(10) Pers. Syn. i. 324 (1805).
(11) Link, Enum. Pl. Berol. i. 285 (1821).
(12) Lasègue, Mus. Bot. Deless. 94 (1845).
(13) F. Muell. Fragm. iv. 184 (1864); Second Census Austral. Pl. 108 (1889); F. M. Bailey, Queensl. Fl. ii. 724 (1900).
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(15) Parlatore, Fl. Ital. viii. 451 (1889).
(16) Tenore, Fl. Nap. iii. 312 (1829); Syll. 146 (1831).
(17) DC. Troisième Not. Pl. Rar. Jard. Bot. Genève, 7 (1830); DC. Prodr. iv. 105 (1830).
(18) Bertol. Fl. Ital. iii. 283 (1837).
(19) Smith in Rees, Cyclop. xxxiii. *Sison*, no. 4 (1819).
(20) Fiori et Paol. Fl. Anal. Ital. ii. 161 (1899).
(21) Penzig, Fl. Lig. Syn. 68 (1897).
(22) Reichb. Fl. Germ. Exsicc. no. 2215; Fleischmann, Uebers. Fl. Krains, 83 (1844).
(23) Reichb. Ic. Fl. Germ. Helv. xxi. 8 (1867).
(24) Aschers. in Verh. Bot. Ver. Brand. 1867, ix. 136 (1868).

(25) Nyman, Consp. 305, 310 (1879).
(26) Pospichal, Fl. Oesterr. Küstenl. ii. 141 (1898).
(27) Hayward and Druce, Adventive Fl. Tweedside, 76 (1919).
(28) Allg. Bot. Zeitschr. 1916, xxii. 72; Vierteljahrsschr. Nat. Ges. Zürich, 1919, lxiv. 773.
(29) Benth. Fl. Austral. iii. 372 (1866).
(30) Caruel, Prodr. Fl. Tosc. 270 (1860).
(31) Lagasca, Amen. Nat. i. no. 2, 101 (1821).
(32) Calestani in Webbia, i. 171 (1905).
(33) Mart. Fl. Bras. xi. pars i, 341 (1879).
(34) Contrib. U.S. Nat. Herb. vii. 86 (1900).
(35) Small, Fl. Southeastern U.S. ed. 1, 866 (1906).
(36) Urb. Symb. Antill. viii. 512 (1921).
(37) Journ. Bot. 1922, 212; Proc. Linn. Soc. 1921–2, 51.
(38) Arech. Fl. Urug. ii. 350 (1905).
(39) Just, Jahresb. 1883, ii. 227.
(40) Journ. Coll. Sc. Tokyo, xvi. Art. 4, 35 (1902).
(41) Bull. Soc. Bot. France, 1906, liii. 425; Kew Bull. Add. Ser. x. 116 (1912).
(42) Proc. Linn. Soc. N.S. Wales, 1903, xxviii. 706 (1904).

NEW TROPICAL AFRICAN UMBELLIFERÆ.

By Cecil Norman.

(Continued from Journ. Bot. lx. 120; 1922.)

Pimpinella favifolia, sp. nov.

Herba annua ?, alta, caule glabro, ramoso, terete, striato; *foliis* pinnatis, in sicco pallidis, crassiusculis ±5-jugatis; utrinque pilis, albidis bulbosis obtectis; *petiolo* foliorum infimorum longo, piloso breviter vaginante; superiorum, multo breviore, glabro, omnino vaginante; *foliolis* late-linearibus, apiculatis, marginibus minute acutissimeque serratis; lateralibus sessilibus oppositis, basi rotundatis; terminalibus nonnunquam inæqualiter ternatis. *Umbellorum* radiis paucis glabris; *pedicellis* numerosis filiformibus; involucro et involucellis 0; *calycis* dentibus obsoletis, stylis brevissimis reflexis; *fructu* glabro, minimo, nigrescente; jugis valde indistinctis; vittis invisis.

Congo: Kasenga River, Lake Moero; *Kässner*, 2818! in Herb. Mus. Brit.

Specimen in fruit, without radical leaves: principal measurements approximately—*petiole* of lower leaves up to 8 cm.; of upper 3·5 cm.; *leaflets* up to 5 cm. × 6 mm.; *rays* of umbel 1·5–3 cm.; *pedicels* 5 mm.

Belongs to the subgenus *Eupimpinella* of Drude, section *Tragoselinum*, and is nearly allied to *P. Buchanani* Wolff. It is, however, readily distinguished from that plant by its much longer rays—nearly double as long—and especially by the remarkable hairs and honeycombed upper surface of the leaves, whence the name.

Pimpinella pseudo-caffra, sp. nov.

Herba annua gracilis, circa metralis; caule simplice, erecto, glabro, tereto; *foliis* heteromorphis; radicalibus simplicibus, triangularibus, obtusis, membranaceis, utrinque glabris late cordatis, marginibus inæqualiter serratis; *petiolis*, longis, ad basim brevissime vaginantibus, pilis longiusculis sparse vestitis, suffultis; caulinis inferioribus inæqualiter bisectis, marginibus exterioribus denticulatis, dentibus nferioribus bifidis; caulinis superioribus bipinnatis; ad segmenta subulata inæqualia distantia, reductis. *Umbellis* glaberrimis, pauciradiatis, tenuibus; *pedicellis* tenuibus; involucro et involucello 0. *Calycis* dentibus obsoletis; stylis longis reflexis; ovario omnino glabro, petalis albidis.

Congo: Kundelungu, "in damp places"; *Kässner*, 2783! in Herb. Mus. Brit.

A slender graceful plant in flower; quite glabrous except for the petiole of the lower leaves: principal measurement approximately, *radical leaves* 4·5–6 × 5–6·5 cm., petiole 10–12 cm; *lower cauline leaves* lobes 5 × 1·5 cm. and 3 × 1 cm., petiole 7 cm.; *upper cauline leaves* 2·4–4·5 cm. long; rays of umbel 1·5–2 cm.; pedicels 4–5 mm.

This, like the preceding, belongs to the subgenus *Eu-pimpinella*, section *Tragoselinum*. It is nearly allied to *P. caffra* Harv., which it much resembles in general appearance, but is well separated by being quite glabrous, whereas *P. caffra* is completely clothed with a rather harsh indumentum; in *P. caffra* the radical leaves are of a thicker texture and considerably smaller size.

A NEW CERCOSPORA ON HUMULUS.

By E. S. Salmon and H. Wormald.

In September 1922 we observed a fungus attacking the leaves of the cultivated Hop (*Humulus Lupulus* L.), in a hop-garden near Canterbury, Kent. On examination it proved to be a species of *Cercospora* not hitherto described. We were aware, however, through correspondence in 1919 with Prof. S. Hori, of the Imperial Agricultural Experimental Station, Nishigahara, Tokyo, Japan, that a species existed on *Humulus* spp. in Japan, and had been called "*Cercospora Humuli* Hori." Prof. S. Hori has now sent us examples of his species, with the information that "the Japanese *Cercospora* on *Humulus* spp. was described as a new species in my monograph of Japanese *Cercospora* in our language." The English and the Japanese specimens were found on comparison to belong to two quite distinct species. At the request of Prof. Hori we give below the diagnosis (in English) which he communicated in his letter. We have added a diagnosis in Latin, which for those who do not recognise descriptions in Japanese will be its first publication.

The following is the description of our species, which we propose to call *Cercospora cantuariensis*:—

C. cantuariensis, sp. nov.

Maculis definitis sparsis primo orbicularibus amphigenis in pagina superiore coloratis centro griseis margine angusto purpureo-brunneo zona exteriore flavo-virente circumdatis; hyphis fertilibus amphigenis

sparsis hyalinis vel dilute brunneis plerumque simplicibus rare bifurcatis continuis, basi bulbosis sursum attenuatis apice truncatis 50–70 μ longis; conidiis magnis cylindricis utrinque attenuatis obtusis dilute brunneis rectis vel plus minusve curvatis, demum 5–14-septatis, 114–380 $\mu \times$ 12–19 μ, plerumque circiter 200 $\mu \times$ 14 μ.

In foliis *Humuli Lupuli* Linn. (cult.).

Cantuaria, Anglia (E. S. Salmon et H. Wormald).

A *C. Humuli* S. Hori maculis orbicularibus hyphis fertilibus non fasciculatis conidiis multo majoribus statim dignoscitur.

Cercospora Humuli S. Hori.

Maculis definitis sparsis angularibus 1·5–2 mill. latis sæpe coalescentibus avellaneis hyphis fertilibus amphigenis in cæspites dense congestis e basi subsphærica orientibus divergentibus curvatis vel flexuosis nodulosis 1–2-septatis rare ramosis apice obtusis basi parum bulbosis dilute brunneis 20–40 $\mu \times$ 4 μ, conidiis filiformi-obclavatis dilute brunneis 4–9-septatis curvatis granulatis apice obtusis basi truncatis 56–90 $\mu \times$ 4 μ.

In foliis vivis *Humuli japonici* Sieb. et Zucc. (indigenæ) nec non *H. Lupuli* Linn. (cult.), Tokyo.

The description which Prof. S. Hori sent is as follows:—

"*Cercospora Humuli* Hori MS.

"Spots distinct angular 1½–2 mm.; scattered, often coalescing into a large irregular spot, drab coloured. Sori amphigenous. Conidiophores numerous, fascicled in a hemispherical form, arising from a small cellular base, free ends scattered, curved or flexuous, 1–2-nodulose, 1–2-septate, rarely branched, apex rounded with a scar, base slightly bullate, light brown, 20–40 μ long, 4 μ broad. Conidia filiform-obclavate, light brown, 4–9-septate, curved, apex obtusely pointed, base truncated, 56–90 μ long, 4 μ broad, contents finely granular.—On living leaves of the wild *Humulus japonicus* Sieb. et Zucc. and cultivated *H. Lupulus* L. in Tokyo and its vicinity. Very common, August to November."

Up to the present *C. cantuariensis* has been met with only in one locality, viz. a hop-garden at Canterbury. It was found on the living leaves, forming spots characterized by a greyish (almost white), central portion (1–5 mm. diam.) bordered by a dark, purplish-brown line, outside which was a yellowish zone extending for from one to several mm. and merging into the general green of the leaf. Where the spots were close together the yellow zones coalesced to form large yellow areas. These colour characters were more conspicuous on the upper surface of the spots than on the lower. The conidia were found to be produced on the grey central portion of the spots, chiefly on the lower surface, but also occasionally on the upper. The conidiophores are 50–70 μ long, simple or occasionally furcate, non-septate and swollen at the base, hyaline or pale brown. The conidia are pale brown in colour, cylindrical, and tapering towards the ends, which are rounded. They are characterized by their large size, being usually 200 μ or more in length by about 14 μ; they are very variable however in this respect, the limits observed being 114–380 $\times$ 12–19 μ. The septa, too, are very variable in number, 5 to 14 being observed.

An examination of the material sent by Professor Hori showed that not only was there considerable difference in the morphology of

the two species (particularly with respect to the size of the conidia), but also that the spots produced on the leaves were different in appearance. In the Japanese species the spots are bordered by the veins of the leaf, thus giving them a quadrangular or polygonal outline. In our species the spots are more circular in outline, and the dark line between the grey central portion and the yellow outer zone is a conspicuous feature of the fresh leaf. We could find no evidence of the presence of this darker border on the Japanese specimens, and Professor Hori does not describe one; there was some yellowing to be seen round the spots, however, this being evident even on the dried leaves.

THYMUS LANUGINOSUS IN HERB. MILLER.

By A. J. WILMOTT, F.L.S.

OCCASIONAL enquiries have been received at the Natural History Museum about the types of *Thymus* spp. of Miller's Gardener's Dictionary. The specimens of *T. ovatus*, *T. glaber*, and *T. odoratissimus* are written up with these names by Solander, with "Herbar. Miller" on the back of the sheet. They may reasonably be used as types to give greater precision to the Miller names. But with *T. lanuginosus* the case is different, and the object of this note is to explain the relation of these specimens to the Miller name.

They are presumably those indicated by Solander as present in Herb. Miller by a mark in the Museum copy of Miller's Dict. ed. 8. The sheet is written up on the front in the same way as the other three, *i.e.*, "*Thymus lanuginosus* Mill. Dict."; but on the back is written "Gallia Loeis montosis circa Fountainebleau." In the *Dictionary* we read that this "grows naturally in the forest of Fontainebleau in France," but there is no mention of "locis montosis." This fact indicates that the information was copied by Solander from a ticket that was with the plant in Herb. Miller; this ticket was then destroyed as was custom in Herb. Banks. But the specimens do not agree with Miller's description. They could not be described as "with small oval, spear-shaped, hoary leaves," since they are fairly typical specimens of *T. Serpyllum* var. *angustifolius* (Pers.); Billot 828, Schultz 1844.

The solution of this discrepancy is probably very simple. After the War I studied carefully the whole series of (European) sheets of Herb. Miller which had been selected as types for special preservation. Many facts become evident from the examination of a large series which had remained uncertain from the study of solitary instances. It was quite certain that many sheets with no information on the back were sent from Herb. Miller when the name was written up on the sheet as of "Mill. Dict." or even only "L. M." (Linnæus, Miller) or "M. L." This has already been shown by Mr. Britten in this Journal for 1913 (p. 132). But it also became clear that plants written up "Hort. reg. paris. 1727" were also "Herb. Miller," being part of Herb. Houstoun, of which the original tickets are sometimes preserved. Many are also merely labelled "Hort. reg. paris." or

"Hort. Chels." (being collected there by Houstoun and sometimes dated and with the original labels). The same applies to those labelled "ex herb. Dni Gronovii," apparently acquired by Houstoun in 1729, for this date is found wherever the original labels are dated; the same probably applies to those labelled "Hort. Lugd. Bat." and occasionally to others, of which the only evidence of connexion with Miller is the "L. M." on the sheet: it is not impossible that even this evidence was omitted sometimes. In fact, all these specimens form part of the 10,000 sheets of Herb. Miller, which I should not now consider as a bad estimate (*cf.* Britten, *l. c.*).

Now there are some labelled "ex agro Parisiensi" which are just as certainly part of Herb. Miller, being doubtless collected by Houstoun during his visits to Paris. There is little doubt that the specimen of *Thymus lanuginosus* was collected by Houstoun at Fontainebleau, and had originally a label similar to the others of Herb. Houstoun which are occasionally preserved. But it must be remembered that Miller took his descriptions from the plants in the Chelsea Garden, as was pointed out by Britten, *l. c.* These garden plants were therefore the types of the names in such cases, and they may not have been preserved in the herbarium; for when Miller was satisfied that the specimen in Herb. Houstoun was identical with the one in the garden he may not have troubled to dry another. The specimens in Herb. Miller may not be types when they form part of Herb. Houstoun, even if Miller's name has been added to the Houstoun label in Miller's own handwriting. True, they will in such cases be *syntype* material, but they should not be made *lectotype* if they differ from the original description. They are thus in the same position as the specimens in Linnæus's herbarium. It therefore seems probable that in the present case there was a plant grown in Chelsea Garden which was Miller's *T. lanuginosus*, and agreed with Miller's description. It also seems probable that Miller considered Fontainebleau specimens to be the same, adding the habitat where it "grows naturally" to his account in the Dictionary. As I can find no other specimens from Fontainebleau to which Miller could have been referring, it seems probable that he was referring to those already mentioned, but they cannot be used as *type*. There is no means of discovering whether any plant was grown at Chelsea Garden, or what it was and whence it came—for I am told that *T. lanuginosus* auct. does not occur at Fontainebleau—and we must therefore regard Miller's name as a nomen dubium, probabiliter etiam confusum, and use the next valid name. What this may be I leave to the specialists, with the hope that they will find an unambiguous one.

[Terms for Types.

The terms "syntype" and "lectotype," employed above by Mr. Wilmott, may not be familiar to all British botanists, and a note upon them may be useful. They form part of a long series of terms proposed by Charles Schuchert in his Introduction to the Catalogue of . . . . Fossils in the Department of Geology, U.S. Nat. Museum, where, under the heading "Classification of Type Specimens" it occupies pp. 9–18 (Bull. U.S. Nat. Mus. No. 53, part 1, Washington,

1905). A synopsis of the paper ("The Nomenclature of Types in Natural History," by the author and S. S. Buckman) is printed in Ann. Mag. Nat. Hist. xvi. 102–4 (1905), in which two additional terms are proposed and other suggestions are made. The following abridged and slightly modified scheme includes such of the terms as seem to be required for botanical purposes.

If in the original place of publication of a name a single specimen only is cited, that specimen is the *holotype*. If two or more specimens are cited, each is a *syntype*. If a syntype is either explicitly or implicitly indicated by the author as the type it is the *holotype*, and the remaining specimens are *paratypes*. If the syntypes have equal claims to be regarded as the type, an author may subsequently select one of them which is then termed the *lectotype*, the remaining ones becoming *paratypes*.

Specimens subsequently determined by the original author or by a specialist are strictly speaking not types, but authenticated specimens. If the original type or syntypes are lost, the best authenticated specimen available may be treated as a working type (*neotype*). The so-called *topotype* is a specimen gathered in the original locality. An authenticated topotype is a *metatype*. No special terms are in our opinion required for generic types. For example, if several species were originally included in a genus, each may be called a syntype-species. Combinations such as "genosyntype" and "paralectotype" are both cumbrous and superfluous. Expressions such as "type-gathering" and "type-number" need no explanation.

Ed. Journ. Bot.]

FRESHWATER PLANKTON ALGÆ FROM CEYLON.

By W. B. Crow, M.Sc., Ph.D.

(Continued from p. 114.)

Aphanocapsa Naeg.

Represented in the freshwater plankton of Ceylon by species which have been recorded from Europe and N. America. The determination of species is rendered difficult in our material, owing to the absence of fresh colour, which is used as a specific character. The majority of specimens met with were fairly well defined on the basis of other characters; in those recorded below, the uncertainty due to lack of colour-character is very slight. A few doubtful forms are omitted.

A. pulchra (Kuetz.) Rabenh. Tycholimnetic. Free-floating colonies only. *Loc.* 2, 4, 5. *Distr.* Eur., N. Amer.

A. elachista W. & G. S. West. Tycholimnetic. *Loc.* 6, 7, 8 *Distr.* W. Indies (f. *conferta* in S. Afr., N. Amer.).

A. Grevillei (Hassall) Rabenh. Apart from the colour of the cells—which in the colonies collected from the tanks at Anuradhapoora was still distinctly blue-green, unlike the pale grey of *A. pulchra*—*A. Grevillei* can be distinguished by its more crowded cells and more definite colonies. In this material the cells were considerably more crowded than in West's figure, the forms approaching

those of some species of *Microcystis*, from which they can be distinguished by the absence of pseudovacuoles or, in the case of *M. marginata*, by their more indefinite outline. *A. Grevillei* is not usually a free-floating species, although W. & G. S. West found a plankton variety of it at Ballinahinch, Ireland, whilst more recently G. M. Smith found it as a facultative planktont in Wisconsin. The Ceylon specimens were evidently free-floating colonies, slightly ellipsoidal, averaging about 80 μ long and 70 μ wide. The determination in the case of the second locality mentioned below is doubtful, on account of the lack of colour in the material. Here it was found amongst floating algæ and in bluish-green scum at some points near the margin. *Loc.* 2, 9. *Distr.* Eur., N. Amer.

A. DELICATISSIMA W. & G. S. West. The cells were appreciably blue-green in the collections from the localities recorded below. A similar organism occurs in several of the other specimen-tubes, but as in these the cells are at present colourless, it is quite likely that they may have belonged to bacteria. Such bacterial groups are not rare in the plankton. The significance of the discovery of blue-green algæ of bacterial size has been commented on by G. M. Smith (Wisconsin Phytoplankton, 20). Cells 5 μ–7·5 μ diam. *Loc.* 3, 10. *Distr.* Eur., N. Amer.

APHANOTHECE Naeg.

No true plankton species observed.

A. STAGNINA (Spreng.) A. Br. The reproduction of the colonies takes place by vegetative breaking of the mucilage masses. The products of this are presumably the microscopic spherical masses of varying size which were fairly numerous. All stages were seen from these microscopic spherical masses to large irregular macroscopic masses. In the limited material at our disposal the largest were about 4 mm. in length, although this species is stated to attain the size of a walnut. *Loc.* 11. *Distr.* Eur., N. Amer.

MICROCYSTIS Kuetz.

As far as our observations go, the members of this genus would appear to be by far the most important constituents of the freshwater phytoplankton of Ceylon at the period when the collections were made. A description of the new species observed and a study of the classification of the genus is published elsewhere (New Phyt. 1923, no. 2).

M. ÆRUGINOSA Kuetz. *Loc.* 4, 7, 9, 12, 13. *Distr.* Eur., N. Amer., Centr. Afr., Madagascar, Ceylon.

M. FLOS-AQUÆ (Wittr.) Kirchner. *Loc.* 2, 14, 15, 16 (water-bloom), 17, 18. *Distr.* Eur., N. Amer., Centr. Afr.

M. PROTOCYSTIS Crow. *Loc.* 6, 9 and 16 (water-bloom), 18, 19.

M. PSEUDOFILAMENTOSA Crow. *Loc.* 20.

M. MARGINATA (Menegh.) Kuetz. *Loc.* 3 (rare), 4 (rare), 19. *Distr.* Eur., N. Amer.

M. VIRIDIS (A. Br.) Lemm. *Loc.* 3. *Distr.* Eur., Centr. Afr.

M. HOLSATICA Lemm. *Loc.* 6. *Distr.* Europe.

M. PULVEREA (Wood) Migula. *Loc.* 15 (21 ?). *Distr.* Mostly N. Hemisph.

Var. *incerta* (Lemm.) Crow. *Loc.* 4. *Distr.* Eur., N. Amer., Ceylon.

Forma *elongata* Crow. *Loc.* 4.

MERISMOPEDIA Meyen.

Represented by four species which are common in the North Temperate Zone: all occur as occasional colonies scattered in the plankton.

M. ELEGANS A. Br. *Loc.* 22. *Distr.* Tropics, N. Hemisph.

M. GLAUCA (Ehrenb.) Naeg. *Loc.* 2, 8, 23, 24, 25, 26. *Distr.* General (incl. Ceylon).

M. TENUISSIMA Lemm. *Loc.* 14. *Distr.* Eur., N. Amer., Antarctica.

M. PUNCTATA Meyen. *Loc.* 27. *Distr.* Temp.

CŒLOSPHÆRIUM Naeg.

C. DUBIUM Grun. *Loc.* 14, 17, 21, 28. *Distr.* Eur., Ceylon.

C. KUTZINGIANUM Naeg. *Loc.* 11, 29. *Distr.* Eur., N. Amer., S. Afr., Antarctica.

C. CONFERTUM W. & G. S. West? Colonies smaller than described by W. & G. S. West. 72 μ diam. Cells 2 μ diam. *Loc.* 5 (rare). *Distr.* Afr. (Mwangdan River), Ceylon.

Oscillatoriaceæ.

Well represented in the present collection. A number of species well known in the plankton of temperate fresh waters occurs, and several which have previously only been recorded as benthonic, but which reach such an abundance as detached filaments as to play an appreciable part as tycholimnetic plankton.

The limits of the *Oscillatoriaceæ* are agreed upon by most authorities. The morphological unit is the trichome, which in itself is unbranched but in the higher members of the group forms multiseriate and even branched filaments by enclosure of several within a common sheath. It is, however, the simpler members of the family that are the most typical plankton organisms. It is these, too, that show active motility; there is thus no reason for assuming that the septate condition of the Oscillatorian filament has been developed in relation to the benthic habit. The plankton members of the group no doubt represent the primitive type, although in many instances their actual origin must be looked upon as a retrogression.

SPIRULINA Turpin.

The two species are found mixed with benthic algæ, and thus do not belong to the typical phytoplankton. They are not attached, as are some of the larger species, and correspond in their morphology with the plankton species of *Oscillatoria*. *Arthrospira* Stizenberger is not distinct from *Spirulina* Turpin, but includes the larger species of the latter. The prominent septation in *Arthrospira* is merely due to the larger size of its trichomes; this view is confirmed

by the demonstration of the presence of similar septa in these small species if appropriate stains be used (see Schmid, Archiv f. Protist. xliii.).

S. PRINCEPS W. & G. S. West. *Loc.* 30, 38. *Distr.* Eur., Afr., Java, Ceylon.

S. TENUISSIMA Kuetz. The only species in which the coils of the spiral are so close as practically to rest one upon the other. Our specimens occurred generally as separate trichomes; only in a few cases were two or more laterally adherent. Trichomes 1–2 μ in width; coils 3·5 μ in width; they sometimes show signs of secondary spiral coiling. Previous records have been chiefly from brackish water, as in this case. *Loc.* 1. *Distr.* Eur., Afr., W. Indies.

OSCILLATORIA Vaucher.

Represented by species that are equally abundant in the north temperate fresh waters, but some perhaps tend to warm water.

O. PRINCEPS Vaucher. This, which is at first benthic, growing in mats, was found as solitary trichomes, easily recognised by their large size, flattened segments, and very characteristic apices. Although frequently recorded for temperate regions, a number of these records are for warm water. Diam. fil. 27 μ. Length of segments 3 μ. *Loc.* 32, 33, 34. *Distr.* General (incl. Ceylon).

O. TENUIS Ag. As the free-floating form: *O. natans* Kuetz. *O. tenuis* var. *natans* (Kuetz.) Gomont. Largely in heleoplankton. *Loc.* 2, 13, 24, 25, 30, 32, 35, 36, 38, 39. *Distr.* General (incl. Ceylon).

O. LIMOSA Ag. Mostly in floating masses. *Loc.* 9, 25, 35, 38, 40. *Distr.* General (incl. Ceylon).

O. CORTIANA Menegh. This has been found in warm water in both N. America and Central Europe and also in the plankton of Tanganyika by G. S. West. It is therefore somewhat surprising that a form of it should have been recorded by W. & G. S. West from Clear Lake, Cape Royds, in the Antarctic; but the specimens from the latter locality had cells appreciably shorter than long, and may therefore have been distinct. In the Ceylon material the dimensions were normal: trichomes 5·5–8 μ in diameter, segments 5·5–8 μ long. *Loc.* 13. *Distr.* N. Temp.

O. AGARDHII Gomont. *Loc.* 8. *Distr.* N. Temp.

O. RUBESCENS DC. *Loc.* 41. *Distr.* N. Temp.

O. CRUENTA Grunow. Floating in littoral region. *Loc.* 37. *Distr.* N. Temp.

O. PROBOSCIDEA Gomont. Floating in littoral region. This well-defined species has been found as far north as Alaska. *Loc.* 13, 33. *Distr.* Eur., N. and Central Amer.

O. MOUGEOTII Kuetz. *Loc.* 13, 42. *Distr.* N. Temp.

O. AMPHIBIA Ag. *Loc.* 35. *Distr.* General.

O. CHLORINA Kuetz. *Loc.* 26, 33, 35, 40, 44, 45, 48. *Distr.* General.

O. MARGARITIFERA Kuetz. A marine species, found in Trincomalie Harbour. *Loc.* 46. *Distr.* N. Temp.

O. SUBTILLISSIMA Kuetz. The validity of this species, in view of its few definite characters, seems very questionable. It is, however,

convenient to retain it for filaments 1–1·5 μ in width with septa scarcely visible and no obvious sheath. Moreover, in those recorded here a more or less yellowish colour was retained, and in the specimens from Mancadawewa distinctly blue-green concave cells were seen. They are mostly from the heleoplankton. *Loc.* 1, 26, 30 (water-bloom), 36 (water-bloom), 41, 47. *Distr.* Cosmopolitan.

Oscillatorian filaments of bacterial size were also met with in loc. 13, 42, 43. These were either thread bacteria or bleached filaments of species of *Oscillatoria*.

Beggiatoa Trev.

B. alba (Vaucher) Trev. *Loc.* 24. *Distr.* Cosmopolitan.

Phormidium Kuetz.

The following were met with as detached trichomes; in the absence of the colony the determinations cannot be regarded as certain :—

P. Retzii (Ag.) Gomont. Tycholimnetic. *Loc.* 32. *Distr.* General (except Africa).

P. luridum (Kuetz) Gomont. Tycholimnetic. *Loc.* 50. *Distr.* Eur., N. Amer., W. Indies, Ceylon.

Lyngbya C. Ag.

L. Kutzingii Schmidle. Attached to portions of filamentous Algæ etc. *Loc.* 51, 52. *Distr.* Eur., N. Amer., Africa.

Var. *distincta* (Nordst) Lemm. A variable form. The sheath of Ceylon specimens did not stain with Chlor-zinc-iodide. Slightly capitate. *Loc.* 9. *Distr.* Europe.

L. contorta Lemm. A typical plankton species. In spider-like masses. *Loc.* 5. *Distr.* Eur., Afr., Ceylon.

L. putealis Montagne. The typical form. Sheath stains with Chlor-zinc-iodide. *Loc.* 53. *Distr.* Eur., Centr. Amer.

L. major Menegh. Tycholimnetic. This forms an important constituent of bluish-black scum in littoral and other regions. Sheath does not stain with Chlor-zinc-iodide. *Loc.* 9, 16. *Distr.* Eur., N. and S. Amer., S. Afr., Ceylon.

L. lutea (Ag.) Gomont. Tycholimnetic. In floating masses. The typical form, sheaths staining with Chlor-zinc-iodide. *Loc.* 9. *Distr.* Eur., N. Amer., W. Indies.

L. majuscula (Dillwyn) Harvey? A marine form. Trichomes 30 μ diam.; segments 3 μ in length. There was a rich glycogen content in some of the filaments. *Loc.* 7. *Distr.* Mostly Europe.

Nostocaceæ.

Anabæna Bory.

The Nostocaceæ are chiefly represented by this genus, which was abundant or at least frequent, although never sufficient to form appreciable water-bloom. At the time of collection the vast majority of the specimens possessed no trace of spores, and some were even without heterocysts, so that in the majority of cases identification

was not attempted. Sterile specimens of *Anabæna* were found in localities 2, 5, 8 (two species), 20, 30, 35, 38, 42, 51.

A. SPIROIDES Klebahn. A typical plankton species, common in all the following localities, except tank Balaluwewa; but, as no spores were observed, the identification is not quite certain. Lemmermann records var. *contracta* Klebs from Colombo Lake. *Loc.* 4, 13, 23, 36, 41, 54. *Distr.* Cosmopolitan (incl. Ceylon).

A. LAXA A. Br. Tycholimnetic. Cells 4–6 μ wide, about equal in length; resting spores rounded cylindrical, 6 μ wide and the oldest about three times as long. The spores were clearly developing by elongation of vegetative cells. *Loc.* 1. *Distr.* N. Temperate.

CYLINDROSPERMUM Kuetz.

C. STAGNALE (Kuetz.) Born. et Flah. Form with cells 4·6 μ diam.; larger than type. *Loc.* 44. *Distr.* Eur., Tropics.

Scytonemaceæ.

TOLYPOTHRIX Kuetz.

T. TENUIS (Kuetz.) Johs. Schmidt emend. The only difference between this and *T. lanata* (Desvaux) Wartm. is one of size. Our specimens had filaments 8–10 μ diam., and therefore would have been classed as *T. lanata* had not Schmidt shown that all size-gradations exist between this and the typical *tenuis*. A study of some British specimens shows that this begins life as attached filaments which later become free-floating colonies about 2–3 cms. diam., wherein the tangled filaments show considerable tendency to radial arrangement. This was evidently the case in the Ceylon specimens. I am informed that they were forming "numerous round floating masses round the margin of the tank." *Loc.* 35. *Distr.* Eur., N. and S. Amer., Africa, Ceylon.

Stigonemaceæ.

HAPALOSIPHON Naeg.

H. LUTEOLUS W. & G. S. West. Tycholimnetic. *Loc.* 32, 55. *Distr.* Eur., Ceylon.

Rivulariaceæ.

RIVULARIA (Roth.) Ag.

R. ECHINULATA P. Richter. *Loc.* 5. *Distr.* Cosmopolitan.

CALOTHRIX.

C. WEBERI Schmidle? Material scanty, possibly a stage of a *Rivularia* or washed down from Sphagnoplankton, which is the normal habitat of this species. *Loc.* 8. *Distr.* Temperate.

II. CHLOROPHYCEÆ.

A. ISOKONTÆ.

The plankton members of the Isokontæ are nearly all unicellular organisms, and hence may be grouped in the order *Chlamydomonadales*. Those recorded below include a vast proportion of forms that have been met with in temperate regions, but in these tropical

waters they seldom compete successfully with the *Cyanophyceæ*. *Pediastrum* is ecologically by far the most important genus. *Cœlastrum*, *Kirchneriella*, and the *Dictyosphæriaceæ* seem also to be among the more important forms; *Scenedesmus* is well represented; *Oocystis* is apparently much less important than in the European and North American limnoplankton.

CHLAMYDOMONADALES.

Sphærellaceæ.

SPHÆRELLA Sommerfeldt.

S. LACUSTRIS (Girod.) Wittr. A few doubtful specimens. *Loc.* 9. *Distr.* Temperate.

VOLVOX L.

V. AUREUS Ehrenb. *Loc.* 15, 35, 44 (abundant), 56 (rare). *Distr.* Eur., Ceylon.

Chlamydomonadaceæ.

CHLAMYDOMONAS Ehrenb.

This genus, which here as elsewhere does not form an important constituent in the plankton of the larger pieces of water, was found in small quantities from localities 42 and 50 and doubtfully from some other localities. Specific determinations were not possible with the material at hand.

PANDORINA Bory.

P. MORUM Bory. Normal 16-celled colonies. *Loc.* 18. *Distr.* Eur., N. Amer., Afr.

EUDORINA Ehrenb.

E. ELEGANS Ehrenb. According to West it is likely that two distinct varieties (species?) are included under this name. The vast numbers of colonies observed by West in Great Britain were perfectly spherical without mammillate outgrowths; but Conrad (Rec. Inst. Bot. Brux. ix.) and Chodat (Algues vertes) record colonies of ellipsoidal form and possessing mammillate outgrowths towards the phialoporic pole: the Ceylon specimens are quite clearly of the latter type. It must be noted, however, that the characters in question are not altogether constant. A few of our specimens very closely approach the spherical form, and whilst many show pronounced mammillæ, the latter feature may in others be poorly developed and sometimes even absent. In view of these facts, we have hesitated to regard the mammillate form as a distinct species or even variety. Moreover, analogous variants have been recorded for *Volvox*, escaping from the oospores in spring.

Conrad found that *Eudorina elegans* has a membrane structure and protoplasmic outgrowths as in *Volvox aureus*. Further investigations may show this and other supposed *Chlamydomonadaceæ* belong more strictly to the *Sphærellaceæ* (*cf.* Crow, "The Classification of some Colonial Chlamydomonads," in New Phyt. xvii. p. 151). *Loc.* 9, 10, 35, 50, 58. *Distr.* Eur., Asia (incl. Ceylon), N. Zealand, N. Amer.

PLEODORINA.

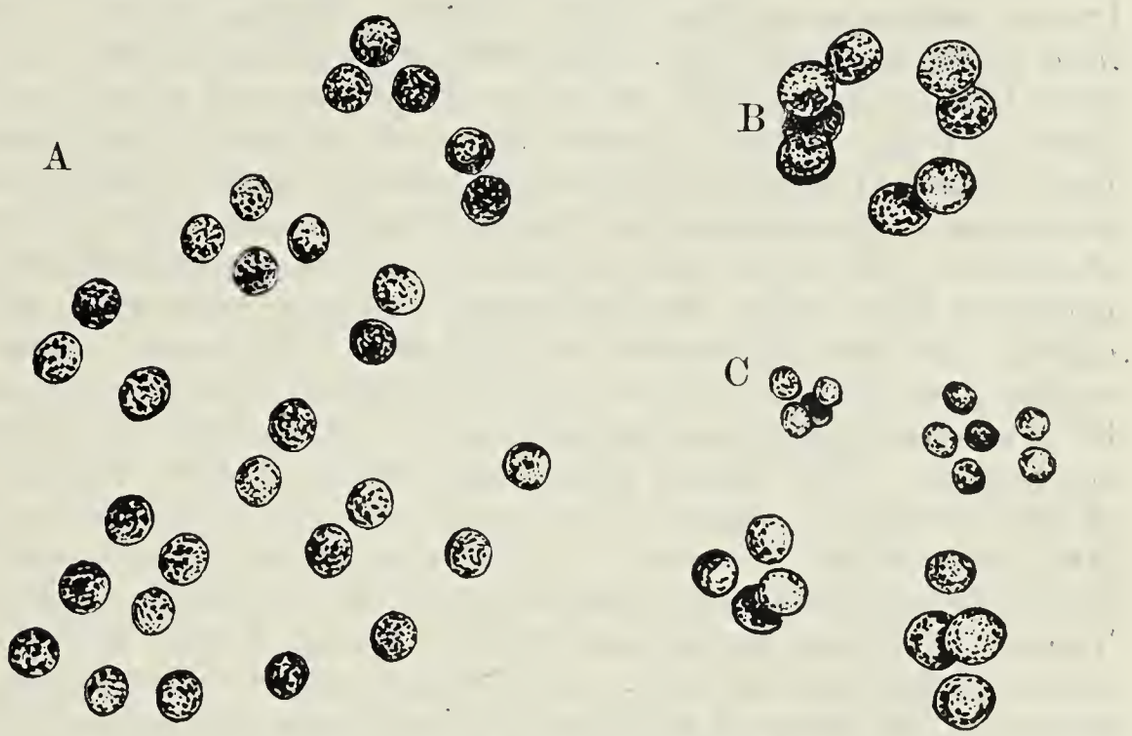
P. CALIFORNICA Shaw. *Loc.* 58. *Distr.* Eur., N. Amer., Ceylon.

Palmellaceæ.

Nearly all benthic or even terrestrial. The only typical plankton representative was found in the Ceylon collections.

GLŒOCOCCUS A. Br.

G. SCHROETERI (Chod.) Lemm. Distinguished from other *Palmellaceæ* by the spherical form of its colonies; the closely-related *G. mucosus* A. Br. has definite colonies but of a less regular form.



Glœococcus Schroeteri Lemm. A. Tetraspora-condition. B, C. Eudorinella-condition.

G. Schroeteri appears to reproduce in the plankton. The small colonies sometimes (especially amongst those collected in tank Borlasgama) closely resemble those of *Eudorina* or *Eudorinella*, from which they can be distinguished by their lack of flagella (see fig. 1, B & C). But in *G. Schroeteri* the cells are often not symmetrically placed. The colonies do not appear to reach the size recorded for other species, but they frequently attain over 200 μ diam. in the material from tank Basawak-kulam, the larger colonies having an extremely striking arrangement of the cells in fours (see fig. 1, A). These colonies resemble those of *Tetraspora lacustris* Lemm., and were connected by all transitions with typical *G. Schroeteri*; but staining with safranin or gentian violet failed to show any pseudocilia such as would be observable if the specimens belonged to *Tetraspora*. *Loc.* 1, 4, 9, 11, 14, 56, 59. *Distr.* Temperate.

(To be continued.)

ALNUS INCANA DC.

By J. E. Little, M.A.

As the Grey Alder was distributed in 1922 through both the Exchange Clubs, some collected notes upon it may perhaps be of interest. "This alder is not considered to be a native of Britain, and has not yet been discovered there in a fossil state: according to Aiton it was introduced in 1780" (Dr. A. W. Hill, in litt. Ap. 3, 1923); "considering the geographical distribution of this plant, it is a remarkable fact that it does not occur in Britain" (Humphrey G. Carter, in litt. Mar. 30, 1922).

The specimens which I distributed through the Clubs were obtained from a swamp near 'The Folly,' Hitchin, Herts, where *A. glutinosa* is the dominant tree. My attention was first drawn to it in June 1921 by the whitish underside of the leaves of a bush without flower or fruit. I took a branch home, and supposed it some kind of birch; but on revisiting the place, I found on another bush a single branch with strobiles, and at length arrived at its determination as *A. incana*. In normal years the bog in which the bushes grow is a quagmire into which one hesitates to plunge without a definite object; but the dry seasons of 1921 and 1922 made it easier to explore more thoroughly, and I was ultimately able to count about 30 patches scattered over the wood, up to 12 ft. high and spreading by suckers. They flower some three weeks at least earlier than *A. glutinosa*, and begin to show green leaf before the buds of the latter have begun to expand. In the autumn the leaves have fallen by the end of September, while the leaves of our alder are still green. Though producing flowers and strobiles freely, I have as yet been unable to find matured seed. I submitted a sheet to Dr. Druce, who wrote: "The leaves of the Herts *A. incana* are of a rather different texture from those of *A. incana* as I saw it this summer in Norway. Can it be the hybrid *A. glutinosa* × *incana*, which we saw there?"

Prof. Jens Holmboe (Bergen Museum) writes of a Hitchin sheet sent to him:—"In some respects it reminds one of *A. glutinosa* × *incana* f. *ambigua* (Beck) Callier; but it also comes near *A. incana* f. *vulgaris* Spach. As favouring the former interpretation, the wings of the fruits seem in most cases to be badly developed. In other respects it can hardly be distinguished from *A. incana*. According to the opinion of some Scandinavian botanists *A. incana* also includes varieties without distinct fruit-wings. The polymorphous form-group *A. incana* is very difficult, and as yet far from sufficiently known."

Prebendary R. J. Burdon sent me a sheet of *A. incana* gathered at Romsdal, Norway, Aug. 9, 1922, from which have dropped four well-developed seeds. In these I can only see a very obscure wing-development on one side. The testa is very hairy. The strobiles are stalked. The axils of the veins of the leaves are thickly pubescent.

In an Arnside sheet the strobiles are stalked, but in the Hitchin sheets they are mostly though not invariably sessile and glomerate. The Arnside bushes have leaves larger than the Romsdal sheet—a

fairly normal leaf 8 cm. by 6 cm. as compared with 6·6 cm. by 5·2 cm., and they are, as are the Hitchin plants, much less tomentose below, and ultimately ashy green beneath. They are also more acute or even acuminate. Prof. Holmboe notes that densely tomentose as well as quite glabrous leaves are met with in Norway.

The leaves of the Hitchin bushes were many of them in 1921 infested with a gall, identified by Mr. E. W. Swanton as caused by *Eriophyes brevitarsus* Nal. Mature leaves of sheets in the European Herbarium of the British Museum show the same leaf-gall. The native alder in 'The Folly' was free from it, although attacked by another mite, *E. lævis* Nal. (*fide* F. Ransom). But in 1922, in the King's Marsh, Wolferton, I found *A. glutinosa* f. *macrocarpa* Fedde strongly attacked by *E. brevitarsus*.

The alder swamp near 'The Folly,' Hitchin, was until recently owned by Mr. M. H. Foster, of Wymondley, and had been for a long while the property of his family. Mr. Foster cannot recall any planting of *A. incana* known to him during the last sixty years, so that if the bushes were originally planted, it is likely to have been very long ago. For timber purposes one would judge a bush that matures at twelve feet, and yields only quickly tapering poles at best, as distinctly inferior to the native alder, so that a reason for their occurrence has yet to be discovered. I cannot help thinking, however, that their origin may conceivably be due to the introduction of seed by such birds as snipe, which frequently visit the spot.

Prof. F. W. Oliver has planted *A. incana* in his small experimental enclosure on the sand-dunes at Blakeney Point, Norfolk, where I saw it last summer.

Alnus incana is also reported from the following stations (probably by no means the only ones where it occurs) :—

Ireland. "On Lord Castletown's estate at Doneraile, Co. Cork, there is a wood partly composed of Grey Alder which has covered the ground with its suckers" (A. B. Jackson, in litt. Aug. 6, 1922).

Cumberland (*fide* Dr. G. C. Druce).

Westmorland. Several trees, one of which flowers very early, in January or February, at Arnside. Sheets gathered by T. Cuckney were distributed through the Watson Club in 1922 by W. H. Pearsall.

Lake Lancashire. "In the middle of Roudsea Wood, in a boggy depression, with *Sphagnum* and *Juncus*. It certainly had not been planted there as a wind-screen, if at all. Roudsea Wood and all the magnificent peat-bogs—The 'Mosses'—between it and Holker Hall form part of the Holker Estate (Lord Richard Cavendish)." (W. H. Pearsall, in litt.)

EHRHART AND THE 'SUPPLEMENTUM PLANTARUM.'

By James Britten, F.L.S.

At the end of the paper on "Ehrhart and his Exsiccatæ"—published in this Journal for 1922 (pp. 318–327), but by some curious oversight omitted from the index to the volume—a further communication was promised concerning Ehrhart's connexion with the *Supplementum Plantarum* published by the younger Linnæus in 1781; that promise I now propose to fulfil.

Ehrhart's relation to the work, which was printed at an orphanage in Brunswick in 1781 is thus stated by Linn. fil. in a note under *Ehrharta*, a genus established by Thunberg in 1779:—"In memoriam clarissimi Frederici Ehrhart, Helveti, observatoris diligentissimi et acuti, cui plura debeo, et qui ob pristinam amicitiam curam typographicum hujus opusculi in se suscepit." This appears on p. 29; but as the work progressed Linnæus took a somewhat different view of Ehrhart's cooperation. According to Smith (in Rees Cyclop. xii. s.v. "Ehrharta," 1809, Ehrhart took too much upon himself; "being employed to superintend the printing of the *Supplementum Plantarum*, he introduced some of his own genera of mosses, with new, affected, and unauthorised terms, which gave so much displeasure to Linnæus that the sheet was cancelled." Smith bases his statement upon a letter (undated) addressed by Linnæus to Johann Philipp du Roi, of which the following translation was subsequently (1821) published by him in the *Correspondence of Linnæus*, ii. 572:—

"Being uncertain of the address of Mr. Ehrhart, I have thought it safest to communicate with you, Sir, on the subject of the *Supplementum Plantarum*, he having entrusted to you the superintendence of the printing of that work in his absence.

"What principally displease me are pages 69–74, containing the following genera of Mosses—*Hedwigia*, *Pottia*, *Georgia*, *Grimmia*, *Webera*, *Catharinea*, *Weissia*, and *Andreæa*—with which I have no sort of concern. Everybody will think me mad, if these should come forth under my authority; especially as I have, this very year, in an academical dissertation already published, reformed the genera of Mosses, according to principles of whose solidity I am convinced; and have also, in the same work, given names to several of them. I would therefore have the above pages, containing these genera, cancelled; or the whole sheet may be reprinted. An interval in the paging would be of no consequence. If Mr. Ehrhart is desirous that the genera in question should be published in this work, they may form an appendix: but in his name, not in mine. Nothing could be more unexpected on my part. No explanation can ever convince me of the propriety of allowing these genera to remain as they are, if the work is in any respect to be attributed to me."

Du Roi sent a copy of this letter to Ehrhart, who in turn quoted it in a letter to Linn. fil. (dated April 20, 1783), which is in the Linnæan correspondence at the Linnean Society. Of this Dr. Jackson kindly gives me an abstract: it contains no trace of resentment, but, after congratulating Linnæus on the extent of his work,

continues: "Do you know what you wrote to Du Roi? [then follows the passage translated by Smith]. I look on it as pardoned."

To his translation of the letter, Smith (*l. c.*) appends a note: "The sheet alluded to was cancelled; but the editor [*i. e.*, Smith] was favoured by Ehrhart with an impression. The discarded genera, with their characters, are published in this author's *Beiträge*, vol. i. 174"—under the title "Meine Beiträge zum Linnéischen Supplemento Plantarum." As has already been indicated, this, though dated 1781, was not published until 1787. Linnæus's direction as to the cancellation of the sheet was carried out: the "interval in the paging," anticipated by him but regarded as "of no consequence," has been obviated by the insertion (pp. 71–78) of an unnecessary and indeed useless (for the pages are not indicated) "Index Specierum" in which is recorded the number of species assigned to each genus in the succeeding pages (79–456) of the work; the paging of the volume is thus rendered continuous. The letter from Ehrhart to Smith which accompanied the cancelled sheet is preserved in Smith's correspondence: it is dated April 11, 1793, and runs: "Mitto Tibi, Vir clarissime, Plagulam desideratum Supplementi Plantarum Linnæani, cum nonnullis Plantis cryptogamiis Hannoveranis, quas Te benigne excipias oro rogoque"; the sheet itself does not seem to have been kept. Dr. Jackson tells me that the Society possesses many long letters (1778–83) from Ehrhart to Linnæus which probably contain matter that would interest any who have time and patience to decipher the script.

The dissertation to which Linnæus refers in his letter is *Methodus Muscorum illustrata*, "proponit Olaf Swartz in auditorio Gustaviano Majori ad diem xiv. April 1781, Upsaliæ apud Joh. Edman," reprinted in Amœn. Acad. x. (1790) and in Act. Medic. Suecic. i. (1783).

It may be noted that Smith (in Rees, s.v. "Linnæus") later (1812?) expressed himself adversely to the action of Linn. fil. in suppressing the sheet, at the same time paying a tribute to Ehrhart's knowledge of mosses as being in advance of his time; referring to the *Supplementum* he says: "the ingenious editor inserted his own new characters of some genera of Mosses; which Hedwig has since confirmed, except that some of the names have been justly rejected. This sheet was, in an evil hour, suppressed by the mandate of Linnæus, from London, where at that period, the subject of generic characters of mosses was neither studied nor understood, whatever superior knowledge was displayed concerning their species." The genera which Linnæus suppressed were indeed so well founded that when S. O. Lindberg revised the nomenclature of mosses he adopted practically all of them, though this in some cases involved the suppression of names which had been commonly in use since Hedwig's time; British bryologists have been made familiar with this resuscitation through Braithwaite's *British Moss Flora*. Ehrhart's acuteness of observation in days when microscopes were primitive has been generally acknowledged; the remarks of C. F. Thedenius (Observ. Scand. spec. Andreææ (Stockholm, 1849, p. 5), may be cited as an instance of this. He points out that prior to 1778 little attention

was paid to the Andreæaceæ, which were regarded as mere species of the intricate genus Jungermannia. But as soon as Ehrhart founded the new genus *Andreæa* and showed by the clearest arguments and with his usual sagacity that it differs so much from all known genera of mosses that only by violation of Nature itself could it be thrust into any one of them, the novel genus at once received wide recognition, although Linnæus filius, as far as he could, prevented the publication of the species. The generic characters were so evident that none could be deceived about them.

According to Smith, who doubtless had many opportunities of meeting Linn. fil. during the visit of the latter to London in 1781, Linnæus also took exception to certain alterations made by Ehrhart in the text—an objection which Smith, with his classical instincts, shared: one such alteration is thus animadverted upon by Smith in Fl. Brit. iv. 79 (1828), where, commenting on the substitution of *Carex Psyllophora* for *C. pulicaris* L., he writes: "The original Linnæan name being Latin, like the classical generic one, was most inadvisedly translated into Greek by Ehrhart, who being entrusted with the printing of the *Suppl. Plant.* abused that trust, by corrupting the text in this and many other instances, to the great displeasure of the younger Linnæus. He therefore ought not to be followed in any such alterations." A number of similar substitutions are indicated by Ehrhart in "Meine Beiträge" (1787), in which are included not only the genera of mosses already indicated, but a large number of names and descriptions textually identical with those of the *Supplementum*; these Ehrhart here claims as his own, making no reference to their previous publication (1781) in the *Supplementum*: it may, however, be noted that when repeating some of these names in 1788 (Beitr. ii. 67, 68, 78, 82, 100) "Linn. Suppl." is cited as the authority. The names thus claimed are *Scirpus Bæothryon*, *Juncus Tenageia*, *Rumex Nemolapathum*, *Mespilus Xanthocarpus*, *M. Phænopyrum*, *Pyrus Botryapium* (*Mespilus canadensis* L.), *P. Amelanchier* (*M. Amelanchier* L.), *P. arbutifolia* (*M. arbutifolia* L.), *Serapias Xiphophyllum* (*S. grandiflora* (*ensifolia*) L.), *S. Lonchophyllum* (*S. grandiflora* L.), *Carex Psyllophora* (*C. pulicaris* L.), *C. Leucoglochin*, *C. Chordorhiza*, *C. Heleonastes*, *C. Leptostachys*, *C. Drymeia*, *C. Agastachys*, *Lichen Bœmyces* (*L. ericetorum stipitatus* L.), *L. Icmadophila* (*L. ericetorum sessilis* L.). For some of these the number of the *Phytophylacium* is cited, both in the *Supplementum* and in "Meine Beiträge," and it will be recognised that many of the names are taken thence. Smith (in Rees, s.v. *Ehrharta*) suggests that the specific name of *E. Mnematea* (Suppl. 209), by which Thunberg's *E. capensis*, published two years earlier, is there superseded, "was probably suggested by Ehrhart himself"; this seems probable, but Ehrhart in the *Beiträge* does not claim the description, and I do not find the name in the eight fascicles of the *Phytophylacium* to which I have access. *Lichen Icmadophila* (L. f. Suppl. 450), by which *L. ericetorum* L. (Sp. Pl. 1141) is superseded, is based on *Icmadophila* Ehrh. Phytophyl. n. 40; the specific name was subsequently adopted by Zahlbrückner for the genus based on the plant.

Notwithstanding Ehrhart's intimate connexion with the *Supplementum*, it is of course obvious that the names must be cited as of Linn. fil., the author of the book. The names, however, have been differently attributed; thus Smith (Fl. Brit. iv. 79 sqq.) cites "Ehrh. in Linn. Suppl." for the Carices, and the *Index Kewensis* allots two to "Ehrh. ex Linn. fil." and five to "Linn. fil." Smith in citing Ehrhart was of course acting on private knowledge; he had previously (in Rees, s.v. *Carex*; 1806) assigned the names correctly to "Linn. jun. Suppl." Ehrhart himself in the *Phytophylacium* appends L. to each; this at first sight suggests a difficulty, as the *Phytophylacium* appeared in 1780, while the *Supplementum* was not published until a year later; but Ehrhart's intimate association with the book enabled him to quote it by anticipation; it is interesting to note that he had no intention of connecting his name with the binominal, contenting himself with the citation of his "nomen." Moreover, when he had occasion to quote the names, he cited them, as we have seen, as of "Linn. Suppl."; see *Beiträge*, ii. 67, 82, etc.

SHORT NOTES.

Astragalus frigidus. The authorship of this name has been attributed to Bunge (Astrag. i. 25; 1868: ii. 28, n. 128; 1869) by Rouy and Foucaud, Ascherson and Graebner, Hayek, Lindman, and others, but should be ascribed to Asa Gray (Proc. Am. Acad. vi. 219; 1866). It was a new combination for *Phaca frigida* L. (Europe and N. Asia). The fact that Asa Gray circumscribed *A. frigidus* so as to include an American species now generally regarded as distinct (*A. americanus* M. E. Jones) does not warrant the attribution of the name to a later author (Art. 41). *Phaca frigida* was duly referred in *Index Kewensis* to *Astragalus frigidus* A. Gray, but the habitat of the latter was inadvertently given as North America; possibly this may have misled Rouy and other authors of European floras. Reichenbach and Beck (Ic. Fl. Germ. xxii. 99, tt. 2201–2; 1903) attributed *A. frigidus* to A. Gray on the plates, but to DC. Astrag. 46, n. 2 (large ed.) in the text. The large edition of the *Astragalogia* appears to be rare. M. Gagnepain, who has kindly consulted a copy in the library of the Institut de France, informs me that *A. frigidus* does not appear on the page cited, the name used by De Candolle being *Phaca frigida*, as in the small edition. Apparently the two editions differ in little but the size and numbering of the pages, there being 218 pp. in the large one and 270 in the small.—T. A. Sprague.

A World-code of Nomenclature. Referring to Mr. Sprague's suggestions summarised in our last issue (p. 109), Mr. A. S. Hitchcock (*Science*, Feb. 16) approves of the proposed compromise, which he suggests "might be accomplished at the next International Botanical Congress if the subject has been sufficiently considered previously by the taxonomic botanists of the world." The Type-

basis Code and the differences between it and the International Rules are summarised by Mr. Hitchcock in this Journal for 1922 (p. 111), and we shall be glad to open our pages to a discussion on the subject.

PULMONARIA ANGUSTIFOLIA L. (P. AZUREA Besser). This beautiful plant is becoming generally known under the trinominal *Pulmonaria angustifolia azurea*—*e.g.*, it is thus named and figured in the *Gardeners' Chronicle* for March 3, and has been exhibited, so-named, at the R. H. S. shows. The misapplication of the name *angustifolia* to the Hampshire plant which is so called in British books was pointed out by Mr. Wilmott in this Journal for 1917 (pp. 233–240), where he shows that the British plant, which Kerner had referred to *P. angustifolia* L., "is certainly not that very distinct species, but is the plant which Kerner calls *P. longifolia*," and identifies the Linnean species as the plant subsequently named by Besser *P. azurea*. Mr. Cowley (Gard. Chron. *l. c.*) speaks of the latter as "the *variety azurea*" and says it "is a great improvement on our native Blue Cowslip (*P. angustifolia*), the flowers of which are at first pink and afterwards turn bright blue"; he goes on to speak of "the true *azurea* as known in the trade as the Munstead *variety*," it having been grown by Miss Jekyll at that place for many years and hence distributed. No one who has seen the plant growing could possibly doubt its distinctness from the English so-called *angustifolia*, both in habit (which is well shown in the Gard. Chron. figure) and in the beautiful blue of its flowers, indicated by Besser in his specific name *azurea*. For horticultural purposes, in view of the existing confusion, the name *azurea* may well be retained for the plant, although it is undoubtedly the true *angustifolia* of Linnæus; "*P. angustifolia azurea*" is a trinominal absurdity which should at once be abandoned.—JAMES BRITTEN.

REVIEWS.

Introduction to the Plant-life of the Oxford District. Pt. I. *General Review.* By A. H. CHURCH. Pp. 103, 15 plates. Oxford Botanical Memoirs, No. 13. Oxford University Press. 3*s.* 6*d.* net.

THIS addition to the *Oxford Botanical Memoirs* is a general account of the vegetations of the Oxford area as a training-ground for students of Forestry and Botany. The author at the outset states that oral instruction is assumed, and it is perhaps to this fact one owes the rather ill-balanced treatment of the subject. That the treatment is original we need hardly say; the style is that which we have come to associate with the pen of Dr. Church. Unconventionality is indeed the chief charm of these pages, and for those who are familiar with the fundamentals of ecology and aware of its many pitfalls and the facilities for easy generalisations which the subject affords, we could thoroughly recommend this memoir, from the perusal of which we ourselves have derived much pleasure. We

should nevertheless be rather chary, despite the "oral instruction," of placing this volume in the hands of the novice, for whom neither the matter nor the manner seems suited. To mention but a single small point in reference to the latter, one cannot but deplore the continual use of the word "regression" for phases in succession—a term particularly inappropriate when applied to the seres of a newly-created habitat such as a disused road, and generally calculated to foster a totally erroneous conception in the student's mind.

The earlier sections treat of the general physical features of the area—its climate, geology, and physiography, though with little indication of how these affect the existing vegetation. There follows an account of primary woodland, in which considerable space is devoted to theoretical considerations respecting the origin of the arboreal and herbaceous habits. From the treatment of the latter the author passes on to consider aquatics.

The latter half of the book is decidedly attractive. Here Dr. Church discusses the effect of man's influence as exhibited on the flora of the roadside, the coppiced wood, the meadow or the arable field. The importance of the historical factor in moulding the character of the vegetation, especially during the past fifteen hundred years, is often too much overlooked, and here receives adequate recognition. During this period man has created artificial environments, each with a flora of its own, built in part from the constituents of pre-existing natural communities, in part from new immigrants whose dispersal and establishment has been facilitated by human activities. Of these and kindred subjects there is much local information both in the text and the numerous footnotes, and the digressions on a variety of more or less relevant matters gives the reader something of that pleasurable mental sensation associated with "browsing" in a library.

One cannot conclude this notice without reference to the fifteen photographic reproductions, of which several are of high technical and artistic merit.

E. J. S.

Botany of the Living Plant. By F. O. Bower, Sc.D., F.R.S., Regius Professor of Botany in the University of Glasgow. 8vo, pp. xii, 634, with frontispiece and 482 text-figs. Macmillans, London, 1923. Price 25*s.* net.

Though the fact is not noted on the titlepage, Prof. Bower's Preface indicates that this is a second edition of his text-book published in 1919; and the preface draws attention to the changes which have been introduced in the work. The first edition was reviewed at some length in this Journal in 1919 (pp. 226–9): the review, which was not signed, showed evidence of a careful examination of the work and suggested various possibilities of improvement; the reviewer also questioned the value of the University Course of Elementary Botany, as exemplified by Prof. Bower's text-book, in affording a scientific training comparable with the general presentation of

elementary chemistry or physics. But the general plan of a text-book must be accepted for better or worse, and the fact that a second edition has already been necessary is evidence that Prof. Bower's volume has met with a welcome.

About fifty pages have been added, including a chapter on "The Living Cell" (pp. 29–37) and one on "Evolution, Homoplasy, Homology, and Analogy"; the object of the latter is to co-ordinate the two parts of the book. Prof. Bower does well in following the sequence which has ruled in the development of Botany, by taking the flowering plants first and devoting the greater part of the course to their study. The brief exposition of what is understood by an evolutionary study of plants then follows as an introduction to the outlines of the characters of the earlier groups, from the simpler to the more complex, which form the subject of the second portion of the book. An appendix of about fifty pages is devoted to a description of a few types of flower, with notes on the natural families to which they belong. Here Prof. Bower is evidently not on his native heath! The arrangement of the Monocotyledons does not follow generally accepted views of affinities; they are represented by three Orders in the following sequence:—Liliales, Orchidales, and Glumales. The last-named include the rushes, along with the sedges and grasses, *Juncaceæ* finding a place here because of their grass-like habit, though it is admitted that the flowers are of the liliaceous type.

The book is well printed and beautifully illustrated, but the copy sent for review has evidently been bound with hot needle and burning thread, and is already beginning to disintegrate.

A. B. R.

Starch and Starch Products. By Harold A. Auden. Crown 8vo, pp. xiii, 121, and 19 figs. Pitman, London. 1922. Price 3*s*.

This little volume, one of Pitman's "Common Commodities and Industries" series, contains much interesting and useful information—chemical, botanical, and technological. The frontispiece is appropriately the picture of Gerard (from his *Herbal*, 1597) with a branch of potato in his hand and wearing an Elizabethan starched ruff. In successive chapters the author gives the history of the use of starch, its properties, and the various sources from which it is obtained commercially—potato, rice and other cereals, sago, yam, arrowroot, and others. Some account is given of each plant, its cultivation and the method of preparation of starch from it. The later chapters deal briefly with some of the products of starch, glucose, dextrine, and gum, and the fermentation products; reference is made to the brewing of beer from barley 3700 years ago in Egypt. The figures illustrate the habit of the starch-yielding plant and the preparation of starch and its products; some are rather poor.

A. B. R.

BOOK-NOTES, NEWS, ETC.

Under the title *Schedulæ Orchidianæ* Mr. Oakes Ames is publishing a series of descriptions of new species of Orchids, with critical notes—many of them the result of his inspection of Lindley's orchid herbarium at Kew. Nos. 1 (Nov. 18, 1822) and 2 (Jan. 6, 1923) are devoted to tropical American species; in No. 3 (Jan. 30) is an interesting note relating to H. G. Reichenbach's Herbarium, his disposition of which by will is cited, with the comment which it naturally inspired, in this Journal for 1889, p. 197. The note is as follows: "Reference is made under *Epidendrum luteoroseum* A. Rich. & Gal. [p. 16] to specimens and drawings of Achille Richard's types which are to be found in H. G. Reichenbach's Herbarium in Vienna. These specimens and drawings represent some of the Mexican species described by Richard and Galeotti in 1845. It would seem that this precious material was loaned to Reichenbach by the Muséum d'Histoire of Paris. That Reichenbach intended to return this material to those who loaned it to him is indicated by the tracings he made from the coloured drawings of the habit and from the analytical drawings of the floral structure of types. The tracings are now mounted on the same sheets that bear the drawings, a few of them actually superimposed on the originals. The most charitable view to take of this extraordinary situation is the one which leads us to believe that Reichenbach's efforts to incorporate in his herbarium tracings of Richard's species were interrupted by death, and that if he had lived he would have returned the originals. But it is difficult to overlook the motives which prompted Reichenbach to have his herbarium, together with loaned specimens, sealed for a quarter of a century; that is, for a sufficient length of time to deprive his contemporaries of its service and to interfere with the progress of orchidology. When death overtook the man who criticised Achille Richard's brevity and who attempted to outlaw Richard's species, his last will and testament put under lock and key the evidence on which some of Richard's work was based. This is the explanation of the mysterious absence of many critical specimens and drawings for the Richard Herbarium in Paris" (pp. 1, 2).

The Bureau of Science Publications (Manila) No. 18 contains the first fascicles of the *Enumeration of Philippine Plants* which has been undertaken by Mr. Elmer D. Merrill. The scope of the work is so fully indicated in the note prefixed to each part that we cannot do better than reproduce it textually, only adding that the "attempt" has been carried out with the thoroughness which will be anticipated by all who know Mr. Merrill's method:—"The present enumeration is an attempt to summarise in convenient form for consultation our present knowledge of Philippine flowering plants, and represents a part of the knowledge accumulated by the author during a course of about twenty years' study of the problem. In the work an attempt has been made to account for all the binomials accredited to the Philippine flora; to adjust the synonymy when necessary; to include all important references to the Philippine botanical literature and essential references to extra-Philippine literature; to give the

habits, additional range, and Philippine and extra-Philippine distribution of each species; to cite illustrative specimens where expedient or necessary; and to record all available local names for each species." Full introductory and explanatory matter will be published in a general introduction to be prefixed to vol. i. when the work, which will comprise one volume for the gymnosperms and two for the gymnosperms and monocotyledons, is completed; this, it is hoped, will be by the end of the present year or early in 1924.

In the *Essex Naturalist* (Oct. 1922–March 1923) Miss Lister figures and describes a new species of *Didymium* (*D. trachysporum*), first found in 1897 by Mr. James Saunders in heaps of old straw near Barton, Beds, and subsequently in Essex, Surrey, and Aberdeenshire. The account of the Easter excursion of the Essex Field Club includes a reference to *Anemone Pulsatilla*, which appears to be disappearing from its well-known Bartlow "hills" locality. "When the Club visited the site in 1912, a single plant was observed: a careful search failed to reveal any trace of this plant on the present occasion, but the caretaker assured us that it had been observed during the past two years, and it is possible that the lateness of the season may account for its absence. Joseph [Joshua] Clarke (1805–90), writing in 1888, says that the statement in Edward Forster's *Flora of Essex* that the plant is abundant on Bartlow-hills must be taken with some reservation, as many years before, he went with Forster and only found one plant. Forster died in 1849, so that the above excursion must have been long before that date, which would indicate that the Pasque-flower has not, for nearly a century, been abundant" in the locality.

Although not strictly botanical, the following account of the disappearance of an industry, which we take from the *Evening Standard* of March 22, seems of sufficient interest for preservation: "Mr. William Cornish, horticultural expert and last of the Mitcham lavender growers, died last night at Mitcham, at the age of eighty-eight. Fifty years ago Mr. Cornish was one of the leading figures in the industry, and for nearly twenty years he was manager of the largest lavender farm and distillery in Mitcham, extending to about five hundred acres of lavender, liquorice, roses, and camomile in the neighbourhood of Figg's Marsh. Part of Mitcham's housing scheme and the London Sports Ground now occupy the site. Not a sprig of lavender is grown in Mitcham to-day, apart from private gardens. Mr. Cornish was also the last of the Mitcham physic garden proprietors. In the early part of last century the physic gardens were the industry of Mitcham, and Mr. Cornish later became as famous for his poison plants—belladonna, henbane, spirting cucumbers, and white poppies, which were used for opium—as he had been for lavender. He was an acknowledged authority on all medicinal plants, and only a few days ago expressed his delight at the trade revival in these herbs. Mr. Cornish died at the picturesque one-story cottage in the midst of his London-road nursery where he had lived for thirty-two years. For the past ten years his chief interest was the growing of chrysanthemums and roses for the London market."

Mr. T. Sheppard sends us a reprint, from the Report of the British Association for 1921, of his useful "List of Papers bearing upon the Zoology, Botany, and Prehistoric Archæology of the British Isles issued during 1921." This is so well done that one regrets that it has not been done better: *e.g.* there may be some reason for classifying the papers under three separate headings, though we think one index for the whole would have been more convenient; but there can be none for not placing at the head of each page an indication of each section, in lieu of the useless entry "List of Papers, 1921." More than six pages are devoted to that versatile author "Anon.," under whom are placed reports of meetings and societies, donations to museums and the like, and such illuminative entries as "A Good Record," "Tragedy of Greed," "Notes and Comments," and so on. On the other hand, cross references, which in some cases are really necessary, are withheld—*e.g.* wishing to know what notices of L. C. Miall had been published, it was only by hunting through the works of "Anon." that we were able to discover the three references relating to him.

The botany of popular magazines so often leaves much to be desired that the appearance of a quite good figure of *Dionæa* on the cover of *The Detective Magazine* of Feb. 16 attracted our attention. It illustrates a story called "The Flytrap," in which the leaves of the plant had been made the recipient of stolen rubies, on which they had "closed like a trap." The accompanying text is hardly up to the level of the picture, as we fear that the author regards the plant as an orchid, though the description is not inaccurate. The number of the same Magazine for March 2 contains (p. 19) a story of Sir George Birdwood, which is new to us. When in Bombay, he was engaged to investigate the case of a young man who had applied for an appointment, and whose letters of introduction had been lost. Sir George met him at the Governor's house at dinner, where the "table decorations of orchids" elicited Birdwood's praise. "You should see the *Amerstia* (sic) *nobilis* in its native woods, sir!" said the applicant. "You come from Rangoon, then?" exclaimed Birdwood. The confusion of the young man, who had stated that he had just come out from England, aroused suspicion, and it was discovered that he had absconded from Rangoon with public funds. *Amherstia*, however, is not an orchid.

An address delivered by M. Molliard at the funeral of Gaston Bonnier, who died on Dec. 30 of last year, is published, with a portrait, in the January issue of the *Revue Générale de Botanique*, which journal he established in 1889 and continued to edit until his death. In 1887 Bonnier succeeded Duchartre in the chair of Botany in the Faculté des Sciences, where he established a botanical laboratory whose work he superintended. His most important work is his *Flore complète de France, Suisse, et Belgique* (begun in 1912), the sixth volume of which, devoted to the *Compositæ*, has recently appeared. The feature of the work is the admirable illustrations, reproduced (in half the natural size) from coloured photographs, in which

each species, with many subspecies and varieties, is represented; the entire absence of dissections is however somewhat a drawback to their usefulness. The descriptions are very full, and include geographical distribution, and popular names in French, German, Flemish, Italian, and English—among the last are many that are strange to us—*e. g.* "Dyer's savory" for *Serratula*—and assuredly no Englishman ever called *Kentrophyllum lanatum* (which is not English) "Blessed-thistle-of-the-Parisians." A British Flora on the lines of the book would be very useful. British botanists are already acquainted with Bonnier's work through the translation by Boulger of his useful little work *Les Noms des Fleurs*, published in 1917 under the title *Name this Flower* and noticed in this Journal for 1917, p. 293.

The *Kew Bulletin* (no. 2) announces the recent death of Richard Arnold Dummer (formerly Dümmer), which followed on a motor accident at Uganda, where he had been stationed since 1914. He came to Kew as a student gardener in 1910, having previously worked in the Municipal Gardens, Cape Town. In 1912 he contributed to this Journal a description of *Pearsonia*, a new genus of *Leguminosæ*, and "An Enumeration of *Bruniaceæ*," which appeared as a supplement to the volume; other papers from his pen were published in these pages in 1913 and 1914. Dummer sent to Kew museums collections, including many fungi, from Uganda and Kenya.

The death is announced of Dr. Charles Immanuel Forsyth-Major which occurred in London on March 25 in his eightieth year. Chiefly known as a paleontologist, he made an interesting collection of plants in Madagascar in 1894–95 which are in the National Herbarium; by one of these—*Mimulopsis Forsythii* S. Moore—he is commemorated. He lived much in Corsica, where he met with a serious accident in the summer of 1922.

The Kew *Bulletin* (no. 2; March) contains the first instalment of a series of "Contributions towards a Phylogenetic Classification of Flowering Plants" by Mr. J. Hutchinson, to which the Director, Captain A. W. Hill, prefixes a preliminary note. The Contributions "will provide keys to the larger families and include all the described genera arranged, as far as may be possible, on the basis of their probable phylogeny." In the present paper the author lays down the general principles adopted, illustrating them by the treatment of *Ranunculaceæ*. In the same number Mr. J. S. Gamble describes a new Bamboo, *Neohouzeaua tavoyana*. In referring to the steady growth every year of the task of compiling the quinquennial supplements to the *Index Kewensis*, the *Bulletin* makes a suggestion to which we willingly give further publicity: "It would be of the greatest assistance if authors would indicate the first time a new group or combination is used by adding the sign 'n. sp.' or 'comb. nov.,' and also cite the synonyms on which they are based. The *Index* is so greatly appreciated that it is felt that these difficulties need only be pointed out for all to assist in lightening the compiler's task."

The *Transactions* of the British Mycological Society (vol. viii. pt. 3; Mar. 21; 10*s.* 6*d.*) contain a paper on "Mould Growths upon Cold-store Meat" (including figures and descriptions of *Wardomyces*, a new genus commemorating the late Marshall Ward) by F. T. Brooks and C. G. Hansford; "Observations and Experiments on Cereal Rusts near Cambridge," by Karm Chand Mehta, Professor of Botany at Agra College; "The Literature on the Classification of the Hysteriales," by G. R. Bisby; and a notice of the late William Beriah Allen (1875–1922) by Carleton Rea.

Dr. Daydon Jackson has reprinted in facsimile a little tract of four pages—*Vegetabilium cum Animalibus Comparatio* [1737], by Lars Roberg (1664–1742)—which came under his notice during the preparation of the new Catalogue of the Linnean Society's Library. "Besides the rarity of the tract, it arrests our attention as treating of the comparison between animals and plants and the new sexual system of plant-arrangement put forward by Linnæus" (in the *Systema Naturæ*, 1735), who in 1841 succeeded Roberg in the chair of medicine at Uppsala.

In the *Gardeners' Chronicle* for March 3 (p. 123) Mr. H. S. Thompson quotes from a letter by Dr. Petrak, of Czecho-Slovakia, who is engaged on a monograph of *Cirsium*, to the effect that the plant that occurs in England is certainly different from the forms that occur on the Continent by the structure of the scales of the involucre and the size and shape of the flower-heads. He proposes to name it sub-sp. *anglicum*.

The *Annuaire du Conservatoire et du Jardins du Botanique de Genève*, vol. xxi. (1919–22: 30 fr.) contains notes by the editor, Dr. Briquet, on the life and work of Auguste Schmidely (1838–1918), Charles Bader (1836–1919), and Paul Chenevard (1839–1919), who also contributes a paper—"Caractères résumés des Principaux Groupes de Formations végétales" and a note on "Le Mélanérythyme floral chez la *Daucus Carota*"; Casimir de Candolle writes on the *Piperaceæ* of Formosa, Brazil, Colombia, Peru, Ecuador, Java, Borneo, Sumatra, Celebes, and Mexico, with descriptions of many new species; Ernest Gaumann deals with the species of *Peronospora* affecting *Euphorbiaceæ* and *Polygonaceæ*; E. Hassler gives a conspectus of the *Lauraceæ*, *Myrsineæ*, *Moraceæ*, and *Urticaceæ* of Paraguay; Dr. Hochreutiner writes on new or little-known *Guttiferæ* and on *Sterculiaceæ* and *Malvaceæ*; and C. de Mereschkovsky contributes notes on his "Lichenes Ticinenses exsiccati."

The *Journal of the Arnold Arboretum* (iv. no. 1; Jan. 1923) contains a reprint, with notes by Mr. Alfred Rehder on "Michaux's Earliest Note on American Plants"; this appeared in vol. i. (1792) of the *Journal d'Histoire Naturelle*, edited by Lamarck and others, and has been generally overlooked; only some of the new names are taken up in *Index Kewensis* or elsewhere. Mr. E. J. Palmer writes on the Red River Forest at Fulton, Arkansas, and Mr. E. H. Wilson on the Rhododendrons of Northeastern Asia; Miss Ethelyn M. Tucker has an interesting account of the incunabula in the library of the Arboretum, to which valuable additions, including a copy of the Herbarium of Apuleius, have lately been made.

The *Naturalist* for March contains the very interesting presidential address on "Botanical Survey and Ecology in Yorkshire," delivered by Mr. T. W. Woodhead at the meeting of the Yorkshire Naturalists' Union held at Scarborough in December last. Beginning with a comprehensive sketch of the floras of the county and their authors, and of the survey in which Messrs. Moss and William G. Smith took so prominent a part, Mr. Woodhead proceeds to summarise the ecological aspects of the flora. A useful and comprehensive bibliography is appended to the paper, which includes some interesting portraits.

In *Rhodora* for February, in the course of some notes on "Critical Plants of North America," Mr. C. E. Weatherby discusses some species of *Chelone* with especial reference to Clayton's and Miller's descriptions—the reference to Miller's plate should be 93, not "19." It would be well if some American botanist, when visiting the National Herbarium, would examine the specimens from both the writers cited; in the absence of authentic material, it seems hardly possible to arrive at any definite conclusion as to the species.

The Report of the National Museum of Wales for 1921–22 shows that steady progress is being made with the Welsh herbarium; the botany department has been enriched by the purchase of Mr. E. M. Holmes's herbarium of algæ, mosses, and hepatics. Loan collections containing economic specimens, tropical fruits and seeds, and herbarium sheets of Welsh plants, have been prepared for and installed in three secondary schools—a useful piece of work.

The *Annals of the Missouri Botanic Garden* (ix. no. 3; Sept. 1922) lately to hand is mainly occupied by a "Monographic Study of *Thelypodium* and its immediate allies," by Mr. E. B. Payson; Mr. G. H. Pring describes and figures a new hybrid *Nymphæa*—"× Nymphæa 'Mrs. G. H. Pring,' Pring, n. hyb. (*N. ovalifolia* ♀ × *N.* 'Mrs. Edwards Whitaker' ♂)."

The *Botanical Gazette* for March contains a paper by M. C. Sewell on the "Effect of *Andropogon Sorghum* on succeeding crops of *Triticum sativum vulgare*"; J. W. Bailey continues his "Notes on Neotropical Ant-plants," with a study of *Tachigalia paniculata*, and Charles Robertson concludes his series on "Flowers and Insects," the terminology of which will afford Dr. Jackson matter for the next edition of his invaluable *Glossary*.

A handy little pocket manual in which are described and figured the *Common Forest Trees of North Carolina*, prepared by J. S. Holmes, State Forester, in connexion with the Forest Service of the U.S. Department of Agriculture, is published at Chapel Hill, N.C.

The *Bulletin of the Torrey Club* for March contains a paper (with plate) on "Polyembryony developed under experimental conditions in certain Polypodiaceous Ferns."

The Imperial Botanical Conference which meets in London next year has appointed a small subcommittee to consider questions of nomenclature, the convener of which is Mr. T. A. Sprague.

THE

JOURNAL OF BOTANY

BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.C.S.G., F.L.S.

LATE SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM.

The Journal of Botany was established in 1863 by Seemann. In 1872 the editorship was assumed by Dr. Henry Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

Without professing to occupy the vast field of General Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains.

Until the beginning of the late War the Journal paid its way and even allowed a slight margin of profit; but during that period the subscribers were reduced in number, and the continental circulation almost ceased. It has now regained its position, but the increased cost of production, which has not as yet been substantially reduced, has resulted in an annual deficit which at one time became so serious that the continuance of the Journal was threatened. By the generosity of those who felt that its cessation would be a misfortune, especially for British botanists whose principal organ it has always been, the deficit has been met and an appeal is now made for an increased number of subscribers.

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ANOMACANTHUS:

A new Genus of Acanthaceæ.

By R. D'O. Good, B.A.

Anomacanthus, genus novum *Acanthacearum*.

Bracteolæ 2, magnæ, foliaceæ, connatæ, primo corollam includentes. *Calyx* annularis brevissimus integer. *Corollæ* tubus obliquus; limbus patens lobis 5 ovatis rotundatis æstivatione contortis; labii antici lobus anticus quam ceteri minor et basi lamelliferus; labii postici lobi fere connati. *Stamina* 4, æquilonga, faucibus tubi affixa, inclusa; filamenta curvata crassa. *Antheræ* lineares æquilongæ, basi glanduloso-pulvinatæ, posticæ 2-loculares, anticæ 1-loculares. *Pollinis grana* sphærica plana. *Discus* annularis valde prominens. *Ovarium* sub-globosum, 2-loculare, disco partim absconditum; stylus elongatus inclusus; stigma infundibulare paulo bifidum; ovula magna in loculo solitaria supra medium septi affixa. *Fructus* magnus pro ordine mirabilis sub-drupaceus in pyrenas duas septicide desiliens, exocarpio coriaceo-carnoso, endocarpio lignoso intus furfure brunneo copiose insito. *Semina* solitaria magna exalbuminosa funiculo subevanido; cotyledones latæ maxime corrugatæ.

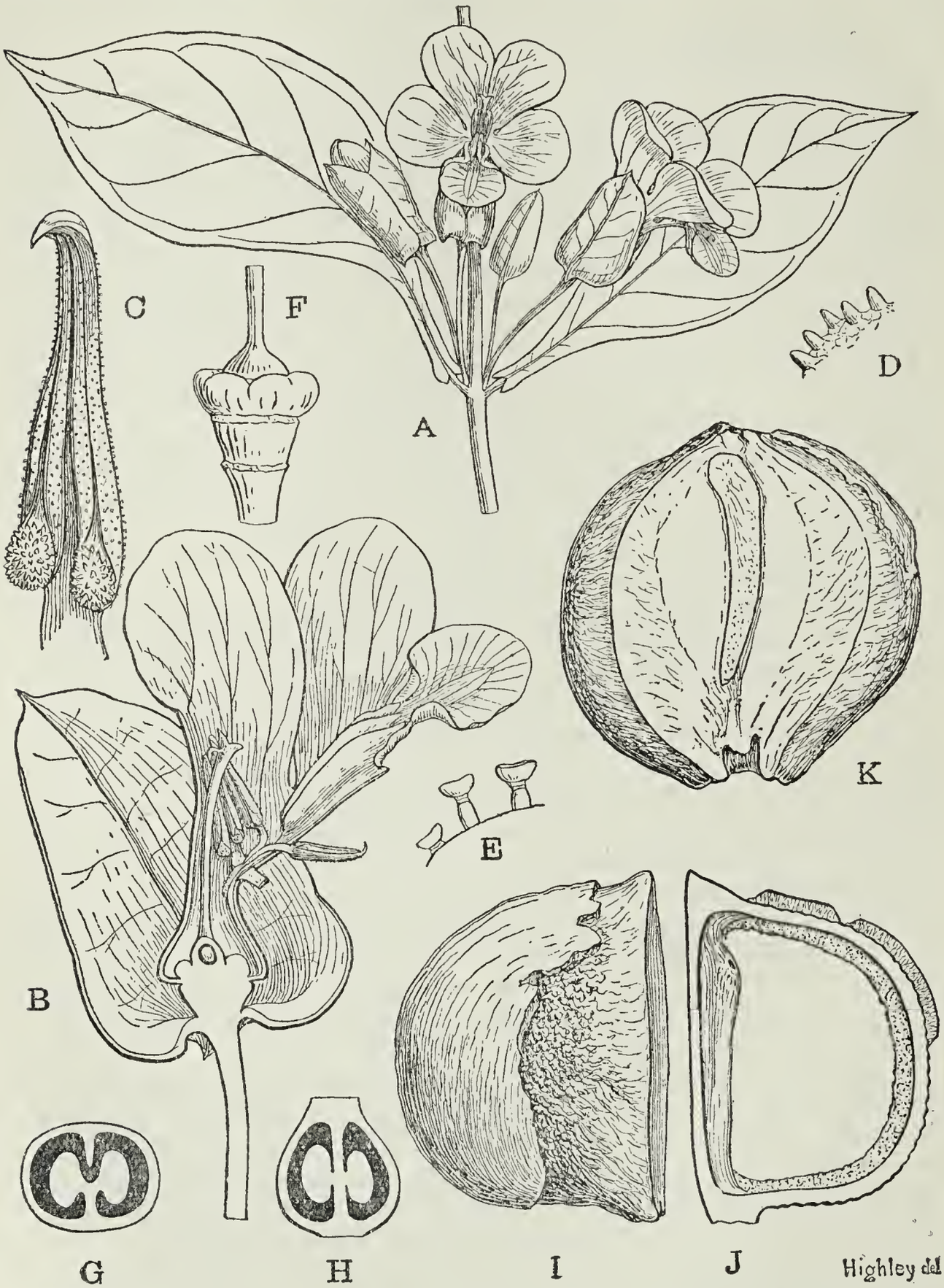
Frutex scandens glaber. *Folia* opposita petiolata integerrima. *Flores* pedunculati in axillis pauci vel solitari.

A. drupaceus, sp. unica. *Frutex* scandens; *caule* quadrangulo contorto; *foliis* brevipetiolatis ovatis acuminatis basin versus angustatis basi ipsa leviter cordatis utrinque glabris supra in sicco pallide viridibus pilisque minutis glandulosis sparsissime præditis inferne griseo-brunneis nervis utrinque precipue inferne conspicuis prope marginem arcuatis nervos secondarios plures ad angulum fere rectum emittentibus; *floribus* axillaribus pedunculatis solitariis vel pluribus; *bracteolis* magnis foliaceisque carinatis acuminatis conspicue nervatis postice fere ad apicem connatis antice infra medium connatis; *calyce* annulato minutissimo truncato; *corollæ* tubo basi expanso superne constricto limbo papyraceo patente; *staminibus* æquilongis; *filamentis* crassis complanatis glanduloso-pilosis; *antheris* glanduloso-pilosis apice acutis hamatis basi rotundatis glanduloso-pulvinatis; *stylo* longo superne aliquid compresso; *stigmate* bifido leviter infundibulari.

Hab. Portuguese Congo. A soft-stemmed climber reaching a height of 15 m. Skirting the woods near the official residence at Buco Zan, *Gossweiler*, 6815! in Herb. Mus. Brit. No. 6815 *b*! is conspecific and was collected near the village of Caio-Rio, Lufo Hombe region, Maiombe. An original note by the collector states that the same plant was collected at Pango Mongo in 1916.

Leaves, including the wing of the petiole, up to 20 cm. long by 8 cm. broad. Petiole below the wing less than 1 cm. long. Corolla white, up to 5 cm. across. Anthers about 1 cm. long, filaments much shorter. Style 3–4 cm. long. Ovary, in the young flower, very small and almost embedded in the disc. Ripe fruit (as far as can be ascertained from the dried pyrenes) at least 10 cm. greatest diameter, by about 6 cm. high and 6 cm. broad.

Anomacanthus drupaceus is of special interest in the androecium and the fruit. The former consists of 4 stamens, equal in length and opposite the 4 posterior corolla lobes. The fifth anterior stamen is



Anomacanthus drupaceus R. Good.

A. Portion of plant, $\frac{1}{2}$ nat. size. B. Flower in section, nat. size. C. Anther, ×4. D. Glands from base of anther, much enlarged. E. Glandular hairs of anther, much enlarged. F. Ovary and disc, ×4. G. Ovary in t. s. H. Ovary in l. s. I & K. Ripe pyrenes, slightly reduced. J. Ripe pyrene in section, slightly reduced.

absent. The two posterior stamens are complete and two-celled, while the anterior ones are one-celled (cf. *Brillantaisia*). Owing to the curvature of the filaments the stamens lie, almost in contact, obliquely across the corolla tube. The anthers are long and narrow, with sharply hooked tips and are furnished at the base of each cell with a glandular cushion-like mass. Both anthers and filaments bear numerous capitate glandular hairs. The fruit is remarkably large for the family and is drupaceous. Within the fleshy exocarp are two large pyrenes, subglobose but flattened on the side of contact. In the type-specimen the outer fleshy layer is incomplete and of uncertain thickness. The pyrenes are woody and hard, much corrugated on the outer surface and lined within by a dense layer of brown felt. The seeds are large and without a hard coat. The placentæ are large and project as sharp ridges into the cavity of the pyrenes. In the young ovary the septum is incomplete, but in the ripe fruit structures can be seen which appear to be the result of subsequent completion of the septum.

The leaves are without cystoliths. The epidermal cells are sinuate in outline, while the stomata are of normal Acanthaceous type. Typical subsidiary cells are present.

The minute structure of the stem also shows many points of interest. In transverse section it is roughly quadrangular, with rather prominent corners and concave sides. The stem is hollow and the central cavity occupies about $\frac{2}{3}$ of the total diameter. Broadly the stem is a thin-walled tube strengthened at the cardinal points of its circumference by 4 massive square-faced ribs. Additional ribs are subsequently formed. Beneath the epidermis is a well-marked hypoderm consisting of a single layer of stone cells, forming a complete ring below the surface of the stem. Within this are two further narrow rings of tissue. The outer is dark in colour and almost structureless. The inner is very open, with numerous scattered fibrous cells. These two layers seem to represent, respectively, the endodermis and the pericycle. The innermost tissue in the stem is a broad ring of centripetal secondary xylem, the elements of which are more or less rounded in section. On the inside, the edge of the stem-cavity is sharply defined and all trace of primary xylem is lost. Each of the 4 main stem-ribs consists of a 4-sided mass of centrifugal secondary xylem. The elements of this wood are square in section and regularly arranged. In each rib there are from 8 to 10 very large vessels. The outer extremities of each xylem mass are occupied by particularly large vessels, while those inside are smaller. Medullary rays, one cell broad, are present in the centrifugal xylem, but are absent from the centripetal ring. Phloem is poorly developed. A certain amount appears to occur between the main centrifugal xylem masses. The centrifugal xylem appears to be of comparatively late inception in response to the assumption, by the young plant, of the climbing habit. In function it gives necessary strength to the stem and provides the large and conspicuous vessels, and is the result of the production of wood elements outwardly by the cambium. During this process the outer stem-tissues become much compressed and the phloem becomes unrecognisable. Where this crushing effect is

reversed, namely between the ribs, the tissue is still visible, and the pericycle tends to be vacuolate.

Apart from the somewhat unusual leaf-shape, *A. drupaceus* shows considerable superficial resemblance to the members of the sub-family *Thunbergiæ* of the *Acanthaceæ*. Certain leaf characters, such as absence of cystoliths and presence of typical somata are also characteristic of this sub-family. The androecium and fruit differ markedly from any known genus, but the remaining characters show affinity with *Mendoncia*, *Afromendoncia*, and *Thunbergia*. Finally, the minute anatomy of the stem is almost exactly that described by Gilg in Ber. der Deutsch. Botan. Ges. 1893, p. 351, for *Afromendoncia*. Reference may also be made to the account by Roulet of the anatomy of *Thunbergia* in Bull. Herb. Boiss. 1894, p. 259.

FRESHWATER PLANKTON ALGÆ FROM CEYLON.

By W. B. Crow, M.Sc., Ph.D.

(Concluded from p. 145.)

Hydrodictyaceæ.

Pediastrum.

Judging by the collections examined, *P. simplex* and *P. duplex* are the most important members of the *Chlorophyceæ* in the plankton of Ceylon. They are frequently very abundant and, although not occurring in such vast quantities as the species of *Microcystis*, have a much wider range, occurring in habitats of very diverse type and occasionally the only phytoplankton present. The two species often occur together. It is noteworthy that only these two forms were observed in appreciable quantity, and many of the best-defined species in Europe were not met with.

P. simplex Meyen. This shows very considerable variation in (*a*) size of colony, (*b*) number of cells, and (*c*) shape and size of lacunæ: these characters should therefore not be used as primary specific distinctions. The great amount of material often rendered the variation very striking, but no essentially new forms were met with. Apparently there is no direct connection between structure and habitat; very many collections, probably all in which the alga was present in sufficient quantity, show variation from the type to *P. clathratum*. The localities where this was the dominant type are recorded below. Probably several other microspecies or forms have been included here as also in the records of *P. duplex*; but owing to the variability of the material it has not been practicable to separate them. *Loc.* 7, 10, 18, 19, 23, 26 (very abundant), 38, 39, 41, 42, 45 (very abundant), 49, 50, 57. *Distr.* Cosmopolitan.

P. clathratum (Schroeter) Lemm. *Loc.* 2, 13, 14, 26, 45, 53. *Distr.* Cosmopolitan (incl. Ceylon).

P. duplex Meyen (incl. var. *clathratum* A. Br.). The material is so abundant and variable that it has not been possible to distin-

guish a definite variety. *Loc.* 2, 3, 4, 6, 9, 10, 11, 18, 24, 25, 26, 27, 31, 35, 37, 38, 41, 42, 43, 44, 47, 48 (rare), 50, 51, 52, 53, 56, 58, 59. *Distr.* Cosmopolitan (incl. Ceylon).

Dictyosphæriaceæ.

Westella.

W. botryoides (W. West) de Wildeman. *Loc.* 6. *Distr.* Eur., N. Amer., Afr.

Dictyosphærium.

D. Ehrenbergianum Naeg. *Loc.* 2, 4, 5, 10, 23, 49, 54. *Distr.* Eur., N. Amer., Afr.

Dimorphococcus.

D. Fritschii Crow, in Ann. Bot. xxxvii. no. clxv. Jan. '23, pp. 141–145. *Loc.* 11, 24, 27, 32, 56.

Oocystaceæ.

Oocystis Naeg.

O. crassa Wittrock. Some of the specimens from Tank Magaswewa diverged slightly from the type. Variants apparently intermediate between the type and *O. Marssonii* Lemm. were observed; in these the cells were 12–15 μ in length and sometimes nearly as wide, thus even in side view approaching a circular outline. This latter feature is characteristic of *O. Marssonii*, but in *O. crassa* the cells are nearly twice as long as wide. There were apparently 3–4 chromatophores in the cells, which seemed to be well preserved. In *O. crassa* there are normally 4–8 chromatophores; in *O. Marssonii* 1–2. Brunnthaler (in Pascher's Susswasserfl.) considers the latter closely related to it if not identical with *O. crassa*, whilst Printz in his recent monograph regards it as a variety. The specimens from the other localities were few; one measured from Tank Andankulam had the rather unusual dimensions of 29 $\mu \times 12\,\mu$; the rest were of the normal type, and fell within the dimensions given by Brunnthaler—14–26 μ in length, 10–20 μ in width. *Loc.* 4, 9, 29, 37. *Distr.* Eur., N. Amer., Ceylon.

Scenedesmus Meyen.

The occurrence of this in the plankton may be contrasted with that of *Oocystis*. The numerous species recorded below are quite abundant even in the larger pieces of water, in this agreeing with the position in other parts of the world, and the plakea type of colony seen in *Scenedesmus* is doubtless in some way related to the free floating habit of the plant. The species recorded below are mostly common as facultative planktonts in other parts of the world. They are morphologically the most highly differentiated types, nearly all showing marked tendency towards the spindle-shaped cell-form and often having spines, teeth, or other ornamentation; dimorphism of the cells is frequently well marked.

S. obliquus (Turp.) Kuetz. *Loc.* 44. *Distr.* General (incl. Ceylon).

S. ACUMINATUS (Lagerh.) Chod. *Loc.* 12, 38. *Distr.* Eur., Austral., Indo-Malaya.

S. ACUTIFORMIS Schroder. *Loc.* 9. *Distr.* General.

S. QUADRICAUDA (Turp.) Bréb. *Loc.* 13, 23, 29, 37, 38, 41, 44. *Distr.* General (incl. Ceylon).

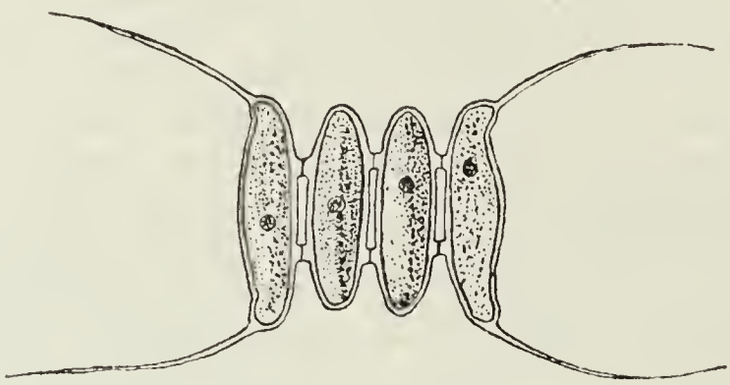
S. OAHUENSIS (Lemm.) G. M. Smith *Loc.* 6, 9. *Distr.* Sandwich Isles.

S. OPOLIENSIS P. Richter. *Loc.* 4, 12. *Distr.* Eur., Afr., N. Amer., Java, Ceylon.

S. CARINATUS (Lemm.) Chod. *Loc.* 13. *Distr.* Eur., Java.

S. tropicus, n. sp.

Cœnobio subquadrato perforato 4-cellulario, cellulis biconvexis, maxima latitudine ad pæne tertiam partem longitudinis, ad apices inflatis; cellulis terminalibus in spinas ad utrumque finem provectis; spinis extrorsum recurvis, tam longis quam cellulæ corpus; cellulis inter se hærentibus compressis pulvillis; foraminibus angustis linearibus inter cellulas. Chlorophoris singulis, singulis pyrenoidibus. Cellulis 31–33 μ longis, raro minoribus.



Scenedesmus tropicus Crow, n. sp.

This is one of the few perforate species, easily distinguished from *S. perforatus* by its narrower cell connections, the biconvex form of the cell, the four-celled character and size of the colonies. Turner's *S. quadricauda* var. *major*, also an Indo-Malayan form, is perhaps to be placed as a variety of this. Although imperfectly known, it is plainly not identical with *S. tropicus* (fig. 2). The intercellular pads are well-developed, although narrow, and result in very clearly perforate colonies. The pads, as in other species, are outgrowths of an outer mucilage layer of the cells; in *S. tropicus* this is particularly well seen, it being clear that each connection is not a continuous bridge, but rather two adpressed pads one from each cell (fig. 2). *Loc.* 6.

S. ARCUATUS Lemm. *Loc.* 4. *Distr.* Eur., Afr., N. and S. Amer.

S. ARMATUS (Chod.) G. M. Smith. *Loc.* 18. *Distr.* Eur., Samoa, Singapore.

S. BERNARDII G. M. Smith. *Loc.* 18. *Distr.* N. Amer.

ACTINASTRUM Lagerh.

A. HANTZSCHII Lagerh. *Loc.* 6, 9, 50. *Distr.* Cosmopolitan.

Crucigenia Morren.

C. rectangularis (A. Br.) Gay. In groups of four cells or occasionally in twos, or more or less displaced and irregular loose syncœnobia. Cells 3–5 $\mu \times 4{\cdot}5$–5 μ. *Loc.* 13, 37. *Distr.* Eur., N. & S. Amer.

C. quadrata Morren. Probably *Crucigenia triangularis* Chod. should be included in this; certainly some of the younger colonies approached the description of this species (*cf.* Pascher's Süsswasserfl.). *Loc.* 49. *Distr.* Europe.

C. triangularis Chod. A few specimens showing triangular cells are conveniently recorded under this name. *Loc.* 18. *Distr.* Europe.

Tetrastrum Chod.

T. multisetum (Schmidle) Chod. In the older colonies the cells reached a diameter of 5–6 μ. *Loc.* 12. *Distr.* Eur., N. Amer.

Kirchneriella Schmidle.

K. lunaris (Kirchn.) Moeb. Distinguished from the very similar *Selenastrum Bibraianum* Reinsch by its mucous coat, and from other species by the form of its cells. *K. obesa* W. West is reported from tropical Africa but not *K. lunaris*. *Loc.* 8, 11, 27, 56. *Distr.* Mostly Europe, Ceylon.

Ankistrodesmus Corda.

A. falcatus (Corda) Ralfs. *Loc.* 2, 8, 9, 12, 18, 26, 29, 49, 56. *Distr.* General (incl. Ceylon).

A. setigerus (Schröder) G. S. West. *Loc.* 12, 25, 60. *Distr.* General.

Golenkinia Chod.

G. radiata Chod. *Loc.* 4, 12. *Distr.* Temperate.

Cœlastrum Naeg.

The two species recorded by W. & G. S. West were not found.

C. microporum Naeg. *Loc.* 8, 18, 41, 50, 56. *Distr.* Eur., N. Amer., Ceylon (f. *irregulare* Fritsch from S. Orkneys).

C. reticulatum (Dang.) Senn. *Loc.* 2, 4, 6, 9, 14, 27, 56. *Distr.* Chiefly tropical.

C. proboscideum Bohlin. *Loc.* 6, 9. *Distr.* N. Temperate.

B. AKONTÆ.

Zygnemales.

Zygnemaceæ.

Species of *Spirogyra* and *Mougeotia* occurred in a very large number of the samples. In these cases we were dealing with detached filaments which were in a sterile condition and hence could not be identified.

Zygnema.

Represented in four localities. Only in one case were fertile specimens observed, viz. :—

Z. stellinum (Ag.) Kirchn. forma *subtile* Reinsch. Vegetative cells 15–16 μ in width, about 50 μ in length. The species showed scalariform conjugation and the typical zygospores. Tycholimnetic. *Loc.* 56. *Distr.* Temperate.

Desmidiaceæ.

The majority are tycholimnetic and have been recorded by W. & G. S. West for the paddy-fields and other habitats, from which they doubtless may occasionally be distributed into the "tanks." These usually afford scanty material, and probably many have been overlooked. There are also a few typical plankton species. A small number were not identified, owing to the difficulty in obtaining relevant literature. Our lists show that many of the common Desmids of Ceylon are also widespread. They do not preclude endemism, although if endemics occur they play a very small part in the limnoplankton.

Gonatozygon De Bary.

G. Brebissoni De Bary. The material when examined only showed isolated cells. Length 162 μ, max. width 6 μ. Our specimens belong to the type-form although somewhat small. W. & G. S. West give length 162–288 μ, breadth 6·8–10·8 μ. The var. *minutum* W. & G. S. West is, however, given as 47·5–67·5 μ in length, 4·2–7 μ in breadth. *Loc.* 16 (rare). *Distr.* Eur., Greenland, India, Afr., N. Amer.

G. pilosum Wolle. Narrowest cells scarcely exceeding 6 μ; West gives 10·5–15 μ. *Loc.* 11, 24. *Distr.* Eur., N. & S. Amer., Java, India (incl. Ceylon).

G. monotænium De Bary. *Loc.* 8. *Distr.* Widespread in tropics. N. hemisphere to Greenland.

Closterium Nitzsch.

C. Kuetzingii Bréb. *Loc.* 3, 11, 24. *Distr.* General (incl. Ceylon).

C. Leibleinii Kuetz. Probably several forms ought to be distinguished. Our specimens came within the range of variation described by West. *Loc.* 9. *Distr.* General.

C. libellula Focke. *Loc.* 44, 61. *Distr.* General (incl. Ceylon).

C. Cynthia De Not. *Loc.* 6, 9, 61. *Distr.* General (incl. Ceylon).

C. Ehrenbergii Menegh. *Loc.* 44, 59. *Distr.* General.

C. Jenneri Ralfs. *Loc.* 44. *Distr.* General, especially Tropics.

Triploceras Bail.

T. gracile Bail. *Loc.* 56. *Distr.* Victoria, Ceylon, Hong-Kong.

Micrasterias Ag.

M. mahabuleshawarensis Hobson. *Loc.* 27. *Distr.* Chiefly tropical.

M. AMERICANA (Ehrenb.) Ralfs. *Loc.* 24, 32. *Distr.* Eur., Greenland, N. and S. Amer., Afr.

M. FOLIACEA Bail. *Loc.* 27. *Distr.* Eur., Ceylon.

COSMARIUM Corda.

C. OBSOLETUM (Hantzsch) Reinsch. *Loc.* 27. *Distr.* General (incl. Ceylon).

C. CIRCULARE Reinsch. *Loc.* 44. *Distr.* Eur., N. and S. Amer., Afr., India.

C. UNDULATUM Corda. *Loc.* 5. *Distr.* General.

C. DEPRESSUM (Naeg.) Lund. The form of semi-cell agrees with that of forma *brunnea* Schmidle 1888, the forma figured by Ström 1921, and with *C. Scenedesmus* Delponte var. *intermedium* Gutwinsky 1892, now regarded as belonging to this species. The cell-wall was colourless. *Loc.* 5, 24, 43, 56. *Distr.* General (incl. Ceylon).

C. PSEUDONITIDULUM Nordst. *Loc.* 6, 9. *Distr.* Eur., N. Amer., Central China, Siam.

C. MONILIFORME (Turp.) Ralfs. *Loc.* 32. *Distr.* General (incl. Ceylon).

C. SUBREINSCHII Schmidle var. *ocellatum* W. & G. S. West. *Loc.* 6 (rare), 9 (rare). *Distr.* Ceylon.

C. PYGMÆUM Arch. *Loc.* 6, 9. *Distr.* General (incl. Ceylon).

C. BIREME Nordst. W. & G. S. West record this and the closely similar *C. bipaxillum* from Ceylon. The latter we have not found, all our specimens being distinguished in vertical view by the more elongated and tapering papilla, which is represented in *C. bipaxillum* by a small hemispherical granule directed backwards. *C. bireme* is also allied to *C. polygonum*, but here the papilla is represented by a broad central tumour. *Loc.* 5, 24. *Distr.* Mostly tropical (incl. Ceylon).

C. SEXANGULARE Lund. *Loc.* 6, 9. *Distr.* Eur., N. Amer., Afr., Austral., Japan.

C. REGNELLI Wille. *Loc.* 5. *Distr.* General (incl. Ceylon).

C. PRÆGRANDE Lund. *Loc.* 56. *Distr.* Eur., Greenland.

C. HUMILE (Gay) Nordst. *Loc.* 1. *Distr.* General.

C. PARDALIS Cohn. *Loc.* 6, 9. *Distr.* Tropics of Old and New World.

C. PSEUDOBROOMEI Wolle. The specimens from the canal near Bentota showed rather larger granules than in the one figured by W. & G. S. West. These authors find the granulation to be variable in *C. pseudobroomei*, and we have therefore no hesitation in referring our specimens to this species. *Loc.* 24, 35. *Distr.* Largely tropical (incl. Ceylon).

XANTHIDIUM Ehrenb.

X. ARMATUM (Bréb.) Rabenh. *Loc.* 6, 9, 56. *Distr.* General.

X. ANTILOPÆUM (Bréb.) Kuetz. *Loc.* 27, 56. *Distr.* General.

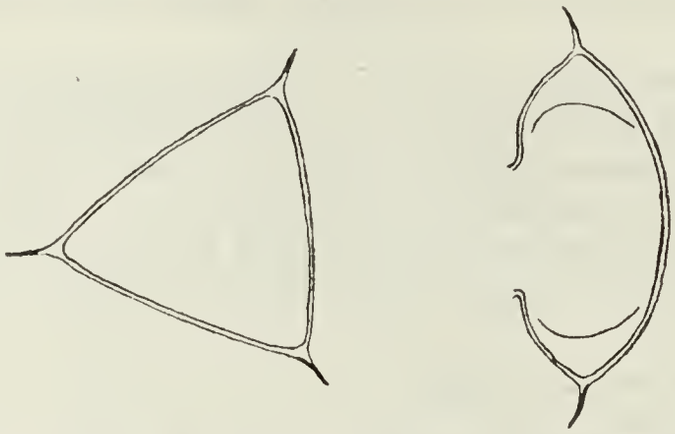
ARTHRODESMUS Ehrenb.

A. INCUS (Bréb.). *Loc.* 23, 56. *Distr.* General.

A. CONVERGENS Ehrenb. *Loc.* 10, 27, 56. *Distr.* General.

forma *triangularis* n. f. Semicellulis a termino visis triangularibus: cetera ut in typo.

The relationships of *A. convergens* are difficult to determine. The occurrence of spineless forms indicates a relationship with *Cosmarium depressum* (Naeg.) Lund; but the trimerous form noted here might equally well be placed in *Staurastrum*. Had the specimens



Arthrodesmus convergens Ehrenb. f. *triangularis* Crow, n. f.
End and side views of semicell.

occurred isolated, it would have been advisable to describe them as species of the latter genus; but they were mixed up with perfectly normal dimerous specimens of *A. convergens*. Trimery has previously recorded for *A. triangularis* formæ, sometimes regarded as forms of *A. Incus*. *Loc.* 27.

A. SUBULATUS Kuetz. *Loc.* 32. *Distr.* Chiefly tropical.

STAURASTRUM Meyen.

S. ORBICULARE Ralfs var. *Ralfsii* W. & G. S. West. *Loc.* 6, 9. *Distr.* General, except Africa.

S. WILDEMANNI Gutw. *Loc.* 27. *Distr.* Eur., Tropical Asia.

S. CORNICULATUM Lund. *Loc.* 32. *Distr.* Europe.

S. TAUPHORUM W. & G. S. West. *Loc.* 27. *Distr.* Ceylon.

S. SUBMANFELDTII W. & G. S. West. *Loc.* 6, 9, 10, 18. *Distr.* Ceylon, Central Africa.

S. ACANTHASTRUM W. & G. S. West. Not common except in Tank Borlasgama and at Kekunadure. There appears to be little variation in details of structure, but the number of horns varies, sometimes being 3 or 4, and often 5 on each semi-cell. The horns of the respective semi-cells alternate in position. *Loc.* 1, 11, 32, 53, 56. *Distr.* Ceylon.

S. GEMELLIPARUM Nordst. *Loc.* 6 and 9 (rare). *Distr.* S. Amer., India (incl. Ceylon).

S. MUTICUM Bréb. *Loc.* 6, 9. *Distr.* General.

S. FREEMANNI W. & G. S. West. *Loc.* 56. *Distr.* Ceylon.

GYMNOZYGA Ehrenb.

G. MONILIFORMIS Ehrenb. W. & G. S. West (*loc. cit.*) observed a variety *gracilescens* Nordst. Our specimens agreed with the type (25–30 μ in length, 17·5–22·5 μ in breadth). *Loc.* 27. *Distr.* Eur., S. Amer., Ceylon.

Spondylosium Bréb.

S. papillosum Schmidle. *Loc.* 27. *Distr.* Europe.

Onychonema Wallich.

O. lævæ Nordst. *Loc.* 56. *Distr.* S. America.

Hyalotheca Ehrenb.

H. neglecta Racib. *Loc.* 11. *Distr.* Europe.

A NOTE ON PRIMULA SINENSIS.

By James Britten, F.L.S.

The interesting paper (Kew Bull. 1923, 97–102) in which Mr. Hutchinson figures and describes as a new species (*P. calciphila*) a plant identified by Hance in this Journal (1880, 262) as a wild form of *P. sinensis* (wherein he has been followed by numerous authors), reminded me of a note which I published (Journ. Bot. 1897, 426) which, quite naturally, seems to have escaped Mr. Hutchinson's notice. It may be noted that Watters's specimen in the National Herbarium from Hance's own Herbarium (where it was labelled *P. sinensis*), although from the same locality as that at Kew cited by Mr. Hutchinson for *P. calciphila*, is not that species, but is identified by Mr. Hutchinson with *P. obconica*. One or two details regarding *P. sinensis* may be worth reproducing, with one which has not previously been printed and is, I think, of interest.

In my published note I had mentioned a specimen sent to Robert Brown a year earlier than the date usually associated with its introduction, and endorsed by him: "China, Mr. Reeves, 1818"; this is named by Brown "*Primula chinensis* MSS." It did not then occur to me to follow the indication thus given; this I have now done, and find in Brown's MSS. two full descriptions of the species—one based on Reeves's specimen "rec$^{d.}$ Nov. 1818"; the other on "Horticult. Soc. sp. no. 42, Oct. 1820." The Reevesian specimen is a fine one, with three whorls of flowers. To one of the descriptions Brown adds a note: "Obs. A Primula characteri recedit tantum modo calyce pluridento fructifero ventricoso."

Mr. Hutchinson's reference to "one John Reeves" suggests that he is not acquainted with the valuable collection of drawings made in China under Reeves's superintendence, now in the Department of Botany, nor with the tribute paid to him by Lindley when naming in his honour the genus *Reevesia* (Bot. Reg. 1236). Among these drawings is that of *P. sinensis* referred to as having been received by the Horticultural Society in 1819; its identity is established by the fact that it bears the native name in Chinese characters and has at its foot a note in Lindley's hand "Specimens at Hort. Soc."; there is also on the sheet the number "42," which, it will be remembered, is associated with the plant and the Society in Brown's MSS. Among the numerous original drawings for the *Collectanea* which

we have in the Department are the details, beautifully drawn by William Hooker, for the plate of *P. sinensis*; the figure of the plant, however, is not among them.

With regard to the nomenclature of the plant, I had in my previous note indicated that there is no need for special pleading in order to retain the use of *P. sinensis*. "As a matter of fact," to quote what I had written, "it is the earlier name, as part ii. of Lindley's *Collectanea*, in which it occurs, was published on April 1, 1821, while *prænitens* Ker (Bot. Reg. t. 539) dates from the 1st of May of the same year." The name *sinensis* was then already in actual use, as Ker says it was "mentioned to him by Mr. Sabine"—it may be noted that Lindley quotes the name as of "Sabine MSS." but rejected it on the ground that there was a *Primula sinensis* of Loureiro, which, whatever it may have been, was certainly not a *Primula*.

I take this opportunity of calling attention to the MSS. of Robert Brown, which, like those of Solander and Dryander known as the "Solander MSS.," are in the Department of Botany. Some account of the latter, which are bound and indexed, will be found in "The History of Aiton's *Hortus Kewensis*," published as a Supplement to this Journal for 1912 and also issued separately; the Brown MSS. are in Solander cases, and are arranged in the natural orders. Both collections often throw considerable light upon the Banksian Herbarium with which the writers were so intimately associated.

SANDORICUM KOETJAPE AND DENDROBIUM CANINUM.

By Elmer D. Merrill

(Director and Botanist, Bureau of Science, Manila).

In this Journal for 1922 (lx. 273) Mr. Ridley takes exception to the application of these two specific names. In one case he is in error, in the other he is correct.

In reference to the application of the name *Sandoricum koetjape* (Burm. f.) Merr., which Mr. Ridley thinks belongs to *S. nervosum* Blume rather than to *S. indicum* Cav., Dr. Hochreutiner writes under date of January 3, 1923, that the type of *Melia koetjape* Burm f. still exists in the Delessert Herbarium; that it is *Sandoricum indicum* Cav.; and that, therefore, Burman's specific name should stand for this species. The use of a local name is not always a safe guide; in this connexion Dr. J. J. Smith of Buitenzorg writes under date of February 7, 1923, to the effect that *ketjapi* and *sentoel* are currently used in western Java, but that confusion may occur for the reason that without fruits it is often impossible, especially in the herbarium, to separate the two forms. In *ketjapi* the fruit is sweet and edible, while in *sentoel* the fruit is larger, more distinctly ribbed, sour, and is not eaten by the natives; in typical *sentoel* the leaves are often larger and the inflorescences are longer and more robust; and in *sentoel* the old leaves turn red before falling, and the wood is dark red, while in *ketjapi* the leaves turn yellow and

the wood is light red. The two forms were confused by Blume, by Miquel, and by Koorders and Valeton. According to Dr. Smith, *Sandoricum indicum* Blume is *ketjapi* and *S. nervosum* Blume is *sentoel*, with the native names interchanged. Thus *S. nervosum* Blume Bijdr. 163 is a synonym of *S. indicum* Cav.=*S. koetjape* (Burm. f.) Merr., and is not the same as *S. Maingayi* Hiern as Mr. Ridley thinks. I am not concerned with the question as to whether one or two species exist here. Dr. Smith thinks that the *sentoel* and *ketjapi* cannot be maintained as species. Is it not possible that the *ketjapi* is a form derived from the *sentoel* by cultivation and selection? At any rate the application of the specific name *koetjape* would seem to be fixed.

In reference to *Dendrobium caninum* (Burm. f.) Merr., Mr. Ridley is correct in maintaining that this binomial does not appertain to the Pigeon Orchid, *Dendrobium crumenatum* Sw. Burman's descriptive sentence reads: "caulescens, foliis ovatis aveniis integerrimis, nectario conico." Ridley states that "Burman quotes the figure and description from Rumphius." This is true only in that he gives as a reference to his description "Angrecum caninum Rumph. Amb. 6, p. 105, t. 47. f. 1"; nothing in his original descriptive sentence is quoted from Rumphius. The descriptive sentence and the local name "Angrec utan. Javanis" indicate clearly that Burman had an actual Javan specimen. Dr. Hochreutiner informs me that he could not locate Burman's type of *Epidendrum caninum* in the Delessert Herbarium, but that *Dendrobium crumenatum* Sw., is represented as *Epidendrum spatulatum* (Fl. Ind. p. 188, angrec poeti); for Burman at least, the Pigeon Orchid, *D. crumenatum* Sw. was *E. spatulatum*, although perhaps not *E. spatulatum* Linn., which is supposed to be a *Vanda*. The figure cited by Burman in the original description of *Epidendrum caninum* represents *Dendrobium anosmum* Lindl. (*D. superbum* Reichb. f.). If we follow Ridley's interpretation and consider the Rumphian illustration as the type, then the binomial *Dendrobium caninum* (Burm. f.) Merr. would of necessity have to be accepted as the earliest name for the species commonly known as *D. superbum* Reichb. f. Reichenbach's species, however, does not occur in Java, and hence it is very improbable that Burman's type, whatever it may have been, represents either Reichenbach's species or the form figured by Rumphius. Under the circumstances it would seem that the binomial *Dendrobium caninum* must be abandoned.

If Mr. Ridley were correct in maintaining that *Dendrobium crumenatum* Sw. was based on *Agræcum caninum* Rumph., this specific name would have to be restricted to the Amboina form—*Dendrobium papilioniferum* J. J. Sm.—and some other name adopted for the widely distributed Malayan one. Fortunately in this case Swartz's species was actually based on a Javan specimen, as examination of the original description clearly shows, and is not typified by the Rumphian reference as Ridley claims.

I would emphasize the fact that in Burman's *Flora Indica* as well as in Loureiro's *Flora Cochinchinensis* there is little evidence that any of the binomials therein contained were primarily based on

pre-Linnean references; they were for the most part, perhaps entirely, based on actual specimens with literature references added merely to supply illustrations of what was thought to be the same species, quite as Linnæus did under similar circumstances. It is not safe to assume, without first searching the herbarium record, that a species was based on a pre-Linnean reference, especially in those cases where the descriptive sentences were manifestly based on actual botanical material and not quoted from previous authors.

BIBLIOGRAPHICAL NOTES.

LXXXVIII. The Evolution of Linné's 'Species Plantarum.'

The preparation of the *Species Plantarum* took several years to accomplish, as will be seen by the following extracts from the correspondence of Linné and other sources. When it was begun seems uncertain; but in a letter to his intimate friend, Abraham Bäck—undated, but believed to be written early in September 1746—Linné says:—"I am sticking to Species plantarum and am working from morning to night so that I am growing grey with it." Rather more than three years later, Linné wrote to the same friend, 6th October, 1749: "I am beginning completely to cast out Species plantarum from my thoughts. It is a year since I had time to look at it. I drove ahead to Polyandria: it is impossible for me to finish in a whole year's constant work: I desire to leave what I have done as a testimony that those coming after may see what I could do, if only I had time and disposition. . . ." This abandoned draft is in the possession of the Linnean Society, and is described by Dr. J. M. Hulth in *Svensk Botanisk Tidskrift*, vi. 1912 (1913) 627–631 with facsimile of a page. As Linné was also busy on the bringing out of his *Materia Medica*, 1749, it is easy to understand why the prosecution of the *Species* was held up, but it seems certain that when he resumed his labour on the same subject in June 1751, he made use of this draft to help him. On the 28th June he wrote to Bäck: "I am now writing Species plantarum, have reached *Poa* in 8 days, if I might boast a little or even more, I believe that its like could hardly appear in 10 or 1000 years; if I can complete it, it is fine throughout; therefore I want to get a couple of sheets printed, that the world may see what had to be accomplished." Three months later, at some date in September, he wrote: "When I am well I work at 'Species' and 'Museum Ulricae'"; and some few days later, 27 Sept., "I am writing, when I can, on 'Species plantarum,' 'Museum Reginae,' and hybrid plants." By the 12th November he reports: "I am working on Species plantarum and have come to Icosandria" [p. 466]. On the 6th March, 1752, he says: "I have now reached in my 'Species' to Syngenesia [about p. 789] now I am thinking of resting a few days." On the 10th July he tells Bäck: "If I can get some strength, I will come immediately to Stockholm, or rather, to Ulriksdahl; I will bring my 'Species' with me.

Turning then to the 'King' Cabinet' he remarks on the 28th

January, 1753: "I am working myself to death on the Royal Cabinet," and a week later, 5th February, "I have been writing day and night on the King's Cabinet, so that my eyes ache, and I can hardly close them," and comments on the collection growing faster than he can describe the objects.

Again mentioning the 'Species':—"Lectures stop in a fortnight; I am afraid that Salvius will overtake me in printing. Cryptogamia stand before me, and not a word yet written." The *Species* was dated 2nd May three weeks later. The first volume came out in May, for the *Lärda Tidningar* [Learned News], which was also printed by Salvius, under date of 24th May, 1753, p. 145, says: "We have the opportunity of speaking of a work, whose title is 'Caroli Linnæi Species plantarum,' vol. i. with 560 pages in 8°. This work will consist of two volumes, of which the later one will also be ready in seven weeks." Later, on the 16th August, the same journal says: "Species plantarum second volume has come from the press during the last few days; it begins with page 561 and closes with page 1200. We have already in this Journal reviewed the first volume, of which this is a continuation from the beginning of Didynamia to the end of the System."

I have to thank Dr. J. M. Hulth, Chief Librarian of the Library at Uppsala University, for the above extracts, as I have not succeeded in finding a set of the *Lärda Tidningar* in London. In the Linnean collection are a few early copies, which end in 1752. Wikström in his *Conspectus litteraturæ botanicæ in Suecia* (Holmiae, 1831, pp. 153, 191) refers to the above passages without reprinting them, and Dr. H. E. Richter in his *Codex Linnæanus* (1835) quotes "*Species plantarum* . . . . 1753 Mai et Aug.," presumably from Wikström.

Going back a little in time, we find that on the 25th May, 1753, Linné was informing Bäck that he could still take in synonyms into his Appendix, which must refer to pp. 1190–1199 in the second volume, and not the 2 pages of Addenda in the first, which must have been published by that time; on the 29th of the same month he repeats the statement; in this last letter Linné says he has had no holiday for three years; in another sentence that Salvius promises a prompt review; a student had been put to the task, but Salvius had improved it. A letter dated 1st June relates that the printer will soon finish the 'Species,' then an undated and unfinished letter says: "Next week I can drop both 'Museum' and 'Species,' as both will be finished and I shall be a free man"; this appears to be the last allusion to it amongst his extant letters to Bäck.

B. Daydon Jackson.

SHORT NOTES.

Mimulus moschatus scentless. In connexion with the interest which has arisen on this subject, Miss Gertrude Jekyll approached Mr. C. F. Saunders, of Pasadena, California, receiving in reply the following letter which she kindly allows us to publish :—

"Your letter has opened up an interesting subject. *Mimulus moschatus* used to be grown—and perhaps still is—rather commonly in gardens of the Atlantic side of our Continent, and people who knew it there tell me it was decidedly musky. On our western coast it seems to be neglected as a cultivated plant, and I know of no one who has it, so I cannot speak from experience of its scent in cultivation here. In nature there are two varieties both musk-scented, but the var *inodorus*, I read, is only faintly so. After receiving your letter I asked Mr. Theodore Payne, of Los Angeles, a seedsman who has done much of recent years to awaken interest among Californians in the value of their native plants for gardens, to supply me with some seed of the musk plant, which he lists in his catalogue. My plan was to send you some that was native-grown to test for fragrance. To my surprise he tells me his seed is imported from Europe! It is quite possible that the continual inbreeding of the plant under foreign conditions has resulted in suppressing entirely the character of scent—a possibility hinted at, I think, in nature by the occurrence of the faintly-scented variety referred to. Change of environment, we know, has a more or less marked effect in time on plants. Mr. Payne has told me that the seeds of *Eschscholtzia californica*, for instance, imported from Europe (a principal source of them for many years) produce flowers noticeably different in colour from the Californian. I shall endeavour to secure you some native-grown seed of the musk. . . . The species is very rare in Southern California, and I do not know a station for it here, or would collect some seed myself."

Barren Larches. I should be glad to know whether any of your readers have noticed the complete absence this year of the crimson female conelets on the Larch? The small yellow male cones I did see on one tree. I have been searching for them from early March till mid-April, in order to make my usual entry of the flowering date, and for the first time for about five and twenty years I have failed to do so. This year, when most flowering records are early, I expected a March date, the 5th being the earliest on my list, and April 16th the latest. Can it be the effect of the cold, wet weather of last summer?—Eleonora Armitage.

? Senecio viscosus × vulgaris. Last autumn some plants of *S. viscosus* were sent to me from E. Glos. (v.c. 33), together with specimens of what appears to be *S. viscosus* × *vulgaris*. No doubt *vulgaris* was in the neighbourhood, though, as a fact, *S. erucifolius* was the only other *Senecio* noted. The supposed hybrid has smaller heads and intermediate phyllaries, and the heads in fruit have a very strong appearance of *S. vulgaris*: fruit sets poorly. The plant is far less viscid than *viscosus*. The ray-florets are well developed.

(N.B. it is not *sylvaticus*.) I know nothing of this hybrid, nor whether it has occurred in England previously.—H. J. Riddelsdell.

Heliocarpus americanus L. In my notes on this plant (Journ. Bot. 1898, 131) I had identified *H. tomentosus* Turcz. with this species on the faith of the specimens labelled *americana* in Cliffort's herbarium which I had taken as the type of the plant figured and described in Hort. Cliff. (p. 211, t. 16) wherein the species is founded. These consist of a single leaf and some fruits which were sent to Linnæus by Philip Miller. The leaf, as I have pointed out (*l. c.*), is softly tomentose. Mr. E. E. Watson in his recent paper on the genus in the *Bulletin of the Torrey Club* for March (p. 111) calls attention to the fact that Linnæus could hardly have described a plant bearing such leaves as "fere glabra," and also notes that the plate accompanying the description figures them as lobed. *H. tomentosus* therefore cannot be regarded as synonymous with *H. americanus*. In view of the definite reference on the title-page of Hort. Cliff. to "Hartecamp in Hollandia," it is not easy to understand Mr. Watson's allusion to "the Clifford Garden at Chelsea."—E. G. Baker.

REVIEWS.

Plant Names.

1. *Popular Names of Flowers, Fruits, etc., as used in the County of Somerset and the adjacent Parts of Devon, Dorset, and Wilts. Compiled by* A. S. Macmillan. *Reprinted from the Somerset County Herald.* Yeovil: *Western Gazette Co., Ltd.*, 1922. Cr. 8vo, cloth, pp. 297. Price 4*s.*

2. *Plant Names.* By T. S. Lindsay, B.D., Archdeacon of Dublin. Cr. 8vo, pp. vii, 93, cloth. S. P. C. K.; 2*s.* 6*d.* net.

3. *British Plant Names and their Derivations.* By R. J. Harvey-Gibson, M.A., D.Sc., etc., Emeritus Professor of Botany in the University of Liverpool. 8vo, pp. 50, limp cloth. A. & C. Black.

1. This exceedingly interesting and cheap little book is the outcome of a correspondence originated by the newspaper from which it is reprinted, in the course of which "prizes were offered for the best lists of the most interesting local names of flowers used in the district in which the competitors resided." Mr. Macmillan, the Secretary of the Western Gazette Company, from whose preface we are quoting, then enlisted the sympathy of certain schoolmasters and schoolmistresses, who obtained lists from many of their pupils. "Unfortunately my helpers, both old and young alike, were not always absolutely reliable in the information they gave," and Mr. Macmillan was not always "quite sure of [his] ground in attaching the scientific names of the plants which [he believed] were intended by the senders," nor does it appear that the names were accompanied by specimens—an

essential precaution when the records of botanically ignorant folk are in question *.

While, however, doubt may fairly be entertained with regard to the accuracy of some of the names in the list, a considerable number of which rest upon the unsupported testimony of a "schoolchild," the proportion of these is relatively small, but includes some which surely should have been omitted—*e. g.*, Mr. Macmillan, on the authority of "a school-girl" gives the name "Joseph and Mary" as used locally for "Spotted Ferns," by which he "believes she means the common hartstongue": the reference to spots and the general application of the name throughout the district to *Pulmonaria* leaves little doubt that this was intended; but in any case it is difficult to see what is gained by speculative identifications in such a case. Again, "Judas Tree" as applied to the Tulip-tree is, as Mr. Macmillan says, "probably due to a confusion of names"; it is surely treating legend too seriously when it is pointed out that "elders, in this country at least, would hardly be suitable in size or strength for the purpose" of hanging Judas, with whose suicide the Elder is sometimes popularly associated.

Some names which at first suggest doubt are supported by indisputable authority; thus Miss Ida Roper vouches that *Cladium* is at Shapwick called "Pussy-cats'-tails," and the name of "Aaron's beard" for *Allium vineale* was suggested by the heads "with the stiff young leaves growing out of the top." But surely "Frenchman's Darling" came from some book—there are too many book-names in the list—where it was assumed (incorrectly) that the French name for *Reseda odorata* was mignonette, which, of course, it isn't—French folk always call it "réséda." To take one more instance of misapplication, one feels that such a name as "Eggs and Bacon," though vouched for by "a well-informed correspondent," could never have been applied to *Parnassia*, which, moreover, "has not been seen in Somerset for a hundred years"; and the editor's presumption that "the name refers to some cultivated variety" is the kind of suggestion which occupies space uselessly, for surely no "variety" is in cultivation.

So far our comments on Mr. Macmillan's contribution to popular nomenclature have been somewhat critical; but we are far from disparaging the value on the interest, from a dialectal point of view, of the copious material he has brought together. He has shown in one particular—what everyone who has taken up dialect work or is accustomed to refer to the *Dialect Dictionary* knows in general—how inexhaustible is the vocabulary of the language still waiting to be collected. Of such names as these a supplement to the *Dictionary of English Plant-names* has for years been accumulating: this, it is hoped, may some day see the light, and will be greatly increased by the contents of Mr. Macmillan's book. From it we may take an example of a name which has never hitherto been identified and, so far

* An instance which comes to hand as we write is given in the recent *Supplement to the Flora of Cornwall*, where it is stated that *Hypericum linariifolium*, recorded in a local paper "as having been found by a schoolchild, ... proved to be *Hieracium aurantiacum*."

as we are aware, occurs in only one place in literature—in chap. xxii. of Hardy's *Far from the Madding Crowd*, where in a long list of plants comes a mention of "the black-petalled *doleful-bells*." The *Dialect Dictionary*, which cites the passage and gives no other reference for the word, gives the somewhat obvious explanation that it was "the name given to some kind of plant," and it was not difficult to conclude that *Atropa* was intended; but the fact is established by one of Mr. Macmillan's correspondents from Charmouth, where the name is actually thus applied—this confirmation from the county in which the story is laid is an interesting testimony to the distinguished author's well-known local exactness.

The only thing to regret is the absence of the index to the scientific names of the plants in alphabetical order which was promised in the preface which introduced the first instalment of the serial issue, followed by the local names grouped under each. The omission is justified by the cost which such a list, unsuitable for the columns of a newspaper but invaluable for possessors of the volume, would entail. There seems, however, no reason why the blank page at the end of the book should not have been occupied by a list of the books quoted in the text, for which both readers and bibliographers would have been grateful.

2. *Plant Names* is a very readable and on the whole accurate account of the Latin names of plants, in which a great deal of useful and interesting information is grouped under various headings—medicinal and commemorative names, names from use and from place of origin, classical and fancy names, and the like. There are introductory chapters dealing with the history and principles of plant nomenclature and with spelling and pronunciation; the final chapters deal with generic names—so far as these "refer to some peculiarity of the plant in its root, or stem, or leaf, or bloom, or seed, or smell, or general appearance"—and with the more frequent specific names and their meanings: there is also a good index; the cover, however, is aggressively ugly.

Here and there we come across statements which suggest that Archdeacon Lindsay is not fully acquainted with his subject: it is news to us that an International Committee, appointed by the Botanical Congresses, "assumes control over matters of priority and synonymy"; or that "when a plant is found and named by two people about the same time, it becomes the duty of the International Committee to decide which name was given first, and that will be the plant's true name, the other being reduced to a synonym" (p. 21). There are far too many misprints: on p. 5 we have sib*e*ricus and madagascaresis: "Mentresius" and "Townæfort" (p. 18) are inexcusable; "Cardamindum" (p. 20); "Sold*i*nella" (p. 74); "flor*a*bundus" (p. 82); "Hippoph*æ*" (p. 35); "Grevill*i*a" (p. 43) are but a few of those which might be cited. We cannot agree that "it is now becoming usual to drop the diphthongs *æ* and *œ*, and to write *Spirea*, *Crategus*"; and the suggestion that Hollyhock "derived its name from the Holy Island, Lindisfarne, or from the saints of that isle, after whom it was called St. Cuthbert's Kale"

(p. 47) presents a double difficulty, for the Hollyhock does not grow on the island. If any one ever "suggested that Coltsfoot is probably colds*wood*" (*sic*) we agree with the Archdeacon that "this is unlikely"; perhaps the name intended is cold's *food*—an explanation given in Brewer's *Dictionary of Phrase and Fable* with a German equivalent, *calt's* (sic) *futter*, "*i. e.* food for colds and coughs"! *Plant Names*, however, is quite a useful little book, and the mistakes we have pointed out can easily be corrected in a second edition.

3. The title of Prof. Harvey-Gibson's little book is somewhat misleading, for it is not "*British Plant Names*" that are considered in it, but the names of British plants. Save for a short and not always quite accurate introduction—it is certainly not always the case that when a genus is sunk "under another and more comprehensive genus, the name of the latter is then cited as the generic one and the older generic name becomes the specific one, the original specific name being dropped,"—the little book is a dictionary, arranged in one alphabet; the derivations, though short, convey much information; thus after commemorative names, which when specific have a small initial, are given the country and dates of the person commemorated—not always accurately nor completely—*e. g.* "T. Kirk, Irish botanist, flor. 1869" would stand more correctly "New Zealand botanist (1828–97)." There is a useful explanatory list of abbreviations, and the names are accented—we note that *Gladiolus* stands as "*Gladíolus*," although, as has been said, there can be no doubt whatever about the true pronunciation [*Glad'iolus*], those who adopt it are still in a small minority.

The explanations of Latin names so far as we have tested them, seem on the whole accurate, though we regret the inclusion of such entries as that appended to *Archangelica*—"*by some regarded* as named after the Archangel Michael, or because *it is said* to be in flower on St. Michael's Day!" (italics ours); there are, however, curious slips—e. g. "*bahusiensis*, native to (*sic*) Bahus, a district in Brazil"; Bahus was an old province of Sweden; the author was probably thinking of Bahia. In view of the fact that the book is likely to be accepted as a convenient authority, the speculations as to English names are unfortunate and, we venture to think, out of place: *e. g.* we read (s.v. *Campanula*) "Harebell, Anglo-Saxon *hara*; originally hoary, thence transferred to hairy, from the delicate hair-like peduncles"; but hairy and hair-like are not synonymous, and *C. rotundifolia* is neither hoary nor hairy. It would seem that the Professor accepts the purely modern explanation of the name (s.v. Harebell), as to which the Oxford Dictionary tersely says "Hair-bell, non-existent," adding that "Lindley tried to establish [the name] in this sense, leaving *hare-bell* to its original sense"—*i. e.*, as is shown by numerous quotations, *Scilla nutans*. Privet again (s.v. *Ligustrum*) is "perhaps a form of private, from its use in forming hedges or screens"; the Oxford Dictionary mentions this suggestion, adding "but of this there is no evidence." The temptation to suggest derivations often proves irresistible to a dictionary-maker; the reference to Coltsfoot in the preceding notice shows what it may

lead to—one would have thought the shape of the leaf would have supplied the obvious explanation. *British Plant Names* is a useful little book—a little more care and a little less speculation would have made it more so.

BOOK-NOTES, NEWS, ETC.

At the meeting of the Linnean Society on April 19th, Dr. Rendle, with the aid of a lantern slide, demonstrated the structure of the fruit of the Mare's-tail (*Hippuris vulgaris* Linn.). The figures and description of the fruit of this well-known British plant in the text-books and floras were unsatisfactory, and overlooked points of detail in structure associated with the germination of the seed. The fruit is a drupe, the upper portion of which around the persistent base of the style, with the seedcoat, is developed in the form of a stopper which is easily withdrawn on soaking the ripe fruit. The embryo ultimately fills the seed, and has the large radicle and hypocotyl so often found in water plants. The speaker had been unable to get fruits of herbarium specimens several years old to germinate, and suggested that Fellows interested in British botany might look out for seedlings during the next season. The radicle was placed directly beneath the stopper which provided a place of exit on germination.

At the same meeting Dr. Daydon Jackson continued his account of the History of Botanic Illustration during Four Centuries presented to the Society in 1920:—

Alluding to the methods of producing by printers' ink representations of plants in general, the speaker grouped the main methods into three: (1) where the design was in relief, and received the ink, which by pressure was transferred to paper, as in wood-engraving; (2) where the design was cut or bitten into a plate of metal, as copper-plate engraving, etching, mezzotint, &c.; (3) where the design did not differ much in level from the stone on which it was drawn, but depended upon the antagonism of grease and water, the stone receiving either and then refusing to receive the other. Examples were then shown of early herbals with artless colouring, most of them apparently due to the work of private possessors; but with later years, as in a copy of Fuchs's *Stirpium Historia*, 1542, printed at Basel, the character of the work pointed to a trained colourist, such as Plantin of Antwerp employed at a later period. During the prevalence of wood cuts during the early years of printing, copper-plate engraving began to make its way, and was employed in providing outlines for hand-colouring until the last century, when it was ousted by lithography. The method of printing from engraved plates was briefly described, and the application of mezzotint restricted to leaves and stems was pointed out, also Redouté's method of semi-stipple for coloured prints, each colour being separately applied to the plate and cleaned off, before finally heating the plate and pulling the print. A simpler method was also shown where an ordinary engraving was printed in green ink, and other colours, as red or yellow, applied in water-colour. The three-colour process was touched upon, and the preparation of three (or four) half-tone blocks to print its

own colour to be combined by the eye into a complete colour scheme. The weakness of the process lay in this, that it almost demanded a paper coated with baryta or china-clay which could not be guaranteed as permanent besides the temptation to use inks made from aniline dyes which were fugitive. In the course of the interesting discussion which ensued, Sir David Prain remarked that Mr. Pantling prepared the coloured plates for his *Orchids of Sikkim* by training native boys to colour his special portion of each plate, the last touches completing the colouring being put in by the last boy.

At the meeting of the same Society on April 19, Mr. James Groves presented a paper entitled "Notes on Indian Charophyta." He stated that it was seventy-four years since a separate account of the Indian charophytes had appeared and that at that time eleven species only were known to occur. A few additional records were published in 1873, and in the "Fragmente einer Monographie der Characeen" compiled by Nordstedt from Braun's MS. and published in 1882, a number were added. Since the last date much collecting had been done and the present paper was the result of the examination of specimens which had passed through the hands of the late Henry Groves and the author. In 1882 representatives of the genera *Chara* and *Nitella* only were known from India; he was now able to record a *Nitellopsis*, a *Lychnothamnus* and three species of *Tolypella*. The paper included descriptions of two new species, *Nitella Wattii* and *N. mirabilis* (previously found in China, and named in MS. by Dr. Nordstedt). That much was still to be done in this group was evident from the fact that Mr. G. O. Allen had within the past three years, in a comparatively small area, added three well-marked species to the Indian flora besides rediscovering *C. Wallichii*, of which only the male plant collected in 1809 by Dr. Wallich was previously known, and establishing the occurrence of *Nitellopsis obtusa* (in Kashmir) the only previous Asiatic record of which was dependent on a poor specimen from Burmah, as to which, owing to its sterility, there had been an element of doubt.

From the *Journal of the Botanical Society of South Africa* (part 9) we learn that Mr. Fred Eyles, an enthusiastic collector, some of whose plants have been described in these pages, has been appointed Chief Government Botanist of Southern Rhodesia, and that Prof. Thoday, who since 1918 has filled the Harvey Bolus Chair of Botany at Cape Town, is leaving that post for the Chair of Botany in the University College of North Wales. The number contains papers (all of them illustrated) on "The Native Trees and Tree-Shrubs of Kirstenbosch," by R. H. Compton, with a key to the species; "South African *Iridaceæ*," by L. Bolus, with notes on their cultivation by J. W. Matthews, Curator of the National Botanical Gardens; and "Carnivorous Plants of the Peninsula," by Edith Stephens. The eccentricities of pagination still continue; each part is paged separately, and the number is given in words in thick black type at the foot of each page; the page-headings afford no useful information, but this ineptitude is unfortunately too common to call for remark.

The third volume of *The Cactaceæ*—"descriptions and illustrations of the Cactus Family"—by N. L. Britton and Mr. J. N. Rose was issued in October last by the Carnegie Institution of Washington. Like the preceding volumes, it is admirably printed and abundantly illustrated—there are 24 plates, some of them coloured, and 250 figures in the text. We note that *Cactus* of Linnæus is retained as a genus, the type being his *C. Melocactus*, "under [which] name however were included several species." Many new genera, mostly based on species of *Echinocactus* and *Echinocereus*, are established, and the genus *Echinofossulocactus*, to the publication of which by George Lawrence, until then overlooked, we called attention in this Journal for 1916 (p. 338), is taken up, with twenty-two species. The account of each species is very complete; the bibliography, with notes on the material on which the species were originally based and whence the figures were taken, their geographical distribution and other information bearing on their history, are given with a completeness which we have seldom seen equalled. We note that Dr. Stapf (Bot. Mag. t. 8951, where by a printer's error the work under notice is attributed to the Editor of this Journal) refrains from taking up *Echinofossulocactus* for a plant which he describes, regarding it as "an open question how far the splitting up of the genera proposed by Britton and Rose is justified on material and practical grounds."

The fourth volume of Oudemans' *Enumeratio Systematica Fungorum* has lately appeared. The host plants dealt with are the Archichlamydes from Malvales onwards and the Metachlamydeæ. The volume is much the same size as its predecessors, having 1232 (+x) pages, the last fifty or so of which are devoted to Additamenta to the previous three volumes, and the price is the same—4 guineas. The fifth volume is to contain the index, and on its appearance it will be possible to hazard an opinion as to the position the *Enumeratio* is likely to hold in the literature of mycology. Meanwhile the importance of the work to the student cannot be over-estimated.—J. R.

The British Mycological Society held its spring foray at Bristol on April 20–23rd. The first excursion was to Ashton Court Park, ending at the Long Ashton Horticultural Research Station. On the 22nd, underground mushroom beds in disused Bathstone quarries were visited at Corsham, Wilts; the last excursion was to Wrington. The country everywhere was amazingly dry and fungi were scarce. The evenings were devoted to informal discussions; Miss B. M. Breeze gave an account of her work on pollen sterility in the potato; Mr. F. E. Smith described his investigations on the *Mycogone* disease of Mushrooms; and Miss E. M. Wakefield recorded her efforts to prove the relationship between *Rhizoctonia violacea* and *Helicobasidium purpureum*.—J. R.

A new edition (the sixth) of Mr. J. M. Lowson's *Text-book of Botany* has lately been issued (price 9*s.* 6*d.*) by the University Tutorial Press. The issue of a new edition indicates that the book has a vogue among a certain class of students, but, as the references made in this Journal (1912, 325; 1914, 343) show, we cannot regard it as satisfactory. To our mind it presents the study of botany in a most

unattractive and depressing form, and it is a matter for regret that a book of this type should apparently be extensively used. As a glossary of terms, illustrated by a number of clear diagrammatic sketches, it has a certain use, but that is the best that we can say of it. The chief alteration in the present edition is the addition of a chapter on "Evolution and Genetics" in the form of a supplement.—A. B. R.

The *Kew Bulletin* (no. 3) contains besides Mr. Hutchinson's paper on *Primula calciphila*, referred to on p. 171, the first part of an account of the Flora of Sinaloa—a State on the Pacific littoral of Northern Mexico—by Mr. L. A. M. Riley, containing new species; and a continuation of "Decades Kewensis"; and a list of "Additions to the *Index Kewensis*" containing the names published by E. H. L. Krause in the second edition of Sturm's *Flora von Deutschland*.

The *Journal of the Linnean Society* (Botany, xlvi, no. 308; April 25) contains "A Preliminary Paper on the Cuticular Structure of certain Dicotyledonous and Coniferous Leaves from the Middle Eocene Flora of Bournemouth," by Helena Bandulska (2 plates); and "A Critical Revision of the British Species of *Polysiphonia*," by Dr. Lily Batten (4 plates): a new species (*P. spiralis*) from Swanage is described and figured.

The *Bulletin of the Torrey Club* for April contains the description (with plate) by Mr. H. A. Gleason, of *Windsorina*, a new genus of *Rapateaceæ* from British Guiana: "since Schomburgk named a genus, *Saxo-Fredericia*, and a species, *Rapatea Friderici-Augusti*, in honour of a contemporary German ruler, the name *Windsorina* is given in commemoration of the House of Windsor of Great Britain."

Under the title *Les Filicinées du Quebec*, Fr. Marie-Victorin publishes in the *Contributions du Laboratoire de Botanique* of Montreal (no. 2; Montreal, 1923) what is evidently a careful and comprehensive description of the ferns of that region.

Part 3 of the *Botanical Magazine* (issued May 3) includes descriptions of a new *Isotrema* (*I. chrysops* Stapf) from China and a new *Rhododendron* from the same country, named *R. cantabile* by the late I. B. Balfour "in reference to its charming flowers which are 'worth to be sung.'"

Mr. Arthur E. Wade, Department of Botany, National Museum of Wales, Cardiff, is collecting material for a Flora of Monmouthshire, and will be glad to receive help.

Mr. C. V. B. Marquand, the son of the late E. D. Marquand (1848–1918), has been appointed to an assistantship in the Kew Herbarium.

We regret to record the deaths of our valued contributor William Henry Pearson, which occurred on April 19 at his residence at Withington, Manchester; of Frederic Newton Williams, who died at Isleworth on May 6; and of William Barclay, who died at Perth on May 10: notices of their life and work will appear later.

THE

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BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.C.S.G., F.L.S.

LATE SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM.

The Journal of Botany was established in 1863 by Seemann. In 1872 the editorship was assumed by Dr. Henry Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

Without professing to occupy the vast field of General Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains.

Until the beginning of the late War the Journal paid its way and even allowed a slight margin of profit; but during that period the subscribers were reduced in number, and the continental circulation almost ceased. It has now regained its position, but the increased cost of production, which has not as yet been substantially reduced, has resulted in an annual deficit which at one time became so serious that the continuance of the Journal was threatened. By the generosity of those who felt that its cessation would be a misfortune, especially for British botanists whose principal organ it has always been, the deficit has been met and an appeal is now made for an increased number of subscribers.

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A NEW BRITISH CALAMINTHA.

By H. W. Pugsley, B.A., F.L.S.

The nomenclature of the plants that we regard as the true Calamints has become so entangled in this country that it seems necessary to unravel it in order to render intelligible any description of a new form. Two of our British species were known to Linnæus, who placed them in the genus *Melissa* in Spec. Plant. 593 (1753), as *M. Calamintha* and *M. Nepeta*. In 1778 the genus *Calamintha* was founded by Lamarck (Fl. France, ii. 393), and the two Linnean species became *C. montana* and *C. parviflora*, the Linnean non-British species *C. grandiflora* being placed under the former as a variety *β*. Lamarck's genus was subsequently adopted by Moench and most other writers until Scheele (in *Flora*, xxvi. 577 (1843)) proposed to sink it in *Satureia* L., and transferred the two British species to *S. Calamintha* and *S. Nepeta*. This new arrangement, however, was not followed, and the generic name *Calamintha* remained in general use. In 1891 a third system was inaugurated by O. Kuntze (Rev. Gen. 515), who absorbed *Calamintha* in *Clinopodium* L.; and in 1895 Briquet (Labiées Alp. Marit. iii. 433) revived Scheele's arrangement. Both of these latter systems have found followers among recent authors.

In British botany the genus *Calamintha* has usually been adopted till very lately, and I am not convinced that sufficient grounds exist for merging it in *Satureia*, which differs in possessing almost uniformly a regularly 5-toothed instead of bilabiate calyx—an important difference in *Labiatæ*—and comprises plants very unlike the Calamints in general aspect, or yet in *Clinopodium*, which also possesses an essentially different calyx. The genus *Calamintha* will therefore be maintained in this paper.

The first species, *Melissa Calamintha* L., which by the general consent of continental authors represents, at least mainly, the Isle of Wight plant described as *Calamintha sylvatica* by Bromfield, when transferred to *Calamintha* cannot retain its specific epithet, as this simply repeats the generic name. The next name, *C. montana* Lamk. (excl. var. *β*), is also inadmissible, for it contains as a variety a Linnean species (*M. grandiflora*) which should have been made the specific type. *C. officinalis* Moench, Meth. 409 (1794), is commonly regarded by Continental authors as valid for *C. sylvatica*, but while the brief description points to this plant, the citations clearly refer in part to the common British Calamint, and the name was interpreted in this latter sense by Host and by Bentham. Host's *C. menthæfolia* (Fl. Austr. ii. 129 (1831)) appears also to refer to *C. sylvatica*, but was understood otherwise by Grenier and Godron, by Reichenbach, and by Syme. With these conflicting views it seems best, until further evidence is adduced, to treat both *C. officinalis* and *C. menthæfolia* as *nomina confusa*, and to adopt Bromfield's *C. sylvatica* (Engl. Bot. Suppl. 2897 (1845)), which is free from all ambiguity. The *Melissa Calamintha* of Linnæus's Herbarium is neither of our

British species, but probably a cultivated plant, with remarkably small flowers on rather long peduncles, of *C. nepetoides* Jord.

Linnæus's second species, *Melissa Nepeta*, presents little difficulty, and the fresh epithets created by Lamarck and Moench must be passed over in favour of *C. Nepeta* Savi, Fl. Pis. ii. 63 (1798), where the Linnean trivial was first restored. This species is represented in the Linnean Herbarium by *C. nepetoides* Jord.

The third and commonest British species—the *Thymus Calamintha* of Smith's *English Botany*, no. 1676—has been the most generally confused. Although known to Morrison it was not distinguished by Linnæus, for it is generally agreed that it is not, or at most only in part, his *Melissa Calamintha*. It was apparently first separated in post-Linnean times by Host (Fl. Austr. ii. 129 (1831)) as *C. officinalis*, which is invalidated by Moench's earlier name. And if *C. officinalis* Moench and *C. menthæfolia* are ignored as suggested above, it remains to adopt Jordan's *C. ascendens* (Obs. Pl. Rar. iv. 8, t. 1. f. B (1846)), where the plant is described at length and well figured. The identity of this species with the common British plant is readily seen from Jordan's account, and is abundantly confirmed by a comparison with the ample authentic material at Kew and South Kensington.

The three recognised British Calaminthas will therefore be treated as *C. sylvatica* Bromfield, *C. Nepeta* Savi, and *C. ascendens* Jordan.

I first collected the new Calamint, to which attention is now drawn, in September 1900, when I saw it growing in some abundance in a perfectly wild situation near Swanage, Dorset. It gave me the impression of a large-flowered *C. Nepeta*—a species with which I was not then very familiar,—but I determined at the time that it was not identical with that plant or *C. ascendens*, and it remained unnamed. In 1912 I made a second excursion to its habitat and gathered a series of specimens for examination; and in 1918 I had roots of it sent home for cultivation. It has now flowered in my garden with the three known British species for four successive summers. In addition to this Dorset material I possess an imperfect specimen, collected in 1900 by my old friend Mr. C. R. P. Andrews in Guernsey as *C. ascendens* var. *Briggsii*, which appears to be conspecific.

Quite recently I have taken the plant in hand for identification, and have found, somewhat unexpectedly, that I had discovered a Calamint well known in Spain and Portugal, described by Boissier and Reuter (Pugillus Pl. Nov. 92 (1852)) as *C. bætica*. My Dorset specimens agree with the original description, and match the exsiccata at Kew and Herb. Mus. Brit., which include authentic material received from Boissier, except that their leaf-cutting is a little more pronounced, probably owing to our milder and moister climate. It is possible that on this ground they may be varietally separated, but this is certainly undesirable without a full knowledge of the living Spanish type.

C. bætica is maintained as a distinct species by Willkomm and Lange (Fl. Hisp. ii. 413 (1870)), and appears to have about as good a claim to that rank as the other British and foreign forms similarly recognised. In Briquet's *Labiées des Alpes-Maritimes*,

pt. iii. 433 *sq.* (1895), the whole group receives a rather Benthamian treatment, resembling that accorded by Briquet to *Salvia Verbenaca*. Ten forms previously described as species, including all the British plants, are placed in one aggregate species, *Satureia Calamintha*, under which are three subspecies (*silvatica*, *ascendens*, and *Nepeta*) divided into nine varieties. The subspecies *silvatica* embraces two varieties—α *silvatica* (*C. sylvatica* Bromf.) and β *calaminthoides*. The latter variety is based on *Thymus calaminthoides* Reichb. in Holle Pl. Lusit.-mader. Exsicc. (1828), and of this *C. bætica* Boiss. & Reut. is made a synonym. Höll's plant, which came from Madeira, was not described by Reichenbach, and the validity of its name, which is included in a list published in Hooker's *Journal of Botany*, i. 19 (1834), is doubtful. The Madeiran form was subsequently described by R. T. Lowe as *Melissa rotundifolia* in the *Transactions of the Cambridge Philosophical Society*, vi. 536 (1838), which appears not to have been seen by Briquet, and the description was reprinted in 1851 in Lowe's *Novitiæ Floræ Maderensis*, p. 536. The name *M. rotundifolia* is attributed by Lowe to Sol. MSS.; a brief diagnosis by Solander exists in the Banksian interleaved copy of Willd. Sp. Pl. p. 3027, and the type-specimen named by him, from the Banksian herbarium, is in Herb. Mus. Brit. The British Museum collection also contains a fair series of Lowe's specimens, which, although varying, agree generally with his description and those of Solander and Briquet. For the most part they bear some resemblance to Briquet's var. *silvatica*, and thus explain the position of his β *calaminthoides*. But I do not think they are identical with the Spanish *C. bætica*, which Briquet united with them, because they usually lack the characteristic triangular, truncate-based leaves and show much longer-pedunculed and fewer-flowered cymes. *C. bætica* should, I believe, be separated and placed nearer the Algerian *C. heterotricha* Boiss. & Reut. and *C. Nepeta*.

The description &c. of *C. bætica* is as follows:—

Calamintha bætica Boiss. & Reut. Pugill. Pl. Nov. 92 (1852); Willkomm & Lange, Fl. Hisp. ii. 413 (1870); *C. officinalis* β *villosa* Boiss. Voy. Bot. Esp. 497 (1839–45) ex spec. auth.; *C. officinalis* β *villosissima* Bentham in DC. Prodr. xii. 228 (1848), ex parte; *C. menthæfolia* var. *bætica* Ball, Spic. Fl. Marocc. in Journ. Linn. Soc. xvi. 613 (1878); *Satureia Calamintha* subsp. *silvatica* β *calaminthoides* Briquet, Labiées Alp.-Marit. iii. 434 (1895), ex parte; Coutinho, Fl. Portugal, 517 (1913).

Exsicc. Porta & Rigo, It. iv. Hisp. 1895, Yunquera, Malacitana! Reverchon, Pl. d'Andalousie, 1889, no. 251, Ronda! R. P. Murray, Oporto, 1887, in Hb. Kew! Wolley-Dod, Fl. Calpensis, no. 8, as *C. officinalis* v. *bætica*! Bourgeau, Pl. d'Espagne, 1853, no. 1986, Algarve, as *C. officinalis*! Willkomm. It. Hisp. no. 696, Sierra Nevada, as *M. Calamintha* v. *villosa*!

Rootstock much branched, with numerous stems 30–70 cm. long, suberect from a decumbent and rooting base, often forming a large tuft. Stems villous with spreading hairs, leafy with short internodes and usually much branched. Leaves small, even on the main stems, rarely exceeding 2–2·5 cm. in length and often equally broad, ovate-

H. C. P. del.

Calamintha bætica Boiss. & Reut.
Part of plant, natural size, with detached calyces ×3. (From a Dorset specimen.)

or triangular-deltoid with rounded-obtuse apex and truncate base, subentire or distantly crenulate with flattened teeth, frequently densely hairy with appressed hairs in exposure, less so in shade (upper floral leaves more glabrous), and with short hirsute petioles. Cymes of the inflorescence borne on hairy peduncles shorter than the subtending leaves or the upper subsessile, few- or many-flowered. Pedicels pubescent, unequal, mostly exceeding the peduncles. Calyx ascending and not spreading horizontally in fruit, pubescent and with sessile, shining glands, 6–7 mm. long, less strongly bilabiate than in *C. ascendens* but more so than in *C. Nepeta*; teeth of straight upper lip 1·5–2 mm. long, those of lower lip 2–3 mm. long, straight and not curved upwards, all but especially the lower distinctly ciliate; hairs of throat included. Corolla pale lilac-pink with purple markings on the lower lip, hirsute; ☿ with tube much exserted and dilated above, exceeding the calyx-tube by 8–12 mm.; ♀ much smaller, 5–7 mm. long. Seeds brown, oval, punctulate. Plant with strong, rather fœtid scent, resembling that of *C. Nepeta*.

Widely distributed in the Iberian Peninsula from Galicia (Corunna) through Portugal to Andalousia. Morocco. Western Algeria. Doubtful for the Atlantic Islands. In Britain at present known only from one locality in Dorset. Guernsey?

The occurrence of *C. bætica* in what appears to be a truly native habitat in the south-west of England is of special interest as adding one more unit to the Lusitanian element in the British Flora, and it is a peculiar coincidence that its British station is situated on the same calcareous ridge—now broken by the sea—as produces *C. sylvatica*. If my identification of the Guernsey specimen is correct, this provides just such a connecting-link in the range of the species as might be expected, and it is probable that it may also occur in Normandy or Brittany, where it may have been confused with *C. ascendens* or *C. Nepeta*.

The four British Calamints may be conveniently contrasted thus:—

1. Calamintha sylvatica Bromf. E. B. S. 2897 (1845); Bentham in DC. Prodr. xii. 228 (1848); *Melissa Calamintha* L. Sp. Pl. 593 (1753); *C. montana* Lamk. Fl. Fr. ii. 396 (1778), excl. var. β (nomen abortivum); *C. officinalis* Moench, Meth. 409 (1794), ex parte; Jordan, Obs. Pl. Rar. iv. t. 1. f. A (1846); *C. menthæfolia* Host, Fl. Austr. ii. 129 (1831), non al.; *Satureia Calamintha* Scheele in *Flora*, xxvi. 577 (1843); *S. Calamintha* α *silvatica* Briquet, Lab. Alp.-Marit. iii. 434 (1895).

Stems few or many, erect nearly from the base, not much branched; leaves ovate or ovate-elliptic, subacute, serrate, rather large on the main stems; cymes peduncled, spreading in fruit; calyx with strongly reflexed upper lip and very long, curved, and markedly ciliate teeth to lower lip; hairs of throat included; corolla ☿ large, with long tube, pink, much variegated with crimson-purple.

Plant normally less hirsute than the following species.

2. C. ascendens Jord. Obs. Pl. Rar. iv. 8, t. 1. f. B (1846); *Thymus Calamintha* Sm. E. B. 1676 (1806); *C. officinalis* Host, Fl. Austr. ii. 129 (1831)?, non Moench; Bentham in DC. Prodr. xii.

227 (1848); *C. menthæfolia* Gr. & Godr. Fl. Fr. ii. 664 (1850), non Host; *Satureia Calamintha* δ *ascendens* Briquet, Lab. Alp.-Marit. iii. 436 (1895).

Stems few, erect nearly from the base, not much branched; leaves broadly ovate, obtuse or subacute, obscurely serrate, rather large on the main stems, smaller and narrower on the branches; cymes subsessile (except the lowest), subumbelliform, spreading in fruit; calyx bent on the pedicel, with reflexed upper lip and very long, curved, conspicuously ciliate teeth to lower lip; hairs of throat included; corolla ☿ of moderate size, with rather short tube, pale lilac-pink slightly variegated with purple.

Plant (in Britain) shorter-lived, but seeding more freely, than the other species.

f. *Briggsii*; *C. menthæfolia* var. *Briggsii* Syme, E. B. ed. 3, vii. 35 (1867).

Plant taller and more robust; lower cymes with rather long peduncles.

3. C. Nepeta Savi, Fl. Pis. ii. 63 (1798); Jord. Obs. Pl. Rar. iv. t. 2. f. A (1846); Bentham in DC. Prodr. xii. 227 (1848); *Melissa Nepeta* L. Sp. Pl. 593 (1753); *C. parviflora* Lamk. Fl. Fr. ii. 396 (1778); *C. trichotoma* Moench, Meth. 409 (1794); *C. obliqua* Host, Fl. Austr. ii. 131 (1831); *Satureia Nepeta* Scheele in Flora, xxvi. 577 (1843); *S. Calamintha* θ *Nepeta* Briquet, Lab. Alp.-Marit. iii. 440 (1895).

Stems many, ascending from a decumbent base, generally much branched; leaves ovate or deltoid-ovate, obtuse, subentire or obscurely serrate, small; cymes shortly peduncled, ascending in fruit; calyx with nearly straight lips, the teeth of the lower not much longer than the upper, straight and weekly ciliate; hairs of throat protruded; corolla ☿ rather small, with relatively long tube, pale lilac slightly variegated with violet.

Plant more shortly hairy (pubescent) than the other species.

4. C. bætica Boiss. & Reut. *l. c.*

Stems many, ascending from a decumbent base, usually much branched; leaves ovate- or triangular-deltoid with truncate base, very obtuse, subentire or obscurely serrate, small; cymes shortly peduncled, ascending in fruit; calyx with nearly straight lips, the lower with long, straight, ciliate teeth; hairs of throat included; corolla ☿ rather large, with long tube, pale lilac-pink slightly variegated with purple.

Plant normally more hirsute than the preceding species.

British examples of *C. bætica* (Pugsley no. 401) have been deposited in the Herbaria at Kew and South Kensington.

Postscript.—Since the above paper left my hands I have received a copy of the *Report of the Botanical Exchange Club* for 1922, which contains (p. 618) remarks by Dr. Druce respecting *C. boetica* (sic) that cannot pass unchallenged. Dr. Druce proposes to name the plant "*Satureia Calamintha* Scheele var. *villosa* (Boiss.), comb. nov." and quotes as a synonym "*Calamintha officinalis* var. *villosissima* Willkomm & Lange, Prod. Fl. Hisp. ii." This is a false

citation: the plant does not stand in the *Flora Hispanica* as *C. officinalis* var. *villosissima*, but as a distinct species, *C. bætica* Boiss. & Reut. Touching Dr. Druce's remark that "on a *Taraxacum* standard it may deserve specific rank," it may suffice to observe that the authors of the standard Floras of the two countries where the plant has long been known to occur (Willkomm & Lange, and Battandier & Trabut) treat it as a species; Briquet also gives it the same rank as the other members of the group. Boissier's var. *villosa* was published merely as a hairy variety of *C. officinalis*, and in the Pugillus, where he subsequently described *C. bætica* in considerable detail, it is not referred to. The identity of the two plants is based on exsiccata sent out by Boissier under the earlier name.

Dr. Druce makes a further mis-statement of less importance in saying that I discovered this plant in 1922. In Proc. Linn. Soc., December 1922, from which alone his information could have been obtained, it is stated that I found it in 1900, and again in 1912.—H. W. P.

ON THE TYPE-SPECIES OF BIGNONIA.

The extensive segregation to which the Linnæan genus *Bignonia* has been subjected has left the present-day application of the name a matter of dispute. Bureau (Monogr. Bignon. 44, pl. 7, 1864), without designating a type, figured "*Bignonia unguis* L." (i. e., *B. unguis-cati* L.) to represent the genus, and is followed by Bureau & Schumann (in Mart. Fl. Bras. viii. pt. 2, 281, 1897), who restricted the name *Bignonia* to *B. unguis-cati* and its close ally *B. exoleta* Vell., but without advancing any reason for this course. In 1913 Rehder (Mitt. Deutsch. Dendr. Ges. 1913, 262) selected *B. radicans* L. as the type of the genus, mainly on the ground that the plate of Tournefort (Inst. i. 164, pl. 72, 1700), the original author of the name *Bignonia*, represented this species, at least so far as the flower and floral parts are concerned. The same species was also designated as type of the genus in 1913 in the second edition of Britton & Brown's *Illustrated Flora* (iii. 237).

Mr. Sprague, on the other hand, in an interesting paper on "The Type-species of *Bignonia*" (Journ. Bot. lx. 236–238, 1922), maintains that the species figured by Tournefort (except as to the fruit) was *B. capreolata* L., and that this species is therefore the type. In a later note (*op. cit.* 363–364), referring to Rehder's article, Mr. Sprague reaffirms his conviction that Tournefort's illustration of the flower and floral details represented *B. capreolata*. Mr. Sprague states that certain minor details of corolla form, calyx shape, and character of disk shown in Tournefort's plate agree with these parts of *B. capreolata* and not of *B. radicans*. After comparing Tournefort's plate with Bureau's beautiful figures, as suggested by Mr. Sprague, and also with herbarium specimens, I am not able to follow him in his belief that the species figured is definitely *B. capreolata*. In the first place, it must be remembered that Tournefort's figures are some-

what generalized. He was merely representing in 17th century style the more obvious floral features of a new genus, not, like Bureau, figuring with scrupulous accuracy the minuter distinctive details of allied genera. The proper tube of the corolla, for instance, at maturity is not absolutely included in the calyx, as Tournefort figures it, in either species. Figure C of Tournefort, on which Mr. Sprague relies in his remarks about the disk, can be referred to one species as well as to the other.

One point not mentioned at all by Mr. Sprague seems to indicate definitely that Tournefort's illustrations represent *Bignonia radicans*, and that this should in consequence be regarded as the type of the genus *Bignonia*. The calyx, as is clearly shown in figure AD, and somewhat less clearly in figure D, is 5-toothed with distinct acute teeth. This is precisely the calyx of *B. radicans*. In *B. capreolata*, on the other hand, the calyx has a nearly or quite truncate margin, with the teeth either very short, blunt, and obscure, or represented by minute mucronulations. This, in my opinion, is the only feature in Tournefort's figures which is definitely assignable to one of the two species concerned and not to the other, and it is a feature so definite and so unlikely to be misrepresented that the figures can be relied upon for the determination of the species concerned.

It should be noted that, while the genus *Bignonia* is taken in Dalla Torre and Harms's *Index Siphonogamarum* in the sense given it by Bureau and Schumann, the Rafinesquian synonyms there given belong to other genera.

As stated by Rehder and by Sprague, the proper name for the genus typified by *B. unguis-cati* is *Doxantha* Miers (1863). Miers's genus was a somewhat heterogeneous one, but he stated definitely that the type was *B. unguis-cati*. The definitely known species are the following:—

Doxantha dasyonyx Blake.—*Bignonia dasyonyx* Blake in Contr. Gray Herb. n. ser. lii. 94 (1917).

Doxantha exoleta (Vell.) Miers in Proc. Roy. Hort. Soc. iii. 190 (1863).—*Bignonia exoleta* Vell. Fl. Flum. 248 (1825); Icon. vi. pl. 30 (1827).

Doxantha unguis-cati (L.) Rehder in Mitt. Deutsch Dendr. Ges. 1913, 262 (1913).—*Bignonia unguis-cati* L. Sp. Pl. ii. 623 (1753). *Doxantha unguis* Miers, *l. c.* (1863). *Bignonia californica* Brandegee in Zoe, v. 170, 1903.

S. F. Blake,
U.S. Dept. of Agriculture, Washington.

In my supplementary note on the type-species of *Bignonia* (Journ. Bot. 1922, 363) six characters of the calyx, corolla, disc, and ovary were mentioned in support of the view that *Bignonia*, Tourn. Inst. t. 72, figs. A–D, represents *B. capreolata*, not *B. radicans*. Dr. Blake does not deny that these characters are observable in Tournefort's plate, but summarily dismisses them as "minor details." His statement that "figure C . . . . can be referred to one species as well as to the other" is surprising—to put it mildly. It may suffice to mention in

this connection that Mr. Rehder, after consideration of my supplementary note, wrote to me in Dec. 1922: "I think the shape of the disk in Tournefort's figure is the most conclusive evidence that the plant Tournefort intended to figure is *Bignonia capreolata*."

The sole character on which Dr. Blake relies to support his identification of *Bignonia* Tourn. with *B. radicans* is the shape of the calyx-lobes. He states that "in *B. capreolata* . . . . the calyx has a nearly or quite truncate margin, with the teeth either very short, blunt, and obscure, or represented by minute mucronulations." In point of fact, the calyx of *B. capreolata* is extremely variable as regards its lobing. It is about 8–9 mm. long in a dried state, and frequently has lobes 2–3 mm. long, both in wild and cultivated specimens. The lobes may be rounded or shortly ovate-deltoid, with or without an apiculus. The lobing is frequently irregular, as it is in Tournefort's calyx, where the lobes are markedly unequal in length in fig. AD. The calyx-lobes of *B. radicans*, on the other hand, are equal and acuminate or very acute, and decidedly longer in proportion to their width than those in Tournefort's plate.

Dr. Blake thinks that the lobing of the calyx is unlikely to be misrepresented. Reference to previous figures of *B. capreolata* demonstrates the fact that 17th century botanical draughtsmen were apt to pay relatively little attention to the calyx, and sometimes conventionalized it so much as to render it quite unreliable for purposes of identification. The calyx-lobes of *B. capreolata* were misrepresented by Zanoni (Ist. Bot. 74, t. 28, 1775) as being lanceolate or ovate-lanceolate and very acute. In Dodart (Mém. 71, 1676) they are shown as unilaterally split (spathaceous) in most of the flowers, bilabiate in an old calyx, and with deltoid very acute lobes in a flower-bud. Boccone (Ic. 30, t. 15, 1674) has the calyx-lobes as long as the tube, though in other respects his figure is an excellent representation of *B. capreolata*, considering the date. Tournefort's figure (Elem. t. 72, 1694) published just twenty years later shows a marked advance in the delineation of the calyx, the lobes being considerably shortened. Further stages may be seen in *Bot. Mag.* t. 864 (1805); and Britton and Brown, Ill. Fl. ed. 2, iii. 237 (1913). In the last-mentioned the corolla is almost actinomorphic with subacute lobes—Tournefort's corolla is more faithful to nature. No one has questioned the fact that Boccone's and Zanoni's figures represent *B. capreolata*, in spite of the calyx-lobes being very incorrectly drawn. Why then should there be any difficulty in accepting Tournefort's calyx, which is a much better representation? Blake has made the mistake of judging 17th century illustrations by 20th century standards.

T. A. Sprague.

WILLIAM HENRY PEARSON, M.Sc., A.L.S.

(1849–1923).

William Henry Pearson was born on July 22nd, 1849, at Pendleton, near Manchester. On leaving school he was placed with a Manchester firm of yarn agents to learn the business, and eventually set up in the same line himself. Although he actively participated in this business up to the time of the short illness which caused his death, he found time to acquire such an extensive knowledge of *Hepaticæ* that for many years he was the chief authority in this country on these plants. It seemed a peculiar thing to enter a yarn agent's office and find an enthusiastic hepaticologist, who greeted one with a pleasant smile and readily entered into a conversation about his beloved plants. Many an interesting interlude to business has been spent in this way; not once only, but scores of times has a scientific discussion been interrupted by the whirr of the telephone-bell and the enthusiastic botanist become the business man quoting the prices of various yarns. As a general rule, however, Pearson did not mix up his business with his botany: on 'Change he was the keen business man selling his yarns, and many of his customers knew not that his botanical reputation was an international one. Now and again, business cares were put on one side, and he indulged in a botanical ramble with one of those who had the privilege of knowing him. A stranger, meeting him on such an occasion, never dreamt that the man with such a remarkable knowledge of the characters and habitats of the small liverworts was yesterday making a deal with a cotton-doubler, as business cares or worries were very rarely mentioned even to his most intimate friends.

One of our joint expeditions stands out very prominently in my memory. Mr. Broome of Failsworth and I were going to Delamere Forest, and Pearson was to meet us at the Central Station, Manchester. He was not on the platform, and, as we concluded that business had prevented him from coming, we went on to Delamere without him and examined the marshy places round Oakmere. Our "bag" was a good one and included some rare Cephaloziæ. On our way back towards Delamere station we met Pearson, who had seen the tail-end of our train and followed on by the next. He was so pleased with our finds that we had to retrace our steps, so that he could delight himself with the sight of such interesting plants in their natural situations. Our second visit repaid us; not only was our way rendered shorter by Pearson's genial comradeship and pleasant discourse, but other plants which we had failed to observe were discovered by him, and with his usual generosity pointed out and commented upon.

Pearson's first botanical interest was in ferns and their culture; later he developed a love for alpine plants, and an article on British alpine plants in the Rucksack Club Journal of 1907 is reminiscent of this phase. In an article on Dolgelley (Lanc. & Ches. Naturalist, Dec. 1922 and Jan. 1923), quoted in the March number of this Journal (p. 94), he explains how the desire to know more about the structures and life-stories of plants was initiated by his fern-collecting. By this

time (1874) Pearson had married and settled in Eccles, where Dr. Carrington had a medical practice and also conducted a botany class. Pearson attended this class and thus began an intimate friendship with Carrington, who no doubt was the means of inducing him to take up the *Hepaticæ* as his special study. This choice was further stimulated by the encouraging letters of Spruce, of whom Pearson always spoke in terms of gratitude and admiration. In 1878 Carrington and Pearson issued the first part of *Hepaticæ Britannicæ Exsiccatæ*; after Carrington's death the latter continued to issue sets, and many hepaticologists have profited by his well-prepared specimens. In 1886 Carrington received a number of liverworts from New South Wales and Tasmania; these were studied together by him and Pearson, and the results were published under their joint names in Proc. Linn. Soc. of N. S. Wales and Proc. Roy. Soc. of Tasmania. In 1889 a joint paper on "A New Hepatic" was published in this Journal. This valuable collaboration was cut short by Carrington's ill-health, but their friendship continued till Carrington's death in 1893, when an appreciative obituary notice of Carrington was contributed by Pearson to this Journal (p. 120).

Pearson's first contribution to this Journal was an account of a new Killarney liverwort, named *Radula Carringtonii* by Jack, This was published in May 1882, and was followed by many other contributions on hepatics and hepaticologists:—on *Radula germana* (1882), the Lejeuneæ of Lindenberg's Herbarium (1890), *Scapania aspera* (1891), *Cesia conferta* (1892), *Frullania microphylla* (1894), *Plagiochila Stableri* (1896), *Lejeunea Macvicari* (1900), the genus *Herberta* (1919), in which volume he also published notes on Radnorshire Hepatics. His last contribution to the Journal, with whose editor he was in frequent communication, was in August last year on the collection of West Indian Hepatics made by Miss Armitage—a good example of his critical work. In the preceding June his account of the *Hepaticæ* of New Caledonia was published in the *Journal of the Linnean Society*; in this many new species were described, and the paper, as were many others, was illustrated by drawings from his pencil.

Many other journals benefitted by Pearson's knowledge; the account of *Harpanthus Flotovianus* in Scotland (Trans. Bot. Soc. Edinb. xiii. 443; 1879) appears to have been his first botanical article; the description of a new Irish hepatic (*Cephalozia hibernica*) was appropriately published in the Irish Naturalist for 1894; numerous other papers appeared in the *Naturalist*, *Bryologist*, *Revue Bryologique*, *Kew Bulletin*, *Lancashire and Cheshire Naturalist*, and *Proceedings* of the Manchester Literary and Philosophical Society. He was a Corresponding Member of the Linnean Society of New South Wales, of the Royal Society of Tasmania, and of the Christiania Videnskabs Selskabs, and some of his papers were published in their journals. His services to science were recognised by his election as an Associate of the Linnean Society in 1907, and by the award of the honorary degree of M.Sc. by the University of Manchester. Pearson's monumental work, *The Hepaticæ of the British Isles*, is the standard work of reference for British hepaticologists; the herbarium on which

this was founded was acquired some years since by the British Museum (Nat. Hist.).

Pearson took an active part in local naturalist societies, frequently exhibited specimens and mounted preparations of hepatics at their meetings, and occasionally lectured on some aspect of his special study. As a member of the Manchester Museum Committee he rendered considerable service in making the reference collection of *Hepaticæ* one of the best in the country; his *Catalogue of Hepaticæ* (1910) is one of the Museum Handbooks. Students of the structure of hepatics were assisted by him in the supply of material for study and in other ways, and the botanical literature of the last thirty years contains many references to his generous help.

Pearson's international reputation is indicated by the numerous species named in his honour—among them *Jungermannia* (*Spheno-lobus*) *Pearsoni* and *Lepidozia Pearsoni* by Spruce, *Riccia* and a *Bazzania* by Stephani, a Chinese *Madotheca* by Massalongo, and a *Marsupella* by Schiffner.

During recent years one of Pearson's greatest delights was to get a circle of bryologists round him on one of his happy hunting-grounds and, whilst the fragrant weed was indulged in, discourse in his genial way on his hobby. Many bryologists will recall the memory of such a discourse, during which Pearson, in his charming and modest way, delighted his audience with an account of the discovery or characteristic of some rare hepatic, or with a pleasant story of some association with a departed naturalist. He was especially interested in the various Working-men's Societies which took up natural history, and was always ready to help them by his sympathy and advice.

Pearson took a keen interest in the formation of the British Bryological Society, and at its inaugural meeting at Dolgelley last year was elected Vice-President. In the excursions he always joined, but, when the more active members ascended to the summit of Cader Idris, he had to content himself with work on the lower slopes, though one could see the glint of desire in his eyes. Early in the present year he had a serious attack of influenza, but appeared to have recovered. At Easter he joined his Rucksack Club friends at Beddgelert. Mr. D. A. Jones joined him there, and an enjoyable moss-trooping expedition to an altitude of about 2000 ft. resulted in finding *Marsupella sphacelata* and other rarities. On his return our mutual friend, Mr. Broome of Failsworth (to whom I am greatly indebted for help in the preparation of this obituary notice), informs me that Pearson looked remarkably well, was full of enthusiasm over his Beddgelert trip, and planned with him a week-end in Derbyshire. He also arranged to exhibit specimens of hepatics at the Spring Exhibition of the Manchester Microscopical Soc., of which he was a Vice-President, on April 28th. A bright day tempted him to go to business without an overcoat; a chill was the consequence and pneumonia developed; Pearson fought against it for several days, but succumbed at his residence, Palatine Road, Withington, on April 19. His death came as a shock to the many comrades who were honoured with his friendship, cheered by his genial personality, and stimulated

by his example and counsel. He was buried at the Southern Cemetery, Manchester, on April 23rd, the British Bryological Society, the Manchester Microscopical Society, and other bodies being represented at the funeral.

W. Watson.

ADDITIONS TO THE MARINE FLORA OF THE CHANNEL ISLANDS.

By Lilian Lyle, F.L.S.

These additions have been gathered from various sources. I am indebted to Dr. Rendle, Keeper of the Department of Botany, British Museum, for the opportunity of looking through two collections of algæ recently acquired by the Department, wherein a number of species and varieties not yet recorded for either Jersey or Alderney were noted. Mr. Gepp, of the same Department, kindly showed me a collection from Guernsey made by Lady Mansell in 1840, which included specimens of great interest; none of these had been determined, but they had been carefully mounted and preserved. Lastly, a recent visit to Guernsey enabled me to explore again my old hunting-grounds, and I was fortunate in finding several algæ new to the locality and one new to science.

An account of the marine flora of Jersey was published in 1908 by Dr. Van Heurck entitled the "Prodrome de la Flore des Algues Marines des Iles Anglo-Normandes et les Côtes Nord-Ouest de la France." The lists of seaweeds gathered by him and other collectors are very extensive and apparently exhaustive, but as a result of my examination of the above-mentioned collections I have been able to add sixty species and varieties for Jersey and Alderney. The new records are as follows:—

Jersey.

Enteromorpha paradoxa Kütz. forma typica Batters; also var. *tenuissima* (Kütz.) Batt. (=*E. Hopkirkii* McCalla).

Cladophora arcta Kütz. var. *radians* Batt.

Dictyosiphon hispidus Kjellm. Dr. Van Heurck enters this as "forma subhispida" of *D. fœniculaceus*; Kjellman had figured and described it as a subspecies of *D. fœniculaceus* in *Spetsbergens Thallophyter*, ii. 1876, t. 2. The plant differs markedly in form from *D. fœniculaceus*, the frond being clothed with short branches "subulate or linear about a line in length." Batters has therefore rightly made of *D. hispidus* a separate species.

Punctaria tenuissima Grev.

Asperococcus fistulosus Hooker var. *vermicularis* (Griff.) Harv.

Chorda tomentosa Lyngb.

Chantransia Lorrain-Smithiæ mihi (see Journ. Bot. lviii. 1920, Suppl. 2, p. 13).

Gelidium latifolium Born. var. *laciniata* Batt., very rare. There is only one other record for this plant in the British Isles—Tor

Abbey, March 1883, E. M. Holmes. The spathulate branches tapering towards the base quite distinguish it from the species.

Chylocladia kaliformis Hook. var. *patens* Harv.

Nitophyllum punctatum Grev. var. *ocellatum* J. Ag. and var. *fimbriatum* Harv.—*N. ramosum* (=*laceratum* Grev.) f. *ciliifera* Batt.—*N. litteratum* J. Ag.

Delesseria hypoglossum Lam. var. *ovalifolia* J. Ag. A broad form; the only other British locality is the Orkneys.

Bonnemaisonia asparagoides Ag. var. *teres* Harv. The stem of this variety is round with very long cilia, while the typical form has a compressed stem with alternate ramuli coming out on either side. The plant has been also found in Wicklow and Kingstown Harbour, and is extremely rare.

Pterosiphonia parasitica Schm.

Dasya ocellata Harv.

Ceramium tenuissimum J. Ag. The species does not appear to be listed by Dr. Van Heurck, though he records the variety *arachnoideum* Ag.—*C. strictum* Harv. var. *zostericola* Le Jol.—*C. diaphanum* Roth.

Halarachnion ligulatum Kütz. var. *latifolium* Harv. This broad form is rare, it has been gathered in S. Devon, Kirkwall, and the west of Ireland.

Alderney.

The most notable collector in Alderney was the late Mr. E. D. Marquand, whose lists are published in Trans. Guern. Soc. Nat. Sci. 1901, 1902, 1904, 1908. Dr. Van Heurck quotes all the known seaweed habitats for Alderney in his Prodrome. Batters, in his Catalogue, published as a Supplement to this Journal in 1902, included many localities for the island.

The following have not been previously noted:—

Monostroma Grevillei Wittr.

Enteromorpha clathrata J. Ag. var. *Linkiana* Batt.—*E. compressa* Grev. var. *constricta* J. Ag.—*E. intestinalis* Link. var. *flagelliformis* (Le Jol.).

Ulothrix speciosa Kütz.

Chætomorpha linum Kütz.

Cladophora Hutchinsiæ Harv. var. *distans* Kütz.; var. *divaricata* Harv.—*C. utriculosa* Kütz. var. *lætevirens* (Harv.).—*C. arcta* Kütz. var. *radians* Batt.; var. *vaucheriæformis* Harv.—*C. lanosa* Kütz.

Desmarestia viridis Lamour.

Punctaria tenuissima Grev.

Phyllitis fascia Kütz.

Ectocarpus velutinus Kütz.—*E. granulosus* Ag. var. *refracta* Batt.

Sphacelaria cirrhosa Hauck var. *irregularis* Hauck.

Chilionema reptans Sauv.

Stilophora rhizodes J. Ag.

Chordaria flagelliformis Ag.

Mesogloia lanosa Crn.
Carpomitra costata Batt.
Laminaria Cloustoni Edmondst.
Chantransia cæspitosa L.
Gelidium crinale J. Ag.
Callymenia reniformis J. Ag. var. *undulata* J. Ag.; var. *cuneata* J. Ag.; var. *Ferrari* J. Ag.
Calliblepharis lanceolata Batt. var. *divaricata* Holm. & Batt.
Chylocladia kaliformis Hook. var. *squarrosa* Harv.
Nitophyllum litteratum J. Ag.
Rhodomela subfusca Ag.
Spermothamnion Turneri Aresch. var. *monoica* Schm.
Antithamnion crispum Thur.
Platoma marginifera J. Ag. This plant is very rare. Whitsand Bay and Padstow are the only other British localities. The following description is translated from Bornet et Thuret's *Notes Algologiques*, i. p. 49, pl. xvi. :—

"A large and beautiful species gathered at Biarritz-Guéthary, June–July, a deep-water plant found also in crevices of rocks and on stones, it ascends even to ½ tide level if there is no complete desiccation. Tufts of 10–12 plants resembling in form, size and division deep water specimens of *Rhodymenia palmata*, colour a soft wine-red, gelatinous to the touch like *Halymenia*. The base of the plant has a short round stalk attached to the rock by an orbicular disc (épatement) regularly and dichotomously divided, typically palmatifid. Tetraspores are unknown. Antheridia consist of whitish cells situated on the extremities of the cortical filaments. Cystocarps are very small and hardly visible to the naked eye, immersed in the cortical tissue, the spores escaping by a narrow canal between the peripheral filaments."

Schmitziella endophlœa Born. & Batt.
Lithophyllum pustulatum Fosl.

Guernsey.

Lady (Catherine Rabey) Mansell (1781–1841), wife of Rear-Admiral Sir Thomas Mansell, R.N., K.C.B., was the sister of Mr. F. C. Lukis, the Guernsey archæologist, whose house at St. Peter Port with its large and interesting collection has been converted into a museum. She also studied conchology, and collected for the most part at Le Crocq and also along Perelle and Vazon Bays. Her collection, already mentioned, is in beautiful preservation and contains 107 species and varieties, one of which, *Ceramium pennatum*, has not been previously recorded for Guernsey. There is also a specimen of *Chondria cærulescens*—a plant which I had collected in 1914 and listed in 1920 as new to the island.

A list of the known Marine Algæ of Guernsey was published by me in 1920 as a Supplement to this Journal; on a visit in Oct.–Dec. 1921, I again did some collecting. I was disappointed in not finding *Nemastoma dichotoma*, one of the plants recorded as new to Britain, *Chondria cærulescens*, or *Chantransia Lorrain-Smithiæ*; possibly

the lateness of the season accounted for their absence. *Polysiphonia obscura* was listed by Mr. Marquand as new to Britain; in 1914 I found it in a different locality, and 1921 in still a third habitat. *Ctenosiphonia hypnoides* was found again in 1921 at Moulin Huet, another locality with similar conditions to those of the former gathering—in chinks of rock holding sand and particles of shells so forming a nidus for other sporelings.

The following are new to Guernsey:—

Ceramium pennatum Crn., found by Lady Mansell in 1840—the only record for the Channel Islands.

Ceramium gracillimum Harv. gathered at Pleinmont. It is an exceedingly delicate and fragile plant and most difficult to "lay out," as the fine branches become easily entangled. It is of rare occurrence along the southern coast of England as as far north as Cromer, also at Kilkee in Ireland.

Gracilaria confervoides Grev. var. *procerrima* Batt. grows side by side with the species, from which it is quite distinct, being characterized by very long wavy branches with short subulate ramuli. This variety is new to the Channel Islands.

C. Boergesenii Petersen, is another addition to the Channel Islands. It was listed for the first time as a member of the British Marine Flora by A. D. Cotton in his Clare Island Survey (in Proc. R. Irish Acad. xxxi. part 15, 1912), who points out that it had probably been overlooked or confused with *C. circinatum*; the latter has descending cortical filaments only, while in *C. Boergesenii* they are both ascending and descending. It has been so far recorded from the Faroes, Iceland and Clare Island.

Antithamnionella sarniensis mihi, found in several localities. See Journ. Bot. lx. 346–50, figs. 1–6 (1922).

SHORT NOTES.

Galbulimima or Himantandra. As indicated in Journ. Bot. 1922, 137, *Himantandra* is a synonym of *Galbulimima* (Internat. Rules, Art. 38). Hence the two new species from New Guinea described under *Himantandra* by Messrs. E. G. Baker and C. Norman (Journ. Bot., May 1923, Suppl. p. 2) should be known as Galbulimima nitida and G. paryifolia respectively. The fact that the family was named *Himantandraceæ* by Diels is immaterial so far as the name of the genus is concerned; names of families are formed from the names (or synonyms) of their type-genera, not *vice versa*.—T. A. Sprague.

Koetjape and Sentol (p. 172).—I note Mr. Merrill's defence of his position with respect to these two words. There is obviously some confusion in the minds of modern Javanese on the subject. In the Malay peninsula Kechapi (not Kuehapi, *i. e.* Koetjape of the Dutch) is only applied to the half-wild sour-fruited tree, *Sandoricum radiatum* King, and Sentol to the sweet-fruited cultivated plant, *S. indicum*; and the Malays and Blume probably are correct in separating

the two plants. As for many years the greater part of Java has been under cultivation, the Javanese have lost all knowledge of plant-names, and constantly use the wrong ones for species. The Malays being less urban, living in a forested and wilder country, know the names more accurately and would scoff at anyone who called a Kechapi tree a Sentol. If the two species are descended one from the other, which is possible, it is most probable that the Sentol—a somewhat popular plant the fruit of which is sold in the markets—is a cultivated form of the wild Kechapi, which I have once or twice seen in the Malay forests apparently wild; Sentol I have only seen in cultivation. I should like to see the type-specimen referred to; it must be an unusually good herbarium specimen for the date to be identifiable. Any way, it does not seem to be of any service to botany to dig out from its well-preserved oblivion a specific name which is neither Latin nor Greek, but a barbarous Dutch mis-spelling of a Malay word applied to the wrong plant. I do not know why Mr. Merrill thinks I consider the common *Sandoricum nervosum* Kechapi to be the very rare and little-known *S. Maingayi*—I certainly do not and never did (see *Flora of the Malay Peninsula*, i. 385).—H. N. Ridley.

The Huntingdon Elm.—In the Sloane Herbarium, vol. 126, p. 38 (verso) (Adam Buddle's collection), is an Elm labelled by Buddle: "Ulmus folio latissimo glabro Buddle. The broad leaved smooth Wich-Elme. I observed this Anno 1711 plentyfully about Danbury in Essex." This specimen seems to be the Huntingdon Elm: I showed it to Mr. A. B. Jackson, who at once said the same. If so, this Elm was in existence and mature some years before the reputed raising of the Huntingdon Elm by Wood of Huntingdon "about 1746."—J. E. Little.

REVIEWS.

Fungus Diseases.

(1) *The Diseases of the Tea-Bush.* By T. Petch, B.A., B.Sc. Pp. xii, 220, 3 coloured plates, 69 text-figs. Macmillan, 1923. Price 20*s.* net.

(2) *Fungus Diseases of Crops*, 1920–21. Ministry of Agriculture and Fisheries Miscellaneous Publications; No. 38. 1922. Price 3*s.* net. Pp. 104, 2 charts.

(1) The name of Mr. T. Petch, botanist and mycologist to the Government of Ceylon, on any mycological work is sufficient guarantee of competent treatment. This in its way is remarkable, as he is probably the most prolific British writer on the subject, and a prodigious output is not usually regarded as indicating efficiency. "This book is intended to enable the planter to recognize the diseases of the tea-bush which have up to the present been recorded, and to take steps to control them when they appear or to lessen the probability

of their occurrence. It is of exceptional value owing to the qualifications of the author and the fact that very few works have as yet been written upon the subject"—it is a refreshing experience to be able to quote with approval and endorsement a publisher's "puff."

The cultivation of tea within the British Empire began about the year 1836, and there are now more than a million acres in India and Ceylon devoted to it. The tea-bush is a very hardy plant, and hitherto has not suffered exceptionally from any disease; in the present work some sixty diseases are enumerated. The first twenty-one pages are devoted to an elementary account of the classification of fungi. This, which is to be regarded as a "running glossary" is exceptionally clearly written and appears adequately to fulfil its purpose. (Incidentally it may be mentioned that the derivation of *Æcidium*, which is queried, is given by John Hill, the authority for the name, as follows:—"We have called this genus, distinguished by its peculiar cells, *Æcidium*, from the Greek *oikidion*, cellula.") The remaining chapters deal with leaf diseases; leaf and stem diseases; stem diseases; root diseases; wound covers, sprays, and sprayers; mycological notes; and fungi on the tea-bush. The chapters on the leaf, stem, and root diseases respectively begin with accounts of how the bush is affected by interference with the physiological activities of these organs; these are obviously written with the object of interesting practical men. The chapter devoted to leaf diseases contains most descriptions (though that on root diseases occupies more space): "The tea-planter is perhaps more alert to notice the occurrence of leaf diseases than is the grower of other plants, for the very obvious reason that the tea-bush is cultivated for the sake of its leaf. The leaf is the crop. Hence a leaf disease of tea not only affects the crop at some future date by its indirect effect on the bush, but, if it attacks the young leaf, immediately and directly reduces the amount of leaf which can be utilised for the manufacture of tea." Chlorosis, double leaves, and dwarf leaves are mentioned under leaf diseases, and abnormalities such as fasciation, galls, burrs, and abnormal callus outgrowths under stem diseases.

In describing the several diseases, the appearance of the affected part and the microscopic details of the fungus are given. Practical methods of dealing with the diseases are treated in full; this is perhaps best seen in the chapter on root diseases, which is full of wise saws and modern instances. The chapter on sprays is practical: "The preparation of these spray fluids is no doubt a troublesome process, but it is within the capacity of the average dispenser. Attempts have been made to avoid all the trouble by manufacturing a paste which has merely to be mixed with water before using, and these have been successful, as far as temperate countries are concerned. But these pastes invariably decompose under tropical conditions, and up to the present no method of overcoming that appears to have been discovered." It is probably to the two final chapters that the mycologist will first turn: that entitled Mycological Notes is a commentary on matters of systematic interest, whereas that on Fungi on the Tea-bush consists of classified descriptions of fungus parasites. Throughout the book are numerous points of mycological

interest, particularly in the case of *Cephaleuros*, Thread Blights, and the characteristics of diseased roots when attacked by different fungi.

The illustrations are very good and the coloured plates of leaf diseases, stem and root diseases, and root diseases, respectively, are excellent in every way, except that some of the greens do not come out well. An extensive bibliography and a full index complete a work which will be invaluable not only to planters, but also to those mycologists who are concerned with tropical phytopathology.

(2) The "Report on the Occurrence of Fungus, bacterial and allied Diseases on Crops in England and Wales for the Years 1920–21" is a summary of the original pathological returns received by the Ministry. Owing to the somewhat perplexing move of the Plant Disease Branch of the Ministry from Kew to Harpenden, the Report for 1920 was so delayed that it was found advisable to issue it together with that of the following year. Fortunately there was a very great dissimilarity between the two seasons, the summer of 1920 being unusually cold and wet, whereas that of 1921 was exceptionally long and warm; and this difference is reflected in the incidence of certain diseases. Such annual surveys of the occurrence of plant disease have been found useful in many countries, and have an additional use in comparative international phytopathology. In the present work the diseases are listed under the general headings Cereals, Potatoes, Roots, Pulse, Forage Crops, Vegetables, Fruit, and Miscellaneous. A popular name is given for the disease together with its scientific name: the points of its special occurrence in the last two years are noted, with recent relevant results obtained in the investigation of the disease either in this country or in other British-speaking countries—references to continental work are very infrequent. A further useful point is that information is given when it is known that a disease is under investigation in this country. The survey will be extremely useful to phytopathologists. Naturally it suffers, as must all such lists, in that the data are supplied by people with different interests, opportunities, and efficiencies; in connection with this no authority is given for the naming of the fungi concerned. In the case of the more important diseases this is of little importance, as we may assume that the fungi are well known; but for rarer species it would have been well to indicate the persons responsible for the identifications. In a pocket in the cover are two weather charts which are useful in studying the relation of weather conditions to the reported incidence of diseases during the two years.

A foreword gives the information that the report has been prepared by Mr. A. D. Cotton, lately Mycologist to the Ministry; and adds—"It is a matter of regret that his connexion with the Pathological laboratory has now been severed by his acceptance of the post of Keeper of the Herbarium at the Royal Botanic Gardens, Kew."

J. R.

Die Vegetation der Erde.

(1) XIV. *The Vegetation of New Zealand.* By L. Cockayne, Ph.D., F.R.S., etc. With 2 maps, 65 plates, and 13 figures in the text. Pp. xxii, 364.

(2) XV. *Die Pflanzenwelt der bolivischen Anden und ihres östlichen Vorlandes.* Von Prof. Dr. Th. Herzog. Mit 25 figuren im text und 2 karten. Pp. viii, 255.

We have received from W. Engelmann of Leipzig the two most recent instalments of the important series of quarto volumes, admirably produced, which he is publishing under the general title indicated above.

(1) In his account of *The Vegetation of New Zealand*, Dr. Cockayne sums up not only his own observations of thirty years, but, as his excellent and exhaustive bibliography shows, the numerous contributions of recent workers, among whom Thomas Kirk, William Colenso, and T. F. Cheeseman hold a prominent place. This is preceded by an admirable summary of the history of the botanical investigation of New Zealand, beginning with the landing of Banks and Solander in 1769 and extending to the end of 1913, at which period the actual writing of the book was begun.

The work is divided into four parts, which deal respectively with (i.) the physical geography and climate, (ii.) the vegetation of primitive New Zealand, (iii.) the flora and its distribution, and (iv.) its history from the Jurassic period to the present time. These are divided and subdivided into sections and chapters: thus under ii. there are sections on the vegetation of the sea coast, the lowlands and lower hills, the high mountains and the outlying islands, with one on the effect of settlement upon the plant-covering of New Zealand; to this last, Mr. G. M. Thomson's volume on *The Naturalisation of Animals and Plants*, reviewed at some length in this Journal last year (p. 301) but published too late for reference in Dr. Cockayne's book, which was published in 1921, forms an important supplement. The chapters under Sections i.–iv. on "the leading physiognomic plants and their growth-forms" are of especial interest; other chapters under each section treat of the history of the plants and of plant-formations.

The limited space at our disposal compels us to content ourselves with this indication of the arrangement and scope of the work; we must not, however, omit to mention the excellent index—we note with pleasure that there is only one!—and the useful maps and plates by which the volume is illustrated.

(2) Dr. Herzog has made two trips of botanical exploration to the Bolivian Andes, in 1907–8 and 1911–12, during which he made extensive collections. The volume dealing with the plant-geography of this district therefore embodies the results of his own investigations. The introduction contains a short sketch of the history of previous botanical exploration and a detailed account of Dr. Herzog's routes; also a bibliography and a list of the large number of specialists who have worked out Dr. Herzog's second collection, the results of which have been published in the Meded. van's Rijks Herbarium, Leiden. A brief description of the physical geography of Bolivia

forms the first part of the subject-matter. The second part comprises a systematically arranged account of the groups and families represented in the flora, but the greater part of the text is included in part iii., a descriptive account of the various plant formations, with photographic illustrations and lists of the characteristic species. Part iii. includes a list of the endemic genera, and also of the local plant names. At the end of the volume are three maps indicating phases of geographic distribution.

BOOK-NOTES, NEWS, ETC.

THE problem of the origin and distribution of the British Flora has long attracted the attention of geologists and botanists, and references to the work of the late Mr. Clement Reid, Dr. Stapf, and others on this subject have appeared from time to time in the pages of this Journal. In a paper in the *Annals of Botany* for April, entitled "The Distribution of certain Portions of the British Flora," Mr. J. R. Matthews has renewed the attack, employing the statistical method. The aim of the author is not "to solve the whole problem of distribution in Britain," but "to trace probable lines of invasion and inward spread" of certain limited portions of the flora; these, if discoverable, may give some indication, it is believed, of the immigration of the British flora as a whole. With this aim in view, the distribution of those members of our flora (266 species) which are restricted to England and Wales is illustrated cartographically. They exhibit a concentration in the S.E. counties and diminish in numbers fairly regularly towards the North and West. Nearly 50 per cent. of these "English" plants are of considerable rarity, and a detailed analysis of this rare element seems to provide a clue to the directions from which many of the species came, since it is found that the points of arrival and establishment in England are very fairly matched by the European centres of distribution of the same species. An invasion from the east and another from the south are indicated, and between these two lines the main portion of the English flora has probably advanced.

THE *Museums Journal* for May endorses and reprints with endorsement, from *The Times* of March 31, a vigorous protest from Sir Henry Howorth against the restriction of the work and publications of the British Museum on the ground of economy. "The Parliamentary grant for purchases," he says, "has been cut down until it has become positively ridiculous"; while "a paralysing hand has been laid upon the publication of the catalogues of the collections, a number of which have been hung up, with a serious loss to all students and the waste of excellent material waiting to be published." Moreover, the valuable annual Blue-book, "containing an account of what has been done in the Museum, and a list with the description of what has been added to the collection, with a special reference to the donors of different objects . . . . has been cut

down to a dozen pages of jejune matter—can imbecility be carried further?" Sir Henry contrasts this niggardly treatment with the "great many thousands spent upon a new-fashioned Museum, not meant to illustrate the origin and progress of human art, but for perpetuating the cruel memories of a savage war and to preserve specimens of ephemeral inventions," thus constituting "a drain upon the resources alone available for the maintenance of the older museums."

The fourth part of vol. viii. of the *Transactions of the British Mycological Society* (issued May 22) contains papers on "Parasites of Scale-insect Fungi" and "The Genus *Cladorostigma*" (in which is included the description of a new genus, *Trichosterigma*) by Mr. T. Petch; Miss Wakefield and Mr. A. A. Pearson give "Additional Records of Surrey Resupinate Hymenomycetes," including two new species of *Tulasnella*; Sir H. C. Hawley contributes "Notes on some British Pyrenomycetes"; Dr. Jessie Bayliss Elliott and Miss O. P. Stansfield give "Records of Fungi Imperfecti," in which numerous new species are figured and described; Miss Irene Mounce writes on "Fruit-bodies of *Coprinus comatus* in Laboratory Cultures"; Miss G. C. Gilchrist describes the "Bark Canker Disease of Apple Trees caused by *Myxosporium corticolium*" (3 plates); Mr. R. C. McLean describes a new species of *Sigmoideomyces* (*S. divaricatus*; 1 plate); and Miss Lorrain Smith reviews recent works on Lichens.

The *Kew Bulletin* (no. 4) contains a revision by J. Burtt Davy and J. Hutchinson of the equatorial African genus *Brachystegia*, of which fifty-four species are enumerated, seventeen of them new; special attention is paid to the economic value of the genus as a result of Mr. Davy's visits to Rhodesia and the Belgian Congo in 1919. Mr. L. A. M. Riley continues his "Contributions to the Flora of Sinaloa," in which new species of *Bursera* and *Rhamnus* are described; and there is an interesting note on the original drawings for the *Botanical Magazine*, which are to a large extent preserved in the Kew collection of drawings, and have lately been increased by a number belonging to the period 1830–34. No. 5 contains a description and figure of *Streptolophus*, a new genus of grasses from Angola allied to *Cenchrus*, by D. K. Hughes, and a continuation of "Diagnoses Africanæ."

At the Anniversary Meeting of the Linnean Society on May 24, Dr. Rendle was elected President and Mr. John Ramsbottom Secretary. The Linnean Gold Medal, which had been awarded to Mr. T. F. Cheeseman, Curator of the Auckland Museum, for his labours in New Zealand biology especially in Botany, who became a Fellow of the Society in 1873, was presented to Sir James Allen, High Commissioner for New Zealand, who suitably acknowledged the award and undertook to transmit the Medal to Mr. Cheeseman.

The Report for 1922 of the Botanical Society and Exchange Club of the British Isles, edited by the Secretary, Dr. G. C. Druce,

does not reach us for notice, but in the interests of British botany it seems desirable to call attention to the more interesting of its contents. These include a paper on "*Centaurea Scabiosa* L., varieties and a hybrid," by C. G. Britton; "Some new English species of *Taraxacum*" by H. Dahlstedt; an account of the herbaria of Ulisse Aldrovandi (1522–1605) and Gherardo Cibo (1512–1600) compiled by the editor; "Variations in Vegetation," by Donald Patton; and a note wherein Professor Almquist summons "all friends of the flora to observe the wild allogams in Nature," which concludes with a reference to his paper "in another place"—the reference to this Journal for 1922 (292–296) might have been added. There are numerous notes on plants and publications, and obituaries of botanists and others, mostly by the editor, which contain much autobiographical information—as, indeed, does the rest of the Report. The Report of the Exchange Club, issued separately, is edited by Mr. Lester-Garland.

Prof. K. Fr. v. Tubeuf has published in a handsome volume a *Monographie die Mistel* (Munich, Oldenbourg), in which the history of *Viscum album* is fully treated from every point of view. The first 350 pages are concerned with prehistoric finds, with the folk-lore and popular names of the Mistletoe and with its distribution in Europe; these are followed by a discussion at equal length of its morphology, anatomy, physiology, biology, and pathology, concluding with chapters on the varieties and races, culture, and kindred subjects. The volume, which is lavishly illustrated with plates, maps, and figures in the text, is beautifully printed and in every way attractive.

The *Journal of the Ministry of Agriculture* for May contains an account by Mr. G. H. Garrad of the endeavours, to some extent successful, which have been made to control the spread of *Lepidium Draba*, which "has done an enormous amount of damage in Thanet and North Kent during the last few years, and is gradually spreading from East Kent and East Essex westwards." The plant, Mr. Garrad tells us, "is known in Essex and Kent under the names of Whitlow Pepperwort, White Weed, Chalk Weed, Thanet Weed, Devil's Cabbage, Hoary Pepperwort, or Hoary Cress."

Part 58 of Mr. Maiden's *Critical Revision of Eucalyptus* contains figures and descriptions of six hitherto undescribed species, one of which bears the curious name of *E. Comitæ-Vallis*—apparently intended as a translation of the locality (Comet Vale) in which the tree occurs.

The *New Phytologist* (xxii. no. 2; May 19) contains "An Example of Leaf-enation in *Allium ursinum*," by S. L. Ghose; "The Toxonomy and Variation of *Microcystis* in Ceylon," by W. B. Crow (1 pl.); "*Tetraedroides spetsbergensis*, gen. & sp. n., a new Alga from Spitzbergen," by B. M. Griffiths (1 pl.); and a continuation of Walter Stiles's paper on "Permeability."

The second volume of Mr. Ridley's *Flora of the Malay Peninsula*, which has recently been issued, contains the Gamopetalæ. Of the species included, the author has seen the greater number in a living state—a considerable proportion have been collected by him only—a fact which is unusual in colonial floras. The number of endemics is very large, especially in *Gesneraceæ*, where 52 out of 56 species of *Didymocarpus* and 15 out of 16 of *Didissandra* are endemic.

Under the title *Allgemeine Abstammungslehre* "zugleich eine gemeinverständliche Kritik des Darwinismus und des Lamarckismus" (Berlin, Borntraeger), Dr. Bernhard Dürken attempts to compress into 200 pages an account, adapted for the general reader, of the present position of the Evolution theory. About one-half of the book consists in a recapitulation of the familiar arguments for the theory of Descent; the remainder is occupied with an exposition and criticism of the Lamarckian and Darwinian interpretations. The conclusion is that, while the fact of Evolution is clear, no adequate explanation of it has yet been given; Darwinism is "ein grosser Irrtum" and Lamarckism is little better. Throughout the book most of the illustrative examples are taken from the animal kingdom, and some aspects of the subject especially interesting to botanists are only lightly touched on. To English readers, at any rate, many of the criticisms of the Natural Selection theory will seem somewhat antiquated, but their revival may be of use if it leads readers to turn to the *Origin of Species* to see how they were met by Darwin.

At the sale of Mr. Graham's Library at Sotheby's on May 28, one of the twelve copies printed of Lord Bute's *Botanical Tables* (1785) was acquired by Messrs. Wheldon & Wesley for £55. An account of the work and of the copy in the Department of Botany will be found in this Journal for 1916, p. 84.

Mr. Martinus Nijhoff, of the Hague, has issued an interesting Catalogue (No. 487) of books of the 15th and 16th centuries, with a supplement containing books on the bibliography and typography of the same period.

The account of the Lichens collected during the British Antarctic ('Terra Nova') Expedition, 1910, by Prof. O. V. Darbishire, has been issued (March 24) by the Trustees of the British Museum (7*s.*). It contains a complete list of the Lichens brought back by the various Antarctic expeditions, and includes descriptions and figures of eight species new to science, all save one belonging to *Buellia*, of which Ferns another new species was figured and described in this Journal for April (p. 106).

In *Botaniska Notiser* no. 3, Dr. J. Hendriksson publishes a supplement to his paper on *Corylus Avellana* (Bot. Not. 1915, 236), in which several new varieties are described and figured.

THE

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BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.C.S.G., F.L.S.

LATE SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM.

The Journal of Botany was established in 1863 by Seemann. In 1872 the editorship was assumed by Dr. Henry Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

Without professing to occupy the vast field of General Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains.

Until the beginning of the late War the Journal paid its way and even allowed a slight margin of profit; but during that period the subscribers were reduced in number, and the continental circulation almost ceased. It has now regained its position, but the increased cost of production, which has not as yet been substantially reduced, has resulted in an annual deficit which at one time became so serious that the continuance of the Journal was threatened. By the generosity of those who felt that its cessation would be a misfortune, especially for British botanists whose principal organ it has always been, the deficit has been met and an appeal is now made for an increased number of subscribers.

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VARIABLE ÆSTIVATION OF RANUNCULUS BULBOSUS AND R. ACER.

By L. A. M. Riley, B.A.

The existing terminology of imbricate æstivation lacks precision owing to different terms having been used for the same arrangement and the same term having been applied to different arrangements.

Three main modes of closed æstivation are generally recognized—namely, valvate, imbricate, and convolute. The valvate mode and its modifications, in which the members meet without overlapping, is clearly distinct and presents no difficulties. In the imbricate and convolute modes each margin of a member overlaps, or is overlapped by, a margin of an adjacent member. Hence these two may be treated as subdivisions of one mode, to which the term imbricate has been applied in a general sense by some authors. Others, however, have restricted the term to those phases with at least one wholly exterior and one wholly interior member, or even to one such particular phase only.

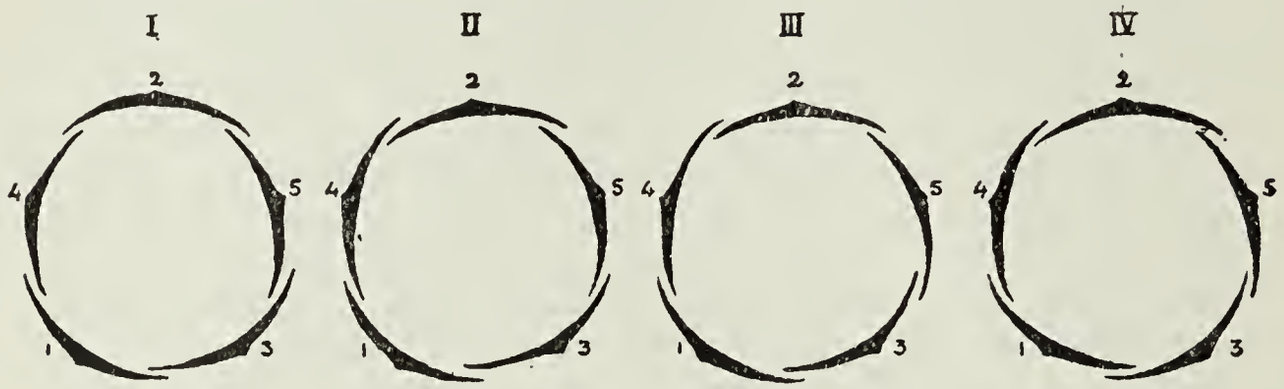
In pentamerous whorls four overlapping arrangements are possible (see diagram, p. 210). (I) Two members exterior, two interior, and one intermediate. (II) One member exterior, one interior, and three intermediate, the exterior and interior members not being adjacent. (III) One member exterior, one interior, and three intermediate, the exterior and interior members being adjacent. (IV) Each member with one margin exterior and the other interior.

To these the following terms have been respectively applied by Le Maout and Decaisne (Gen. Syst. Bot. ed. J. D. Hooker, 86; 1873); Eichler (Blüthendiagramme, i. 7; 1875); G. Henslow (Trans. Linn. Soc. ser. II. Bot. i. 178, t. 25; 1876); Asa Gray (Struct. Bot. ed. 6, 137, footnote; 1879); Bentham and Hooker (Handb. Brit. Fl. p. xxviii; 1887):—

Authority.	I.	II.	III.	IV.
Le Maout and Decaisne...	Quincuncial.	Cochleate.	Imbricate.	Contorted.
Eichler	Quincuncial.	Cochlear.	Cochlear.	Contorted (gedreht).
G. Henslow...	Quincuncial.	Half-imbricate.	Imbricate.	Convolute.
A. Gray	Quincuncial.	Subimbricate.	Subconvolute.	Convolute.
Bentham and Hooker ...	No special term.	No special term.	Quincuncial.	Twisted, contorted, or convolute.

A glance at the above table shows that a large majority of authorities have used the term quincuncial for the first phase. It seems desirable to maintain this usage, although the term denotes an arrangement very different from the Latin "quincunx." For reasons given by Asa Gray, the fourth phase should be known as convolute rather than contorted. Considerable confusion attends the terminology of the second and third phases. Cochlear is ambiguous, having been applied to two different phases. Imbricate, being generally employed so as to include the first three phases, should not be restricted to one of them, and a similar objection applies to half-imbricate and sub-

imbricate. Subimbricate and subconvolute are ambiguous, as strictly they mean "somewhat imbricate" and "somewhat convolute" respectively. To avoid this confusion, new and distinctive terms for the second and third phases are here proposed. As the essential difference between them is in the relative positions of the exterior members, the term apotactous (*ἀπὸ* and *τακτός*—arranged apart) is suitable for the second phase, and paratactous (*παρά* and *τακτός*—arranged side by side) for the third.



QUINCUNCIAL. APOTACTOUS. PARATACTOUS. CONVOLUTE.

In the quincuncial diagram the members have been numbered 1 to 5 in the usual sequence. For purposes of comparison, corresponding numbers have been used in the other diagrams.

The direction of overlap shown in the four diagrams is clockwise (I and IV) or prevailingly so (II and III). By drawing the mirror-image of each diagram the corresponding counter-clockwise series may be obtained.

Henslow showed that the quincuncial, "half-imbricate" (apotactous), "imbricate" (paratactous), and convolute phases formed a series in which each phase could be derived theoretically from the preceding by a single reversal of overlap (Trans. Linn. Soc. ser. II. Bot. i. 182). Undoubtedly this is so, but in any such series evolution might have taken place in either direction. He offered no satisfactory evidence in support of his view that the quincuncial phase was primitive relatively to the others. This view seems to have been based on his previous hypothesis that $\frac{2}{5}$ phyllotaxy in Dicotyledons was originally derived from an opposite-decussate arrangement (*l. c.* 41).

Evidence for or against the evolution of one phase of overlapping æstivation from another may be sought in those species in which the æstivation is variable. Henslow examined the æstivation of the petals in *Ranunculus bulbosus*, *Viburnum Tinus*, *Primula vulgaris*, and *Ribes coccineum*, in each of which the æstivation varies, and indicated the relative frequency of the various phases. But his percentages are of little value, as he himself admitted (*l. c.* 177), as they are based on examination of an insufficient number of flowers—125 of *V. Tinus*, 120 of *P. vulgaris*, and an unspecified but probably smaller number of *Ranunculus bulbosus* and *Ribes coccineum*. His figures for *R. bulbosus* were: 38 per cent. quincuncial, 14 per cent. "half-imbricate" (apotactous), 32 per cent. "imbricate proper" (paratactous), and 12 per cent. convolute. They give a misleading impression of the relative frequency of the various phases. The

results of an examination of the corolla-æstivation in three thousand flowers of *R. bulbosus* by Mr. T. A. Sprague and myself, and in one thousand flowers of *R. acer*, are given below. The number of flowers in each set examined is given in the second column. The figures in the last four columns are percentages. The letters Q, A, P, C indicate the quincuncial, apotactous, paratactous, and convolute phases respectively. Flowers were examined in the following localities: Kew (Surrey), Odiham and Western Corbett (Hants), and Pembury (Kent).

Corolla of Ranunculus bulbosus: *percentages of phases of æstivation.*

Locality.	Number of flowers.	Q.	A.	P.	C.
Kew	370	31·6	31·9	28·7	7·8
do.	190	31·6	32·1	30·0	6·3
do.	200	33·0	26·5	33·0	7·5
Odiham	440	36·4	25·2	32·0	6·4
Weston Corbett	400	37·0	23·25	34·5	5·25
do.	400	35·75	30·5	27·5	6·25
Pembury	200	32·5	31·0	32·5	4·0
do.	300	30·7	30·3	32·3	6·7
do.	100	32·0	23·0	39·0	6·0
do.	200	27·5	32·0	34·0	6·5
do.	200	31·0	33·5	29·0	6·5
Total: Surrey .	760	32·0	30·5	30·1	7·4
Total: Hants..	1240	36·4	26·3	31·4	6·0
Total: Kent...	1000	30·6	30·7	32·7	6·0
Grand Total	3000	33·3	28·8	31·5	6·3

Corolla of Ranunculus acer: *percentages of phases of æstivation.*

Odiham	700	32·4	26·9	33·4	7·3
Kew	300	37·0	29·0	29·0	5·0
Total ...	1000	33·8	27·5	32·1	6·6

The æstivation of the calyx in *Ranunculus bulbosus* and *acer* is normally quincuncial. Out of 250 flowers of the former, 249 had the calyx quincuncial and 1 apotactous. No connection could be traced between the direction of overlap of the sepals and that of the petals, homodromous and antidromous arrangements being about equally frequent.

As regards the corolla, there were usually two or three phases of æstivation on the same plant, less frequently all four phases or only one.

Examination of the tables shows that the percentages of the quincuncial, apotactous, and paratactous phases are approximately equal, and that the convolute phase is about one-fifth as frequent. I have discussed the results with Mr. Sprague, who points out that the percentages of the four phases are such as might be expected were the direction of overlap of the petals purely fortuitous. On this

hypothesis the probability of the occurrence of the quincuncial, apotactous, and paratactous phases would be $\frac{5}{16}$ (31·25 per cent.) each, and that of the convolute phase $\frac{1}{16}$ (6·25 per cent.). The approximation to these percentages observable in each separate set of flowers examined seems to indicate that the direction of overlap is mainly, if not entirely, a matter of chance. On the whole, a slight excess of quincuncial corollas is observable in both species, and a corresponding deficiency of apotactous corollas. This irregularity might disappear on counting larger numbers.

Conclusions.

1. The method of æstivation of the petals in *Ranunculus bulbosus* and *R. acer* is apparently fortuitous.

2. This indicates that the petals are arranged cyclically, not in a $\frac{2}{5}$ spiral—otherwise the quincuncial arrangement would be much more frequent. According to Payer (Organogénie, 255, t. 57 ; 1857) the primordia of the petals arise simultaneously.

3. The sepals are, on the other hand, normally arranged in a $\frac{2}{5}$ spiral (quincuncially). Payer (*l. c.*) states that their primordia arise successively.

4. The difference in arrangement of the sepals and petals respectively lends support to the view that the sepals and petals in *Ranunculus* may have had a different origin, the former having possibly been derived from bracts and the latter from stamens.

MYOSOTIS SICULA Gussone IN JERSEY.

By A. J. Wilmott, B.A., F.L.S.

While in Jersey last year, Mr. Francis Druce and I found two unusual forms of *Myosotis* growing together at the east end of St. Brelade's Bay on the fixed dune between the strand and the pond. One proved to be the white-flowered form of *M. versicolor* mentioned in the *Flora of Jersey* as the var. *pallida* of Brébisson ; the other proved to be that very local species *M. sicula*, exactly matching specimens from the Loire Inférieure (Nantes).

M. sicula has the appressed hairs and extremely short style of *M. cæspitosa*, but differs in being (? always) annual, with a bright green usually almost glabrous shoot whose branches are peculiarly divaricate and flexuous, leaves oblong linear obtuse, pedicels about equalling the conico-cylindric fruiting calyx, teeth rather obtuse subconnivent slightly appressed-hairy, corolla minute, limb typically concave, nutlets narrowly ovoid, slightly more than half the length and less than half the breadth of those of *M. cæspitosa*. The Jersey specimens are short, only 5–10 cm.

The distribution of the species is wide, but the known localities few. Those which I have so far traced are :—

France : Loire inf. (Nantes ! Ancenis !) ; Maine et Loire (Angers) ; Hautes Alpes (Marais de Chateauroux !).

Portugal : "Beira transm. e merid." (Coutinho Fl. Port. 397 : 1913).

Spain: Catalonia; Castile; Andalusia (only three localities; see Willk. & Lange, Prodr. et Suppl.).

Corsica: Bonifacio! (Not known to Knoche in the Balearic Is.)

Sardinia!: frequent, and the only species of this affinity occurring (see Moris, Fl. Sard. iii. 115).

Sicily!: frequent and varying exactly as described by Moris in Sardinia, but the variations are distinguished by Lojacono (Fl. Sic. II. ii. 84) as *M. lingulata* Lehm. and *M. humilis*, although his descriptions of these fit *M. sicula*. True *M. cæspitosa* Schultz (*lingulata* Lehm.) is named by Lojacono "*M. palustris* var. *strigulosa*."

Italy: Pisa!; Tuscan alpes (Mugello); Vallombrosa; Abruzzi; Apennines of Latium (Fiori & Paoletti, Fl. anal. Ital. ii. 370, who state that the plant is annual or perennial).

Albania: Janina!

Greece: Thessaly near Sermenica, and Neuropolis!; Argolis near Tyrinthium; Messenia, between Methone and Corone, Mt. Taygetos; Cyclades ins. Naxos.

Macedonia: Lahana (C. D. Day, 1918, in Herb. Mus. Brit.!). The plant recorded for Mt. Peristeri by Formanek is *M. idæa* B. & H. *fide* Vandas, Reliq. Form. 411: 1909).

Bulgaria: Dubnica; Kavaklij; (Velenovsky, Fl. Bulg. 402: 1891; the plant recorded for Kara Bair is only *M. cæspitosa* fide Vandas, *l. c.*).

Serbia: Kladovo! Velenovsky, *l. c.*, mentions "*Byzant.*" also.

It is clear that the species is extremely local throughout its range, only one or two localities being known in each country with the exception of Sicily and Sardinia. Owing to the incomplete original description (Gussone, Fl. Sic. Syn. i. 214: 1842) there has been some confusion in the naming of some Sicilian and French material. Moris removes the difficulties by stating (Fl. Sardoa, *l. c.*) that in Sardinia, where no other allied species occurs, *M. sicula* varies much. The stems may be solitary or several, sometimes erect, sometimes decumbent, the base sometimes hardly rooting but sometimes long rooting, rarely simple, often branched, from 2 inches to 2 feet long; the calyx subequalling the pedicels in fruit or sometimes, especially the lower, 3–4 times longer, segments often obtuse but rarely acutish; the corolla limb, even in the same plant, sometimes concave and sometimes flattened out. Since the same forms evidently occur in Sicily and are the basis for Lojacono's *lingulata* and *humilis*—which have the glabrescence, closed calyx with obtuse segments, and minute corolla of *M. sicula*,—it seems safe to assume that there is no justification for Rouy's separation of the plant of western France from the more typical Corsican specimens.

Although Gussone's original character of the ebracteate inflorescence is insisted upon by all the authors I have consulted, it is fallacious, since the Todaro specimens from a type locality have the inflorescences with the same long, obtuse, elliptical bracts as in France, Jersey, and elsewhere. Some of the Sicilian specimens are considerably stouter, with bigger fruiting calyces than in the Jersey specimens, which exactly match the Nantes form; but the Jersey specimens were

immature, and Sicilian specimens may be equally small. The Jersey specimens lack the reflexed pedicels mentioned in the original description, but so do the Todaro topotypes mentioned above. The Sicilian specimens seen are glabrescent, while the Greek specimens have longer and sometimes stronger hairs; but Sardinian specimens seem to have the same hairs, and the Jersey form, while usually subglabrous, is sometimes more strongly hairy, varying from almost one extreme to the other. The nutlets of the Jersey plant match those of the Sicilian topotypes, if allowance be made for immaturity: they are very unlike those of *M. cæspitosa*. I think we may therefore ignore Rouy's names, although I have not yet been able to discover whether *M. multiflora* Mérat is a form of *M. cæspitosa* or (perhaps?) of *M. sicula*. The inflorescence of the Jersey and western France specimens is not elongated, as is characteristic in *M. sicula*, but that is perhaps due to immaturity or to the more restricted growth in the higher latitude.

There is nothing in the recorded occurrences of *M. sicula* which suggest that it is likely to be introduced as an alien; everything suggests that it is a dying form and that its occurrence in Jersey and W. France is as relict from the preglacial flora, so that one must assume that it has been overlooked at St. Brelade's Bay and that it is a natural element in the flora. I should be glad if any collectors who have specimens of *Myosotis* collected there some time ago would let me see them.

I had at first thought that the plant would prove to be *M. oraria* Dumort., with the description of which in Rouy (*op. cit.*) it agrees well except that the plant is subglabrous. But it is certainly not *M. oraria* Dumortier in Bull. Soc. Bot. Belg. vii. 350 (1868) as "*" under *M. cæspitosa*. This name applies to "une forme de *Myosotis* très-curieuse" which comes from the "vallées marecageuses des dunes de Flandre." It has the entire corolla-lobes of *cæspitosa*, but is described as perennant, covered with appressed strigose hairs, and having divergent branches. Dumortier asks whether it may be a proper species or only a dwarfed (basse) and divaricate variety of *M. cæspitosa*. There is no specimen bearing this name in Herb. Dumortier, but there are three sheets of *cæspitosa* from the dunes of Flanders. Two of them I consider must be regarded as syntypes of the name *oraria*, for they are labelled respectively "*Myosotis* .... In vallibus dunarum Flandriæ hyemi inundatis versus Coxyde, Nieuport, Furnes. Corollæ lobi rotundati! integerrimi! corolla plicata, plicis alternativis semiteretibus!" and "*Myosotis* .... in exsiccatis humidis dunarum Flandriæ versus Nieuport. Corollæ segmenta ovata apice rotundata! nec ullo modo præmorsa cor. 5 plicata plicis alternativis semiteretibus!"; both have been determined by Crépin as "vera *Myosotis cæspitosa* F. Schultz." They certainly seem to be merely small specimens (15–22 cm. high), *i. e.* the "dune marsh" form of ordinary *cæspitosa*, and are not at all like the distinct Jersey plant. I think there can be little doubt that these are the types of *oraria*, since in his paper Dumortier gives definite localities for his *cæspitosa*, and none of them are on the dunes! Although he does not cite Nieuport, Coxide, or Furnes, and in his herbarium does not name or

date his specimens, the fact that he does not here name them at all indicates that he regarded them as a peculiar form, and makes it fairly certain that these specimens represent the dune form which he named *oraria*. The third sheet probably explains why he never wrote further; it contains fairly typical specimens of *M. cæspitosa* from the "fosses des Dunes de Flandre vers Nieuport, Coxide, Furnes," which were originally labelled by Dumortier "*Myosotis strigulosa*" and later corrected by him to "*cæspitosa*." He doubtless realised that the plant from the dried-up marshy places on the dunes was the same as that from the ditches, and abandoned his name. Compared with the Jersey form these types of *oraria* could not be called "basses." Nor are they especially divaricate, certainly nothing like the Jersey form, in which the branches may stick out at right angles so that those from opposite sides of the same stem may be in the same straight line. *M. oraria* Dumort. is certainly not *M. sicula* Guss.

HEREFORDSHIRE SPHAGNA.

By the Rev. C. H. Binstead, M.A., and Eleonora Armitage.

It seems desirable to bring together all the available data of the occurrence of Bog Mosses in Herefordshire, as they are largely a relict flora in the county, and are slowly but surely vanishing. When the Plantagenet and later kings came down hither to guard the Marches from border raids, the surface of the country was mostly covered with oak forest intersected by trackways and by infrequent but rapid streams, with little swampy ground. The land now has been long drained and cultivated, the woodland has retreated up the hill-sides, and there is no Sphagnum on the low-lying moist ground.

The chief hold, where most of the forms are found, is on the Black Mountain moorland in the West, in elevation 1800–2000 ft., with a neighbouring outlier, Cefn Hill; but even there the older hillside farmers say that the boggy areas have much dried up in their memory, and there is scarcely a bog-pool left. Another western area, known as Crowthers Pool and Pentre Gove, is a drying swamp on a hill with hardly any open water remaining. The only other localities, about ten in number, are just damp spots in woodland, small depressions under bushes, a few yards across; a few moist places under furze bushes, as on the slopes of May Hill, in the south-east; or a small swamp on a bit of elevated common in one or two districts. The plants here have a precarious hold on existence; one locality has been lost already, as the wood was felled and the land drained and cultivated; and, with a succession of dry seasons, other herbage spreads and fills up the ditch or depression, and the bog moss disappears.

It may be taken as evidence of an anciently far wider distribution of Sphagna in Herefordshire that so large a number of species (17) is found, varying into very many forms (71). The Subsecunda forms, *inundatum* and *auriculatum*, are naturally the most widely dispersed; Acutifolia, with *plumulosum* in several forms comes next; Cymbifolia

are uncommon; Cuspidata occur only on mountain moorland; while Squarrosa are found only in one north-westerly swamp. One variety and two forms are found only in v.c. 36.

Sphagna are only found in Herefordshire on the outer fringe of the county from S.E. to N.W., in the botanical Districts 3 (S.E.), 2 (S.), 1 (S.W.), 14, 13, 12 (W.), 11, 10 (N.W.). None are known from the central or north-eastern parts. The few old records in Purchas and Ley's *Flora of Herefordshire* (1899) will be found under their modern names in the list, which gathers up the results of a careful survey of the county made by us both since 1917. We visited old localities especially, and refound most of the recorded forms, to which we have added many others.

To avoid attaching our initials to each entry, we may state that E. A. is responsible for Districts 1 and 2; and E.A. and C.H.B. together, for the most part, for 3, 11, 12, and 14. Other collectors are named. The names and order follow Mr. J. A. Wheldon's *Synopsis of the European Sphagna*; to whom and also to Mr. W. R. Sherrin we are much indebted for naming the plants.

Sphagnum fimbriatum Wils. var. *robustum* Braithw. f. *compactum* Wheld. 2 Howle Green Wood, E.A. 1918, new form, see M. E. C. Report, 1919; var. *validius* Card. f. *spectabile* W. subf. *squarrosulum* H. Mull. 2 Howle Green Wood; var. *intermedium* Russ. 2 Howle Green Wood, 11 near Kington, Rev. W. O. Wait; var. *tenue* Grav. 2 Howle Green Wood, 14 Black Hill; var. *laxifolium* W. 2 Howle Green Wood.

S. rubellum Wils. var. *versicolor* W. 14 top of Black Mountains, 2100 ft.

S. plumulosum Roll. [Fl. Heref. as *acutifolium* 14 Blaen Olchon] var. *viride* W. 14 Olchon Head and Black Hill, 12 Crowthers Pool; f. *laxum* W. 11 Moseley Mere; f. *squarrosulum* W. 2 Bishopswood; f. *lætevirens* W. 14 Prill Dingle and Black Hill; var. *lilacinum* Spruce 2 Bishopswood; var. *purpureum* W. 11 Lyonshall Park, A. Ley and C. H. B. 1895; var. *versicolor* W. 2 Bishopswood, 12 Crowthers Pool, 14 Black Mountains; f. *validum* W. 14 Black Mountains; f. *tenellum* W. 11 Lyonshall Park, 12 Pentre Gove, 14 Olchon Head; f. *flavofuscescens* W. 14 Craswall; f. *ochraceum* W. subf. *orthocladum* Wheld. 14 Olchon Head, Black Hill, and Prill Dingle, Black Mountains, new form, E. A. 1919 (see M. E. C. Report 1920 and Journ. Bot. 1921, 185, J. A. Wheldon).

S. squarrosum Pers. var. *subsquarrosum* Russ. ap. W., f. *elegans* Russ. 11 in Birch swamp, Huntington Park; f. *gracile* Russ. 11 Huntington Park, E. A. 1922, the only occurrence of this species in v.c. 36.

S. amblyphyllum Russ. var. *macrophyllum* W. 14 top of Cefn Hill, 1700 ft.

S. recurvum P. de Beauv. [Fl. Heref. 2 Howle Green, A. Ley, 3 May Hill, A. L., 14 Crib yr Garth, A. L.] 14 Olchon Head; var. *robustum* Breidl. f. *latifolium* W. 14 above Prill Dingle and boggy swamp on Black Mountain cir. 2000 ft.; var. *majus* Ångstr. p. p., f. *silvaticum* Russ. 3 Haugh Wood, 11 Lyonshall Park, 14 Black Hill and swamp on Black Mountains; subf. *deflexum* W. 11 Lyonshall

Park; f. *subundulatum* W. 12 Crowthers Pool; var. *parvulum* W. f. *viride* W. 2 Howle Green Wood, 14 Olchon Head and summit of Black Mountains; f. *pallens* W. 14 Moorland and bog holes above Prill Dingle.

S. SERRATUM Aust. var. *serrulatum* W. very rare, 14 in bog holes on Black Mountain, 2000 ft.

S. CUSPIDATUM Ehr. [Fl. Heref. 2 Howle Green A. L. not refound, Doward A. L. 1890, 11 Lyonshall A. L. not refound] var. *falcatum* Russ. f. *molle* W. 14 bog holes on Black Mountain moorland; f. *rigidum* W. subf. *pungens* W. 14 moorland bog holes; var. *submersum* Schimp. [A. L.'s record of var. *plumosum* 11 Park Stile, Lyonshall, has been renamed var. *submersum* by J. A. W.], f. *crispatum* W. 14 bog holes above Prill Dingle; var. *plumosum* Schimp. f. *remotum* W. 14 in deep bog holes, Black Mountain, 2000 ft.; f. *densum* W., 14 same locality.

S. OBESUM W. [Fl. Heref. 3 May Hill, A. L., 11 Kingswood Common, A. L. not refound.] 11 submerged in birch swamp, Huntington Park; var. *teretiramosa* W. f. *magnifolium*, W. 3 in very small pool on slope of May Hill, H. H. K. and E. A.

S. HERCYNICUM W. var. *Binsteadii* Wheld. 14 Cefn Hill, C. H. B. 1921, described and figured by J. A. Wheldon in Journ. Bot. 186–8, 1921. The cells of the hyalodermis are elliptical in section, and less incrassate than those of the type, which is not found in Britain. Also there are small pores in mid-cell as well as the commissural ones both in stem and branch leaves.

S. INUNDATUM R. et W. [In the Fl. Heref. are included under *subsecundum* and *contortum* all the forms now placed under *inundatum*, *auriculatum*, and *rufescens*; a list of them follows; most of the localities have been visited and the plants refound and other forms added. Vallets Wood, Pembridge, 11, has been grubbed up and the land cultivated, so that locality is lost (C. H. B., 1918). *Subsecundum* (agg.), all A. L., 1 Welsh Newton Common, 2 Howle Green (not refound), 3 May Hill, Haugh Wood, Mainwood, Putley, 10 Brampton Brian Park, 11 Vallets Wood, 13 Meerbach Hill, 14 Black Mountains; var. *contortum*, 3 Haugh Wood, May Hill, 14 Hatterel Hill] var. *ovalifolium* W. f. *brachycladum* W. 14 top of Black Hill, Cefn Hill; f. *brachyanocladum* W. 11 Huntington Park; f. *eurycladum* W. 12 Pentre Gove, f. *laxifolium* W. 1 Ganarew Hill, 2 Bishopswood, 3 May Hill, H. H. K. and E. A.; f. *densum* W. 1 Ganarew Hill, 12 Crowthers Pool, 14 Cefn Hill, and above Prill Dingle; subf. *brachycladum* W. 14 Cefn Hill; var. *lancifolium* W. f. *falcatum* W. 12 Pentre Gove; f. *tenellum* W. 3 Haugh Wood; f. *submersum* W. 3 Haugh Wood; var. *diversifolium* W. f. *eurycladum* W. 2 Bishopswood; f. *dasybrachycladum* W. 14 Cefn Hill; subf. *fuscescens* W. 12 Brilley.

S. AURICULATUM Schimp. var. *ovatum* W. 3 Haugh Wood; f. *brachycladum* W. 3 May Hill, H. H. K. and E. A., f. *pallidoflavum* W. 14 Cefn Hill; f. *variegatum* W. 3 May Hill, H. H. K. and E. A., 14 Black Mountains by boundary stream; f. *pungens* W. L. Ganarew Hill; var. *canovirescens* W. 12 Pentwyn, 14 Cefn Hill and in drying bog holes, Black Mountains.

S. CRASSICLADUM W. var. *magnifolium* W. 12 Pentre Gove; f. *versicolor* W. subf. *turgescens* W. 14 Olchon Head; var. *diversifolium* W. 11 Lyonshall Park, 14 Black Mountains; f. *intermedium* W. 14 Prill Dingle; subf. *breviramosum* W. 14 Moorland above Prill Dingle.

S. RUFESCENS Nees et Hornsch. var. *magnifolium* W. f. *virescens* W. 3 May Hill, H. H. K. and E. A. 12 Crowthers Pool, 14 Cefn Hill.

S. TURGIDULUM W. var. *teretiusculum* W. 2 Bishopswood.

S. PAPILLOSUM Lindb. [In this group in Fl. Heref. there is no mention of *papillosum*. The few records under *cymbifolium* and vars. are detailed below. The localities, when revisited, were found to contain forms mostly incorrectly named in the *Flora*. A. L. *cymbifolium* 3 May Hill, 11 Vallets Wood, 14 Blaen Olchon, head of Cusop Valley, var. *squarrosulum*, 2 Howle Green, Lodge Grove, 3 Haugh Wood, 11 Vallets Wood; var. *compactum*, 11 Vallets Wood.] var. *normale* W. f. *brachycladum* W. subf. *pallescens* Wheld. 14 Olchon Head; f. *confertum* W. subf. *inundatum* Wheld. 14 Black Hill; var. *sublæve* Limpr. f. *glaucovirens* Schlieph. 14 Black Hill; f. *breviramosum* W. 12 Pentre Gove; f. *compactum* W. 14 top of Black Mountains, 2100 ft.; var. *leve* W. 14 Olchon Head.

S. CYMBIFOLIUM Ehrh. var. *glaucescens* W. 3 Haugh Wood; f. *squarrosulum* Pers. subf. *pycnocladum* W. 2 Bishopswood, 11 Lyonshall; var. *pallescens* W. 2 Bishopswood, 3 May Hill, H. H. K. and E. A.; var. *flavescens* W. 2 Bishopswood, 11 Lyonshall.

We have voucher specimens of all these Sphagna in our herbaria.

CALATHODES.

By T. A. Sprague, B.Sc., F.L.S.

The name *Calathodes* was given by Hooker and Thomson to a remarkable genus of *Ranunculaceæ* discovered by the former at an altitude of 10,000 ft. in the Sikkim Himalaya (Fl. Ind. 40; Fl. Brit. Ind. i. 22), which combined the approximate floral structure of *Caltha* with the foliage of *Trollius*. The generic name doubtless refers to the relationship with *Caltha*, and this connection has led to its being misprinted *Calthodes* (Græco-Latin). The original and correct spelling was *Calathodes*—Hooker accepted the derivation of the Latin *Caltha* (common Marigold, *Calendula officinalis* L.) from κάλαθος (Student's Fl. 9; 1870), and presumably employed the adjective καλαθώδης in the sense of "*Caltha*-like," not "cup-like," since the perianth-leaves of *C. palmata* appear to be spreading.

The type-species, *C. palmata*, was subsequently discovered in Hupeh by Henry and Wilson and figured in Hook. Ic. Pl. t. 1935. But Henry's no. 6977, which was the type of that plate, was a mixture, the flowering specimen being *C. palmata* and the two fruiting ones representing a new species which I described as *C. oxycarpa* (Kew Bull. 1919, 403). As the description and plate in the *Icones* covered both species, it seems desirable to give their synonymy.

It should be mentioned that the Hupeh specimens of *C. palmata* have smaller flowers than the type from Sikkim, but this is the only difference observable. The follicles of Hupeh *palmata* (*Wilson* 2673) are broad and subtruncate above; those of the Sikkim *palmata* are still unknown: should they prove to be different, the Hupeh *palmata* will have to be separated, but pending their discovery there is no adequate ground for according it even varietal status.

CALATHODES PALMATA Hook. f. et Thoms. Fl. Ind. 40 (1855); Fl. Brit. Ind. i. 22; Oliv. in Hook. Ic. Pl. t. 1935, quoad specimen floriferum.

Hab. Sikkim Himalaya, 10,000 ft., *J. D. Hooker*. Hupeh: Hsingshan, 9000 ft., *Henry* 6977 (fl.); western Hupeh, *Wilson* 2048, 2673.

C. OXYCARPA Sprague in Kew Bull. 1919, 403.—*C. palmata* Oliv. in Hook. Ic. Pl. t. 1935, quoad specimen fructiferum.

Hab. Hupeh: Hsingshan, *Henry* 6977 (fruct.); Mt. Wa, 9500 ft., *Wilson* 3056. Szechuan: Tchen-keou-tin; Heou-pin, 7200 ft., *Farges* 924 (a depauperate state).

Hooker and Thomson described the flowers of *C. palmata* as yellow; those of *C. oxycarpa*, according to Wilson, are white, tinged with blue.

A NEW VERONICA FROM BULGARIA.

By Prof. N. Stojanoff and B. Stefanoff,
Sofia University.

While revising the material collected by us in the Strandja range, in south-eastern Bulgaria, we became particularly interested in a species of *Veronica*, which was different from any known to us in the flora of Europe and Western Asia. Owing to the absence of a large general herbarium, we sent a specimen to Mr. W. B. Turrill for comparison with the collections in the Kew Herbarium. Mr. Turrill replied that he had been unable to match the plant, and confirmed our opinion that it represented a new and undescribed species. We have therefore drawn up the following account of the plant, which we have named after Mr. Turrill:—

Veronica Turrilliana, spec. nov. Sect. *Chamædrys* Griseb. Spicil. Fl. Rum. ii. 28; affinis *V. Teucrium* L. et *V. prostrata* L.

Suffrutescens, caulibus numerosis ascendentibus cylindricis ad 2·5 dm. altis lævibus bifariam sparse et breviter puberulis. Folia ovata vel oblongo-elliptica, basi sensim rotundato-attenuata et breviter cuneato-petiolata, circiter 8–12 mm. longa et 6–8 mm. lata, subcoriacea, persistentia, glabra. Racema ex foliorum supremorum axillis 2–4, multiflora, pedicellis vix puberulis calyce æquantibus vel longioribus; bracteæ pedicellis æquilongæ vel sublongiores. Calycis laciniæ 5, lanceolatæ, valde inæquales, glabræ. Corolla 1·1 cm. diametro, lilacino-cœrulea, in fauce lurida et obsolete striata, calyce triplo vel quadruplo longiora. Capsula compressa, apice rotundata, basi rotundata et sinuata, 4 mm. longa et lata, calyce æquilonga vel vix longiora. Floret Majo.

In. rupestribus cretaceis ad Malko Tirnovo in monte Strandja, Bulgaria austro-orientalis.

This new *Veronica* is easily distinguishable from the other species of the group to which it belongs, as follows:

V. Teucrium L.—Perennial but herbaceous. Stems erect, tall. Stems hairy all round. Leaves soft, membranous and pilose, oval or elliptic-cordate, sessile 12–22 mm. broad. Sepals glabrous or ciliate at the margin. Fruit pilose.

V. prostrata L.—Perennial but herbaceous. Stems ascending or prostrate. Stems hairy all round. Leaves rugose, membranous and pubescent, elliptic-oblong, shortly petiolate, 4–6 mm. broad. Sepals glabrous. Fruit glabrous.

V. rhodopea (Vel.) Degen.—Perennial but herbaceous. Stems ascending or prostrate. Stems hairy only along two opposite lines. Leaves rugose, membranous and glabrous, only ciliate at the margins, elliptic-oblong, shortly petiolate, 4–6 mm. broad. Sepals ciliate at the margin. Fruit slightly puberulous at the summit only, otherwise glabrous.

V. Turrilliana, sp. nov.—Suffrutescent. Stems ascending or prostrate. Stems hairy only along two opposite lines. Leaves coriaceous, persistent, quite glabrous, oval or elliptic-oblong, shortly petiolate, 6–8 mm. broad. Sepals glabrous. Fruit slightly puberulous at the summit only, otherwise glabrous.

It is noteworthy that *V. rhodopea* and *V. Turrilliana*, both endemic to the Bulgarian flora, are quite isolated plants; no intermediates are known which connect them with one another or with what are apparently their closest allies—*V. prostrata* L. and *V. Teucrium* L.: at the same time intermediate forms between *V. prostrata*, *V. Teucrium*, *V. austriaca*, and other species of this group, do occur in Bulgaria. It is also worth recording that our plant and the species compared with it above show ecological differences in the habitats respectively favoured. *V. Teucrium* and *V. prostrata* are widely distributed over all Bulgarian territory, as in many other parts of Europe; the former is common in the dry oak and mixed forests, and the latter is not rare in the dry pastures of the plains. On the other hand, *V. rhodopea* and *V. Turrilliana* are apparently narrowly limited in their distribution; the former is a West Rhodopean endemic, occurring in moist mountain pastures, while the latter is a xerophyte, restricted to the small portions of cretaceous rocks which remain oasis-like among the large forests of *Fagus orientalis* and other trees of the Strandja range. The isolated position of these rocks in the forests is connected with the complete absence of a specific xerophytic vegetation. With the exception of *V. Turrilliana* and *Sideritis taurica* M. B., all the other forms occurring in these habitats are common Mediterranean therophytes, apparently of relatively recent introduction. It is thus possible that our new plant is a descendant from *V. prostrata* and was derived from this species, in an older epoch, through the agency of the habitat conditions, and is not, therefore, a recently formed ecological race.

SHORT NOTE.

Nectar Secretion in the Hyacinth. In view of the contradictory statements of various botanical writers, it seems desirable to call attention to one or two facts in regard to the floral biology of the common Hyacinth (*Hyacinthus orientalis* L.). To anyone who has carefully studied the flower, the following statement—in Groom's *Elementary Botany*, ed. xvi. 169; 1920—is rather surprising:—"Apparently no honey [*sic*] is excreted; probably long-tongued insects stab the fleshy parts of the perianth and suck the juice." Christian K. Sprengel, as far back as 1793, stated in his classic work (*Des entdeckte Geheimiss de Natur*, etc.) that the flowers are nectariferous and that nectar is secreted by three glands on the upper part of the ovary. Hermann Müller, however, wrote (*Fertilization of Flowers*, Engl. transl. 1883, 554) that he had been unable to detect any nectar secretion:—"No free honey [*sic*] is secreted, but the wall of the perianth is fleshy and succulent, and is probably bored by long-tongued insect-visitors." Groom does not seem to have devoted any special attention to the flower, and his statement is apparently merely repetition of Müller's remarks. C. Warnstorf, in Schr. Natw. Ver. Weingerode, xi. 1896, states that nectar is secreted by the upper portion of the ovary in three furrows alternating with the sutural grooves of the carpels. Careful examination of the flowers fully confirms Warnstorf's observations, and also substantiates Sprengel's earlier statement; there is a fairly copious exudation of nectar, which forms three large globules in the intra-sutural regions a little below the insertion of the style. If a flower is taken at the right stage, a circular incision made around the base of the perianth tube, and the perianth carefully removed—taking the precaution not to rub or squeeze the ovary—this is very obvious.—A. A. Dallman.

REVIEWS.

The Primulas of Europe. By John Macwatt, M.B. xvi + 208 pp., cr. 8vo, with 41 illustrations (from photographs) and 8 coloured plates. London: 'Country Life,' Ltd. 12*s.* 6*d.* net.

There has been for some time an opening for a comprehensive monograph of the genus *Primula*, so interesting to the critical botanist on account of the large number of species comprised in it and their extremely-perplexing relationships, so attractive to the horticulturist owing to the great beauty of the flowers of most of its species. Even the fine work of Pax and Knuth (1905), though excellent in its day and as far as it went, is no longer adequate; for scores of new species have been discovered and described since it appeared.

When the issue of the present work was announced recently, there seemed a chance that it might meet, to a limited extent, the requirement indicated. Unfortunately its appearance destroys all such hope, for there is little in it that will satisfy the careful botanist. True, the reader will find in it, under each of the thirty species or thereabout treated, extensive synonymic lists, elaborate statements of specific characters, numerous specific "keys," and the like; but these are largely copied, word for word, as is acknowledged

(p. 4), from Pax and Knuth. We have, too (pp. 12–20), a comprehensive synonymic list of the European species, excellent in itself, but not new; for it is extracted bodily from Mr. Chittenden's list of the members of the genus, published in the Report of the Primula Conference of 1913. As to the rest of the botanical information given, some of this is worse than inadequate, for it is largely erroneous. The treatment of the three common British species (all which extend also over the greater part of Europe) is especially unsatisfactory. Dr. Macwatt seems unacquainted with the work done by botanists during the last forty or fifty years to ascertain the distributions and elucidate the relationships of these species, which are admittedly very difficult to discriminate, owing to the readiness with which they hybridize, producing perplexing intermediate forms; yet these "critical" forms and their origins are now perfectly well known to those who have studied them, and many papers have been written upon them. There is, therefore, no excuse for the very out-of-date information given in regard to them. The author's account of that exceedingly interesting plant *Primula elatior* Jacq. is particularly misleading; it might have been written in the days of his grandfather, when there was complete ignorance among botanists as to its status and distribution.

Still, Dr. Macwatt's book is far from being altogether without merit. Many of the half-tone illustrations given are quite pleasing, though one has seen some of them before and the naming of a few is questionable; the coloured plates are, however, poor and ineffective, being ill-reproduced. The volume contains also much information as to the best means of cultivating the various species of *Primula*, and this is no doubt excellent; for Dr. Macwatt is an old and enthusiastic grower, with a genuine love for his plants. His work is in fact really one for the horticulturist rather than for the botanist—and he would have been wise had he confined it entirely to that side of the subject, which he evidently understands thoroughly. Instead of this, Dr. Macwatt has chosen to bestow upon his book an appearance of such extensive botanical erudition as to invite scientific criticism, and he can hardly complain if the botanist, finding how little of the scientific information given is new, criticises the book with some severity.

M. C.

A Handbook of the Larger British Fungi. By John Ramsbottom, O.B.E., M.A., F.L.S., Assistant, Department of Botany. Based on the *Guide to Sowerby's Models of British Fungi* . . . . by Worthington George Smith. Printed by Order of the Trustees of the British Museum, 1923. 8vo, cloth, pp. iv, 222; 141 figures in text. Price 7*s.* 6*d.*

Although based on the *Guide to Sowerby's Models*, this, as Dr. Rendle shows in his preface, is practically a new book; the introduction has been greatly extended, the descriptions generally have been revised and enlarged, and additional matter of economic and biological interest has been included.

Mr. Ramsbottom is to be congratulated in having provided an excellent introduction to the study of the larger British fungi. For many years past, mycologists have been unable to recommend to

would-be students a good text-book, but this deficiency is now admirably supplied. The volume includes a description of all the British genera of Basidiomycetæ, accompanied by the late Worthington G. Smith's fine illustrations.

In the introduction Mr. Ramsbottom gives a lucid and concise sketch of the leading characters that distinguish fungi from all other members of the vegetable kingdom and of the main groups into which these are divided. Incidentally he gives an exhaustive and up-to-date account of fairy rings, mycorrhiza, and poisonous and edible species. These illuminating summaries show how deeply the author is versed in the vast literature dealing with the subject. Amongst the fleshy Agarics, Boleti, Clavariæ, and Puff-balls, the species enumerated are confined to those having edible or poisonous qualities; the *Handbook* thus forms a complete guide to these plants, and its compact form will enable the student to refer to it in the field for their distinguishing characters. Mr. Ramsbottom deals very fully with the poisonous *Amanitæ*, describing the symptoms caused by their ingestion, the medical treatment of the same, and the causative poison. With regard to this last he shows that in cases of poisoning by the destructive *Amanita phalloides* the blood-dissolving hæmolysin phallin is not the cause of death, being dissolved by the action of cooking and broken up by the digestive juices, but the heat-resistant, non-digestible Amanita-toxin of Ford. Under *Armillaria mellea* the rhizomorphs and their destructive action as a parasite on almost every kind of tree are succinctly described; the various rots of timber-trees are briefly referred to under the descriptions of *Polyporus Schweinitzii*, *P. squamosus*, *P. sulphureus*, *P. betulinus*, *Fomes fomentarius*, *F. ulmarius*, &c. The subject of Dry-rot and its control is set out very ably in the notes to *Merulius lacrymans* and *Coniophora puteana*.

We presume Mr. Ramsbottom felt obliged to adopt the misleading names for the authors set out in W. G. Smith's *Synopsis of the British Basidiomycetes*; but we see no reason for his adopting the derivation of *Merulius* from *merula*, a blackbird; Fries (Syst. Mycol. i. 327) derives it from *merus*, pure—"nomine ad Morchellas (*meras*-tute cibarias) denotandas veteres usi sunt, huc transtulit Haller."

A word should be added on the excellent way in which the book is produced, and the reasonable price at which it is published.

CARLETON REA.

BOOK-NOTES, NEWS, ETC.

AT the meeting of the Linnean Society on June 7, Prof. C. E. Moss spoke on the species and forms of *Salicornia* in South Africa, Mr. Ramsbottom exhibited specimens of the White Truffle, *Choiromyces meandriformis*, from Chelmsford. Mr. Burtt-Davy read a paper on the geographical distribution of some Transvaal Leguminosæ. As far as available data enable us to show, the Leguminosæ form the largest family of Transvaal Spermatophyta as regards numbers of species, having about 100 species more than the Compositæ, and comprising nearly 10 per cent. of the recorded species of the flora. The sub-family Papilionaceæ includes fifty-eight genera and 428 species;

excluding the aliens, and the genus *Indigofera* which is not yet fully worked out, we have fifty genera and 325 species. Since the first Check-list of Transvaal Flowering Plants was published in 1911, the number of recorded species of Papilionaceæ has been nearly doubled. A large number of the genera have very few species, and there are few genera with many species, *i. e.*, forty-five species are distributed among thirty genera, while 188 occur in four genera. As a general rule, the genera with few species have no endemics; the greatest number of endemics occur in genera with the greatest number of species; but some of the large genera have a small proportion of endemics, e. g., *Crotalaria* with thirty-three species and *Tephrosia* with thirty-one have only eight and nine endemics respectively. The species show great variation in range, even in the same genus; some range almost the length of the Continent; others are restricted to very limited areas; every possible variation of range between these two extremes is covered by the majority of the species.

At the meeting of the Linnean Society on June 21, Mr. T. A. Dymes spoke on "Seeds of the Marsh Orchids," his remarks being illustrated with lantern-slides, coloured drawings by Mrs. Godfery, and living specimens. He considered that these fell into two groups—*Maculatæ* and *Latifoliæ*. To the first belong *maculata* L.=*Fuchsii* Druce, *ericetorum* Linton=*præcox* Webster, and *O'Kellyi* Druce; to the second *prætermissa* Druce, *incarnata* L., and *purpurella* Stephensons. The seeds of these groups are separable by their testal cells: in *Maculatæ* these are sculptured; in *Latifoliæ* not. Further distinctions are: in *maculata* the apex and testa are curved and pointed, with loose coils; the kernel in *ericetorum* is about one-third larger than in the other two; *O'Kellyi* has a long narrow seed, with close coils; *prætermissa* has a long straight seed, not much dilated above the kernel; in *incarnata* the seed is much shorter and broader, and the mesh and testa are smaller; *purpurella* has the smallest seed, with testa indented above the kernel, tapering, with small mesh. Seeds even from the same plant may vary greatly; there is a form (*Orchis majalis* Reich.) with uniform seeds. Questions connected with the forms can only be solved by systematic cultivation. Colonel Godfery gave an account of the occurrence of certain of the forms abroad, especially in the case of those which did not grow associated with allied forms.

Dr. Walther Rytz's pamphlet, *Leitsätze für ein richtiges Zitieren in wissenschaftlichen Arbeiten* (Ber. Schweiz. Bot. Ges. Heft xxxii. Beilage; Zurich, 1923, 20 pp., 60 centimes), contains an elaborate set of rules, with special reference to botanical literature and with copious examples, for the citation of scientific publications. The general adoption of his suggestions would lead to the saving of time too often unprofitably spent in running down incomplete references, or in tracking an "l. c." to its source. It is gratifying to learn that, so far as England is concerned, established custom renders special rules of citation almost superfluous. Dr. Rytz's recommendation, that references should either be grouped at the end of each work or be inserted as footnotes, is a counsel of perfection so long as the cost of printing remains at the present level.—T. A. S.

THE

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BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.C.S.G., F.L.S.

LATE SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM.

The Journal of Botany was established in 1863 by Seemann. In 1872 the editorship was assumed by Dr. Henry Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

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Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains.

Until the beginning of the late War the Journal paid its way and even allowed a slight margin of profit; but during that period the subscribers were reduced in number, and the continental circulation almost ceased. It has now regained its position, but the increased cost of production, which has not as yet been substantially reduced, has resulted in an annual deficit which at one time became so serious that the continuance of the Journal was threatened. By the generosity of those who felt that its cessation would be a misfortune, especially for British botanists whose principal organ it has always been, the deficit has been met and an appeal is now made for an increased number of subscribers.

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LLOYDIA SEROTINA.

By James Britten, F.L.S.

It is not often that one finds an account of a botanical excursion in a work of fiction; but in the collection of short stories by C. E. Montague, lately published under the title *Fiery Particles*, is a sketch entitled "In Hanging Garden Gully" which merits that description. It is mainly concerned with a graphic and exciting account of an expedition undertaken by the writer in company with an enthusiastic botanist in search of *Lloydia* in its Twll Ddu locality, which, attended with many risks, was rewarded with success. The account brought to my mind a passage in R. A. Salisbury's paper (read before the Horticultural Society in 1812) in Hort. Trans. i. 328 (1820), wherein the name *Lloydia* first appears: "Dr. William Alexander, of Halifax, like Sir Thomas Gage, was near losing his life in climbing to the dangerous summits where it grows wild." Alexander, Salisbury says, gave him a plant which he "sacrificed in examining the root, which is not bulbous"—it may be remembered that the first description of the plant (R. Syn. ed. 2; 233; 1696) characterises it as *Bulbosa Alpina juncifolia* etc.—"but most faithfully represented by Mr. Sowerby in his excellent figure" (E. Bot. t. 793). The plate, published Oct. 1, 1800, was taken from a specimen sent to Sowerby by Smith in that year and received by the latter "in a fresh state" from John Wynne Griffith (1763–1834). Both specimen and drawing are in the Department of Botany, where is also a sheet from the Banksian Herbarium endorsed by Banks: "Trig-ŷ-fylichan, part of the Glyder Range on the N. side of Llanberris in the County of Carnarvon, found by J. W. Griffith of Garn Esq^{r}. the 23rd of June 1794."

Griffith was introduced to Banks in 1783 by a letter from John Lloyd—a frequent correspondent, whose letters range from 1778 to 1790, and whose interests, though including Botany, were chiefly geological—as "a very near neighbour of mine, a very goodnatured young man of family and a decent fortune, now at Cambridge, quite an enthusiast in Botany and very desirous of being introduced to you and your Hortus" (Banks Corr. iii. 162). The letter is dated from "Wickwar," but this, I think, is an error in transcription for "Wȳgfair (*i. e.* St. Mary's Wood) near Denbigh or St. Asaph," whence another letter is dated and where Lloyd resided. It would appear that John Lloyd had sent a specimen of *Lloydia* to Banks which the latter seems to have regarded as unsatisfactory; writing on Oct. 1, 1778, Lloyd says: "I was much surprised to find you were not satisfied of the bulbose plant I sent being Bulbocodium: I do not recollect ever before having seen any plant with a bulbose root near Lanberris; and the leaves answered the description very exactly, so I hope, upon the whole, you may be mistaken; it grew deep betwixt a cleft in the rock which was moist facing the north, with a great deal of earth about the root, which lay 4 inches under the splinter of the rock" (Banks Corr. i. 214). Twelve years later

(Nov. 28, 1790) Lloyd writes that Griffith had "spent some time this autumn at Llanberris" and had made a very fine and plentiful collection now in his garden. . . . The Bulbocodium blossomed in Griffith's garden last month and that specimen was pentandria and pentapetalous, and instead of being 'extus squalide *rubente*' [as Ray had described it] they are viridente, and the green stripe down the middle of the petal of a deep colour, so that he thinks all the specimens we have seen have been blossoms of the year preceding that when they were collected. . . . He found it at Trigoylchon (Trig-y-fylchan) and in two other places" (Banks Corr. vii. 173).

It does not seem that Griffith ever entered into intimate relations with Banks—the only letter from him in the Banksian Correspondence (xiii. 204) dated July 12th [1802] is couched in formal terms and has no connexion with botany—it is concerned with his discovery "beyond all doubt" "that the shell-fish called the Periwinkle is only the first state of a small species of Lobster"—a discovery with which "I think I shall astonish the world." It may be well to correct the dates assigned to Griffith in the *Biographical Index*—for "fl. 1783–1855," b. 1763, d. 1834 should be substituted.

If we may assume, as seems probable, that the Griffith who acted as guide to Brewer in his unsuccessful search for *Lloydia* in 1827 and to Richardson and Sherard in their earlier and successful expedition in 1700 was the father of J. W. Griffith, we may regard J. W. Griffith's "enthusiasm in botany" hereditary. The plant had been discovered by Edward Lloyd in one of his earlier journeys in Wales and, as has been said, was first described by Ray (from his specimens) in 1696 (Syn. ed. 2, 233); Lhwyd accompanied Richardson in 1700. Specimens from the latter are in Buddle's herbarium (xxv. f. 30; Herb. Sloane 124) and in Petiver's Hortus Siccus Anglicus (Herb. Sloane 152, f. 156); the latter is accompanied by the following note in Richardson's hand: "Bulbosa alpina juncifolia pericarpio unico erecto in summo caulículi dodrantalis R. S. 233. In the year 1700 which was the first time that I ever saw the Welsh mountains, being in Mr. Lhwyd's company we found severall plants of it in flower upon the side of Trigvulcaugh being the first time we saw it in flower which was in the beginning of June, it is very difficult to finde unles in flower as I have since several times experienced, not being able to finde one root of it though I am certaine there were severall where I was; the flower when fresh is not unlike that of Trifoliũ acetosũ [*Oxalis Acetosella*] in shape texture & size though the outside of it be of a purplish coloure, this is the only plant I have left and believe I shall never see an other of them unles I fetch it my selfe in the time of flowring. Mr. Lhwyd having by his name [given above] not reduced it to any genus of plants, for my own satisfaction have given it the following name which you may retaine or vary as you may thinke convenient: Ornithogalum alpinũ juncifoliũ humile flore unico erecto intus albo extus ad purpureũ tendente R. Richardson." This name was also communicated to Buddle with the specimen sent to him by Richardson. Petiver (*English Herbal*, t. 67, f. 1) figures it as "Lewyd's (*sic*)

Snowdon Bulb." In R. Syn. ed. 3, 374 (1724), Dillenius prints a note from Richardson in which he refers to his finding the plant in Lloyd's company and modifies his name as follows: "Bulbocodium Alpinum, pumilum, juncifolium, flore unico: intus albo extus squalide rubente." He continues: "Flos ei hexapetalus, pro plantulæ modulo magnus, figura & magnitudine ad florum Lujulæ nonnihil accedens." A rather charming figure (t. xvii. fig. 1) accompanies the description.

Some account of the 1700 expedition will be found in Richardson's undated letter to Sherard (Richardson Corr. p. 237) assigned by his editor, Dawson Turner, on internal evidence, to April 1, 1726. In this he describes the *Lloydia* plant as "springing out of the naked rocks"; "I brought severall bulbs from thence; but they would not flower in my garden, but in a year or two died." The letter was intended, as Turner suggests, "to guide Dillenius and Brewer and [Littleton] Brown in the tour they undertook a month or two afterwards." This is made evident by the letter of Dillenius to Richardson, which appears in the *Correspondence of Linnæus*, ii. 131–143, in the course of which the former thanks Richardson "for your directions, which have proved very useful to us." This letter contains an account of the tour in company with Brewer (who had also seen and followed Richardson's directions) which was of two months' duration. They did not succeed in finding *Lloydia*, and Brewer, who made two expeditions in search of it in June and July of the following year was equally unsuccessful. This we learn from the diary of Brewer's "Botanical Journey through Wales in the year 1726" [1727] of which a transcript by Sigismund Bacstrom, which may form the subject of a future note, is in the Department of Botany. From this it would seem that Richardson had joined the expedition: the passage relating to it runs thus:

"July 10. We went to Trigfylchan with Mr. Griffith [subsequently mentioned as W. Griffith, and probably, as has been suggested, the father of J. W. Griffith] who was guide to Consol and Mr. Sherard and Dr. Richardson, to the place in search for *Bulbosa*, but we did not find it, tho' Dr. Richardson says we were upon the very rock, being very dark and wet weather; Griffith said that he carried us to every place where the said gentlemen went after plants that day and in particular to the place where he says they searched for *Bulbosa*, but our search this day was as fruitless as theirs." It would seem from this that two separate parties visited the locality; Dillenius (in 1776) mentions no other companion than Brewer, and the latter clearly did not accompany Richardson and Sherard. In a letter to Brewer, dated Dec. 20, 1726—the first of seventeen in the Department of Botany, the contents of which are summarised in Druce and Vines' account of *The Dillenian Herbaria*, pp. lviii–lxix—Dillenius reports that [Dr. Richardson] "tells that it is a very hard matter for anybody to find it that does not know the particular place exactly"; this suggests that the visit of Sherard and Richardson mentioned by Brewer may have been early in 1727: the matter is of small importance, but is mentioned lest future writers should think that it has not been fully investigated. It may be

noted that at a later period in the century R. A. Salisbury visited the locality and found the plant: in the fragment of his *Genera of Plants*, published by J. E. Gray in 1866, he writes (p. 52): "Forty years have elapsed since I gathered a living flower of *Anthericum serotinum* on Mount Snowdon";—Salisbury died in 1829; he adds a description, from a dried specimen, which will be found in an amplified form (ix. 884) in the volumes of Salisbury's drawings and MSS. in the Department of Botany; these are too little known, but should be consulted in connexion with Salisbury's work, to the carefulness of which they bear abundant testimony.

In the course of writing these notes my attention was attracted to a fact which, so far as I am aware, has hitherto escaped notice. The genus *Lloydia* is universally cited as of Salisbury, with a reference, as in *Index Kewensis*, to Trans. Hort. Soc. i. 328 (1812). Salisbury here indicates the genus, which he bases on "*Anthericum serotinum* Smith in Engl. Bot. n. 793, cum ic.," with references to L. Sp. Pl. ed. 2, 444 and to R. Syn. ed. 3, 374. After the passage relating to William Alexander quoted above (p. 225) Salisbury continues: "As it constitutes a distinct genus, I have named it after the celebrated Edward Lihwyd (*sic*) Esq." . . . . but he gives no diagnosis. In the fragment of *The Genera of Plants* already referred to—a work which incidentally contains a good deal of interesting information—Salisbury forms for it a special section of his Order *Veratreæ*, which he characterises (p. 51) as: "Sect. 3. Stylus 1. Flores 1-rii vel rarissime 2. Must go to Bulbocodeæ having a true Bulb prominent on one side like *Colchicum*"—in Trans. Hort. Soc. he had spoken of "examining the root, which is not bulbous"; but even if were possible to regard this as a diagnosis, it was not published until 1866, nor does his MS. description contain any generic character.

The first publication of *Lloydia* as a genus seems to be that of L. Reichenbach in *Flora Excursoria* (p. 102), who, however, cites Salisbury as its author, rightly discarding Salisbury's specific name *alpina* in favour of *serotina*, which Linnæus gave the plant under *Anthericum*. The date of the first section of the *Flora* (pp. 1–142) is definitely given by Reichenbach on the half-title to the complete work as 1830; but it appears from a long review (pp. 273–285) in *Flora* for May 14, 1830, that the section was issued in two parts, to the first of which (pp. 1–54) the review was devoted. The second part (pp. 55–140), in which *Lloydia* is contained, is reviewed in the *Literaturberichte* of *Flora* for 1832 (pp. 65–77); the date of the *Flora Excursoria* stands at the head of the notice as 1830–31. That this second part was published later than the first is evident from the last paragraph of the review of part 1; and the date 1830–31, with that of the review (1832), suggests 1831 as the year of its actual appearance. The matter is of some interest, for, in the event of *Lloydia* dating from 1831, it would by antedated by *Nectarobothrium* of Ledebour (Fl. Altaica, ii. 36 (1830)) which is established on the same plant; but in view of the uncertainty as to Reichenbach's date, it would be undesirable to make any alteration of the accepted name for the genus.

The specific name *serotina*—which dates from L. Sp. Pl. 294, where the plant, subsequently (Sp. Pl. ed. 2, 444) placed by Linnæus in *Anthericum*, appears as *Bulbocodium serotinum*—remains as given by L. Reichenbach (*l. c.*), and is thus cited by Kunth (Enum. iv. 244; 1843) and J. G. Baker (in Journ. Linn. Soc. (Bot.) xiv. 300). Salisbury's name *alpina* is adopted in MS. Kew., but is clearly invalid, although it was at one time (*e. g.*, by Smith in E. Bot.) generally adopted. The first restoration of *serotina* appears to be that of Sweet (Hort. Brit. ed. 2, 527; 1830), but he follows the then general tradition of attributing the genus to Salisbury, and was clearly unacquainted with Reichenbach's description. Ledebour (*l. c.*) names it *Nectarobothrium striatum*, basing it upon *Ornithogalum striatum* Willd. Sp. Pl. ii. 112—a plant which Willdenow himself (in Neu Schr. der Berlin Ges. Naturf. Fr. Band iii. 421) subsequently reduced to *A. serotinum*, which is also cited by Ledebour as a synonym of his *striatum*.

HEPATICS FROM WEST SUTHERLANDSHIRE.

By William Edward Nicholson, F.L.S.

In July 1899 I visited Sutherlandshire in company with Mr. H. N. Dixon and Mr. E. S. Salmon, when we investigated the rich moss-flora, particularly in the neighbourhood of Inchnadamph, and the results of our investigations were published in this Journal for 1900 (vol. xxxviii. pp. 410 *et seqq.*). At that time the Hepatics were left severely alone and, though I had long suspected the district of being rich in these plants, it was not until July 1921 that I had an opportunity of remedying past omissions when from the 2nd to the 18th July I stayed with Mr. H. H. Knight at the Inchnadamph Hotel, near the head of Loch Assynt. The rich flora of the neighbourhood is largely due to the great variety of rocks which comes to the surface, as the district was one of considerable volcanic activity in the remote past. Prominent among the rocks are the Durness limestone, which mostly occurs low down, reaching a maximum elevation of about 2000 feet over a small area, the Torridan sandstone, of which Quinag (2653 ft.) with its fine cliffs is mostly composed, and other hard siliceous rocks, of which quartzite is perhaps the hardest. The limestone was not so rich in hepatics as it had proved to be in mosses. The dry exposed cliffs of this formation to the south of Inchnadamph yielded very little, and a large part of it had weathered into smooth rounded surfaces, practically devoid of these plants. The most favourable locality on the limestone was the banks of the Traligill in Glen Dubh, where several interesting species occurred. The majority of the Hepatics and all the interesting "Atlantic" species, in which the district proved to be rich, came from the siliceous rocks, and among the most favourable localities were the slopes of Ben Fhurain and the damp wood by the southern shore of Loch Assynt. With few exceptions,

all the plants were gathered within a short walking distance of the Inchnadamph Hotel, and a short visit to Loch Inver, about 14 miles distant, was rather disappointing from a botanical point of view.

I am indebted to Mr. Knight for a good deal of assistance in preparing the following list, in which the species marked with an asterisk appear to be new vice-county records for West Sutherlandshire:—

Conocephalum conicum (L.) Dum. Glum Dubh.

**Preissia quadrata* (Scop.) Nees. On the limestone, c.fr.

Aneura multifida (L.) Dum. Sphagnum bogs.—*A. latifrons* Lindb. Moist peat near Inchnadamph.

Metzgeria furcata (L.) Dum. Trees and rocks. It was very common on rather dry rocks near Loch Inver, often c.fr.—**M. pubescens* (Schrank) Raddi Limestone cliffs, Inchnadamph.

**Fossombronia Dumortieri* (Hueb & Genth.) Lindb. Shore of Loch Assynt, c.fr.

Gymnomitrium concinnatum (Lightf.) Corda Ben Fhurain, alt. ca. 2250 ft.—*G. obtusum* (Lindb.) Pears. and **G. crenulatum* Gottsche. Allt Poll an Droighinn.—*G. adustum* Nees. Near Inchnadamph.—**G. alpinum* (Gottsche) Schiffn. var. *heterophyllum* Bernet, Ben Fhurain.

Marsupella ustulata* Spruce. Allt Poll an Droighinn, c.per.—M. Funckii* (Web. & Mohr) Dum. Glen Dubh.—*M. emarginata* (Ehrh.) Dum. Near Inchnadamph.—**M. Pearsoni* Schiffn. Allt Poll an Droighinn.—*M. aquatica* (Lindenb.) Schiffn. Stream in the wood by Loch Assynt.—**M. Sullivantii* (De Not.) Evans. Allt Poll an Droighinn.

**Eucalyx paroicus* (Schiffn.) Macv. Near Inchnadamph, c.per.

Haplozia sphærocarpa (Hook.) Dum. Allt Poll an Droighinn, c.per.—**H. cordifolia* (Hook.) Dum. Glen Dubh.—*H. riparia* (Tayl.) Dum. On the limestone by the Traligill, Glen Dubh, c.per.

Jamesoniella Carringtoni (Balf.) Schiffn. Very fine on the lower slopes of Ben Fhurain; not uncommon, but smaller on Meallan Liath Mor at an alt. of about 1200 feet with other Atlantic species.

**Anastrophyllum Donianum* (Hook.) Steph. Higher slopes of Ben Fhurain, not infrequently with perianths also on Meallan Liath Mor at a much lower elevation on a rather dry skree.

**Anastrophyllum Jörgensenii* Schiffn. A few stems of this interesting plant were found in tufts of *A. Donianum* from Ben Fhurain. I sent some to Mr. Macvicar, who submitted them to Mr. Jörgensen, and the latter replied "It must really, I think, be our *A. Jörgensenii*, but it is a considerably larger form (compare Schiff. Hep. eur. exs.)." The following is a translation of Dr. Schiffner's original description in Hedwigia, Bd. xlix. pp. 396 *seqq.*:—

Anastrophyllum Jörgensenii Schiffn. Tufts erect, 15–16 cm. high. Stems generally simple, slender but rigid, black, almost without rhizoids; leaves approximate (smaller and more distant in the more slender stems) subsecund, transversely inserted, patent, amplexicaul at the base, concave, margins and apex more or less incurved, often with two irregularly longitudinal furrows on the back,

fragile, the lower leaves brown or blackish-brown, the upper more or less reddish to almost carmine, broadly cordate when flattened out, larger leaves 1 mm. and more long and equally broad (smaller leaves of the more slender stems 0·7 mm. long and equally broad), subcordate at the base, apex broad with a shallow sinus, lobes unequal, roundish. Apical cells about 12 μ, lumen stellate, interstices almost equal to the lumen (rarely less incrassate and not conspicuously stellate), cells of the middle of the leaf similar, but larger, 18–20 μ long, 14–15 μ broad, basal cells almost rectangular, much larger up to 43 μ long and 17 μ broad, nodulose, incrassate in the angles.

Inflorescence dioicous, ♀ terminal, often with innovations underneath; involucral leaves slightly larger than those of the stem and in other respects similar, but more cordate at the base and the lobes unequal, the latter sometimes smaller and subacute, bracteole absent. Perianth up to 22 mm. long, 6 mm. broad (often less), cylindrical, subtriquetrous above, bleached and plicate-constricted at the mouth, the rest reddish-brown, in the upper part formed of elongated, subrectangular almost equally incrassate cells, mouth provided with short incurved cilia, often of two superimposed cells. Capsule unknown.

The Sutherlandshire plant agrees well with the above description and with the specimen in Schiffner's Hep. Eur. Exs. No. 423 so far as the very characteristic shape of the leaves is concerned, though as pointed out by Mr. Jörgensen it is considerably larger. Mr. Macvicar, who has also kindly examined and compared it, points out that it is a good deal larger and darker in colour than Schiffner's plant above referred to, but he says that there is little difference otherwise, and he adds that "the more concave fragile leaves, only about as long as broad, and the usually retuse or emarginate apex with rounded or obtuse lobes, seldom subacute, are quite different from those of *A. Donianum*." It is unfortunate that there are no perianths on the Sutherlandshire plant for comparison. The plant was always found on Ben Fhurain as a few stems intermixed in tufts of *A. Donianum*, but in Norway it has been found in considerable quantity and often in pure tufts.

Gymnocolea inflata (Huds.) Dum. Not uncommon.

Lophozia turbinata (Raddi) Steph. Limestone cliffs.—**L. badensis* (Gottsche) Schiffn. On the limestone.—*L. Muelleri* (Nees) Dum. By the Traligill in the lower part of Glen Dubh, not uncommon and variable.—**L. longidens* (Lindb.) Macoun Wood by Loch Assynt.—*L. incisa* (Schrad.) Dum. On *Sphagnum*, Glen Dubh.—*L. Floerkei* (Web. & Mohr) Schiffn. Ben Fhurain.—*L. quinquedentata* (Huds.) Cogn. Ben Fhurain in tufts of *Anastrophyllum*.

Sphenolobus minutus (Crantz) Steph. Wood by Loch Assynt, c.per.—*S. ovatus* (Dicks.) Schiffn. Trees in the wood by Loch Assynt, c.per.—*S. exsectiformis* Breidl. Steph. Wood by Loch Assynt.

Anastrepta orcadensis (Hook.) Schiffn. Not uncommon in the district.

Plagiochila asplenoides (L.) Dum. Here and there, but not common.—**P. spinulosa* (Dicks.) Dum. Slopes of Glas Ben.—**P. punctata* Tayl. and **P. tridenticulata* Tayl. Trees in the wood by Loch Assynt.

Leptoscyphus Taylori Hook. Mitt. Not uncommon.—*L. anómalus* (Hook.) Mitt. Wet peaty ground, apparently rare.—**L. cuneifolius* (Hook.) Mitt. In some abundance, mostly on *Frullania* growing on rock, in the wood by Loch Assynt.

**Lophocolea cuspidata* Limpr. Wood by Loch Assynt, c.per.

**Chiloscyphus polyanthus* (L.). Corda var. *fragilis* (Roth) K. M. Marshy ground, Glen Dubh.

**Harpanthus Flotowianus* Nees. By a stream in the upper part of Glen Dubh.

Saccogyna viticulosa (Sm.) Dum. By a waterfall on a stream from Glas Ben.

Cephalozia bicuspidata (L.) Dum. Common, c.per.—**C. Lammersiana* (Hüb.) Spruce. Wet peaty ground, c.per.—*C. pleniceps* (Aust.) Lindb. var. *macrantha* (Kaal. & Nichols.) K. Müll. Marshy ground, rare, c.per.—**C. Loitlesbergeri* Schiffn. Among Sphagnum, rare.—**C. media* Lindb. Wood by Loch Assynt.—**C. leucantha* Spruce. Near Inchnadamph.

**Nowellia curvifolia* (Dicks.) Mitt. On moist peat.

**Prionolobus striatulus* (Jens.) Schiffn. Rare, Meallan Liath Beag, c.per.

Hygrobiella laxifolia (Hook.) Spruce. In and by the stream in the upper part of Glen Dubh, sometimes c.per.

Odontoschisma sphagni (Dicks.) Dum. Here and there on moist moors near Inchnadamph.—**O. denudatum* (Nees) Dum. var. *elongatum* Lindb. Wet ground, Meallan Liath Mor, sparingly.

Bazzania tricrenata* (Wahl.) Pears. Generally common in the district.—*B. triangularis* Pears. Ben Fhurain, sparingly.—B. Pearsoni* (Steph.) Pears. Skree on Meallan Liath Mor in company with *Scapania nimbosa, Anastrophyllum Donianum, Jamesoniella Carringtoni* and other Atlantic species. A fine form and rather more robust than the plant from Ireland; also among *Anastrophyllum* on Ben Fhurain. I have also seen this species from Ben Atta, Glencoe, where it was gathered by the late Mr. W. West, and it is possible that it extends over a considerable area of the West of Scotland. I have seen it commonly this year in Glen Nevis.

Lepidozia trichoclados K. Müll. Moist peaty ground in the wood by Loch Assynt with a few immature perianths. Among the older stems are a number of oblong bodies of variable size, which are really short, swollen branches. often provided with very rudimentary leaves. They appear to function as gemmæ, which are rare in this genus and very rare of this form among all Hepatics.

Blepharostoma trichophyllum (L.) Dum. Common and not infrequently c.per. in the wood by Loch Assynt.

Anthelia julacea (L.) Dum. Common on wet stony ground.

Herberta adunca* (Dicks.) Gray. Ben Fhurain at about 2000 feet, well marked.—H. Hutchinsiæ* (Gottsche) Evans. More generally distributed in the district, but at lower elevations than *H. adunca*. These two species are carefully distinguished, and valid reasons are given for considering them distinct by Dr. A. W. Evans, of Yale University, in his "Notes on the Genus *Herberta*" (Bull. Torrey Bot. Club, 1917, pp. 191 *et seqq.*). An abstract of this paper, so

fascicle. As regards these species, was given in this Journal for 1919, pp. 42–44, by the late Mr. W. H. Pearson.

**H. tenuis* Evans. Among rocks in the wood by Loch Assynt, a single largish tuft only. *H. tenuis* is proposed as a new species by Dr. Evans in the paper above cited, and it is distinguished from *H. Hutchinsiæ* by its smaller size, straighter leaves with rather less thickened cells, and the not infrequent presence of rounded or sharp teeth on the basal margins of the leaves. I submitted the Scotch plant to Dr. Evans, who replied: "It seems to me that you are correct in referring your *Herberta* to *H. tenuis*, and I am glad to know that the latter species occurs in the British Isles as well as in North America." *H. tenuis* is no doubt very close to *H. Hutchinsiæ*, and if one looked at the Scotch specimen alone, it might perhaps be regarded as a depauperate form or variety of that species. Dr. Evans attaches considerable importance to the marginal teeth which are generally obtuse in the Scotch plant, and to the remarkable fact that in North America the two plants appear to have entirely different ranges, *H. tenuis* being restricted to the hills and mountains of Eastern North America and *H. Hutchinsiæ* to the Pacific coast. The conditions in the wood by Loch Assynt, which was moist and sheltered, were not such as generally produce depauperate forms, and most of the Hepatics growing in it were rather luxuriant.

Mastigophora Woodsii (Hook.) Nees. Ben Fhurain and Meallan Liath Mor, fairly common but small in the latter locality.

Ptilidium ciliare L. Hampe. Glen Dubh.—**P. pulcherrimum* (Web.) Hampe. Pine trunk near Loch Inver, a single tuft only.

Diplophyllum albicans (L.) Dum. Fairly common, c.per.—**D. obtusifolium* (Hook.) Dum. Lower part of the Valley Alt nan Uamh, rare, c.per.

Scapania subalpina (Nees) Dum. Glen Dubh, a pale lax form.—**S. Bartlingii* (Hampe) Nees. Glen Dubh, on moist limestone rock by the Traligill with *S. æquiloba* and other Hepatics.—*S. æquiloba* (Schwaegr.) Dum. Moist limestone rocks, Glen Dubh.—*S. gracilis* (Lindb.) Kaal. Widely distributed.—*S. aspera* Bernet. Limestone rocks by the Traligill.—**S. nimbosa* Tayl. and **S. ornithopodioides* (With.) Pears. Ben Fhurain and Meallan Liath Mor.—*S. dentata* Dum. Glas Ben.—*S. undulata* (L.). Dum. Glen Dubh.—*S. uliginosa* (Swartz) Dum. Near the stream, Alt a Chalda Mor.—*S. irrigua* (Nees) Dum. Frequent in the district.—*S. curta* (Mart.) Dum. var. *geniculata* (C. Massal.) K. Müll. On decaying heather, upper part of Glen Dubh, very sparingly, with a few perianths.—*S. umbrosa* (Schrad.) Dum. Wood by Loch Assynt.

Radula complanata (L.) Dum. Trees near Loch Inver, c.per.—**R. Lindbergii* Gottsche. Limestone rocks, Creag nan Uamh.—**R. aquilegia* Tayl. Rocks in the wood by Loch Assynt.

Pleurozia purpurea (Lightf.) Lindb. Marshy ground near Inchnadamph; a dark, occasionally almost black, form.

Madotheca lævigata* (Schrad.) Dum. Below the limestone cliffs at Inchnadamph.—M. platyphylla* (L.) Dum. Creag nan Uamh.

**Colurolejeunea calyptrifolia* (Hook.) Schiffn. Moist shaded rocks in the wood by Loch Assynt, c.per.

Cololejeunea calcarea* (Lib.) Schiffn. Limestone rocks by the Traligill.—C. microscopica* (Tayl.) Schiffn. Moist rocks in the wood by Loch Assynt.

Lejeunea cavifolia (Ehrh.) Lindb. Near Inchnadamph and Loch Inver, common, c.per.—*L. patens* Lindb. Wood by Loch Assynt and by a stream near Loch Inver, c.per.

Drepanolejeunea hamatifolia* (Hook.) Schiffn. Moist rocks in the wood by Loch Assynt with *Radula aquilegia*.—Frullania germana* Tayl. Birch-trees in the wood by Loch Assynt, in large well-developed tufts, c.per.—*F. Tamarisci* (L.) Dum. Common, c.per. —*F. fragilifolia* Tayl. Moist rocks, Glas Ben.

WILLIAM BARCLAY

(1846–1923).

British Botanists generally and Scottish Botanists in particular will deeply regret the death of William Barclay which occurred suddenly at his home in Perth on the 10th of May.

Born at Tulloch, near Perth, on 19th March, 1846, he was the second oldest of a family of six, of whom two were sons and four were daughters. He received his early education at the National School in the "Fair City" that was his native town, and in which he was destined to spend the greater part of a long life. Choosing teaching as his profession, he served, as was the custom in those days, his apprenticeship in one of the city's schools, and when eighteen years of age he proceeded to the Church of Scotland Training College in Edinburgh, having gained first place in the examination qualifying for entrance. On the completion of his training in Edinburgh he was appointed to Glenrinnes School, in Banffshire, where he remained for fully five years. In 1871 he returned to Perth as Headmaster of Watergate School, relinquishing that charge on his appointment in 1884 to the Headmastership of the new Western District School, where he remained until his retirement in 1911, after having been actively engaged in the teaching profession for forty-five years. During that period, as many can testify, nothing but success attended his scholastic work. As a prominent educationalist he was well-known—a Fellow of the Educational Institute of Scotland and for a considerable time Secretary and Treasurer of the Perthshire Branch. Deeply interested in all that concerned the welfare of the community of which he was a member, he ungrudgingly devoted much of his time to helpful social work connected with his town. He acted for many years as a Director of Perth Royal Infirmary, and served as Convener of the Books Committee of the Sandeman Public Library from the date of its opening. He was an active member, also, of the Perthshire Horticultural Society.

Residence in Perth brought Barclay under the influence of Dr. Buchanan White, who, during the last thirty or forty years of the nineteenth century, was the mainspring of all that pertained to the study of the Natural History of Perthshire—the guide and

inspirer of that small band of workers who set themselves the task of investigating the flora and fauna of the premier county of Scotland. With this aim in view, the Perthshire Society of Natural Science was founded in 1867, and few small societies can boast so fruitful a record of work of over fifty years. The chief botanical outcome of the Society's labours was *The Flora of Perthshire*, published in 1898. Both in the collection of material and in the preparation of the work for publication Barclay was intimately associated with the author and with the late Professor J. W. H. Trail, into whose hands fell the editing of the volume. But the appearance of the county Flora was not an end in itself. The work of the Society continued, and for twelve years Barclay was responsible for the publication of its *Transactions and Proceedings*, retiring from that duty only to fill the more arduous one of the presidential chair—an office he maintained with conspicuous ability and success for eleven years, resigning as recently as 1918. During his long association with the Society he contributed numerous papers to its publications, and it was typical of the man as a worker that when he had prepared some technical communication—usually exclusively botanical—as his Presidential Address he would ask it to be taken as read and would then deliver an illuminating account of some more general topic—not infrequently dealing with the history of his native city, a subject on which he was recognised as no mean authority.

It was natural that Barclay's botanical work should centre mainly on the flora of his own county; its wood and glen, mountain and moor, river and loch provided ample and varied ground for the enthusiastic worker he was, and no more delightful and helpful companion in the field could one desire to meet. He knew Perthshire well, and many a botanist from across the Border sought his guidance to the stations for some of Britain's rarest plants.

In his countless excursions Barclay made discoveries which added greatly to our knowledge of the local distribution of plants within the county. An important paper was "Additions to the List of Perthshire Plants since the Publication of Dr. White's 'Flora,'" published in Proc. Perth. Soc. Nat. Sci. 1912. Some of his finds were of course of interest to botanists beyond the bounds of Perthshire: his discovery of *Poa palustris* in 1889 in the marshes of the River Tay below Perth constituted an addition to the British Flora; *Potamogeton venustus* Baagoe, found in the River Earn in 1915, proved to be the first British record for this rare hybrid pondweed; while in the following year he added a second Scottish station at Loch Moraig for *P. gracilis* Wolfg.

It was not, however, the mere finding and the collecting of plants that interested Barclay, although these he enjoyed as the reward of many a long tramp or toilsome climb, but it was the underlying problems of distribution that fascinated him. There is evidence of this in his early papers which deal with the floras of several restricted areas in his own immediate neighbourhood. Cataloguing in 1887 the flowering plants of the "Woody Island," a small island in the Tay above Perth, he says: "Nothing has struck me more forcibly in drawing up the list of the Woody Island Flora than the

importance of the plan which was inaugurated last year . . . . . of thoroughly examining and recording the flora of a comparatively limited locality. In this way not rarities only are noted, but, what is more liable to be overlooked or neglected, the presence or absence of the commoner plants is forced upon the attention of the enquirer. Such records will not only serve as guides to local students and as authentic testimonies to which reference can be made in the future, but, as it is only in this way that the larger districts can be thoroughly and systematically worked out, they will provide a body of facts which will help to throw light upon many dark questions concerning the distribution of species, questions which are at present but little understood, and to the solution of which naturalists are as yet but slowly groping their way." During his long residence in Perth the banks of the Tay as far as "Woody Island" was one of his favourite walks, and there, as elsewhere, his eye was ever open for those changes in plant-life which are constantly taking place.

But undoubtedly it is by his contributions to our knowledge of British roses that Barclay is best known to a wide circle of botanical friends and correspondents. Until he systematically took up its study, very little was known about this critical genus and its distribution in Scotland. The hybrid forms interested him especially, and in Ann. Soc. Nat. Hist. are numerous notes on the occurrence of *Rosa involuta* Sm., *R. hibernica* Sm., and other *pimpinellifolia* hybrids in different parts of Scotland. Roses also formed the subject of most of the notes that occasionally appeared from his pen in the pages of this Journal. The rare hybrid *pimpinellifolia* × *rubiginosa* which he first discovered in Scotland at Caputh in 1897 was found in greater abundance on the Haddington coast and recorded in Journ. Bot. 1910, 260. In the same volume he described (p. 332) from the same locality a distinct variety of *R. hibernica* without appending a varietal name.

It is of interest to recall that it was through the introduction of the late Sir Isaac Bayley Balfour that Barclay entered into correspondence in 1894 with Professor Crépin, of Brussels, one of the leading continental rhodologists at that time. The exchange of specimens which followed, together with the observations Crépin was able to offer from a wider field of experience, enabled Barclay to deal systematically with his Scottish material, and he published the first of his results in this connexion in Ann. Scot. Nat. Hist. 1896, under the title "Notes on Scottish Roses." One form of the *R. coriifolia* aggregate perplexed him, as it also did Crépin, and only after long and patient study did he publish an account of it under the name of *R. subcoriifolia*. The description is given in "Further Notes on Scottish Roses" (*op. cit.* 1899). This, so far as the writer is aware, is the only name of which Barclay is the author, and among those who were especially interested in the genus the plant provoked a certain amount of discussion in which the author held his ground with characteristic tenacity, maintaining to the end that his species was distinct from any of the earlier described forms to which some sought to refer it. Had it been his inclination to create names, he could have done so, as he often told me, with great ease, for the

minor variations so abundantly found in the southern *canina-dumetorum* series all bearing their varietal names are as profusely developed in its northern counterpart the *glauca-coriifolia* series that came so prominently before his notice. But Barclay had no sympathy for the species-monger. He could never understand the attitude of mind which resulted in the creation of innumerable names such as were proposed by continental authors, making "confusion worse confusion." It was some satisfaction to him to know that by his position as a referee in the Botanical Exchange Clubs, by correspondence and in other ways, he was able to make his moderating influence felt. He was satisfied with the major species that are recognisable in the field or in the herbarium; when recent cytological work on the genus became known he remained content with the larger morphological view, saying that "after all, one cannot sit down in the field with a microscope and count the chromosomes in order to determine one's species." He was not a species-hunter; the criticism that the field botanist neglects ninety-nine common plants "in the transports of finding some obscure or critical type 'new to the district'" could never be advanced against him. The man was much bigger than that. He searched for abiding knowledge, not for passing notoriety.

In his latter years practically all Barclay's botanical energies were devoted to the study of the genus he had determined to master, and to make more room in his herbarium for his Roses he gave his general collection of plants to the writer in 1913. He did not mount his specimens in orthodox fashion, but left them loose between double covers, enabling him "always to get a better look at them." With some persuasion from his friends he published his matured views on his favourite genus in a number of papers in Proc. Perth. Soc. Nat. Sci.; "Our Native Hybrid Roses" appeared in 1911 and "Notes on Roses" in 1915 and 1916.

It is no secret that Barclay was asked to write the account of the genus *Rosa* for the *Cambridge British Flora*, but, although that is a considerable time ago, he felt even then that increasing years and ties of home would prevent him from completing a work which involved, as he recognised it would, repeated consultations of the great libraries and collections at South Kensington and Kew. But the invitation was a recognition of the man's worth and of his ability to perform a difficult task, and anyone seeking a sound view on one of our most troublesome genera could not do better than turn to Barclay's "Notes."

In the early part of the present year, in recognition of his services to botanical science he was recommended for election as an Associate of the Linnean Society. The election took place on 3rd May. Three days later he wrote to me saying he had never been particularly desirous of having distinctions attached to his name—characteristic of the man—"but," he adds, "this is one which I shall estimate very highly and be proud of as long as life lasts." It is sad to realise that only for seven brief days did he enjoy the honour he prized so much and which he so justly deserved.

J. R. Matthews.

PEHRIA, NOM. NOV.

By T. A. Sprague, B.Sc., F.L.S.

Dr. Rendle has shown (p. 115) that *Grislea* L. (1753) is the earliest name for the important tropical genus *Combretum* Loefl. (1758). All botanists who accept the principle of *nomina conservata* will doubtless agree that *Combretum* should be added to the list, but the case for retaining the name *Grislea* for the genus of *Lythraceæ* which usually bears it does not seem so convincing. If Loefling had given the name independently to the Lythraceous shrub which he discovered in Venezuela, *Grislea* Loefl. would automatically be adopted under International Rules (Art. 50) as soon as *Grislea* L. was treated as a *nomen rejectum*. But Loefling must have known of the existence of *Grislea secunda* L.—he had the *Species Plantarum* with him in Venezuela, and referred to it as his only vade-mecum so far as species were concerned (Iter, 110); and it is improbable that he would have knowingly applied a Linnean name to a different plant. He apparently identified the Lythraceous shrub as *Grislea* from Linné's diagnosis in the *Genera Plantarum*, and thought it desirable to supply a new and more complete description, including an account of the fruit and seeds.

The only means by which the name *Grislea* could be retained for the genus of *Lythraceæ*, with which Loefling erroneously identified it, would be to put *Grislea* Loefl. on the list of *nomina conservata*. But exceptions to rules are justifiable only when a strong case can be made out for them; and to conserve an erroneous name for a monotypic genus would, in my opinion, tend to prejudice the chances of general acceptance of the principle of *nomina conservata*. A new name is therefore required for *Grislea* Loefl., *non* Linn. (1753), as *Grisleya* Post et Kuntze is merely an orthographic variant. The genus may accordingly be known as Pehria in commemoration of Pehr Loefling, who was the first to discover and describe it.

Pehria, nom. nov.—*Grislea* Loefl. Iter, 245 (1758); Linn. Syst. ed. 10, ii. 999; Gen. Pl. ed. 6, 189; Koehne in Engl. Jahrb. iii. 343; et in Engl. Pflanzenr. Lythrac. 244; *non* Linn. (1753).

P. compacta (Rusby) comb. nov.—*Grislea compacta* Rusby, Descr. N. Sp. S. Am. Pl. 68 (1920). *G. secunda* Loefl. *l. c.*; H. B. K. Nov. Gen. vi. 185; Koehne, *ll. cc.*; Rusby, *l. c.*; *non* Linn. (1753).

Hab. Venezuela: near San Bernardino (5 miles from Barcelona), *Loefling*; near Caracas on the banks of the river Anauco, 2760 ft., *Humboldt et Bonpland*; Caracas, *Linden* 10! *Birschel*! *Mærter*! *Cockburn*! valley of Macarao, *Moritz* 1708! near Colonia Tovar, *Fendler* 519! Venezuela, *Funck et Schlim* 307! La Guayra, Victoria and Valencia (*fide* Koehne). Colombia: Santa Marta, 200 ft., *H. H. Smith* 1874! 1000 ft., *H. H. Smith* 1875! Santander; near Ocaña, on mountain ridge in open sunny places, 6000 ft., *Kalbreyer* 641! Cundinamarca; Cáqueza, 6000 ft., *Triana*! (Hb. Kew.) *Triana* 6156! (Mus. Brit.).

Vernacular name "Indiecito" (Venezuela).

I can find no characters by which to distinguish *Grislea compacta* Rusby (Smith 1875), which is an excellent match of Linden 10 from Caracas. Smith 1874, which Dr. Rusby has named *G. secunda*, appears to be merely a broad-leaved form of the same species. The genus *Grislea* is attributed by Koehne (*ll. cc.*) to "Loefl. in Hort. Cliff. 146 (1737)," at which date Loefling was only eight years old. Apparently Koehne did not study the description in Hort. Cliff.: the sentence "Racemus ramos terminans, simplex, extrorsum flexus, longitudine foliorum, cui a basi ad apicem insident numerosi flores pedicellis longitudine calycis, sursum uno versu flexi omnes" is irreconcilable with the Lythraceous plant; the latter has *axillary compound* inflorescences *much shorter* than the leaves, and the flowers are *not* secund.

FORSSKÅL'S HERBARIUM.

In his book *Naturforskeren Pehr Forsskål* (1918), of which a short notice appeared in this Jounal for that year (p. 357), Dr. Carl Christensen promised to give an index to the *Flora Ægyptiaco-arabicæ* (1775); this was delayed on account of the cost of printing, but is now published in Dansk Bot. Archiv. vol. iv. n. 3; 1922.

In order to perform his task thoroughly, Dr. Christensen has examined Forsskål's Herbarium at the University of Copenhagen. This is now kept separately, and contains about 1300 specimens; of the total number of plants described or mentioned in the *Flora*, about 500 are represented in the Herbarium, including about 400 of the 700 new species there described, besides numerous types of species founded by other botanists, chiefly by Vahl (in his *Symbolæ Botanicæ*) and Rottboll, on plants collected by Forsskål. His specimens had many vicissitudes; some sent by him to Copenhagen never reached their destination; a parcel from Suez and others from Constantinople were lost; the plants from Yemen were brought by Niebuhr to India, and sent thence to Copenhagen, where they were not unpacked until 1767: "in 1772 they were removed to the University, and placed under the care of Professor Rottboll, who at once began to describe some of them, especially the *Cyperaceæ*, but the bulk of the plants was not determined." In 1916 Dr. Christensen undertook the rearrangement of Forsskål's Herbarium, and discovered that numerous species redescribed by Vahl, including all the *Compositæ* and *Papilionaceæ*, were missing; most of these, however, were found in the General Herbarium of the University. It may be noted that the Department of Botany contains a large number of Forsskål plants, which formed part of the Banksian Herbarium. A memorandum by Robert Brown, dated March 26th, 1808, runs:— "Forskael's plants in Herb. Banks were received from Fabricius, then a professor at Copenhagen, and were laid in before Mr. Dryander came to England [1777]. Several of them have names not to be found in Forskael's Flor., which Mr. Dryander supposes came with them as well as the short descriptions which accompany a few of

them." A large number, about 180, mostly very small specimens, and many represented only by autograph labels, were acquired with Nolte's herbarium, which was purchased by the Department in 1875. Another note by Brown (undated) runs "Forskael's coloured drawings for 3 guineas; of this Mr. Dryander supposes there is only another copy, they are paintings copied from the originals of"—the sentence is not completed, and the drawings cannot be traced.

Dr. Christensen's revision of the *Flora* is very complete; it conveys in little space indications of the existence or non-existence of each species in the Herbarium; the arrangement is that of the *Flora* under the names there given, followed by such synonyms as bear upon them and the modern name of the species; the relation of all being made clearly an excellent typographical arrangement. In the identification with more recent species, Ascherson, Schweinfurth, and Muschler have, as a rule, been followed. "My purpose," says the author, "is chiefly to point out whether Forsskål's species really were undescribed in 1775 [the date of the publication of the *Flora*], and their names in consequence have claim of priority; in some cases I have therefore created new combinations of names"

The clear printing and arrangement of the revision render it very convenient for consultation, and Dr. Christensen is to be congratulated on his useful and interesting work.

SHORT NOTES.

The Derivation of Merulius. In his review of the British Museum *Handbook of the Larger British Fungi* (p. 222) my friend Mr. Carleton Rea comments on the adoption of the derivation of *Merulius* from *merula*, a blackbird, adding that Fries (Syst. Mycol. i. p. 327) derives it from *merus*, pure—"nomine ad Morchellas (*meras*—tute cibarias) denotandas veteres usi sunt, huc transulit Haller." Mr. Rea in his *British Basidiomycetæ* follows Fries, as do Bigeard and Guillemin and others. On the other hand, Saccardo derives the name from "*Merula*, prob. ob colores fungi," and in this is followed by W. G. Smith. The name *Merulius* was first used with more or less its present significance by A. Haller, who in his *Historia Stirpium indigenarum Helvetiæ* 1768 includes four species in the genus—two of them species of *Cantharellus* and the other two *Merulius tremellosus*—"Nomine meo Johannes Bauhinus & Boerhaavius ad alium Fungum usi fuerant." Bauhin and Boerhaave had both used the name *Merulius* to signify Morels, both, moreover, including the same four species, the "primum genus" of the "fungi esculenti" of Clusius. (Haller in 1742 had used the name for one of these species of Morchella.) The first use of the name *Merulius* is usually assigned to J. Bauhin, who in his *Historia Plantarum* 1651 (lib. xl. Cap. 37) treats of "Fungus rugosus, vel cavernosus, siue Merulius niger & albus." There is neither here nor in Haller any suggestion of the derivation of the name, and on the face of it there seems more ground for Saccardo's guess than for that of Fries. Although the matter seemed of little consequence, it appeared likely

that Bauhin had adopted it from some other writer; and that further investigation might give a clue to its derivation. A search showed that the name first occurs in J. Ruellius' *De Natura Stirpium* (1536), where (lib. iii. Cap. cxiiii.) the following sentence appears: "Nanq; qui riguis prodeunt longo pediculo, callo corporis in turbinem mucronato, *merulios*, a metae figura, quasi metulios nominant"—and it was found that this same sentence occurs in Bauhin's introductory remarks on fungi where he describes Ruelle's classification. It is clearly a description of Morels. Ruelle in his account of fungi has four groups which are very much those of his mentor Hermolaus. In addition he has several groups with descriptive names which he attributes to popular French usage, e. g., *fusei*, *campestres*, *arborei*, *crepitus lupi*. *Merulii* occur amongst these. It is extremely probable that Ruelle was himself responsible for most of these names, at least in the form given. In the case of Morels, however, it is possible that *merulius* is the precursor of the modern popular name *morille*. Paulet (1793) comments on the derivation of the word "Je crois que Ruelle se trompe, lorsqu'il dérive le mot *merulius*, de *meta*, parce que la morille a quelquefois la forme d'une borne. Il est plus vraisemblable que ce mot vienne de *morus*, mûre, à cause de la ressemblance qui existe, pour la forme & l'état de leur surface, entre la morille ordinaire & le fruit du mûrier noir. Il y a lieu de croire qu'on a dit d'abord *morilius* ou *morulius*, & enfin *merulius*."—J. Ramsbottom.

Tree Epiphytism. A remarkable instance of the epiphytism of one tree on another was observed on July 18th of this year in Perthshire. Descending the northern side of Ben Voirlich, towards Ardvorlich on Loch Earn, one of the first trees encountered, at a height of about 1300 ft., before reaching the wooded sides of the Ardvorlich Burn, is an isolated Alder with a trunk about two feet in diameter at knee height; evidently a tree of considerable age. On this tree was seated at a height of five feet from the ground, a smaller tree of *Pyrus Aucuparia* with several stems, the chief of which was six inches in diameter and some seven or eight feet high. The most striking fact was that there were no roots of the *Pyrus* visible; it seemed exactly as if grafted on to the Alder, though as it arose from near a fork of the host tree it is probably a bird-sown seedling. Presumably its roots are entirely intra-cortical, but there was no external indication of their whereabouts. Both trees were fruiting and apparently in full vigour. There was no sign of any shoot of hybrid or intermediate character arising from the point of junction, although naturally the alien character of the two plants to one another would make such an occurrence improbable.—R. C. McLean.

Misleading Geographical Names (see Journ. Bot. 1922, 135). The earliest valid name of *Heberdenia excelsa*, a well-known Myrsinaceous tree endemic in the Canary Islands and Madeira, is *Anguillaria bahamensis* Gaertn. (1788). Consequently, under Art. 50 of the International Rules, the species should be known by the misleading name Heberdenia bahamensis (comb. nov.). Mez cited it merely from Tenerife and Madeira (Engl. Pflanzenr. Myrsinac.

159; 1902); but it occurs also in Grand Canary (Webb, Phytogr. iii. 169; Pitard et Proust, *Iles Canaries*, Flore, 267).—T. A. Sprague.

Orchis hircina L. On July 21st we had the good fortune to come upon a fine specimen of the Lizard Orchis on the outskirts of a wood near Wye. The plant, two feet six inches in height, was in full bloom and contained over 30 "lizards" on the nine-inch spike; it was growing in a tangle of privet and bramble. I understand that this is the third specimen of this rare orchid that has been found in the Ashford and Wye district this season.—A. B. Cobbe.

REVIEWS.

Plant and Flower Forms: Studies of typical Forms of Plants and Plant Organs. By Esther J. G. Kirkwood. 8vo plates. 4to. Sidgwick & Jackson Ltd. London, 1923. Price 7*s.* 6*d.* net.

Miss Kirkwood has produced a novel aid to the study of the form and life-history of a number of common flowering plants. In a series of 80 plates she has depicted, first, the important features of thirty-one plants, representing sixteen families; the greater part of the plate is occupied by analyses of the flower and fruit, and the floral diagram is also included. Then follow in succession series illustrating types of pollination, fruit- and seed-dispersal, germination, and vegetative reproduction. There are also studies of six familiar trees, various types of spines, and different forms of climbing plants. The studies should prove a boon to the teacher of elementary botany in schools; but the student should not be allowed to see them—at any rate, until he or she has attempted to make a similar series from the actual plant. There is a danger that the drawings may be allowed to take the place of sketches made by the student, thus seriously diminishing the value of an elementary study of the living plant.

The text is restricted to explanatory words and short paragraphs inserted with the sketches. In the titles of the plates the author has used merely the common name; the botanical name might perhaps also have been added. In one case the common name is botanically misleading, namely "Smilax," which is the trade-name for a species of *Asparagus*.

The drawings and explanatory text are very clearly printed, and the paper is said to have been specially selected to allow of tinting in water-colour. The book, which is in every way attractive, has the additional advantage of being exceedingly cheap.

A. B. R.

Poisonous Plants of All Countries. By A. Bernhard-Smith, late House-Surgeon to Lord Lister, etc. Second Edition, Cr. 8vo, cloth, pp. xii, 112; 185 figures in text. Price 6*s.* n. London: Bailliere, Tindal, & Cox.

We do not quite understand the object of this curious little book, and the author does not enlighten us. It consists of short descriptions of plants, grouped in accordance with their effects, the main divisions being into plants acting on the brain, the spinal cord, and the heart, followed by irritant poisons and specific irritants. The Latin names are followed by the English ones; the author acknowledges his

indebtedness to Mr. W. Miller "for the many culled from his *Dictionary of the English Names of Plants*"; as we pointed out when noticing that work, Mr. Miller omitted to make a like acknowledgement of *his* "indebtedness" to the *Dictionary of English Plant Names*, which he largely appropriated. There is a large number of scratchy little figures "reduced one-fifth: the Micro-Fungi and Bacteria are magnified 500 diameters."

To each plant a line or two of poetry is appended. Mr. Bernhard-Smith has evidently a wide acquaintance with the works of the poets, including those of "Anon.," but it is difficult to conjecture on what principle his extracts are selected. Thus to *Helleborus fœtidus* is appended:

"Belle of the forest, everywhere she dips
And dances prettily and pouts her lips."

Shelley's lines

"In the warm hedge grew lush eglantine,
Green cow-bind, and the moonlight coloured may"

are placed under *Cicuta virosa*, apparently because that plant is called cow-*bane*; "long purples" comes under *Digitalis*; and to apply

"Cow parsley skirts the hawthorn hedge"

to *Æthusa* is hardly fair to Rossetti, the author of the line. The book might indeed be employed as a guessing game with much success: who could suppose that

"Flowers that squander
Gold as golden as the gold of hives"

could apply to *Euphorbia portlandica*? or that "foul standergrass" related to *Sedum album*?

Misprints abound, especially in the appendix of "plants reputed poisonous" and in the remarkably full index—"*Arictus hypogrea*" for example, in which it is difficult to recognise *Arachis*, "*Æsculus hippocastaneum*" and "*Adonis ammensis*." As we said at the beginning, it is a curious little book, and we do not see to whom it could be useful.

BOOK-NOTES, NEWS, ETC.

ADVANTAGE was taken of the last day of the Oxford Summer Term (June 23) for a pleasing University function in remembering to celebrate the Tercentenary of the founding of the Oxford Physic Garden (July 25, 1621). Summer refreshments were provided by Magdalen College for a large gathering of distinguished guests, and speeches appropriate to the occasion were delivered by the Marquess Curzon, Sir David Prain, Professor Seward, and the President of Magdalen (Sir Herbert Warren). Lord Curzon, who presided as Chancellor of the University, expatiated on the delights of gardening generally to the man of affairs, and Sir David Prain contributed a dissertation on the importance of the Garden in the history of botanical science and its more celebrated benefactors and alumni; this is printed in full in the *Gardeners' Chronicle* for July 14. The present Sherardian Professor (Sir Frederick Keeble) also made a special appeal for new benefactions. From Mr. R. T. Gunther's genial little

volume on *Oxford Gardens*, one gathers that this Garden is not University property, but is leased from Magdalen College, which largely retains control; and the President of Magdalen emphasized the fostering care of previous horticulturally-inclined Bursars. However, as Sir David Prain pointed out, the underlying motive of the founders was the relief of human suffering and the possible service of humanity, rather than the creation of a pleasaunce for aged University dons and nursemaids; and, as any further endowment would appear but as an attempt to gild the Magdalen lily, it is quite time that the University considered the advisability of supplying its School of Botany with a teaching and experimental garden of its own, more in touch with modern ideas and research.

THE *Thirty-ninth Annual Report of the Watson Botanical Exchange Club* (1922–23) contains as usual numerous notes on critical genera—notably *Rubus* (by Mr. Riddelsdell), *Sorbus*, *Euphrasia*, *Salix* and *Carex*—*Hieracium* is conspicuous by its absence; but nothing that seems to call for quotation. Mr. Little describes from fresh specimens a hybrid *Epilobium* (*E. palustre* × *parviflorum*) from Hertfordshire. A note on *Ficaria* will strengthen the view of those who think that "varieties" are sometimes based on insufficient data:

"*R. Ficaria* var. *incumbens* Bab. . . . . Rather poor examples of a variation that appears to be rare in an extreme form . . . . Jas. W. White. I should put this under type; only one leaf on my specimen has the leaves slightly overlapping. G. C. D[ruce]. It may be so when alive, but the leaves (in my example) in the discomfort of of being pressed have spread out their lobes and become var. *divergens*. C. E. S[almon]."

There is a plate of *Circium eriophorum* subsp. *anglicum* Petrak—a plant which has had the distinction of being twice figured but of which no description has yet, we believe, been published, to which we referred on p. 159 (where the specific name is omitted). We note that *Pæonia corallina* is retained for the Steep Holm Peony; Miller's earlier name (*P. mascula*) is adopted, we think correctly, in the *Cambridge British Flora*—why, by the way, is the English name always in that work spelt "Paeony"? We note that a certain number of European plants have been distributed to the members, contributed by various botanists. The Report is chiefly edited by Mr. J. E. Little, who is also responsible for the distribution for the year; the number of specimens sent in was 2735.

THE early publication is announced of an *Official Catalogue of Standardized Plant Names*, which has been compiled and arranged by the American Joint Committee on Horticultural Nomenclature, who have entrusted the work to a subcommittee consisting of Messrs. F. L. Olmsted, F. V. Coville, and H. P. Kelsey; Prof. L. H. Bailey has also been consulted. The Catalogue, we are told, "will be accepted as the standard authority for all dealings in and current literature about plants in the United States. It is not offered as a new and different scientific system of nomenclature, but rather as

a sane and workable harmonization of the present confusion. The botanists and terminologists will continue their study and determination of plant names, but any changes they propose need not disturb commercial and educational relations for a period of years, until a future revision of this Official Catalogue includes such changes as will not unduly affect commercial plant relations. The plain aim of this Official Catalogue is to make buying easy by providing definite and uniform names, both scientific and 'common,' for American horticultural commerce." It will include "the approved scientific names of plants in American commerce, and the synonyms which have been most generally used for such approved names; the approved common names of such plants where such names have been formulated, and important synonymous or unapproved common names; authoritative lists of variety names, in important classes, such as Rose, Iris, Peony, Dahlia, Lilac, Rhododendron, Chrysanthemum, Sweet Pea, etc.; the approved variety names of fruits, according to the newly revised code of the American Pomological Society." The specimen pages which accompany the circular show that much care has been taken in the typographical arrangement of the various sections, and we shall await with interest the appearance of what promises to be an important work; owing to the amount of voluntary help that has been rendered, it has been found possible to produce the book at the cost of five dollars.

The first volume of the new series of the *Botanical Magazine*—vol. 148 of the whole work—is completed by the issue of its fourth part, dated Aug. 13; it is dedicated by the Committee of the Royal Horticultural Society responsible for its publication, to Mr. George Forrest, in commemoration of his explorations, dating from 1904, of Yunnan and Tibet and of his introduction to our gardens of many new and beautiful plants. The present part, which is almost entirely the work of the editor, Dr. Stapf, contains a figure and description of a new *Hæmanthus* (*H. Lynesii*) from Darfur, and of a new *Echium*—*E. cœleste*—an addition to the Canary Island group; there is a new name—*Wattakaka sinensis*—for *Dregea sinensis* K. Sch., for which Hasskarl's genus *Dregea* is abandoned; the English descriptions are more lengthy and consequently more generally interesting than most of those given in preceding volumes.

The London Naturalist for 1922 (L. Reeve, 3*s.*) contains the Presidential Address of Mr. E. B. Bishop on "The Extreme Localness of Certain Species" (of plants and insects), but little else of botanical interest. The report of the Botanical Section—which notes that "ten species have been added to the Northern portion of our area and 45 for the Southern, including 35 Rubi recorded on the authority of Mr. W. Watson"—has been cut down almost to a minimum "on grounds of economy": as the object of the publication is to promote the knowledge of London Natural History, one cannot but regret that nearly a third of its pages should be occupied by a paper on "The Birds of Texel," which, however interesting, hardly seems to come within its scope.

In the *Irish Naturalist* for May, Mr. H. N. Dixon records the occurrence in Ireland of *Porotrichum angustifolium*, hitherto known only from a single station in Derbyshire. The Irish locality given by the late Canon Lett proves to be incorrect, but a specimen collected "probably in Antrim in the neighbourhood of Glenariff"—the name of the locality on the label is unfortunately illegible—proves to be the true plant.

The *New Phytologist* (xxii. 3: July 31) contains a note by the Editor on "The Teaching of Botany," introducing a paper by Dr. F. E. Clements on the same subject from an ecological standpoint; and a very interesting paper by Mr. Cockayne on "Hybridism in the New Zealand Flora"; Miss E. R. Saunders writes on "The Bractless Inflorescence of the *Cruciferæ*" (1 pl.); and R. Snow describes an apocarpic plant of *Lychnis dioica*, found near Exeter.

The *Kew Bulletin*, no. 6, is almost entirely occupied by an enumeration of the species contained in the two sets of Rehmann's South African mosses, issued between 1875 and 1877 and in or before 1886. No list of these has hitherto been published; the enumeration is a transcription from Rehmann's labels, and the "n. sp." attached to many of the names—which, unless taken up and described elsewhere, as indicated in many instances, are *nomina nuda*—represents his view. In No. 7, Mr. Hutchinson continues his "Contributions towards a Phylogenetic Classification of Flowering Plants," in which the genera of *Anonaceæ* (95 are recognised) are dealt with; we hope that arrangements have been made for reissue of this important series in collected form. The number also contains "Notes on Upper Guinea *Flacourtiaceæ*," by Major Chipp, in which two new species—*Dasylepis brevipedicellata* and *Scottella Chenatieri*—are described. In No. 8, W. A. Millard and S. Burr discuss "The Causative Organism of Skin Spot of Potatoes"; Miss D. K. Hughes writes on *Paractænum novæ-hollandiæ*—the specimen to which she refers is from Robert Brown's herbarium, who received it from Paris (in Herb. Mus. Brit.)—and on *Orthacne* and *Streptachne*; Major Chipp revises the West African species of *Rinorea*, and describes several new species; Mr. Hutchinson deals with the affinity of *Rhododendron micranthum*.

The *Bulletin of the Torrey Club* for July contains a continuation of M. Levine's "Studies on Plant Cancers," and O. Overholts gives diagnoses (with plates) of American species of *Poria*.

In *Nuovo Giornale Botanico Italiano* (xxx. 1–2; Jan.–April), A Zenari presents a second contribution to the Flora of the Val Cellina; G. Chiovenda writes on the work of G. B. Biadego on the Italian Flora; C. Cappelletti on the hymenium of *Coprinus*; and T. Provasi on the Cecidii of the Herbarium Chinense-japonicum at the Instituto Botanico of Florence.

The *Bulletino della Societa botanica Italiana* (April–June) contains an account (with figures) of a remarkable anomaly in *Anemone sulphurea* by A. Barbiani and M. Minio; E. Barsali con-

tinues his notes on Italian Hepaticæ; R. Pampanini has a long paper (with figures) on *Artemisia Verlotorum* Lamotte; and E. Mussa writes on the flora of the district known as "Il Po Morto," with especial reference to the occurrence there of *Hippuris vulgaris*.

Numbers 6–8 (June–August) of *Osterreichische Botanische Zeitschrift* include "Blütenstände als Vogelbumen," by O. Pursch (3 pl.): "*Homogyne* and *Adenostyles*" (1 pl.); *Aristolochia grandiflora*," by H. Cammerleher (3 pl.); H. Handel-Mazzetti has a supplement to his monograph of *Taraxacum*. Nos. 9–10 for Sept.–Oct. (it is not often that periodicals are antedated!) contain continuations of papers on the Floras of Steiermark (K. Fritzch) and Obersteiermark (K. Reichinger); a paper on Roumanian and Bulgarian *Fraxinus*, by A. Lingelsheim; and a useful bibliography from January.

The *Bulletin de la Soc. Bot. de France* (lxii. nos. 3, 4; 4 June) contains the following among other papers: "Sur l'insertion fusoriale des chromosomes somatiques," with especial reference to *Crepis virens*, by R. de Litardière, who also revises the group of *Festuca ovina* subsp. *alpina*; a continuation of P. Guérin's paper on the cells of *Urticaceæ*; the conclusion of E. Marnac and A. Reynier's "Contributions à la flore du Var"; "Formation des pigments anthocyaniques," by R. Combes; Euphorbiacées nouvelles (*Aporosa* and *Baccaurea*) by F. Gagnepain; "Sur la zone halophile en Provence," by J. Arènes; "Cladomanie et castration parasitaire de *Reseda lutea*," by S. Buchet; a new form (var. *nummulariæfolia*) of *Vinca minor*, by P. Fournier: the useful "Revue Bibliographique" occupies 80 pages.

The *Orchid Review* for August contains a continuation of an (unsigned) paper on "The Segments of Orchid Flowers"; two of the species noticed—*Bulbophyllum barbigerum* and *Masdevallia muscosa*—have inspired Miss (?) J. H. A. Hicks to burst into song:—"Why," it is asked of the latter—

> "Why is thy lip atremble?
> Dost [*sic*] thy heart fear the crude
> Intrusion of my footfall
> On thy mossed solitude?"

The preceding article supplies the answer to this and similar queries by the prosaic statement that the object of the sensitive lip is to keep "prisoner for some twenty minutes" an insect alighting upon it; so that neither "the overflowing of joy in the heart's core" nor the fear of "eager eyes that stare" have anything to do with the matter.

We learn from the *Western Daily Press* of July 2 that Miss Ida Roper has retired from the work, carried on by her for thirteen years, of exhibiting in the Bristol Museum living specimens of wild flowers and fruits in their respective seasons; "her personally supervised case at the Museum," says the writer, who pays a high tribute to Miss Roper's work, "revealed the local flora from A to Z."

Annales Mycologici (vol. xxxi. nos. 3, 4) is mainly occupied by a continuation of F. Petrak's "Mykologische Notizen," in which many new genera and species are described. H. Sydow enumerates the species contained in fascicles xxxvii–xli of his "Mycotheca germanica" (nos. 1801–2050) with descriptions of new genera and species; G. Werdermann writes on the genus *Tetratonema*; and P. Dietel describes a new *Coleosporium* (*C. Reichei*) from Mexico.

A PAPER in the *Observer* of July 1 headed "A Garden of Birds" gives a charming account of an Oxford garden; but it is somewhat odd to read that its "floor" was "decorated" with "patches of *yellow mellilot* (sic), which looked like a patch of sunlight."

THE sixth volume of the *Conspectus Floræ Fennicæ*, by Dr. Hjalmar Hjelt—containing the *Scrophulariaceæ*, *Labiatæ*, *Rubiaceæ*, *Caprifoliaceæ*, and *Dipsacaceæ*,—which has lately been issued, forms the first part of vol. 51 of the *Acta Societatis pro Fauna et Flora Fennica*. We hope to notice it later.

Rhodora for July contains a biography and portrait of William Conklin Cusick (1842–1922), who investigated the botany of East Oregon and is commemorated in the umbelliferous genus *Cusickia*; Mr. M. L. Fernald writes on the distribution of *Naias* in North America and Mr. S. F. Blake on the forms of *Osmorhiza longistylis*.

Malpighia (xxix, fasc. 7, 8), although dated 1922, only reached us in July; it contains a continuation of the monograph of the American species of *Saurauia*, by L. Buscalioni and G. Muscatello; and papers on the leaves of *Eucalyptus* and the cells of the cortex of *Lantana alba* by the former author in conjunction with G. Roccella.

THE Fourteenth Report of the Devonshire Botany Committee (Trans. Devon. Assoc. liv. pp. 78–86) contains numerous additions to the knowledge of the botany of the country both in phanerogams and cryptogams. Mr. Hiern describes a new variety—*erythrocarpum*—of *Chenopodium polyspermum*; and there is an interesting note on the appearance in great quantity of *Epilobium angustifolium*.

THE *Gardeners' Chronicle* of August contains a letter of congratulation and appreciation addressed to Sir W. Thiselton-Dyer by "all the leading botanists of Great Britain and Ireland" on the occasion of his eightieth birthday (July 27); a portrait of Sir William appears in the issue for July 28. The number for July 21 contains an interesting note on "The Tercentenary of Gaspard Bauhin's *Pinax* (1623)" by Mr. S. Savage.

WE understand that good progress is being made with the arrangements for the Imperial Botanical Conference which is to be held next year. Encouraging letters have been received from a number of overseas botanists, and we hope shortly to be able to give an indication of the programme for the meetings. The Conference will take place at South Kensington early in July.

THE

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BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.C.S.G., F.L.S.

LATE SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM.

The Journal of Botany was established in 1863 by Seemann. In 1872 the editorship was assumed by Dr. Henry Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

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Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains.

Until the beginning of the late War the Journal paid its way and even allowed a slight margin of profit; but during that period the subscribers were reduced in number, and the continental circulation almost ceased. It has now regained its position, but the increased cost of production, which has not as yet been substantially reduced, has resulted in an annual deficit which at one time became so serious that the continuance of the Journal was threatened. By the generosity of those who felt that its cessation would be a misfortune, especially for British botanists whose principal organ it has always been, the deficit has been met and an appeal is now made for an increased number of subscribers.

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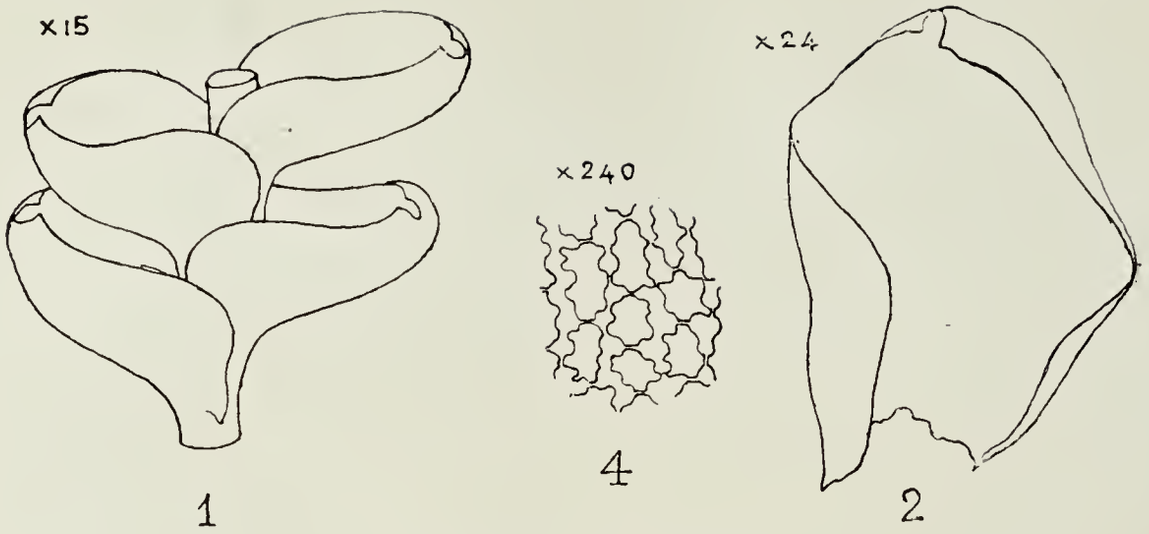

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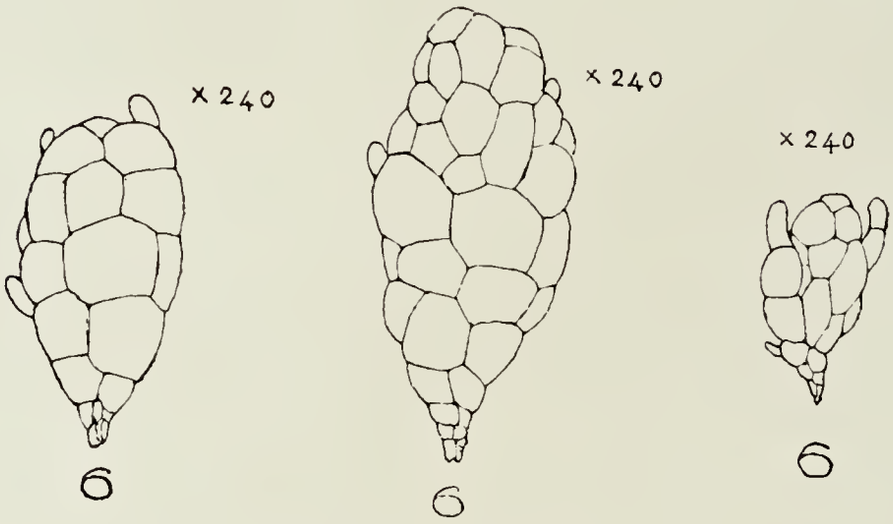

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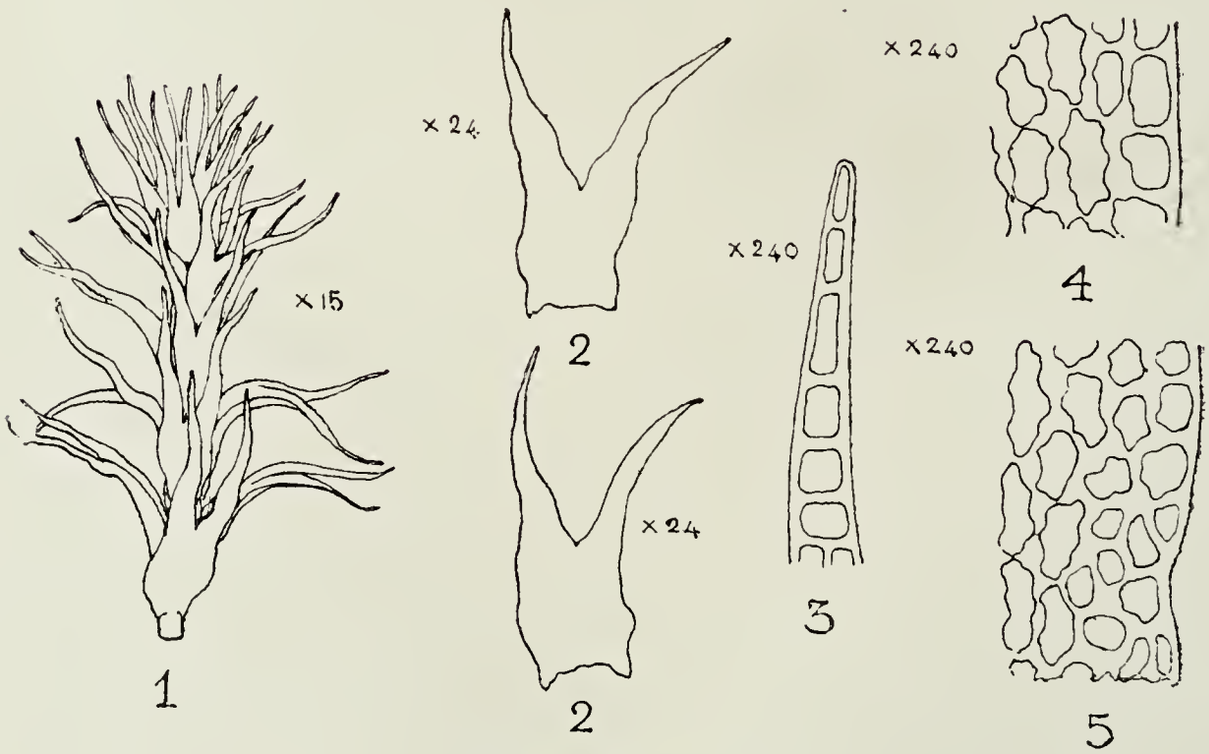

Herberta tenuis.

1. Part of plant.
2. Leaf.
3. Apex of leaf.
4. Cells of upper part.
5. Cells at basal margin
6. Gemmæ.

H. G. Jameson, del.

FREDERIC NEWTON WILLIAMS

(1862–1923).

Frederic Newton Williams was born in Brentford on March 19, 1862, where his father was in practice as a doctor. Frederic was educated at Edward Bancroft's Hospital in London, where he distinguished himself in general studies, becoming head boy of the school and passing Oxford and Cambridge examinations. Having decided to follow the medical profession, he became a pupil of Huxley and proceeded to St. Thomas's Hospital; he then came to Brentford, where he succeeded to his father's practice, having previously taken the degrees of L.R.C.P. and L.S.A. While at St. Thomas's Williams took up Botany, which became one of the chief interests of his life. The practical aspect of medicine never greatly appealed to him, though at first he somewhat specialised in diseases of the throat; and although he practised in Brentford and sometimes held local appointments—at the date of his death he was a Home Office Inspector of Factories—he took little pains to develop his practice. He was, however, keenly interested in the progress of medicine and surgery, frequently attending congresses abroad, and in new remedies and appliances; and the writer can speak gratefully of his skill and attention on more than one occasion.

In 1884 Williams became a Fellow of the Linnean Society, among whose publications some of his most valuable papers were produced. He was a constant attendant and a frequent speaker at the Society's meetings, and was on terms of friendship with many of the Fellows, usually spending the evening after the meetings in the company of one or more of them. He was very good company and an excellent conversationalist, owing to the number of subjects in which he was interested; though his statements could not always be taken *au pied de la lettre*.

Although as a neighbour for many years I had more opportunities than most of studying his character, I find it very difficult to convey any definite estimate of his personality. His interests, though, as has been said, various, were in certain directions curiously limited. The æsthetic side of his character was largely undeveloped; although interested in the music of the early composers and of Wagner and his school, neither dramatic nor pictorial art appealed to him. He had no knowledge either of poetry or fiction, neither of which was represented in his library; he was wont to say that he had never read a novel, and the boast, as it appeared to be, seemed to be warranted. Although a sceptic in religious matters—he was a member of the Rationalist Press Association—Williams was interested in ritual and ecclesiastical observances, and in their origin and development; from time to time he attended services at Westminster Cathedral and at the Orthodox Church in Bayswater. It was perhaps on this account that in one of his obituary notices Williams was set down as a Catholic; as a matter of fact, he was a Freemason, a member of the Grand Orient of France. In politics he was not seriously interested, and indeed held neither definite nor settled opinions.

It is chiefly as a botanist that Williams will be known to posterity, and the following list of his papers, while not claiming to be exhaustive, will give some idea of the extent of his work in that direction. His knowledge of plants was almost entirely derived from herbarium specimens, especially those in the British Museum and at Kew—he knew little about them in the field, and preserved no specimens. In Botany as in other matters Williams had no respect for conventions; his views were strongly individual and even anarchical, which may partly account for the comparative neglect of his *Prodromus*, whereof more will be said later.

Williams's first paper—an enumeration of the species and varieties of *Dianthus*, including sectional characters and descriptions of several new species—was published in this Journal for 1885 (pp. 340–349) with a Supplement in 1886 (p. 301). It is in Latin—a language which Williams wrote with fluency—and shows that he must by that period have made considerable progress in botany for some time before committing the results to print. This was followed by a succession of studies in *Caryophyllaceæ*, with which order his systematic work was chiefly concerned; it was followed by revisions of *Gypsophila* (Journ. Bot. 1889, 199), *Tunica* (*id.* 1890, 193), *Dianthus* (Journ. Linn. Soc., Bot. xxix; 1893), *Silene* (*id.* xxxii. 1896); *Arenaria* (xxxiii. 1898); *Velezia*, *Moenchia*, and *Telephium* (Journ. Bot. 1899, 1901, 1906). In 1898 he began in this Journal the "Critical Notes on *Cerastium*," which, after many years' interval, were resumed in 1921 but never completed; these contain much information derived from Gay's important MSS. preserved in the Kew Herbarium, the neglect of which was a frequent subject of Williams's animadversion. Other papers in this Journal dealing with the Order are "Pinks of the Transvaal" (1889, 199); "The Disintegration of *Lychnis*" (1893, 167); "Subdivisions in *Silene*" (1894, 10); "A Revised List" of British genera and species, with bibliography and notes (1896, 423); and *Stellaria Dilleniana* (1910, 223), which he was the first to distinguish as a British plant. In the Linnean Society's Journal he enumerated and described the *Caryophyllaceæ* of Szechuen (xxxiv. 426) and of Tibet (xxxviii. 395); in the Bulletin of the Boissier Herbarium he revised the section *Adenonema* of *Stellaria* (1907, 830) and described the European varieties of *Silene inflata*. In 1890 he published privately a small volume on *The Pinks of Central Europe*, and in the same year at the Carnation Congress read an interesting paper on "The Carnation from a Botanical Point of View," which was printed in Journ. R. H. S. xii. 464.

Williams's most important contribution to British botany was his *Prodromus Floræ Britannicæ*, of which ten parts were issued at irregular intervals between 1901 and 1912. The earlier portions were reviewed in this Journal (1901–3–4–9–10) by Mr. Hiern, who summarised and criticised at some length the author's methods and conclusions. The reviewer's concluding remark that British botanists will find in the *Prodromus* "much to interest them and not a little to learn" may be endorsed; a more definite estimate will be found in the review of part 9 (*op. cit.* 1912, 260), where reference is made to

"the individual manner characteristic of Mr. Williams's work, which, while adding to its interest, renders it difficult to discover the general principles on which he proceeds .... In matters of arrangement, nomenclature, spelling, and other details, the course adopted is not that pursued by most botanists and does not, we think, tend to convenience: his notes on the species are however always extremely interesting, and show an amount of literary and historical research which no similar work presents." The *Prodromus* shows, as indeed do all Williams's papers, an astonishing acquaintance with botanical literature, the historical aspect of which especially appealed to him; the account of the British records for each species is remarkably full.

The publication of the existing portion of the *Prodromus* was assisted by a grant from the Royal Society; the MS. of the remainder, save for one or two lacunæ, is complete. The question of expense alone would be sufficient to render it unlikely that this will ever be printed; but I am glad to say that it will be offered to the Department of Botany, where it will be accessible for consultation. Whatever may be thought of its usefulness, the *Prodromus* may be regarded as a *tour de force* as the work of one man, and will remain as a permanent testimony to the thoroughness of the author's work.

The studies of individual British plants published by Williams in this Journal include *Antennaria dioica* var. *hyperborea* (1901, 217); *Ranunculus aquatilis* (1908, 11, 44); *Carex canescens* (*id.* 369); *Viola tricolor* var. *sabulosa* (1911, 341); in each of these is given the full synonymy of ancient and recent authors and an examination of the specimens contained in the British Museum and Kew herbaria, to both of which Williams was a frequent visitor; in the Journal for 1902 are several contributions dealing with *Hieracia*, and in 1904 (253) is a paper dealing with "*Veronica Buxbaumii* as a British Colonist." He had intended to publish a new Flora of Middlesex, excluding that portion which is now in the County of London; and in this he had made considerable progress. In 1895 Williams printed privately a "Provisional and Tentative List of the Orders and Families of British Flowering Plants," of which a second edition appeared in 1898; a note in the Journal for 1918 (p. 256), supplied by himself, gives details of a "new Catalogue of British Plants to be published after the end of the War"; this was to form a systematic index to the *Prodromus*. He also contributed to the Journal various short notes and reviews; among the latter is a long notice of the twelfth edition of Babington's *Manual* (1904, 271), the tone of which elicited (p. 352) a protest from its editors, the Messrs. Groves.

Among Williams's other contributions to the Journal may be noted those on *Rheum* (1891, 292), *Ianthe* (*Hypoxidaceæ*; 1901, 289), *Zygostigma* (*Gentianaceæ*; 1903, 232); *Clarkella* (*Rubiaceæ*; 1906, 377), and *Aster sedifolius* and its varieties (1905, 708); the disconnectedness of these studies was characteristic of Williams, who in botany as in other matters was curiously erratic; his absence of system was noted by Mr. J. G. Baker in his review of *The Pinks of Central Europe* as long ago as 1891 (Journ. Bot. 26). He was deeply interested in problems of heredity, as may be seen from his

interesting reviews of books on Mendelism (1902, 329; 1905, 277; 1909, 325) and kindred subjects (1903, 171; 1907, 165). His paper on the botany of Siam (Journ. Bot. 1903, 306) was followed by a list of the species, with descriptions of novelties in Bull. Herb. Boissier for 1905; in the same periodical for 1907 he published a "Florula Gambica," preceded by a list of collectors of Gambian plants.

The *Cape Argus* of May 19, in a brief notice, states that "Mr. Williams had compiled a book on Swiss flora for the Swiss Government by the time he had reached the age of twenty-two, and in recognition he was made a Fellow of the Linnean Society"; the *Cape Times* of May 24 has a paragraph to the same effect. The statement is manifestly without foundation, as at the time specified Williams had barely completed his medical studies; he was admitted to the Linnean Society in the ordinary way, and I had the pleasure of being one of the signers of his certificate.

Williams had a good knowledge of German, French, and Italian; in the two latter languages he published papers, corresponding also with French and Italian botanists. A biography of Teodoro Caruel (1830–1898)—an excellent example of Williams's style when writing on other than strictly botanical subjects—will be found in this Journal for 1899 (p. 258); to his fluency in Latin reference has already been made. He numbered most British botanists, many of whom he knew personally, among his correspondents; he was an excellent letter-writer, and his letters contained much botanical information.

Williams's end came somewhat suddenly. He was wont to boast that he had never had a day's illness, and he always appeared to be in perfect health, but towards the end of last year he appeared to be somewhat failing—a fact, however, which I attributed to financial worries and other troubles. But on his last visit to me in April it was painfully evident that he was far from well; on this occasion he had some difficulty in reaching home. Shortly afterwards he was moved to the West Middlesex Hospital at Isleworth, where on May 6 he succumbed to heart failure, which was also the cause of his father's death, and was buried on the 10th in the New Brentford Cemetery at Heston.

JAMES BRITTEN.

THE PRESENT POSITION OF BOTANY.

AT the meeting of the British Association at Liverpool on Sept. 12–19, Mr. A. G. Tansley, President of the Botanical Section, delivered an address on "Some Aspects of the Present Position of Botany," of which the following are the concluding paragraphs:—

"The central and vital part of botany as a science is, and must be, the study of process which creates and modifies structure as well as of process which is in its turn determined by structure. In reality no line can be drawn between processes of these two kinds, for the

development and metabolism of the plant form a continuous connected history in which process and structure continually act and interact. Nevertheless, the 'physiological functions' of adult structures certainly have a special position in that the processes of which they consist are, like the adult structures themselves, the current *terms* of ontogenetic development, the current stages of full expression of the given genotype under the given conditions of life.

"The separation of morphology and physiology no doubt ultimately takes origin from the two distinct types of human interest in living organisms, characteristic of different types of mind, the one attracted by the forms, formal relationships and classification of *objects*, the other by the understanding of *process*, the knowledge of working. The one naturally observes and classifies, the other observes and experiments. This kind of separation, clearly enough seen among the older naturalists, has been greatly enhanced on the one hand by the enthusiastic effort to trace phylogeny consequent on the acceptance of the doctrine of descent, on the other by the continuous complication of the physical and chemical knowledge and technique required by the study of physiological processes. It has had a profound effect on the teaching of botany during the past forty years. Botanists whose personal research lay in the one field have been less and less able to take an intelligent interest in the other, even if they could understand the terms in which the results were expressed. The student has perforce come to regard and to study the two fields as wholly distinct, with very few points of contact, and his attention has been directed primarily to morphology largely because it is so much easier for the beginner to examine and cut sections of plants and draw pictures of them than to study the processes which go to the making of them. Too little serious effort has been made to overcome the difficulties of teaching students to study process. The physiologists themselves have been too much absorbed in their apparatus to consider the bearing of their subject on general botany. In recent years the rise of new branches of study, such as cytology, genetics, and ecology, has added to the distraction of the student.

"The result has been to separate botany into disconnected parts and failure to give the student any unified notion of the subject. It is unnecessary to say that the growth of knowledge invariably brings in its train ever-increasing specialisation in *research*, but that fact in no way absolves the teacher who is responsible for the introduction of students to the subject from the duty of displaying it as a whole, and this he can only do by making its most vital part, the study of process, the key to his exposition, by representing all structure as the result of process, and, in its turn, as limiting and directing process, rather than by concentrating the student's interest on structure and the comparison of structure for its own sake. It seems to me most misleading to represent morphology (in the sense in which it has come to be used) and physiology as if they were equivalent branches of the subject between which the attention of students should be divided. It is only the most superficial view that can regard them as equivalent. Structures are the end results of processes, and to understand them we must study process by observation and experiment.

It is unnecessary to remark that thorough and accurate acquaintance with facts of structure is incidentally essential. But to claim the larger portion of the student's time and energy for the work of becoming acquainted with the details of structure of all the various groups of plants involves, in my view, a very serious misdirection of effort.

"There should be no division of elementary botany into morphology and physiology. In advanced work there must, of course, be differentiation, as there must in research, not into morphology and physiology, but into a great number of groups of connected phenomena, because of the vast number and complication of the phenomena of the plant world. Some minds find their satisfaction in studying structure for its own sake, so to speak, and in comparing the structures studied. Their research will naturally lie in that direction, and it is certain to increase, as it has in the recent past already vastly increased, our knowledge of the detailed facts of structure of the plant kingdom, to reveal unsuspected relationships, and to establish probabilities as to the lines evolution has followed. But this knowledge *in itself*, considered in relation to the science as a whole, is, and must necessarily remain, superficial. Its conclusions even in regard to the lines which evolution has followed can at the best never attain to more than a considerable degree of probability. And its methods and aims can never explain structure in any real sense. For that a study of process is essential.

"The great development in morphological knowledge, especially of what I have called the middle grades of the plant kingdom, and of the great groups of fossil plants which belong to these grades, has, as we must all recognise, immensely increased our acquaintance with the structure of the plant world. It was a natural development of interest in the past history of plants, stimulated and directed by the acceptance of the doctrine of evolution. Looking back upon the history of botany during the past half-century we must be grateful to this movement, and proud of the leading and distinguished part our countrymen have played in its development. But I cannot think that it has had a wholly good influence on the progress of botany, particularly on botanical teaching and research in this country. This has remained too long dominated by the ideal of tracing phylogeny, has given far too much time to the detailed morphology of the different groups which make up the plant kingdom, and has correspondingly neglected the newer knowledge of process which must be the main avenue to a deeper understanding of plants. Fortunately there are now many signs of impending change. Meanwhile the younger workers, dissatisfied, especially during the last two decades, with the older outlook, have turned more and more to specialised physiological research, to mycology or to genetics, with their outlets on practical life, but often without the grounding that only a thorough grasp of the essentials of the subject can give. One of the results has been that botany has to a large extent become disintegrated, workers in particular parts of the subject having little understanding and less interest in the results of their fellow-workers

in other parts. It may be said that this is an inevitable result of the complication of the subject, and no doubt that is partly true. There is a type of professional worker who, having once got immersed in a particular line of research, resolutely refuses ever to come out of his groove and take a broader view. The subject no doubt owes a great deal of its energetic detailed development to such workers. But if botany, as the science of plants, is to retain any meaning as a whole, somebody must retain the power of looking at it as a whole. And if, as teachers, we fail to keep touch with the newer developments, and are consequently no longer able to focus the whole subject from a viewpoint determined by current knowledge, this power will come to be possessed by fewer and fewer botanists, and the subject will definitely and finally break up into a number of specialised and uncoordinated pursuits.

"Do we want that to happen? I think that most botanists would answer 'No!' I do not think there can be any question that the most advanced research worker, as well as the student who never goes on to research, benefits substantially by having had a training which is at once the broadest and the most vital that is possible. As science continuously advances and necessarily specialises, the unexplored fields which lie between the traditional lines of research become of more and more relative importance. They cannot receive adequate attention —the student can, indeed, hardly become aware of their existence— unless his introduction to the subject is continuously informed by the widest outlook and the clearest apprehension of the essential relations of the phenomena of plant life."

HELIOCARPUS AMERICANUS.

By T. A. Sprague, B.Sc., F.L.S.

Mr. E. E. Watson has recently identified a specimen collected by Fendler (No. 1277 b) in Venezuela as *Heliocarpus americanus* L. (Bull. Torr. Bot. Club, 1923, l. 109–128). He bases this identification on the partial agreement of Fendler's specimen with the description and figures given by Linné of a plant cultivated in Clifford's garden at Hartecamp in Holland (Hort. Cliff. 211, t. 16, fig. *, *a*, *bc*). It is doubtful whether Linné would have described leaves which have "many long appressed straight hairs" on the upper surface, and "hirsute nerves and nervelets" on the lower surface, as being "almost glabrous." But, quite apart from this, the Hartecamp plant should not be regarded as the type of *H. americanus*.

The genus *Heliocarpos* was first published in Gen. Pl. ed. 1, 157, where *Montia* Houst. was cited as a synonym. In Hort. Cliff. 211, Linné explained that, in accordance with the principles enunciated in Fund. Bot. 243, 245, the existence of a previously published *Montia* Micheli had made it necessary to adopt a new name, *Heliocarpos*, in place of *Montia* Houst. He stated that the Hartecamp plant seemed to be the same. This is a very different matter from giving the name *Heliocarpos* to the Hartecamp plant, and stating that *Montia* Houst. appeared to be synonymous.

Philip Miller was evidently annoyed at the change of name: "Dr. Linnæus has altered the name of this plant to *Heliocarpos* and given another genus the title of *Montia*; but for what reason I cannot say, unless to confound the knowledge of plants" (Gard. Dict. ed. 6, sub *Montia*; 1752). In Gard. Dict. ed. 7 and later editions, however, he accepted *Heliocarpos*.

Linné's generic description of *Heliocarpos* in Gen. Pl. ed. 1 was based, as regards the flower, on the Hartecamp plant; and, as regards the fruit, on material sent him by Miller. In Hort. Cliff. he gave a detailed account of the vegetative characters of the Hartecamp plant, of which he figured a leafy branch and flowers. The fruit, however, was figured and described from the specimen communicated by Miller.

Heliocarpus americanus L., Sp. Pl. 448, was defined by citation of Hort. Cliff., and accordingly consisted of three elements: (1) the synonym, *Montia* Houst.; (2) the specimen sent to Linné by Miller; (3) the Hartecamp plant. The type-specimens of (1) and (2) are preserved in the British Museum (Nat. Hist.), and are conspecific with *H. tomentosus* Turcz., as has already been pointed out by Mr. E. G. Baker (Journ. Bot. 1898, 130). No type-specimen of (3) is in existence, and its native country and fruit are unknown. As some of the most important specific characters in *Heliocarpus* are derived from the fruit, it is probable that the identity of the Hartecamp plant will always remain doubtful.

Mr. Watson has apparently overlooked the fact that the fruiting specimen sent to Linné by Miller, which is the type of Hort. Cliff. t. 16, fig. *d*, is preserved in the Clifford herbarium, and that it is *H. tomentosus* (Journ. Bot. 1898, 131). He seems to be under the impression that the Apothecaries' Garden at Chelsea and Clifford's Garden at Hartecamp were identical—his remarks "It is not explicitly stated that the two drawings [Hort. Cliff. fig. * and fig. *d*] were made from parts of the same plant. Nor does it appear from Linnæus' writings just what was the source of the plant in the Clifford Garden at Chelsea" seem susceptible of no other interpretation.

Mr. Watson considers that *Heliocarpos* Hort. Cliff. could not be *H. tomentosus*, on the ground that "it is simply impossible that Linnæus could have failed to notice the dense tomentum of the lower surface of the leaves." Precisely because Linné did notice this tomentum on the single leaf accompanying the fruits sent him by Miller, he was careful to state that *Montia* Houst. (*Heliocarpos*) and the plant cultivated in Clifford's garden *seemed* to be the same, instead of definitely treating them as synonymous. "Hane videtur Houstonus *Montiæ* nomine indigitasse in manuscriptis apud Cl. Millerum visis."

As the synonym, *Montia* Houst., cited by Linné under *Heliocarpos*, is *H. tomentosus* Turcz., and one of the specimens seen and figured by him is also *H. tomentosus*, while the other has not been preserved and—*pace* Mr. Watson—cannot be identified from the description and figure, it is evident that, if the name *H. americanus*

is to be retained, it should be applied to *H. tomentosus*, and that *H. americanus* E. E. Wats. requires a new name. The synonymy and geographical distribution of the two species in question are given below.

H. AMERICANUS L., Sp. Pl. 448 (1753), emend. (excl. pl. cult. in hort. Cliff.)—*H. tomentosus* Turcz. in Bull. Soc. Nat. Mosc. 1858, xxxi. 225; E. E. Wats. in Bull. Torr. Bot. Club, 1923, l. 123. *Montia* Houst. MS.; Mill. Gard. Dict. ed. 6 (1752). *Heliocarpos* L. Hort. Cliff. 211, t. 16, fig. *d*, quoad syn. et fruct.

MEXICO: Vera Cruz; Old Vera Cruz, *Houstoun* (Herb. Cliff.; Herb. Banks; Herb. Sloane ccxcii. fol. 62); found elsewhere in Vera Cruz by various collectors. According to Mr. Watson, it occurs also in the states of Puebla and Oaxaca, and in Panama. The Panama record, if confirmed, will furnish an interesting case of discontinuous geographical distribution. One would like to know whether the specimens are in fruit.

H. SUBTRILOBUS, nom. nov.—*H. americanus* E. E. Wats. in Bull. Torr. Bot. Club, 1923, l. 123, non L.

VENEZUELA, Fendler 1277 B (Gray Herb.).

I have not seen Fendler 1277 B, the type of *H. americanus* E. E. Wats., but the species seems to be sufficiently distinct from *H. popayanensis*, judging from the description.

CARMICHAELIA AUSTRALIS R. BR.

By JAMES BRITTEN, F.L.S.

IN the recently-issued part of the *Botanical Magazine*, under t. 8972, Dr. Stapf gives an account of the history of this plant, to which in some details it seems necessary to take exception. For that purpose it is desirable to reprint his text, so far as this relates to the points at issue; this runs as follows:—

"*C. australis* was discovered by Sir Joseph Banks and Dr. Solander on the east coast of the North Island in 1769, but was not described until 1825, when Lindley figured it from a plant in Colvill's nursery with a description and notes by R. Brown. R. Brown identified it with [George] Forster's *Lotus arboreus*, but Forster's specimen of that species in the Kew Herbarium is evidently *C. flagelliformis*, under which *C. arboreus* is also quoted by Cheeseman. Brown's description covers probably both, the part referring to the fruits being drawn up from Forster's specimen or drawing which shows fruit, the remainder from Colvill's plant."

I. THE BANKS AND SOLANDER TYPE.

I am not in a position to question Dr. Stapf's identification of Forster's specimen in the Kew Herbarium with *C. flagelliformis*, but the ample material in the British Museum Herbarium lends no support to the view that Brown's description "probably covers both that and *C. australis*," and it assuredly was not in part "drawn up from Colvill's plant." As to this I can speak with some certainty,

for we have among Brown's MSS. the original of the description published in Bot. Reg., prepared for press by Lindley and with an addition in his hand; from this MS. it is apparent that the only material in Brown's possession at that period was that collected by Banks and Solander, supplemented possibly—though of this there is no evidence—by Solander's MS. description to which Lindley refers. In this latter the pod and seeds are fully described, apparently from observations made at the time of collecting, as the specimens in the Herbarium have no fruit; the description in what are known as the Solander MSS. (xx. p. 83) was drawn up by Solander from the notes actually made by him during the voyage, are also in the Department of Botany; they will be found in vol. i. pp. 36, 178, 185, under the name *Genista compressa*, by which Solander described the plant. An interesting note by Solander as to the reproduction of *C. australis* that has not hitherto been reproduced, and which I do not find mentioned in any account of the species runs:—"Obs. Rami interdum ad eorum exsertionem radicant absque contactu vel cum terra vel cum aliis plantis, novasque exserunt plantas." Another note says: "Plantæ omnes foliigera juniores fuerunt, earumque rami valde compressi, subfoliaceæ."

Besides the Banks and Solander specimens, we have (N. Zealand Plants, i. t. 37) the original sketch of the plant taken by Sydney Parkinson during the voyage, with the finished drawing made on his return and an impression of the (unpublished) copper plate prepared from the latter; the drawing gives the fruit, as to which there is a note on the sketch—"the capsule dirty brown, the seeds orange colour'd"—and branches with leaves and fully expanded flowers, thus supplementing the rather poor herbarium specimens which show only immature flowers, no fruit, and small leaves. I do not know on what material Brown based his description, but am inclined to think it must have been from Banksian specimens in his own herbarium, although these were not found when his collections were incorporated in the Museum Herbarium.

II. Lotus arboreus G. Forster.

Although, as has already been shown, Brown's description of *C. australis* included no reference to Forster's plant, a sheet in the Museum Herbarium shows that he subsequently included it under that species. This, from Brown's herbarium, is labelled by him: "Carmichælia [he always spelt the name thus] nob. Lotus arboreus Forst. prodr. ex herb. G. Forster apud D. Lambert." To the sheet is attached a note, also in Brown's hand: "*Lotus arboreus* Forst. in Herb. Lambert a G. Forstero ipso cum nomine supradato prodr. Specimens, one with enlarged ovarium the corolla fallen: it has leaves which essentially agree with those of Sir J. Banks's specimens. The ultimate branches are not plano-compressi [as Brown had described them] but somewhat or rather very deeply furrowed and much narrower than those of Sir J. B.'s specimens. The racemi are similar. There are two ramuli with fruit, one with 2, the other with 3, of which the valves have not fallen off but have begun to separate at

top; two other specimens without fructification and of which only one has a few imperfect leaves. The last specimen is a portion of a primary branch and secondary branches with a few leaves but no fructification."

In addition to this we have the sheet of the plant from Forster's own herbarium, which was purchased by Lambert from Forster's father-in-law, C. G. Heyne, of Gottingen, and acquired by Brown (for £7 10*s.*) at Lambert's sale in 1842; this is written up by Forster as *Lotus arboreus* and by David Don, Lambert's curator, as *Carmichælia australis*. There are six specimens (two of them in fruit) on the sheet, one of which looks somewhat different from the Banksian plant. Yet more different in habit and appearance is the plant of which a coloured figure is in Forster's own drawings (ii. 202) with an impression from a plate prepared but never published: this, however, is written up as *L. arboreus* by Dryander and identified with *Genista compressa*. I note that T. Kirk (Stud. Fl. N.Z. 114) and Mr. Cheeseman (Man. N.Z. Fl. 117) refer Forster's plant to *C. flagelliformis*, but there is no evidence that either of these authors had access to authentic material; Dr. Stapf's identification with that species of the Forster specimen at Kew would seem to show that Forster may have had two plants under the name—his brief description of *L. arboreus* might well include both; but the Museum evidence shows that Brown himself identified Forster's plant with his *C. australis*, and there is assuredly no ground for the supposition that either Forster's specimen or Colvill's plant (which Brown probably never saw) entered into the original description of *C. australis*.

It should be remembered that for the latter part of the eighteenth century and the earlier part of the nineteenth, the Banksian Herbarium—the foundation of the British Museum Herbarium—was the depository of the collections of Banks and his contemporaries; it also contains the MSS. based upon them of Solander and Dryander, which supply such information as is not afforded by the specimens and are equally available for consultation: the MSS. and collections of Robert Brown are similarly accessible. The foregoing note exemplifies the completeness of the information afforded by the Herbarium, which, in the case of the collectors named and in tracing the early history of garden plants, might with advantage be consulted at an early stage of inquiry.

ECHIUM POLYCAULON Boiss.

By C. C. Lacaita, M.A., F.L.S.

In June last I found this splendid plant covering acres of sandy pasture between the railway station of La Bazagona in Estremadura and the Rio Tetiar. It is a perennial; the stem, which always remains exceedingly dwarf, is terminated by a tuft of leaves, as in the related species peculiar to the Iberian peninsula, *E. lusitanicum* L.=*E. Broteri* Samp. and *E. rosulatum* Lange. The central rosette is poor at flowering-time, as in *E. rosulatum*, not well furnished as in

E. lusitanicum. Underneath this central rosette there issue lateral stems, arranged in a circle, to the number of 20 to 50 according to the strength of the individual. Each of these, when detached, might on a cursory inspection be mistaken for *E. vulgare*, if it were not for their curvature. The colour of the corollas is typically brilliant cobalt-blue with purple-pink stamens, but varies to almost "Eton" pale blue and to glorious violet-purple. The corolla is larger than in *italicum* or in *lusitanicum*, not quite so big as in the large-flowered forms of *vulgare*, and less irregular than in the latter; in some cases it might be called sub-regular; a similar variation in the form of the corolla is well known in *E. rosulatum*, in which I have observed it in my own garden. The exserted stamens are very unequal in length with quite glabrous filaments. It is not a strigose plant; the leaves are acute, full green, not greyish, covered with a uniform homomorphous pubescence.

Gay's MS. description of a specimen in his herbarium at Kew, which I have quoted in my paper on *Echium salmanticum* in Journ. Linn. Soc., xliv. 378 is excellent.

I was told by a woman on the spot that the plant, which is conspicuous enough to attract attention wherever it grows, is very plentiful at her native place, the Banos de Montemayor, which lies just within the province of Salamanca. This is some slight confirmation of the opinion I have previously expressed, that *E. polycaulon* Boiss. is identical with the doubtful *E. salmanticum* Lag. Dr. Balguerias, of the Department of Botany at Madrid, kindly made a search for me, but was unable to trace any original specimen of *Lagascava.*

The local name of this *Echium* at La Bazagona is *Pincuinela*; a farmer told me that it is an excellent remedy for tooth-ache—the flowers with the calyces are picked off and steeped in alcohol for three or four days; when the spirit has completely absorbed the colour, the liquor is drained off and applied to the gums. I suspect that the virtue is in the alcohol more than in the *Pincuinela.*

CAPTAIN COOK'S MSS.

On March 21, at Sotheby's, a number of MSS. associated with Captain James Cook were disposed of by auction. They were sold by order of the trustees of Mr. H. W. F. Bolckow, of Manton Hall, Manton, near Cleveland, Yorkshire, in which village Cook was born in 1728. The field in which his father's cottage stood is called "Cook's Garth"; in the church is a monument to the great explorer's memory, and in the churchyard is the tombstone of Mary Walker, who taught young Cook to read, his father being a day-labourer in her service. Bolckow, a native of Germany, who came to England and died in 1878, came to England in 1827 and realized a large fortune as an iron manufacturer at Middlesbrough. The history of the MSS. is to some extent involved in mystery—no reference is made to the diary in Admiral Wharton's preface to the transcription of

Captain Cook's Journal published by him in 1903: all that is known of them is that they have been at Manton Hall for more than half a century. They were thus described in the *Times* of Dec. 7, 1922:—

"Of the nine lots, chief prominence is given to the autograph manuscript of the diary which Captain Cook kept during his first voyage to the South Seas, and detailing the remarkable occurrences on board H.M. barque *Endeavour*, from May 27, 1768, to July 11, 1771, and extending to about 740 folios: one leaf in the account of Tahiti is missing. This manuscript was for many years unknown to historians, but three contemporary copies were available, one at Windsor, one in the Record Office, and that belonging to Mr. John Corner (now in the Australian Museum at Sydney), from which Admiral Wharton printed his version in 1893. There are many verbal differences between the printed version and this autograph manuscript. The second lot is a pendant to lot 1, and consists of contemporary copies of Captain Cook's correspondence with the Admiralty concerning his first voyage, and includes the secret instructions and additional instructions to him, known only from this manuscript. The third lot is the log-book of H.M.S. *Endeavour*, May 26, 1768, to October 5, 1770; while the next is the log-book of H.M.S. *Dolphin*, August 21, 1766, to October 16, 1767, dealing with the voyage to the South Seas under Captain Samuel Wallis. It was during this voyage that Tahiti was discovered, and Wallis reported strongly in favour of this island as the most convenient place at which the Transit of Venus, due to occur in June, 1769, could be observed, and it was his recommendation which led the Royal Society to request the Admiralty that the *Endeavour* be sent there. The autograph manuscript of Captain Cook's description of the coast of Nova Scotia, Newfoundland, Cape Breton, &c., forms another lot. It extends to thirteen pages large folio, and has two maps beautifully drawn in water-colours, and pen and ink. The manuscript was written while Captain Cook was master of H.M.S. *Northumberland*, the dates ranging from 1758 to 1762. Another lot consists of Captain Cook's sailing directions and memoranda, probably written 1755–62; while another is an eighteenth century Epitome of Voyages 1497–1685, and presumably used by Captain Cook."

The log was secured for £5,000 by Mr. W. H. Ifould, principal librarian of the public library of New South Wales, who came over on purpose to obtain it and who also gave £1,780 for the other MSS. They will be placed in the Mitchell Library, Sydney, and will eventually be housed in the Commonwealth National Library.

SHORT NOTES.

Bryum Sauteri Bry. Eur. as a British Plant. In revising the Handbook of British Mosses for a third edition I noticed, what had quite escaped my notice previously, that Hobkirk, in the second edition of his "Synopsis of the British Mosses," p. 161, gives this species as a British one, adding as the localities "Teesdale (Spruce);

Scotland (Mitten)." *B. Sauteri* is near to *B. erythrocarpum*, but is generally recognised as a good species, and if a British plant should certainly be included in our moss-flora. I have found no notice of it in any other work; Braithwaite makes no reference to it, nor can I find any record of its discovery in Britain. I have endeavoured to trace the origin of the record, but without success. I do not know where Hobkirk's herbarium now is, nor, of course, is it at all certain that it would contain the specimens on which the record is based. I have failed at present similarly to trace Spruce's collection of mosses. I have been informed that Schimper purchased some, at least, of these at Spruce's death, but Schimper's moss herbarium at Kew has nothing to suggest this, and there are at any rate no specimens of *B. Sauteri* from Britain there. There remains the record credited to Mitten. I wrote to the New York Botanical Garden, asking for information on this; Mrs. Britton informs me that there are no British specimens in Mitten's herbarium, only Swiss specimens, collected in part by Black. It is a little suggestive that the erroneous record of *Brachythecium trachypodium* from Ben Lawers was connected with another Swiss specimen collected by Black, and it looks a little as if Mitten had confused the localities of some of Black's Swiss mosses. In any case the evidence for *Bryum Sauteri* being a British plant cannot be considered of any value, the more so as Braithwaite makes no reference to it in his work.—H. N. Dixon.

Pollination of Viscum album. Following up the experiments which were begun several years ago, and reported in this Journal (1916, 292; 1918, 331) early in the spring of last year, a sprig of male *Viscum album* with unopened flower-buds was tied firmly to a corresponding sprig of the female flower. The two sexes grow intermixed, in the plants experimented upon, and it was not difficult to take one of each kind, and tie them in such a way that the flower-buds were distant from each other about one inch; the heads thus tied were then enclosed in very fine silk gauze, which is pollen-proof. Later in the spring I noticed that a minute insect had found a way into one of the bags, at the place where the two stems were tied; I therefore considered all the experiments of 1922 as failures. This year I repeated the experiment, but before binding the two stems together, I wrapped cotton-wool round each of them, and afterwards round the two together. On to this cotton-wool the gauze bags were tied, and I am certain that they were thus rendered completely insect-proof. The mistletoe sprigs that were tied together were then made as rigid as possible to prevent the wind moving them. Out of five pairs of sprigs treated as above described, the female plant in four cases is fertilized and has well-formed berries. It is very difficult to account for the method of pollination under these circumstances, as it was certainly impossible for any insect to do it, and for the wind to blow the pollen out of the male flower across an inch of space to the female flower seems equally difficult, as the wind could not move them. I have never succeeded in shaking pollen out of male mistletoe flowers when in bloom.—Ethelbert Horne.

Linaria viscida Mill. On the 1st September I was in Headley Lane, Mickleham, and in a clearing on the left-hand side going towards Headley I found a number of plants of this species, but of a curious stunted form I have not before met with. Whether it was due to the prevailing drought I cannot say, but every plant instead of being upright and more or less slender, as is usual, was only about 2 to 3 inches in height and all the growth, branches, leaves, and flowers, was in a compact mass almost ball-like in form. Is this a known form of this plant? I can find no reference to it in my various floras. On the same cleared patch were many fine seedlings of *Verbascum Thapsus*, promising plants of *Atropa Belladonna* (some in flower and fruit), and many exceedingly well-grown specimens of *Ajuga Chamæpitys* in full flower, some of them being a foot across with all the branches except the centre one prostrate.—C. Nicholson.

Euphorbia Lathyris L. In the British Museum *List of British Seed Plants* we printed this name as *Lathyrus*, following in so doing Sp. Pl. ed. 1 (p. 457), where Linnæus quotes as synonyms "*Lathyrus major* Bauh. pin. and *Lathyrus* Cam. epit., Fuchs hist." In Sp. Pl. ed. 2, however (p. 655) the name is given as *Lathyris*, and a reference to Bauhin shows that he (and early authors generally) so spelt it: there can therefore be no doubt that *Lathyrus* was, as Mr. Groves (who called my attention to it) suggests, a misprint which should not be retained.—James Britten.

REVIEWS.

The Ferns (*Filicales*). Volume I. By F. O. Bower, Sc.D., LL.D., F.R.S. Cambridge University Press, 1923. Royal 8vo, 359 pp., with frontispiece and 309 illustrations. Price 30*s.* n.

Of the Cambridge Botanical Handbooks that have so far appeared, this introductory treatise on Ferns will arouse the greatest interest, not only from a recognition of the status of the Regius Professor in the University of Glasgow as a teacher, but from the critical importance of these plants in any scheme of the evolution of Land Flora. Such a work from the pen of an acknowledged authority will constitute the text-book for another generation of English Students, and its value cannot be over-estimated. Professor Bower introduces, a new feature in leading off with a philosophical introduction, including a quotation from R. L. Stevenson, and the text is arranged rather as an "*analytical* examination of the criteria of comparison"; as, that is to say, recognizing, describing in detail, and evaluating the several features which are most suitable for the treatment of the group; with special reference again to fossil records and ontogeny, as an attempt at arriving at a sound basis for the phyletic grouping of the Filicineæ; while the more *synthetic* treatment is promised for a second volume.

After a preliminary explanatory account of what is meant by the life-history of a Fern, a useful summary of the range of biological variations and morphological adaptations in the series, and a general review of the methods and ideas of classification—the last following the usual inverted order of older systematy,—the significant criteria of comparison are established as involving twelve points (p. 63). Each of these is then examined critically, to the extent of a chapter or more; the important conclusions are clearly stated, and the whole is bound together by a concluding section which summarizes the standpoint of the author, and the present position of the Class in the general story of Plant Evolution.

Thus, an analysis of the shoot-system with its buds and branching gets as far as the conclusion that "branching may be referred to dichotomy, with equal or unequal development of the resulting shanks, or to the formation of adventitious buds." Dichotomy will hence be regarded as the primitive method for Ferns; though any deeper reason for this is still left open. It is perhaps in the account of Leaf-Architecture that Professor Bower is at his best; and in dealing with the complexities of segmentation and venation he has laid the foundation for a comprehensive view of all leaf-construction in higher plants. The characteristic dichotomous venation of the great majority of Fern-types is convincingly shown, by series of ontogenetic comparison, to be the survival of what was once dichotomous ramification; now extended to a broadened lamina by phenomena of "webbing," in which the original veins become secondarily connected, first by a marginal commissure, and subsequently by the addition of free ends and lateral branchings to a reticulate construction. It will be noted that this brings the primitive fern-frond into line with that of *Archæocalamites*; the dichotomous venation of *Ginkgo* is evidently a stage in the same homoplastic progression; while the familiar reticulate venation of modern Angiosperms is probably but the end-term of a similar morphological series. Much of this beautiful work is for the first time introduced in text-book form.

Chapters on vascular organization follow the academic lines of Stelar Theory. For teaching purposes, at any rate, it still seems impossible to escape from the mechanical schemes of Protostele and Medullation, Solenostely and Perforation, Dictyostely and Polycycly. The leaf system of vascular strands is clearly traced from the cylindrical meristele to the horse-shoe section-pattern so characteristic of ferns, and phyletic primitiveness, or advance, may be judged according to the degree of disintegration. On the other hand, the root-characters are found to give little help in comparative study. Such stelar conceptions are admittedly based on evidence of so-called ontogenetic recapitulation; and in Chapter X. a useful passage is introduced on the significance of size-relations between the conducting strands and the bulk of the tissues they supply. To this might have been added the difficulty in utilising the same system for organisms in which, though the volume of the adult may vary enormously from that of the younger plant, the general size of the tissue-units themselves remains practically uniform; so that ontogeny is not necessarily

recapitulatory. However, no finality is claimed, "Evolution has followed lines of opportunism not of logic"; and would-be stelists may follow up the copious literature quoted with this section (66 references).

Discussion of the spore-producing organs follows the lines of the author's previous work (Land Flora, 1908), involving the Simple, Gradate, and Mixed Sorus. The primitive sporangium is taken as terminal or marginal, and the superficial position as derivative—following increase of lamina-surface in a "phyletic slide." The story of the sporangium is again familiar, with its stages of annulus-progression and restriction of spore-output. Little evidence of comparative value is gleaned from the prothallus with its archegonia, antheridia and embryology; but older interpretations of the importance of the octant-embryo are discarded. Special prominence is now attached to the story of the suspensor, which is regarded as probably very primitive for the Fern phylum; this view regarding again the prothallus as originally a massive structure, while the embryo nursed within it is conceived as "a simple leafy shoot from the first." A short chapter deals with abnormalities, apospory, apogamy, reversional teratology, and the total list of papers quoted so far extends to over 300; these being very conveniently numbered in sequence, and given at the end of the respective sections.

In a concluding chapter Professor Bower draws together the threads of his argument, in getting down to the Archetype of the Ferns which is to be the basis of further synthetic treatment of the group. In this he is less happy than in dealing with facts and figures of the general text, if only because in writing but a part of a general series of volumes he wishes to avoid poaching on the preserves of other writers; and little can be said of any one group of plants on internal evidence alone, any more than in age-long discussions of the origin of man from data confined to the human race. However, by adding together the conclusions of the preceding chapters, it is suggested that one may "contemplate the primitive Fern Sporophyte as a simple, upright, radial, rootless shoot, either unbranched or showing dichotomy" (though it is not clear how such a plant managed either to stand up or to get its water-supplies). The primitive fern-leaf is "figured as long-stalked, with a distal dichotomy of narrow, separate, single-veined segments, arranged either radially or bifacially," again "relatively robust in primary organization of parts," with simple stelar strands, and bearing distal or marginal sori, the primitive sporangium large and eusporangiate. In fact, one begins to sense *Rhynia* in the offing, rather than "the spindle-shaped embryo giving off enations" of *The Land Flora* (1908). Students who have long felt the difficulty of cooking a Fern-type from the model of *Lycopodium Selago* will be pleased with this alternative "reasonably tenable hypothesis." It is, of course, "not even suggested that the Psilophytales include the direct ancestry of the Filicales"; but homoplasy affords a convenient key to much ancient land-vegetation. Such little things as the origin of the root, or the phyllotaxis-system which differentiates leaf-members from branches are lightly got over.

Having thus landed the reader in a Palæozoic Scottish bog, one begins to appreciate the application of the initial aphorism in the Prefaee, that "it is better to travel hopefully than to arrive," as also such newspaper captions as "Younger Men left Cold by Morphology" (cf. *Morning Post*, Sept. 14, 1923); and one is left to wish that Professor Bower had followed R. L. S. a little farther for inspiration, to warm and tropieal seas. Homoplasy has a soothing sound; but just as it has been said that everything in plant-organization is an adaptation if one only goes far enough back, so also every surviving structural feature must have been eminently homoplastie to begin with; and it is up to the apostle of homoplasy who demonstrates the identity of resultant morphology to show also identity of the moulding proeesses. Many morphological and anatomical schemes, and the elaboration of reasonably tenable hypotheses, make tedious reading, however skilful, unless illumined by some eonception of *how* the machine was worked, and *why* it changed. Granted that "it seems probable that the Algal progenitors of both generations may have been still filamentous when they essayed the transition from water to life on land," it is sufficiently evident that the present analysis of the criteria of comparison could be scarcely taken further without coming down to the free eells of the plankton-phase, as equally indicated by the story of their reproduetion. Hence one awaits with special interest the promised synthetic seeond volume to explain the successive stages in the biological eonditions to which these beautiful plants are the surviving response.

Typographical presentment, paper, eover, and net price follow the lofty standard now recognized as belonging to the Cambridge Press. The numerous figures are elear and really do illustrate the text. A. H. C.

Conspectus Floræ Fennicæ. Vol. VI. Pars v. Scrophulariaceæ—Dipsacaceæ. By Hjalmar Hjelt. 8vo, cloth, pp. 450. Helsingfors, 1923.

The first volume of this Flora (*Pteridophyte* to *Najadaccæ*) was published in 1888–1895, vol. 2 in 1902, and so on up to this part. There remains only the *Compositæ* to complete the work, and this will not be an easy task, as Norrilin as long ago as 1889 described 51 new species of *Hieracium*. Thirty-five years is a long time, but the excellent form of the first volume has been maintained throughout. One of the most notable features of the Flora is the splendid bibliography, of which this part eontains the seventh instalment. Naturally, the literature is mostly Swedish and Finnish, and in this part is only one reference to a British book: the general literature is given in the first part. It is remarkable that for so small a country the literature should be so extensive; in this part alone 160 references are given. The distribution is based on the divisions given in the *Herbarium Musei Fennici* (1889), a most interesting little work, in which the range of the species is given in parallelograms.

Contrasting the Flora as contained in this part with our own, the

following may be noted:—The hybrid *Verbascum thapso-nigrum* Scheide is included, but it is rare. The six species of *Linaria* are all aliens. *Veronica* has fifteen species, including *V. longifolia* and *V. opaca*, neither of them British. Then *V. spicata* seems quite our eastern plant, and not *hybrida*. As an example of the fulness of distribution given, *Pedicularis palustris* has five pages given to it; *P. sylvatica* is absent, its alleged records being errors. The author adopts the genus *Alectorolophus* instead of *Rhinanthus*. *Bartschia alpina* L. is used for *Bartsia*. No species of *Euphrasia* are given; that is, only a note on *E. tenuis* and *E. brevipila*. *Orobanche minor* is the only species.

Utricularia is fully noted, and *U. ochroleuca* Hartm. is considered a hybrid *intermedia* × *minor*. Whatever this may be for the Scandinavian plant, it cannot be so regarded in Britain. *U. intermedia* is very rare in Scotland and the north of England, where *ochroleuca* is frequent; it is not till Norfolk is reached that *intermedia* becomes frequent, and in some parts dominant. It grows there among *U. minor*, and there is no sign of hybridity. There is only one record of *ochroleuca* for Norfolk, and that is doubted by some. *Pinguicula villosa* L. should occur in Scotland, if it has not already been found in Sutherland.

Mentha aquatica L. has only one station, while *M. arvensis* L. is frequent; in *Thymus* the two old names are retained. *Lamium Galeobdolon* L is very rare, but grows up to 60° N. lat. *Galeopsis bifida* is made a species; *Ajuga pyramidalis* L. is frequent; *A. genevensis* L. is an alien.

Gentiana suecica Murb. and *G. germanica* are placed as subspecies; *G. baltica* Murb. is not admitted. *G. lingulata* C. A. Agardh and *G. axillaris* Murb. stand as subspecies of *G. Amarella*.

In *Galium* there are two species that are not British, *G. triflorum* Mich. and *G. trifidum* L., both widely distributed. *Viburnum Opulus* L. is frequent; *V. Lantana* L. is an alien. *Lonicera Periclymenum* L. is also an alien, while *L. Xylosteum* L. is frequent. *Campanula* has eight species; *C. cervicaria* L. (not British) is frequent. *Valeriana officinalis* L. has a var. *excelsa* auct.; this seems to be our *V. sambucifolia*. *Succisa præmorsa* Asch. is used for *Scabiosa Succisa* L.

The general distribution is given in Latin, with especial reference to the northern limits and degrees of latitude; the species are then traced through Russian Lapland (4 divisions), Finnish Lapland (3), Karelia ross. (4), and Finland proper (17). A. B.

Botanical Pen-Portraits. By Dr. J. W. Moll and Pharm. Dr. H. H. Janssonius. 4to, pp. viii+472. Martinus Nijhoff, The Hague, 1923. Price 30 guilders=$12.

Botanical Pen-Portraits is a title which arouses one's curiosity, but leaves the reader in some doubt as to the character of the work under consideration. The book is not concerned with Botany in general, nor yet in the main with plant description as ordinarily

understood. It attempts to give detailed word-descriptions—termed "pen-portraits"—of the microscopical characters of the numerous parts of plants used in medicine and pharmacy, and includes descriptions of starches, barks, flowers, leaves, herbs, woods, roots, rhizomes, seeds, and other plant-structures found in the various Pharmacopœias and used in the pharmacy.

The book is written in English, the greater part of the actual work having been carried out by Drs. Moll and Janssonius; the literary form was given to the various monographs by two lady co-workers—Miss A. B. Lebeboer, who, owing to ill-health, was unfortunately obliged to relinquish the work when partly finished, and Mrs. C. van Eck-de Wiljes, who completed the task. It forms a valuable contribution to the literature of Pharmacognosy and shows evidence of the greatest care in its production; one cannot but feel, however, that the authors would have been well advised had they sought the collaboration of an English pharmacognosist or botanist so as to have given their work a more finished literary style, since the language occasionally leaves one in some doubt as to the exact meaning which the authors intend to convey.

The Pen-Portraits are produced by what the authors term the "portraying method," by which they mean the application to microscopical description of a plan similar to that used by Linnæus for the systematic characterisation of plants. A series of "guiding schemes" for the description of anatomical plant structures of all kinds, from single cells and their contents to tissues and plant organs, is provided as an introduction to the main body of the work; there then follows an alphabetical bibliography, while the remainder of the book is occupied with the "pen-portraits" themselves.

One of the primary objects of the book is to replace drawings by verbal descriptions; the various monographs, dealing with the microscopy of one hundred drugs, are intended to serve as examples of the kind of description that may enable the reader to build up a mental picture of the microscopical structure without the aid of a set of sectional drawings. In every instance the description follows an ordered sequence based upon the "guiding schemes," and various symbols and abbreviated forms of expression are made use of so as to shorten the descriptions and make them less tedious to read; this is the characteristic referred to by the writers as a "kind of telegram style." In this way "completeness of description" is assured, and "a maximum of information conveyed by a minimum of words."

The work is illustrated by 111 diagrams of sections, but no figures of individual cells are included. The object of the figures is to convey to the reader those elusive features of sections which may be referred to under the term "habit" and which it is at present impossible to express by words alone. By producing descriptions of sufficient detail and accuracy, Drs. Moll and Janssonius consider that eventually even these "habit" diagrams will become unnecessary. The illustrations are very well and carefully produced, and are some of the best diagrammatic figures that have ever been published; they have been made from the preparations by means of the camera lucida

and very carefully worked up. Each drawing is accompanied by a scale from which its dimensions can be readily obtained, but no indication of the corresponding magnification expressed in diameters is given. This is to be regretted, since drawings can be compared more readily by noting the magnification in diameters than by the use of scales, and the reader also quickly obtains an idea of the combination of lenses needed to produce a result similar to that figured. A further improvement to the legends would be made were the letters and abbreviations printed in a type differing clearly from that used for the explanations following them.

With the general proposition of the authors that "it is impossible to make real improvements in the art of drawing for botanical purposes," that "the figures in the works of Dodonæus and Fuchs are vastly superior to any product of the present age," and that "the ancient Egyptian artists would have even surpassed them," one cannot possibly agree. One feels, however, that description of microscopical structure in the past has not been as complete or as systematic as it might have been, and *Pen-Portraits* will do good by calling attention to this defect and by suggesting methods of description which are applicable to this type of work. As pointed out in the volume itself, such systematic description of a more limited character has already been freely used by previous authors, such as Gamble (1902) and Stone (1904) in their books describing commercial timbers and by Koch in his *Die mikroskopische Analyse der Brogenpulver* and *Pharmakognostischer Atlas.* Drs. Moll and Janssonius claim to have made an advance upon these by introducing a "perspective description," which combines in one statement the particulars obtained by the study of sections in three directions at right angles to one another. In the opinion of the authors, there is thus put before the reader sufficient detail to enable him to build up a mental picture of the cells, tissues, and organs as solid structures. In doing this, "the physical energy of the student is" undoubtedly "taxed rather heavily," and, although the descriptions form a very useful method of recording facts, one can hardly share the view of the authors that "it tends to make pictures more and more superfluous." On the contrary, one feels, after reading these elaborate descriptions, that they need to be supplemented by good detailed drawings before one can form an accurate idea of the structures described. The descriptions serve to draw attention to all essential details and to emphasise diagnostic characters, but cannot be considered as being complete in themselves apart from illustrative drawings.

One feels also some doubt as to the precise value of the dimensions given for the various cells. It requires a study of a very large range of specimens before one can lay down maxima and minima for the sizes of all the cells concerned; and, although the numbers given may accurately record the dimensions observed, in one or a few preparations, it would be unwise to accept them as criteria for the exclusion of material as foreign or as sophisticated. For example,

under "Lignum Quassiæ," the vessels are stated to measure tangentially in transverse section up to 110 or 120 μ, whereas one has measured them up to 180 μ, and the drawing in fig. 75 shows vessels measuring up to 180 μ tangentially and up to 200 μ radially, the maximum radial measurement recorded being 140 μ. Similarly, the libriform fibres are described as having a length of 750 to 900 μ, whereas the reviewer has measured them from 500 to 1100 μ. Again, under "Folia Laurocerasi," the height of both the upper and lower epidermal cells is given as 25 μ, whereas those of the lower epidermis are always smaller than those of the upper. In the case of leaves like those of *Eucalyptus*, where there is a very thick cuticle, no indication is given as to the proportion existing between the lumen and the thickened outer wall.

The more one studies this book, the more one feels the need of detailed drawings to accompany the elaborate descriptions which are given of simple structures such as starches, and of more complex organs such as leaves and fruits. A glance at a good drawing will reveal much more than can be conveyed in written words and is always needed to assist the mind in the effort to visualise the objects described. It seems to us that both drawings and descriptions are necessary, and the book serves a very useful purpose in directing attention to the meagreness of many anatomical descriptions and in formulating schemes and providing examples for their adequate treatment. It should be in the possession of all serious students of microscopical pharmacognosy, and will do much to stimulate thought and work in this important department of Economic Botany.

T. E. Wallis.

BOOK-NOTES, NEWS, etc.

The first Annual Report of the British Bryological Society affords gratifying evidence of the energy and activity of this recent addition to our scientific bodies—an amalgamation, we gather from the letter of the Secretary, Mr. D. A. Jones, M.Sc., of the two sections of the Moss Exchange Club. The number of members in July was 87; Mr. H. N. Dixon is President; Messrs. F. Rilstone and Albert Wilson are distributors for Mosses and Hepatics respectively; Mr. J. A. Wheldon is Treasurer, and there is a representative list of referees. Among the most interesting records is that of *Lophozia Kunzeana*, from the Isle of Man, hitherto known only from the Scottish Highlands. From an editorial standpoint, the Report is open to criticism. It contains lists, with localities and notes, of Sphagna, Mosses, and Hepatics, but the text begins abruptly "Sphagna" without any preliminary indication on what principle the lists are compiled, beyond the note under Sphagna that "An Asterisk (*) denotes New Vice-Comital Records." The typographical arrangements, as the sentence just quoted shows, are susceptible of improvement; and there are no headings to the pages—a serious drawback to the usefulness of the work. There are obituary notices of W. H. Pearson, Vice-President of the Society, and of W. Ingham (1854–1923), who had been for many years Secretary of the Moss Exchange Club. We

are glad to learn that a new (the third) edition of *The Students' Handbook of British Mosses* will be issued about the end of the year.

The First Annual Meeting and excursion of the British Bryological Society took place at Buxton on August 3–10. A tour round the district by motor was arranged on two days, the members exploring the more distant botanical grounds en route. Dove Dale was visited in brilliant sunshine and yielded such interesting mosses as *Amblystegium compactum*, *Eurhynchium Teesdalei*, *Trichostomum nitidum*, *T. mutabile* var. *cophocarpum*, and a puzzling form of a *Barbula* which proved to be *B. convoluta* var. *sardoa* B. & S. At Chee Dale the rare *Pedinophyllum interruptum* was met with, while in the Via Gellia were found *Weisia calcarea*, *Seligeria pusilla*, *Metzgeria pubescens*, *Cololejeunea calcarea*, *Scapania aspera*, and an undeveloped form resembling *S. curta* growing on limestone rocks (an unusual habitat for this hepatic), in addition to other rare species of both mosses and hepatics. Near Castleton, *Cololejeunea Rosettiana* grew in extensive patches. *Swartzia inclinata* occurred near the limestone quarry at Burbage, accompanied by *Aneura major* and *Mærckia Flotowiana*. The evenings were spent in discussing various subjects connected with bryology and in examining specimens found during the day. A paper on the Classification and Nomenclature of Mosses was read by the President, Mr. H. N. Dixon, and one on Competition among Plants, mainly Mosses and Hepatics, by the General Secretary, Mr. D. A. Jones, both being followed by a general discussion, and there was an exhibition of local mosses and hepatics, arranged by Mr. W. Bellerby of York. Mr. Symers M. Macvicar was elected Vice-President for the next two years. The Annual Meeting will be held at Llanberis on Aug. 29–Sept. 5, 1924.

The Gilbert White Fellowship has issued in a nicely-printed pamphlet the Presidential Address delivered by Sir David Prain at the last Annual General Meeting on "Gilbert White as a Botanist," which contains an admirable appreciation of White's attitude towards natural science in general and to botany in particular. The list of the "more rare" plants given in White's letter (xli.) to Daines Barrington is duly referred to, and Sir David rightly speaks of this as "the only list of Selborne plants to be found in the famous 'parochial history.'" But it is to be regretted that no reference is made to the paper in this Journal for 1893 (pp. 289–294) in which it is noted that Bell in his edition of Selborne (ii. 369: 1877) mentioned a catalogue of Selborne plants in White's handwriting which was in his possession, and which he embodied in the list which he gave. In the Journal is also printed a list of 439 species taken from White's copy of Hudson's *Flora Anglica*, in which the Selborne plants were marked by White, a note in his hand stating that all had been found within the parish. For the history of the volume, which was then in the possession of the late Canon Gordon, the Journal must be consulted; but the list of species is an important addition to our knowledge of "Gilbert White as a botanist."

The *Essex Naturalist* (xx. pt. 4), issued in September, contains the Presidential Address delivered by Mr. Paulson at the Annual Meeting in March last on "The Fungus-root (Mycorrhiza)." The paper, which is illustrated by three plates from micro-photographs, gives a summary of the three periods—1840–1885; 1885–1894; 1894–1904—in the study of the fungus-root as recognised by Galland in 1904, since which date the number of writers on the subject has rapidly increased; it deals especially with the ectotropic fungus-root and particularly with that of the birch-tree, which has occupied the writer's attention for the last three years. The part also contains the first portion of a biography of Richard Warner (1711–1775) by the late G. S. Boulger, intended as an introduction to a new edition of the *Plantæ Woodfordienses* which was in contemplation; and an interesting sketch by Miss Willmott of her sister, Mrs. Berkeley of Spetchley, who began at Warley Lea, in Essex, the experiments upon the cross-fertilisation of primroses which she afterwards carried out with such success in her Worcestershire home. A copy of Turner and Dillwyn's *Botanists' Guide*, formerly the property of Edward Forster and annotated by him, has been acquired by the Stratford Museum Library.

Mr. Arthur A. Dallman has issued a prospectus of *The Flora of Flint and Denbigh*, on which he has been engaged for about twenty years. In addition to the usual contents of a flora, it will contain matters not always included therein; the author has paid much attention to problems connected with pollination and floral biology, and the results of his observations will find place; folk-lore and plant-names, obtained at first-hand, will form a feature; the biographical section will contain much new and unrecorded matter. "Although the work is in a fairly advanced stage, it is not yet possible to indicate a definite date for its publication"; its price to subscribers will be a guinea—names should be sent to the author, whose address—curiously omitted from the prospectus—is 17 Mount Road, Higher Tranmere, Birkenhead.

We understand that the discontinuation of the *Cambridge British Flora* has been definitely decided upon: there is thus more need than ever for a new British Flora, although it cannot be said that the expensive and cumbrous Cambridge publication could ever supply the want that has so long been felt. Some years ago it was announced in these pages that the Rev. E. F. Linton had such a work in contemplation, and had indeed partly prepared it; but he has abandoned the idea, and the field is still unoccupied. Such a Flora as is demanded would be no light task, but it ought not to be beyond accomplishment, even if, as in the case of the Cambridge book, the work were undertaken by various hands—a scheme which, we think, has much to recommend it.

Mr. Martinus Nijhoff, of the Hague, has issued a well-printed Catalogue (No. 488) of *Books of the 17th and 18th Centuries*—a continuation of that recently issued of 15th and 16th Century books.

THE

JOURNAL OF BOTANY

BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.C.S.G., F.L.S.

LATE SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM.

The Journal of Botany was established in 1863 by Seemann. In 1872 the editorship was assumed by Dr. Henry Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

Without professing to occupy the vast field of General Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains.

Until the beginning of the late War the Journal paid its way and even allowed a slight margin of profit; but during that period the subscribers were reduced in number, and the continental circulation almost ceased. It has now regained its position, but the increased cost of production, which has not as yet been substantially reduced, has resulted in an annual deficit which at one time became so serious that the continuance of the Journal was threatened. By the generosity of those who felt that its cessation would be a misfortune, especially for British botanists whose principal organ it has always been, the deficit has been met and an appeal is now made for an increased number of subscribers.

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Supplement.—Dr. H. O. Forbes's New Guinea Plants (*continued*).

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ORCHIS INCARNATA L.

THE BRITISH FORMS OF ORCHIS INCARNATA.

By the Rev. T. Stephenson, D.D., and T. A. Stephenson, D.Sc.

(Plate 569).

Amongst the Marsh Orchids *O. incarnata* L. should probably be given the premier position, and it is unfortunate that it should so long have been regarded as a mere form of *O. latifolia*. Linnæus separated *O. sambucina* and *O. incarnata* from his *O. latifolia* in ed. 2 of *Flora Suecia* (1755), distinguishing *O. incarnata* from *O. latifolia* by the following (amongst other) characters:—"Foliis pallide viridibus immaculatis; nec saturate viridibus maculatis . . . . Corollis pallide incarnatis; nec rubris. Petalis 2 dorsalibus totaliter reflexis; nec tantum patulis, nec maculatis." Except that the dorsal petals may be spotted, this agrees quite well with the flesh-coloured form which is probably commonest in Britain. The specimen in Linnæus's herbarium is a short plant 17 cm. long, wanting the lowest leaf; those remaining are long and very narrow, 1 dm. by 8 mm., the width being the same for four-fifths of the length. The bracts are long and rather narrow, with an elbow-curve below very characteristic of the species. The flowers are small, the spur is rather long and narrow, the side-lobes, as well as one can see, are broadest towards the base. This plant could hardly be mistaken for any other species.

Nevertheless, much confusion abounds both in the text and figures of British floras. Babington (*Manual*, ed. 2, 310; 1847) first separated it from *O. latifolia* as a variety; this he later (ed. 4, 318; 1854) raised to specific rank, with a variety β *O. angustifolia* Reich., of which he places *O. Traunsteineri* Reich. as a synonym. It was C. B. Clarke (in Journ. Linn. Soc. xix. 206, t. 31; 1882) who clearly demonstrated which form of our Marsh Orchids really corresponds to Linnæus's description. He described and figured a Hampshire plant with pale green, unspotted leaves and flowers of a pale flesh-colour with a yellowish centre and characteristic lip-pattern. A similar form appears as *O. latifolia* in Curtis's Fl. Lond. fasc. v. t. 65, as also in E. Bot. t. 2308 (1811), from which latter the figure of *O. latifolia* in Webster's *British Orchids* is taken. Webster definitely throws over the forms of *O. latifolia* with spotted leaves, regarding them all as hybrids; the plants with unspotted leaves he describes in such a way as to suggest that he had *O. incarnata* mainly in view, though his "deep purple or port-wine" flowers may well have been *O. prætermissa*. At any rate, he is on the right track as regards his grouping, though he takes an unwarrantable liberty with the names.

A further source of difficulty arose in connexion with those very numerous Marsh Orchids with unspotted leaves which have now been segregated as *O. prætermissa* Druce. For instance, Hall and Ullman, in the Winchester College reports, reproduced in Bot. Exch. Club Rep. 1917, refer to *O. prætermissa* as *O. incarnata*, form ii. Now that *O. prætermissa* has been so well established, all the difficulties

have been disposed of; the discussions as to the relation of *O. latifolia* to this species would not now affect *O. incarnata*, which, in spite of all its variations of size, habit, and colour, can be distinguished as a rule with perfect certainty.

The following is a general description of *O. incarnata*:—

An orchis always with hollow stem, tubers narrower and often much longer than in the other species of the group, palmate or bifurcate or rarely simple. Leaves glossy, often fleshy, often yellowish-green, usually erect, sword-like, often almost touching the stem, nearly always broadest quite close to the base, usually with a strong keel and hooded apex, sometimes short, sometimes long, much exceeding the spike, always unspotted. Bracts usually broad and large below, much exceeding the lower flowers of the spike, often purple, often turning up with an elbow just below the middle. Flower, as a rule, smaller than in any other Marsh Orchis. Lip roughly obovate in general outline, length and breadth about the same, from about 7 mm., sometimes longer than wide, less often wider than long, centre-lobe usually blunt, and very small, exceeding the side-lobes—sometimes, however, pointed, and sometimes quite obscure. Side-lobes more or less obscurely crenulate, and in most flowers on every spike strongly reflexed, with a very well-defined oblong pattern fairly parallel to the median line of the lip. Much more rarely dots or broken lines take the place of the lined pattern. Spur short, about two-thirds as long as the ovary when the flower first opens, very stout, rather abruptly shortening to a blunt end which is often slightly curved. It is for the most part shorter and stouter than in the other Marsh Orchids. Sepals broad and usually quite erect, often touching back to back, and often with blotches on them. The colour of the flower varies greatly, white, rose-pink, purple, and maroon being found, but not the lilac and white combinations of the Spotted Orchids. Owing to the small size of the flowers, the spike is often markedly narrow-cylindric. These variations will be noted in detail further on. Seeds rather small, with testa shorter and broader than in any form of *O. prætermissa* and *maculata*, without spiral coils in the cells, which are of small mesh. The testa of *O. purpurella* alone is smaller, and has an indented tapered apex, whilst in *O. incarnata* the apex is broad and almost flat.

This species grows in the wettest situations, often in bogs and standing water. It is also found in great numbers in damp sandy places near the sea. A specimen of the type which is probably commonest, and which we selected for description, is 3·75 dm. high, spike 9·2 cm., dense-flowered. Leaves five in number, all large and almost flat, the largest $20 \times 2{\cdot}5$ cm., the three largest oblong-lanceolate, the two lower reaching about halfway up the spike. Lowest bract 40×6 mm., uppermost much smaller. Flowers very pale rosy pink, lip about 7×7 mm., centre lobe distinct, irregular, side-lobes irregularly crenulate, oblong lip-pattern of firm outer lines with parallel streaks within. Tubers small. This plant is from Norfolk; its general appearance is stout and leafy, with a narrow spike.

The variations in general habit and flower-colour are considerable, more so than in the shape and habit of the flowers. The sepals are not always quite erect, but tend to be, and the side-lobes are not always strongly reflexed; sometimes the lower flowers are less reflexed than the upper on the same spike. The white variety has usually flatter lips than the type, and often larger flowers. The lip-pattern in the great majority of cases is of fine well-marked lines, in a narrow oblong, regularly disposed on both sides of the median line of the lip. In var. *pulchella* the lines are heavy; sometimes they are replaced by evenly-broken lines, or by many fine dots in no pattern. The variations in height are from 5 to 10 cm., which Dr. Druce gives for var. *dunensis*, to 5 dm. or more; the average height is about 3 dm. A splendid plant from Brimsfield Bog, Glos., was 51 cm. high and the stem (pressed) 1·5 cm. thick. The leaves vary considerably, both in length and breadth and shape. In specimens of about 3 dm. high, the length varies in the case of the longest leaf from 1 to 3 dm., and the width from 1 to 2·5 cm. Sometimes the upper leaves are small, and do not reach the base of the spike, sometimes they reach about halfway up it, or quite overtop it. The bracts vary from 1·5 to 4 cm. in length and from 3·5 to 8 mm. in width. We believe that such variations depend very much on the situation in which the plant is growing. In the damp hollows of sand-dunes plants growing clear of herbage tend to dwarf size and broader, less erect leaves, whilst amongst grasses and rushes they are narrower and taller. At the same time one often sees great variations in the size of plants growing in apparently identical conditions.

Thus it would appear that in the case of var. *dunensis*, named by Dr. Druce in Rep. Bot. Exch. Club, 1915, p. 212, we have a form which hardly deserves this special distinction—at any rate, on account of the characters given; its dwarf habit and recurved leaves may be merely due to the situation. In the Freshfield sandhills cited for this var., we have seen dwarf plants growing in the open, side by side with others precisely similar except in size, the taller plants ranging up to 3 dm. and growing amongst herbage. At Kidwelly there are large numbers of dwarfs of deep maroon-colour, and with them many taller ones, of the same fine colour, mostly growing in the more grassy places. We have a small specimen from the Isle of Arran, 7 cm. high, with a spike of 2·5 cm. There are three broad divergent leaves at the base, and two above, of which the lower equals the top of the spike. The flowers are deep maroon, like some shades of dark red mahogany; lip about 6 mm. long and a little wider, side-lobes crenulate and a little angular, not fully reflexed, centre-lobe distinct. Larger plants attained a height of 15 cm.

O. INCARNATA var. PULCHELLA Druce, in Rep. Bot. Exch. Club, 1917, 167, and 1919, 577, Dr. Druce describes a variety of *O. incarnata* which "grows in sphagnum and peat bogs in the New Forest, Teesdale, Wales and Scotland." It is described as slender, the lip less reflexed than usual, not trifid nor trilobed, the colour a rich purple, with darker, interrupted lines. We have seen this plant in the New Forest in fair plenty this year. It is a very beautiful and

distinct colour-variety. We find that the lip of these plants has a well-marked centre-lobe, and note that the chief difference from the type is in the very heavily-marked lip-pattern of deep crimson. Dr. Druce seems to have hesitated to some extent as to the relation of this form to his *O. prætermissa* var. *pulchella*. It is true that they agree in their rich purple colour and heavy lip-markings; but the habit both of plant and flower is different. The New Forest plant is undoubtedly a form of *O. incarnata*, which the other is not. On *O. prætermissa* var. *pulchella*, see Journ. Bot. 1923, p. 66.

O. INCARNATA var. OCHROLEUCA Wüstnei is recorded in the *London Catalogue*. It is possible that it is British, but we do not feel quite certain about it. We have found at Kidwelly in South Wales and in East Anglia a stout, pale-yellow form, which flowers about a fortnight earlier than the type. A representative specimen is dm. high, with a dense spike 8·5 cm. long. At the base four leaves strongly keeled and spreading, above two, much smaller, erect, equalling the top of the spike. Flowers with a lip of about 6 mm. each way, centre-lobe prominent and somewhat deeply cut; they are pale straw-coloured from the first, with a faint line-pattern of the usual type on the lip. Not having seen the Continental variety, we cannot say confidently whether our plant would correspond. The former is described as stout, with straw-yellow or bright yellow flowers; it may have pale yellow flowers with brighter yellow lips. It seems to be a well-marked and conspicuous form.

As has already been said (p. 273) Babington in his *Manual*, ed. 4 (followed in Wilmott's edition, 1922), gives *angustifolia* Reich. with *Traunsteineri* Koch as synonym, as a β-form of *O. incarnata*. In reference to this we may say that no one of the numerous forms of *O. Traunsteineri* has been certified as occurring in Britain. As to its possible connexion with *O. incarnata*, we may find the clue in Schultze's *Die Orchidaceen Deutschlands* and Ascherson and Graebner's *Synopsis*, under *O. incarnata* var. *serotina* Hausskn. It is mentioned in both works that this variety has been often mistaken for a form of *O. Traunsteineri*, from which it should be definitely disconnected. It is described as a distinct form, slender, usually few-flowered, and flowering about a fortnight later than the type. We once found in Suffolk two plants which certainly might come under this head. They were growing in a wet peaty bog which contained many fine plants of type *incarnata* and *prætermissa*, the former of which were nearly over, it being July 12. These two specimens were in perfect condition, much shorter (23 cm.) and much more slender than any others, with pale purple flowers and a lip-pattern of very fine, regularly-broken lines. The leaves were narrow and rather short, none as long as 10 cm. These plants may be var. *serotina*; but a great deal more evidence is needed before we can give the name a place in our British lists. Certainly *O. Traunsteineri* (*angustifolia*) has no right there.

The name *incarnata* suggests that the original plant of Linnæus was of the dull rose-pink tint, and with this his description agrees—"corollis pallide incarnatis nec rubris." The largest plants we have

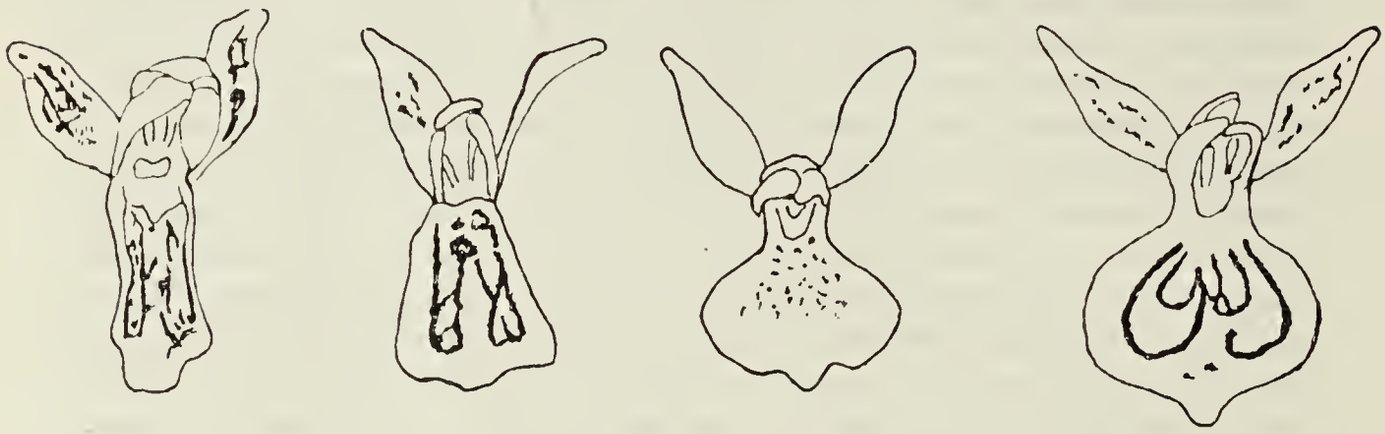
seen are of this type: one from Cranham, Glos., had very large green bracts, tipped with dark purple, incurved, the highest topping the spike; another from Wotton, Norfolk, had very large, pale-green bracts and paler flowers. The colour-variations of *O. incarnata* are much greater than in the other allied species, and of considerable interest. Two, already referred to, are quite peculiar—namely, the pale straw-yellow and the rich maroon or mahogany-red. These may stand at opposite poles in the evolution of the species, the yellow being a retrograde mutation, and the maroon the most advanced. These both grow together at Kidwelly, along with a beautiful pink form, taller on the average than the maroon, and more slender than the yellow; it has a tinge of yellow in it, and there are several shades—to some extent the forms may cross. In respect of numbers, the straw-yellow is much the lowest. The tint we call "maroon" is very distinct and beautiful. We only know of it from South Wales, the Isle of Arran, and West Ireland. From the sands of Barry, in Scotland, the tints reported are purple, rose, pink, and white; evidently pure white may occur in some quantity, both of the taller and shorter types; pure dead-white we have found in very fine plants in East Anglia and the New Forest, and once, in a plant from Salop, growing in standing water, a semi-transparent white. The common orchis-purple is not infrequent, varying in shade from pale to a very deep almost blackish purple in a plant that came from County Clare. In West Wales, in Borth and Tregaron bogs, all the *incarnata*'s are purple, and the habit of the plant is somewhat distinct. The leaves tend to a yellowish tone, and are comparatively short and generally erect.

Clarke's figure of "*incarnata vera*," referred to above, has flowers pale pink above, the lip darker, with yellow centre marked by red spots. Thus, apart from the white forms, we have four colour-groups—yellow, pink, purple, and maroon; it would be useful to know the distribution of these groups and the extent to which they overlap. It is interesting to note that the bright yellow and maroon of the extreme colour-types corresponds to the very similar colour-variations of *O. sambucina*, which in other ways is very near to *O. incarnata*—indeed, in spite of the different habit of the tubers, *O. sambucina* may be a race of *O. incarnata* which has adapted itself to a drier habitat. We are inclined to think that *O. incarnata* is the basal species of the whole Marsh Orchis group.

A number of hybrids are known (*Orchid Review*, 1919, p. 169; Rep. Bot. Exch. Club, pp. 157 ff), though in our field-work we have never found more than occasional single specimens, in great contrast to the numbers in which hybrids of *O. prætermissa* and its var. *pulchella* often occur. We have noted hybrids of *O. incarnata* with *O. prætermissa* and its var. *pulchella*, and with both types of *O. maculata*, i. e., *O. Fuchsii* and *O. elodes* (*ericetorum*). It is not easy to describe most of these forms concisely, though when compared with the parents on the spot the relation is clear enough. In Journ. Bot. 1920, t. 556, are figured two variants of *O. incarnata* × *latifolia* (*O. Aschersoniana* Hausskn.). Fig. 20 is from Salop, where it grew in a bog in a wood, and fig. 23 from the Kidwelly sands, where it

looked at the first glance quite like the pink *incarnata* amongst which it grew, until the blotched leaves and very different lip became evident. In July 1919, Col. Godfery found in Anglesea a remarkable example of *O. incarnata* × *maculata* (*Fuchsii*) = *O. ambigua* Kerner. The leaves were of the most massive *incarnata* type, unspotted, and overtopping the stem; the flowers were pure white, but with flat and deeply trifid lips. This gives the leaf of one parent and the flower of the other.

Several figures of single flowers of *O. incarnata* are given in Journ. Bot. 1920, t. 556, and 1921, t. 559. The photograph now reproduced (t. 569) is from two Winchester plants of the standard pale pink colour. Though the details of the lips are not clear, the



A. B. C. D.

general habit is very well shown. In the text-figures, a rough idea of four types is given for comparison. A is the usual pattern and B the heavier pattern of var. *pulchella*, with a less reflexed lip. C gives a frequent type of *O. prætermissa*, with spotted lip and unspotted sepals, whilst D gives the well-marked double loops of *O. latifolia*. It should be said that lines and streaks enter into the lip-pattern of *O. prætermissa* in many cases, and that *O. latifolia* often has some spots and more or less broken lines on the lip. The lip-pattern of *O. prætermissa* var. *pulchella* is of heavy broken lines somewhat intermediate in type between those of *O. incarnata* and *latifolia*.

Plate 569. *Orchis incarnata* L., from specimens collected at Shawford, near Winchester.

THE SALINE FLORA OF STAFFORDSHIRE.

By the Rev. H. P. Reader, O.P.

The earliest records of the occurrence of maritime plants in Staffordshire are to be found in Shaw's *History of Staffordshire* (1800) and Clifford's *History of Tixall* (circ. 1810). At that time the extraction of salt from the brine-springs constituted an extensive industry—now almost extinct—in a somewhat restricted area to the south-west of the town of Stafford, between the rivers Trent and Sow. Robert Garner in his *Natural History of the County of Stafford* mentions having seen some of these plants *in situ* (1842), and this seems to be the latest record. I have looked in vain through the

Reports of the North Staffordshire Field Club—whose excursions are not confined to the north of the County—for any record of this very interesting Saline Flora. What is far more remarkable is the fact that the late J. E. Bagnall, in his excellent Flora of the County (1900–1), gives no indication that he had met with any of these plants—in some cases, indeed, remarking that he had looked for the plant in vain, "could find no trace of it"; at the same time he inserts all the old records.

Careful investigation conducted this year by myself and two botanical friends discloses the surprising fact that ten species of saline plants still exist, scattered, sometimes in profusion, over six separate remnants of the ancient salt-marshes. In some spots they have the muddy ground entirely to themselves, presenting a truly singular appearance in the heart of England.

The plants noticed are as follows:—

Buda salina Groves. Near Stafford; Baswich; Kingston; Tixall; Shirleywich.

Glaux maritima L. Near Tixall.

**Plantago maritima* L. Near Tixall.

Triglochin maritimum L. Near Tixall; Shirleywich. Remarkably large and fine specimens.

Juncus Gerardi Lois. Near Tixall; Kingston by Stafford; Shirleywich.

Scirpus maritimus L. Ditches at Tixall and Kingston.

Carex distans L. Shirleywich, with *Scirpus Tabernæmontani* in a marshy hollow.

**Sclerochloa maritima* Lindl. Near Tixall.

**S. procumbens* Beauv. In great abundance in two muddy marshes between Stafford and Baswich.

**S. distans* Bab. Shirleywich, with *Triglochin maritimum.*

The plants asterisked appear to be first records for Staffordshire. That the *Plantago*, which is abundant, should have been missed by the older botanists seems strange.

New county localities for *Rumex maritimus* L. and *Samolus Valerandi* L., both rare in the county, may be mentioned, and our discovery of the very rare *Elatine Hydropiper* L. and *Juncus tenuis* Willd.—both near Rugeley—is also worth recording. It would seem that the *Elatine* has vanished, for the present at least, from Bagnall's locality at Pottall.

All the above plants were noted by myself *in situ*; I may add that I have been greatly assisted throughout by the energy and sharp eyes of two enthusiastic botanists, the Rev. J. Perry, of Rugeley, and Mr. Philip Thornton, of Great Haywood.

There remains for future investigation a small piece of ground by the Trent near Burton, from which Brown (*History of Tutbury*) records *Scirpus maritimus*, *Triglochin maritimum*, *Juncus Gerardi*, and *Apium graveolens*. His list was published in 1860, and I have no later notices of the plants there, though it is quite possible they are still to be found.

NOTES ON SOME ORIENTAL ONOSMAS.

By C. C. Lacaita, M.A., F.L.S.

The following notes are based on the specimens in the Bailey Herbarium in the Museum of the Manchester University:—

1. Sintenis: It. orient. 1890, No. 2543. *Onosma* sp. (left undetermined) from "Egin in Armenia turcica, Hodschadurdagh in lapidosis 3 vi." This is *O. polyanthum* DC. Prodr. x. p. 63, founded on Aucher-Eloy, no. 2306, from "Cappodocia ad Euphratem," Egin tigou, the west bank of the Euphrates at the great bend, just within the limits of ancient Cappadocia. Sintenis's specimen is more adpressedly hairy than Aucher-Eloy's, or than a similar one in herb. Kew collected by Montbret in 1834 in eastern Cappadocia. The leaves of the latter are spotted with white, rather distant tubercles, and are only slightly hairy in the intervals. In many species of *Onosma*, as in *Echium*, the hairiness seems to wear off and the tubercles become more pronounced as the plant advances in age. But the exceptionally acute stem-leaves and the sharply reflexed peduncles after flowering confirm the identification.

2. Bornmüller, pl. exs. Anatoliae orient., a. 1889, no. 768, from Amasia "in collinis graminosis planitiei Geldinghiar, alt. 400 m. 15 v," determined by Haussknecht as *O. hebebulbum* DC. has no resemblance to that species, "calyce albo-villosissimo," founded on Aucher-Eloy, Nos. 2314 and 2389, Mesopotamian plants, of which no. 2314 may be seen in herb. Kew. Bornmüller's plant, like *hebebulbum*, shows a passage from Boissier's § *Asterotricha* to his § *Heterotricha*, only the very uppermost leaves and the bracts being without stellate hairs at the base of the bristles, whilst these are present on all the rest of the plant. It is only on this ground and on account of the less blunt leaves that it can be distinguished from the other less hispid forms of *O. pallidum* Boiss., such as var. *olympicum* Bornm. (1899) No. 5309, as to which see below. It is probable that Boissier would have referred this plant to his "*O. stellulatum* var. *genuinum*," with synonym *O. helveticum* Boiss., of Fl. Or. iv. p. 201, which of course is neither *O. stellulatum* W. K. nor the *O. helveticum* Boiss. of Switzerland and northern Italy.

I have not been able to discover that this form has been discussed elsewhere, or had any name given to it, and I therefore propose to call it Onosma ambigens mihi; *Asterotricha* et *Heterotricha* ambigens, formis mitioribus *O. pallidi* Boiss. proximum, et vix distinguendum nisi setis foliorum supremorum basi non stelligeris; ab *O. taurico* et a sequente corollis minute puberulis differt; ab *O. hebebulbo* capitulis pilosis, sed minima "albo-villosissimis" aut "albo-hispidissimis," habitu et patria longius distat.

3. Bornmüller, pl. exs. Anatoliæ orient., a. 1889, No. 769, also from Amasia: "in apricis saxosis alt. 4–600 m. 27 v," and no. 769 *c* "in apricis alt. 4–500 m. 14 v," respectively determined by Haussknecht as "*O. stellulatum* W. K. (Boiss. Fl. Or.) forma strictior" and "forma minor." Here, again, the specimens are not

stellulatum W. K., though they appear to belong to the great congeries of dissimilar plants which Boissier, in a spirit of despair, collected under that general title in the *Flora Orientalis*. This plant differs from No. 2 in its lesser stature, in being strongly asterotrichous throughout, and especially in the glabrous corollas, in which respect it approaches *O. tauricum* Pall., but differs therefrom in the whitish instead of dark green-grey appearance of the plant *in sicco*, in the patent, not adpressed hairs of the stem, in the much shorter basal leaves, in the uncurved bracts, which in *tauricum* are characteristically scimitar-shaped, and in shorter corollas. But for the fatal lack of pubescence on the corollas it might pass as a less strigose *pallidum* of the Smyrna type, to which it comes nearest in general habit. Here, again, so far as I am aware, we need a new name, and I suggest O. AMASIANUM: *O. pallido* Boiss. plantæ ex Smyrna proximum, differt herba multo minus strigosa, corollis glabris, ab *O. taurico* cui propter corollarum glabritatem accedit, diversum toto habitu, colore in sicco cinereo-albescenti, nec atro-griseo, pilis caulinis patentibus nec adpressis vel subadpressis, bracteis minus incurvis nec conspicue acinaciformibus, ab *O.* No. 2, setis fere omnibus basi copiose stellulata oriundis, et corolla glabra.

4. BORNMÜLLER, It. Anatolicum tertium (1899) No. 5309. Bithynia, "in dumosis inferioris montis Olympi (Keschisch-dagh), 2–400 m., 18 v," as *O. pallidum* Boiss. β *olympicum* Bornm. A tall plant; stem 30–40 cm. high, closely clothed with oblanceolate very blunt leaves, and bearing only one or two scorpioid cymes; indumentum not very harsh, the stellate tubercles smaller and less conspicuous than in No. 3, but closely covering all the leaves; corollas thickly pubescent; dries pale green, not grey or ashy. This is evidently the plant from Olympus, which DeCandolle, *loc. cit.*, refers to *O. rigidum* Ledeb., quoting Aucher-Eloy No. 2308 (seen at Kew) which agrees with this Bornmüller number. DeCandolle associates the Crimean *rigidum* with the Bithynian plant, but the only specimen I have seen "ex hort. Petropolitano," and therefore presumably cultivated, is not identical with Aucher-Eloy's or Bornmüller's specimens. It would best be called *O. rigidum* Ledeb. var. *olympicum* Bornm. pro var. *O. pallidi* Boiss. = *O. rigidum* DC. quoad plantam ex Olympo Bithyniæ. Boissier, Diagn. xi. p. 113, points out that the Crimean and Bithynian *rigidum* are not identical.

5. SINTENIS ET BORNMÜLLER, Iter Turcicum (1891), No. 822, from Mt. Athos at Panagia, 23 vi, determined by Halácsy as *O. tauricum* is nothing of the kind, but *O. paradoxum* Janka, Pl. Nov. Turc. breviarium in O. B. Z. xxii. p. 180 (1872), ex loc. class.—a very weak species perhaps, the discussion of which must be left to the botanists who are engaged upon the flora of Macedonia, but *toto cælo* abhorring *O. tauricum* Pall.

6. SINTENIS ET BORNMÜLLER, eodem anno, No. 267, from the island of Thasos, at Limenas, 17 v, also determined by Halácsy as *tauricum*, is the same form as No. 5, and here too must be referred, though not so perfectly identical

7. Sintenis, Iter Trojanum (1883), No. 117, from Renkoli, in montosis, 8 v, named by Ascherson *O. stellulatum* W. Br.

8. Assoc. Pyrénéenne; sine numero, from Smyrna, "Burnabat, in glariosis," leg. H. Petry, 23 iv. 1906, is the very strigose form of *O. pallidum* often to be seen in herbaria from the neighbourhood of Smyrna, and identical with *O. scaberrimum* Boiss. et Heldr. in Heldreich's exsicc. of 1845 from Islarta, the ancient Baris, in Pisidia. These two examples, and others like them, are of the greatest interest, for they are identical with the only specimen of *O. montanum* in herb. Sibthorp, which unfortunately is *sine loco*, but as it is a form which does not occur in "Creta et in Peloponeso," as Smith erroneously states in Fl. Gr. Prodr. i. p. 121, nor perhaps elsewhere in Europe, though there are some approximations in Greece; and as Sibthorp stayed some time at Smyrna, there can be no doubt that he obtained it in that vicinity. This, in fact, is the true *O. montanum* Sibth., as I have maintained in my "Piante Italiane critiche o rare," which Smith so hopelessly confused with Italian "*echioides*" (Columna's plant), and with localities which belong to *O. erectum*. Halácsy seems to have been conscious of the confusion, as the name *montanum* is not mentioned in the *Conspectus Floræ Græcæ*. There is, indeed, another specimen of the greatest historical interest that is identical with these; it is one of those which represent *O. echioides* in the Linnean Herbarium, also *sine loco*. There will be more to say about this specimen on another occasion.

In what precedes, Boissier's name *Onosma pallidum* has been quoted. This was described in 1849 in his Diagn. Pl. Orient. no. xi, p. 112. It is particularly characterised by pale corollas, very strigose spreading indumentum, and leaves shorter and broader than in the forms which he at that time grouped under *O. stellulatum*, by which name he did not mean the true *stellulatum* W. K., of Croatia, but a complex of many forms which would better have been called *O. echioides* L., meaning the *echioides* α, exclusa var. β, of Linnæus. But *O. pallidum* itself is a complex of (1) a plant from Smyrna and elsewhere in western Anatolia, which is *O. montanum* Sibth. herb., and to which alone the above characters and the full description are perfectly applicable; (2) a Constantinople plant, which is almost certainly *O. proponticum* Aznavour, and quite distinct; and a Greek plant, collected by Spruner in Bœotia, the exact position of which cannot now be discussed.

In the *Flora Orientalis*, in a fit of desperation—for gigantic works of that kind must be completed without waiting to clear up the more difficult and critical groups of forms; a procedure of which there are many examples, under the stress of sheer necessity, in the *Flora of British India*—Boissier lumps a number of very different plants under the specific name of *stellulatum*, including his *pallidum* as var. β, with a number of new localities, and with *O. trapezuntinum* Huet, really a distinct form, thrown in. Halácsy, Consp. Fl. Graec. ii. p. 334, revises the specific conception of Boissier's *pallidum*, but calls it *O. echioides* L. Then in the Supplement (1908) p. 76, he criticises a certain name, *O. Javorkæ*, that had been proposed by Simonkai in 1906, as "supervacaneum, nam si *O. echioides* re vera

species mixta, nostra nomine *O. pallidum* Boiss. salutandum esset." This leads to the inquiry whether *O. pallidum* Boiss. must not give way to one of there earlier names—*O. montanum* Sibth., *O. rigidum* Ledeb., or *O. Aucherianum* DC. Taking these in order:

(1) *O. montanum*; although the unique specimen is identical with typical *pallidum* from Smyrna, the name must be abandoned altogether, for Smith's diagnosis in Fl. Gr. Prodr. is insufficient to distinguish it from sundry other Onosmas; the synonyms cited are altogether wrong, belonging to a totally different Italian species, which does not occur in Greece or in Anatolia, and the alleged habitat—Crete and Peloponnesus—is as false for the specimen as for the synonyms. *O. montanum* should therefore be rejected as "nomen confusissimum."

(2) *O. rigidum* DeCandolle, Prodr. x. p. 60 (1846), referred to *O. rigidum* Ledeb., the already mentioned plant from the Bithynian Olympus, distributed by Aucher-Eloy under No. 2308, on which Boissier, Diagn. *loc. cit.*, remarks "*O. rigida* DC. Prodr. est nostra species" (sc. *O. pallidum* "ipsissima, sed *O. rigida* Ledeb. ex Tauria differt." As this seems really to be so, *O. pallidum* must not be called *O. rigidum*.

(3) *O. Aucherianum* DC. *loc. cit.*, on the other hand, also from Olympus, holds the field. Boisser's admission in Diagn. *loc. cit.* is conclusive: "*O. scaberrimum* Boiss. et Heldr. in pl. Anat. 1846" (where it is *nomen nudum*) "est ipsissima *O. Aucheriana* DC. Prodr. quam quoque ad *O. pallidam* ut formam proceriorem scaberrimam refero."

According to the rules then *O. Aucherianum* DC. (1846) cuts out *O. pallidum* Boiss. (1849).

A NEW VARIETY OF ORTHOTHECIUM INTRICATUM.

By H. N. Dixon, M.A., F.L.S.

A little moss from the Yoredale Limestone of West Yorkshire has given rise to much trouble. It has been variously referred to *Orthothecium intricatum*, *Pylaisia polyantha*, *Hypnum cupressiforme* var. *resupinatum*, and *Hypnum incurvatum*. The entire absence of any defined alar cells seems to preclude the two last, while *Pylaisia* is ruled out by the habitat and by the entire sterility of the plants, *P. polyantha* being autoicous and nearly always abundantly fruiting (as is also the case with *H. incurvatum*), with the alar cells more or less clearly differentiated. There can be little doubt that the plant is a form of *Orthothecium intricatum*, forming very dense, somewhat glossy tufts, the stems exceedingly slender, the leaves minute, ovate-lanceolate, and very shortly acuminate, sometimes indeed little more than acute; the cells all very short and comparatively wide, linear-rhomboid, very uniform throughout the leaf, the apical ones a little narrower, and the basal rather wider, without any differentiation in the alar region. The leaves are quite nerveless. The general colour of the tufts is blackish below, deep dull green above, often with a slight reddish tinge, which is one of the clear indications that it belongs to the *Orthothecium*.

A comparison of the measurements of some of the parts with those of the type will perhaps best give an idea of the marked differences. The leaves of *O. intricatum* are from 1·5 to 2 mm. in length, in the variety they are ·5 to ·6 mm. The median cells in the type are narrowly linear, 3–4 μ in width, or more rarely 5 μ, and from 40 μ to 65 μ in length, *i. e.* roughly 10 to 15 times as long as wide. In the variety they are 4–5 μ wide, and about 30 μ long, *i. e.* averaging about 6 or 8 times as long as wide.

The great uniformity in the habit, dimensions, and structure in all the plants I have seen is a very marked feature, and renders the variety a clearly characterised one. The habitat and the distribution, too, are distinctive. The earliest specimen I have in my herbarium was gathered in 1890 by the late W. West, and determined by me as a form of *O. intricatum*, from about 2000 ft. on Peny-ghent. Mr. Wheldon collected it in the same year on calcareous sub-alpine rocks, Ingleboro. Mr. Cheetham gathered it in some quantity on limestone walls and rocks at 2000 ft., on Ingleboro, in December 1912 and January 1913. During the present year Mr. Albert Wilson collected it on Yoredale limestone rocks at 2100 ft. on the north side of Ingleboro, and has since found that he had gathered the same moss in 1919 on Yoredale limestone at 1900 ft. on Barbon High Fell, Westmorland. These gatherings were all made independently, and without the moss being definitely determined. As regards the habitat, Mr. Wilson wrote to Mr. Wheldon on 16 July of the present year as follows :—"On getting your letter I was just starting for Chapel-le-dale, so I decided to make another investigation of the rocks on Ingleboro, where I found the plant. I felt sure that Mr. Dixon was right in regarding it as a condensed form of *O. intricatum*. I ascended Simons Fell, and examined some Yoredale limestone rocks, on which I found the same moss as on Ingleboro, so I did not need to go to the original locality. The moss occurs in shaded rock crevices, and a form rather nearer to the type occurs in more open spaces on the same rocks. I have similar plants gathered a few years ago on Barbon High Fell, Westmorland."

I have not seen it from any other formation, and it would seem to be confined to a very narrow range of altitude, but this may be governed by the outcrop of the Yoredale limestone being limited in the district to these altitudes.

The following is a diagnosis of the new variety :—

Orthothecium intricatum (Hartm.) Bry. Eur. nov. var. abbreviatum Dixon.

Varietas quam planta typica omnibus partibus multo minor, abbreviata. Cæspites perdensi, humiles, nigro-virides vel olivacei. Caulis multo gracilior, filiformis. Folia minima, ·5–·6 mm. longa, anguste ovato-lanceolata, multo brevius acuminata. Areolatio valde brevis, e cellulis medianis 4–5 μ latis, circa 30 μ longis, apicalibus paullo angustioribus, basilaribus parum latioribus, per totum folium subæqualibus, instructa.

Hab. On Yoredale limestone rocks, 1900–2100 ft. alt., Ingleboro, West Yorkshire; C. A. Cheetham, Dec. 1912; and other localities mentioned above.

NOTES ON WEST AUSTRALIAN PLANTS.

By O. H. Sargent.*

Actinotus superbus, sp. nov. *Herba* annua; *caule* erecto tereti pinguiusculo subdense piloso interdum parce ramoso; *foliis radicalibus* longe petiolatis petiolis linearibus lamina bis tripartita segmentis ultimis brevibus elliptico-oblongis subacutis; *foliis caulinis* subsessilibus in segmenta lanceo-linearia 2 vel 3 divisis; *umbellis* longe pedunculatis in paniculam dispositis; *bracteis* involucralibus linearibus præsertim in marginibus paginaque sup. densissime albo-sericeis; *floribus* pentameris hermaphroditis maribusque commixtis; *pedicellis* uti ovaria calycesque dense pilosis; *calycibus* hyalinis campanulatis lobis breviter triangularibus in comis occultis; *petalis* flavidis anguste lanceolatis; *antheris* flavis elliptico-oblongis.

Herba ad 18 cm. alta; petioli 15–20 mm. long.; laminæ 18–25 mm., pedunculi 2–6 cm. (plerumque 4 cm.), bracteæ 17–24 mm., quam flores circa triplo longiores. Herb. Sargent. 1398.

The affinity of the new species is undoubtedly with *A. leucocephalus* Benth., from which it differs conspicuously in its stouter sturdier stems, far more hairy bracts and flowers, in the shape of the calyx lobes and colour of the anthers. I have received it from Bulkuling and Doodenanning (20 miles E. of York), Quairading (still further east), and from Datatine (roughly 140 miles south of the other stations). This very beautiful plant is only found after a fire has swept its habitat.

Actinotus leucocephalus Benth. var. (?) nanella, var. nov. (?). *Herba* annua, parva (circ. 9–13 cm. alta), compacta, basi ramosa; *bracteis* involucralibus externis manifeste herbaceis, internis subdense pilosis; *umbellis* maribus—hermaphroditis vel femineis in plantis disjunctis; floribus iis *A. leucocephali* similibus, antheris atro-purpureis. Herb. Sargent. 1399.

This remarkable gyno-polygamous plant is perhaps entitled to specific rank; but it is certainly close to *A. leucocephalus* Benth., and it seems best for the present to regard it as a variety of that species. I have received it only from Datatine, where pistillate plants seem to be in a majority, from Miss Douteh and Miss Good.

Helipterum cryptanthum, sp. nov. *Herba* annua circa 10–30 cm. alta; *caule* erecto simplici vel pauciramoso; *foliis* late ovatis integris acutis subdecurrentibus; *capitulis* solitariis vel in paniculam dispositis cylindrico-ovoideis paucifloris; *bracteis* scariosis interioribus petaloideis unguibus oblongo-cuneatis quam lamellæ paullo longioribus lamellis erectis anguste-ovatis acutis integris vel dentibus apicalibus paucis parvis; *pappi* setis plumosis; *corollis* infundibuliformibus lobis suberectis.

Bracteæ petaloideæ, roseæ, unguis 6–7 mm., lamella 5–6 mm. longa, ambo ca. 2 mm. latæ. Herb. Sargent. 1404.

This species is homoplastic with *H. Manglesii* F. Muell. (with

* Specimens of the plants here referred to have been presented to the Department of Botany by Mr. Sargent.

which hitherto it appears to have been confused) in foliage; but is readily distinguished by the flower heads, whose shape places it in another section (*Pteropogon*) of the genus, a placing confirmed by the fewness of the flowers. It appears to be more widely distributed than *H. Manglesii*, more particularly in the drier regions. Its flowering season is a little later, though it overlaps; and I have seen a few presumptive hybrids. The following description is for purposes of comparison :—

H. Manglesii F. M., capitulis hemisphæricis, bracteis petaloideis patentibus unguibus distincte cuneatis quam lamellæ multo brevioribus, lamellis late ovatis apicibus obtusis paucidentatis, corollis campanulatis.

Lysiosepalum F. M. Fragm. i. 142 correctio descriptionis originalis : sepala, petala, stamina sex. As there is an epicalyx of three almost equally-spaced bracts and the gynæcium is trimerous, the whole floral structure is practically actinomorphic.

The hexamery of perigone and stamens seems to be unique in the tribe *Lasiopetaleæ*, if not in the order. Attention was called to this very important character, hitherto strangely overlooked, through my specimen No. 782 sent to the Department of Botany with other examples of drier-area plants. On learning that this appeared to be an undescribed *Thomasia*, I carefully searched the whole of my Lasiopetalous material and found other specimens which appeared to be conspecific with 782 and with *Lysiosepalum Barryanum* F. M.; specimens of *L. rugosum* Benth. from Yorkrakine, Burracoppin, and Wongan Hills also proved to be hexamerous. It has since been ascertained that all the *Lysiosepalum* material in the herbaria of the Department of Agriculture, W.A., Department of Botany, British Museum, and National Herb., Melbourne (type-specimens) is likewise hexamerous. Herb. Sargent 782 differs from presumably normal *L. Barryanum* F. Muell. in its smaller leaves and flowers, the colour (greenish, instead of rufous) of the bracteoles, and in the indumentum of the peduncles, consisting of almost sessile stellate hairs intermixed with longer purple glandular (?) simple ones; the petals are sometimes fewer than six or wanting. All these differences seem to me attributable to climatic and edaphic influences; and at the utmost indicate only specific separation in view of the characteristic Lysiosepalous epicalyx, floral hexamery, and scale-clothed ovary. My normal (?) specimens come from Gnowangerup, and their peduncular indumentum consists of long-stalked stellate with a few comparatively short purple simple hairs. In the fresh state both this and 782 have a peculiar somewhat aromatic odour, reminiscent of newly-cut cucumber.

[Sargent 782 was described by me (Journ. Bot. lix. 245) as *Thomasia hexandra*. While agreeing with Mr. Sargent in most of what he says, I cannot admit the conspecificity of *T. hexandra* and *Lysiosepalum Barryanum*, for, besides the much smaller flowers of the former, its bracteoles are smaller and narrower, the sepals differently shaped, the petals, prominent in *L. Barryanum*, are absent at least from all *hexandra* flowers examined, while the much shorter

anthers are obtuse, not acuminate as in the other. At the same time, had I known that the flowers of *Lysiosepalum* are hexamerous, as Mr. Sargent has discovered them to be, I should have described his No. 782 as a *Lysiosepalum*, because, although the presence of petals has hitherto been a character of that genus, there is no reason why an apetalous species should not exist, inasmuch as in *Thomasia* both petaloid and apetalous species are known. The plant in question should therefore be named LYSIOSEPALUM HEXANDRUM, comb. nov. Besides No. 782, the species is represented at the Museum by Mr. Sargent's No. 1052 from Emu Hill, W. Australia.—S. M.]

DICHOPOGON STRICTUS Baker. Corm or cormoid rhizome about 18 mm. across, bearing numerous hard fibres, extending to the surface of the ground, above, and thick but not tuberous roots below. Leaves dried and missing. Pedicels flaccid, recurved, articulate at about the middle. The flower is much like that of *Arthropodium Preissii* Endl.; the stamens bear a specially close resemblance. The appendages, however, are clearly attached to the anthers, whose connective is conspicuous. In *A. Preissii* the appendages are attached to the apex of the filament, and the connective is invisible. Sandy ironstone, Cut Hill, York, W.A. December. Herb. Sargent. 1400.

DICHOPOGON SIEBERIANUS Kunth. Rhizome about 8 mm. thick by 12 mm. long, with few and short fibres above, and several fusiform, fleshy, tuberous roots below. Leaves dead at flowering time, linear, about 20 cm. long. Pedicels rigid, articulate about the upper fourth, sharply reflexed near the base when in fruit. Sandy soil in dry bed of Avon River under *Melaleuca rhaphiophylla* Schauer trees. November. Herb. Sargent. 1401.

Habitat probably accounts for the presence in abundance and comparative absence of fibres in these two species. The comparatively dry well-drained soil of the hill-side offers far less opportunity for complete decay than the perpetually moist soil of the river-bed. I have not succeeded in tracing a previous record of either of these species for Western Australia.

LETTERS OF J. F. VON JACQUIN (1788–90).

BY A. B. RENDLE, D.Sc., F.R.S.

MATTER of great interest to British botanists will be found in Dr. E. M. Kronfeld's notes (Beihefte zum Botanischen Centralblatt, Bd. xxviii. Abt. ii. (1921) from unpublished letters sent by the younger Jacquin to his father and other members of his family, telling of his experiences during his student journeys to the principal centres of botanical work in Germany, the Netherlands, England, and France in 1788–1790.

Joseph Franz Freiherr von Jacquin (1766–1839) was a son of Nicolas Jacquin, the "Linnæus of Austria," Professor of Chemistry and Botany at the Vienna University, and Curator of the famous Royol Garden at Schönbrunn. Joseph had been carefully trained by his father, who himself drew out the plan for the tour, which was undertaken under Royal auspices, for the completion of his studies in

natural history, chemistry, and botany, pure and applied. The extracts from the letters given by Dr. Kronfeld bear on botany and horticulture. That Joseph was well equipped by a careful training is evident from the numerous notes on the identity of species of plants which he examined in the various herbaria and gardens visited during his tour; these notes form a large proportion of the letters.

Joseph left Vienna in May 1788 and visited Prague—where Ferdinand Bauer, the well-known plant-artist, made drawings for him of some pitcher-leaves from a lime,—Karlsbad, and Dresden, where he is much charmed with the gardens of the Elector (Kurfürst), who is "a passionate botanist"; there are also some wonderful original drawings of plants in the library. At Leipzig John Hedwig, the microscopist, shows him the sexual organs of mosses and various points in plant anatomy, which throw doubt on some of the observations of his compatriot Ingen-Houss; of this, however, his father is warned to say nothing. Writing from Halle he mentions that Dr. J. R. Forster (who accompanied Captain Cook on his second voyage of discovery in the South Seas in 1772) had given him plants from Tahiti and elsewhere, and was hoping to succeed Scopoli as University Professor. At Berlin he is struck by the great woods of *Pinus* and other Conifers, of which he secures cones. He also meets young Willdenow (1765–1812) at the Botanic Garden—a very lovable young man, who concerns himself with the despatch of a number of rare living and dried plants which Joseph was sending. The Botanic Garden at Göttingen is the best he has seen on this journey, but the Blocksberg is not to be compared with the Austrian Alps. At Leyden Professor Bruymanns shows him many things of interest, including the herbaria of Rauwolf, Breynius, and Hermann, Rumphius's original manuscript and drawings, and a volume of drawings of fungi by Clusius (1526–1609) beautifully painted; also Hermann Boerhaave's (1668–1738) garden with a fine tulip-tree sown by Boerhaave himself, and duplicates from Gronovius's herbarium.

Jacquin reached London early in December 1788, and spent more than a year in England. The greater part of the brochure is a description of his botanical experiences and work in London. Here are his first impressions:—"Nowhere is more to be seen and learnt in botany than here in England. The large number of helpful means of all kinds, which are open for everyone's use, on the one hand, and the indescribable honour in which our science is held, on the other, make London in this respect the first place in the world. In the British Museum is an extraordinary number of herbaria of famous botanists of all nations, such as Plukenet, Ray, and others; in Oxford are the herbaria of Morison, Dillenius, Bobart, and others. Banks has the greatest herbarium in the world, which includes those of Aublet, Miller, Swartz, and others. Dr. Smith has the herbariums of the elder and younger Linné, König, &c. Add to this the great number of famous gardens and also the appreciation for botany, which is so general here. What an opportunity! I will give you from time to time a detailed account of all these. First let me give you an idea of Banks's house which is the crown of all."

Then follows a description of Banks's library and herbarium in

the very fine large house in Soho Square. Jacquin was much impressed with the method of arrangement of the plants in the mahogany cabinets, each plant mounted on a separate sheet with name and origin, and with the 50 volumes of Solander's MSS. corresponding with the herbarium, a leaf for every plant, on which are noted all later synonyms, corrections, and remarks; also with the excellent facilities for work in the herbarium which is open for workers from 9.30 to 4 o'clock, at 10 o'clock there is breakfast for everybody at which My Lady and Miss Banks are present. The herbarium "is rich beyond expectation ..... there are for instance 16 species of *Pinguicula*!" Jacquin made good use of his opportunities for a critical comparison of species as to which he and his father were doubtful with the specimens in Banks's herbarium; in this he received help from Banks himself and Dryander. In his paper read at the Banks centenary celebration at the Linnean Society in 1920 (Proc. Linn. Soc. Suppl.) Mr. Britten emphasised the position of "Banks as a Botanist"; Jacquin's notes supply ample confirmation of his (Banks's) knowledge of plants and active interest in the collections. Joseph writes that Banks is publishing the *Reliquiæ Kæmpferianæ* which will contain many copper-plates. 8vo copper-plates are already prepared for his great work—on the botany of Cook's first voyage (1768–71). "He has an engraver in copper always at his house, and pays him two guineas a week; he is preparing the few plates which are still required. Of the text a great part is ready, but there is still much to be done. This work is always being interrupted. As soon as the *Hortus Kewensis* and the *Reliquiæ Kæmpferianæ* are finished, they will work at this with full strength. The plates are all in the form which you know from the proofs; some have cost more than 30 guineas to engrave." This great work, a description of the plants collected by Banks and Solander during Cook's first voyage of exploration, which would have fully established Banks's botanical reputation and would have been a classic on the botany of Australasia and the Pacific Islands, was never completed; the beautiful copper-plates are still stored in the Department of Botany of the British Museum where are also the volumes of manuscript descriptions by Dr. Solander. So far as these relate to Australian plants, they were published by the Trustees of the Museum in 1905; their history is given at length by Mr. Britten in his introduction to the volume.

In the same letter is a reference to Smith's *Icones Stirpium*—"the figures are very good, only all made from dried plants." The Linnean Herbarium, in the possession of Dr. Smith, "a rich young man," is also described. "The plants are all stuck down on very dirty small paper but are very well preserved." Dr. Smith has founded a Society for the furthering of systematic natural history, which begins to be very celebrated. Jacquin hopes to become an Associate and it appears that his father is to be honorary president for the botanical side: "One of the works of this Linnean Society, as they call themselves, will be to work out the *Species Plantarum*, and that can certainly be done nowhere more easily than here. They propose to devote to it three or four years hard work." Later, writing

to his brothers, November 3, 1789, Jacquin says "I have just come from a Meeting of the Linnean Society. Dryander communicated a Monograph of *Begonia*, which contains over 20 species. Compliments from Bauer. I think it high time that I brought him away from here, otherwise he will be annexed. Banks is very much impressed by him."

At Kew Jacquin is struck by the Magnolias, Kalmias, Rhododendrons, and others growing in the open air; compared with the Vienna winter that of Kew in mid-December is April weather. "Aiton does everything in the world for me. He is just bringing out a *Hortus Kewensis* in two volumes in 8vo, with 11 finely engraved plates. My lady Banks has had two of these beautifully coloured and made me a present of them; they are *Strelizia regina* (sic) and *Limodorum Tankervilliæ*."

On Aug. 7, 1789, he notifies his father of the despatch of two cases of plants and a copy of *Hortus Kewensis* and Swartz's *Prodromus*. "The former is the first copy that was ready. I have received it as a great favour, for it is the etiquette here that any book that is dedicated to the King, is not put on sale until 14 days after it has reached him, and since the King will probably not come to London for a fortnight, it will be 4 weeks before anyone can procure it."

Jacquin is much interested in the insectivorous *Dionæa* which Curtis is importing from America. It is difficult to cultivate, but Lee has been successful and gives Jacquin written directions for its culture, which he sends to his father with a batch of living specimens. Frequent reference is made in the letters to despatches of dried plants, seeds, or living plants which he has received from Banks, or through the kindness of the gardeners at Kew, Chelsea, Syon, the nurseryman Lee, and others; arrangements are suggested for exchange of plants, and books are obtained by gift or purchase for the library at Vienna. The following reference to Märter suggests that Jamaica was not regarded as a desirable home in 1789:—"Of Märter I know nothing except that he wants to become physician in Jamaica and at the same time Director of the new bread-fruit plantation. This position however cannot be very attractive, since no Englishman would take it, and not even Swartz who is a poor Swede."

Mention is also made of Sibthorp, who thanks Jacquin père for the *Dissertations* and gives an opinion as to the identity of *Cynanchum monspeliacum*; Lady Hume, in whose garden Joseph saw *Sterculia Balanghas* in flower; the Marchioness of Rockingham, in whose garden, twelve miles from London, *Aralia capitata* and *Portlandia grandiflora* were flowering; Mr. Rashleigh; and, on several occasions, Loddiges, who helped in the despatch of plants to Vienna.

There are a few extracts from letters from Paris dated February to July 1790, but beyond an indication that Joseph consulted Jussieu's Herbarium there is nothing of local interest; Jacquin is much distressed by the untimely death of Van de Schot, the gardener at Schönbrunn, to whom many messages had been sent, as to the cultivation of the plants despatched, in previous letters. The brochure concludes with two brief extracts from a letter to his father on Oct. 28, 1790, from Bern.

BOOK-NOTES, NEWS, ETC.

The *Times* of Aug. 28–29 contains an interesting account of the excavations at Knossos from the pen of Sir Arthur Evans, in the course of which he describes the treasures of the Palace. The designs on the walls, which "mark the epoch as the noblest attainment of Minoan art," include scenes "laid amidst rocks, with flowering plants or some time marine growths. . . . . Many kinds of flowering plants are represented, their numbers increased by the artist's practice of varying the colours to suit his sense of harmony in the individual composition. Sometimes, too, they are hybridised, the leaves of one plant being coupled with the flower of another or with a floral reminiscence of a papyrus spray. The crocus is much in evidence, and the decoration of one room shows a divergence from the usual artistic method more in keeping with modern methods. Clumps of crocuses, rose coloured and blue on undulating zones, orange and white respectively, are in this case repeated by means of a stencil process, the details having subsequently been touched up. Among the plants that spring from the variegated rocks are Madonna lilies and a very fine white flower with pointed petals, undoubtedly *Pancratium maritimum*. More than one iris occurs, flowering peas or vetches, labiates, stellate blooms, in one case oddly combined with bell-shaped buds, flowering sedges, ivy and other climbing plants, and briar roses. Besides olive sprays there are seen impressions and designs of branches bearing what look like egg-shaped plums, red and yellow. Some of these finds raise interesting botanical and climatological questions." In one group is "a rose bush in full bloom: by far the earliest representation of what has been the favourite flower of so many later generations. The corolla, to which the artist has given six petals, is of a kind of golden rose colour with the centre dotted red, no doubt to indicate the anthers."

In the *Transactions of the North Staffordshire Field Club* for 1922–23 is a Flora of Hawkesyard, Rugeley, by the Rev. H. P. Reader, containing an enumeration, compiled from the writer's personal investigations, of the plants growing within a radius of five miles from Hawkesyard Priory; local specimens of all the plants mentioned in the list are preserved in the Hawkesyard Museum. In the same volume is a continuation of the North Staffordshire Flora by Mr. W. T. Boydon Ridge, B.Sc., of which the first instalment appeared in the *Transactions* for 1921–2. It is well printed, though the placing of names of species and varieties in large capitals has a somewhat startling effect, and critical as to *Rubi*, of which 48 species and numerous varieties are enumerated. We read that "English names have been appended for those desirous of having the local names used in North Staffordshire"; as a matter of fact, nearly every species included is provided with what is styled an "English name" and it is difficult to suppose that all these are actually in use—e. g. *Cerastium tetrandrum*, which is styled "Sea Mouse-ear Chickweed" is not certainly known to occur in North

Staffordshire. "Pretty Whin" is quite appropriate for *Genista anglica*, but is, we suspect, a misprint, of which there are too many, for the usual "Petty Whin." The numerous aliens and doubtful records are not differentiated typographically from the natural constituents of the Flora. The Club, of whose Transactions this is the 57th volume, is to be congratulated on its prolonged and active existence.

THE University of Chicago has added to its useful Science Series an attractive little volume, *The Story of the Maize Plant* (1 dollar 85, post paid). It claims to be "the only complete modern exposition of the morphology of the maize," and so far as we can judge from an inspection of the book, the claim is justified. In a series of chapters, the author, Mr. Paul Weatherwax, Assistant Professor of Botany at Indiana University, discusses the names and relationships, the history and geographical distribution, and the botanical origin of the plant; the structure, germination, anatomy, and physiology of the seed; the functions of the leaf, the shoot, root, and inflorescence; pollination and fecundation; heredity, breeding, ecology, and kindred subjects, with such practical matters as planting, tillage, and harvesting, products and uses; chapters on maize in aboriginal America and in American life bring the series to a close, save for an admirable bibliography and an excellent index. A word must be said for the text-illustrations—174 in number, with two coloured plates. We have seldom come across a volume in every way so well produced.

THE twenty-seventh annual meeting and autumn foray of the British Mycological Society was held at Windsor from September 28 to October 3. Virginia Water, Windsor Park, Burnham Beeches, Brockhurst Woods, Stoke Common, and Black Park were worked and many rare fungi were gathered, including *Coprinus picaceus*, *Hydnum coralloides*, *H. erinaceum*, *Pleurotus pantoleucus*, *P. revolutus*, *Pluteus eximius*, *P. cervinus* var. *Bullii*, *Polyporus spumeus*, and *Rozites caperata*. Professor Darbishire took for his Presidential Address the general subject of Lichens. The old contrast between systematist and physiologist is now almost gone: the present need of systematic lichenology is that lichen groups, genera, or even species should be treated monographically. The relation between fungus and alga was considered and the evolution traced from the flat crustaceous but areolate type to the highest physiological type in *Cladonia*. Other papers were by Mr. F. T. Brooks on epidermic plant-diseases, emphasizing the delicate balance between host, parasite, and environment, and drawing a parallel between epidemic diseases in plants and man: and by Sir H. C. Hawley on the flora of a blackbird's nest in August, which included fourteen species, ten of them Pyrenomycetes; Mr. Carleton Rea gave a talk on the more interesting fungi of the foray, and Mr. Ramsbottom described an unpublished monograph of Discomycetes by M. C. Cooke. Mr. Ramsbottom was elected President for 1924, and Miss G. Lister Vice-President.

The British Mycological Society is publishing its *Transactions* with great rapidity. The parts 1 and 2 (issued together on Sept. 29; 15*s.* n.) of vol. ix. contain accounts of the Norwich and Keswick Forays (1922) with lists of the species observed, and a report on Keswick Lichens and Mycetozoa; an address by Mr. F. T. Brooks on "Some Present-day Aspects of Mycology"; and a paper by Mr. Carleton Rea, somewhat unattractively printed, on Edible Fungi; Mr. Petch continues his "Studies in Entomogenous Fungi" (*Torrubiella*, with an excellent coloured plate) and has a note on his genus *Trichosterigma*, which proves to be identical with *Hirsutella* Pat.; Miss Lister writes on *Lampoderma columbinum* and its varieties; Mr. W. D. Buckley describes new British Discomycetes, with a new genus, *Ramsbottomia*, from Dunoon; Mr. P. J. Alexander gives the result of ten years' study of the "Ecology and Phenology of Surrey Mycetozoa"; Mr. Somerville Hastings describes and figures an alpine form of *Anellaria separata*; Mr. R. C. McLean offers "Remarks on the Nature and Definition of Species"; Miss W. L. Hake catalogues the British specimens of *Laboulbeniaceæ* in the Thaxter Collection at the British Museum; Mr. W. F. Ridler discusses "The Fungus present in *Lunularia cruciata*" (1 pl.); I. A. Hoggan writes on *Dematium pullulans* De Bary; and R. St. John Brooks and Mabel Rhodes give a "List of Fungi, &c. maintained in the National Collection of Type Cultures"—altogether a varied and interesting number.

The *Journal of the Royal Horticultural Society* for September (xlviii. parts 2 & 3) contains an interesting paper on "Some Early Italian Gardening Books"—"the fruits of a hurried search in Italian book shops and street barrows"—by Mr. E. A. Bunyard, illustrated by four reproductions of plates, one of them (from Arena's *Coltura di Fiori*, 1768) containing figures of 28 pollen grains; another, a beautiful drawing of a lily, is from the *Variæ ac Multiformes Florum Species* of Nicolas Robert (1665 ?)—a series of copper plates rightly described by Mr. Bunyard as "magnificently executed" and undoubtedly a scarce work, as Pritzel only refers to it as in Jussieu's library. Mr. Bunyard will find it thus entered in the first edition of Pritzel, which contains many works on gardening omitted from the second, including, we think, others of those mentioned in his list. The paper contains numerous notes of interest on many of the books mentioned, and a bibliography, ranging from 1474 to 1792, is appended; the letter-press presents a rather curious appearance, on account of the very small paragraphs, often of only one sentence, into which it is broken up. The Journal also includes a memoir with portrait of the Rev. William Wilks (1843–1923), Secretary of the Society from 1888 to 1920; a paper on "Autumn Crocuses," by Mr. E. A. Bowles, with 8 plates; and an account, by Mr. F. Kingdon Ward, of "The Flora of the Tibetan Marshes"—altogether an excellent number.

Einführung in die Pflanzenpathologie, by H. Morstatt (Borntraeger, Berlin, 3*s.*) ("Made in Germany") is noteworthy in so far as

it attempts to summarise various modern aspects of plant pathology and contains much information which has not previously appeared as text-book matter. The author regards Plant Pathology as a separate study, but holds the view that a plant pathologist must not only be a specialist but a general biologist as well: it begins to be a generally expressed opinion that health and disease in plants is an extremely complicated affair—plants are very human. The book is divided into four portions—Recognition of Plant Diseases, Knowledge of Plant Diseases, Origin of Plant Diseases, and Plant Protection; forty pages or so of the third part which deal with fungus and insect parasites seem out of place in a book of this type. It is a common failing of elementary books to give long lists of what are practically only bare names of fungi; these are more misleading than useful when there is not sufficient detail nor illustration. The book would prove an excellent one for practice in translation from the German, as the subject-matter is clear, concise, and up-to-date.—J. R.

The *Children's Book of Knowledge*, which Messrs. Cassell are publishing in monthly parts, is attractively produced, but the botany, judging from the article on the Lily in no. 28, would be better for revision. "The lily," we are told, "is the sign of the Resurrection, and as such is the Easter flower . . . . [It] was long used as the Easter lily, but since its flowers often failed to appear in time for Easter, its place has been largely taken by the Bermuda lily"; no tradition, however, connects *Lilium candidum* with Easter, and the second sentence quoted shows that it could not be so associated. One can hardly allow that the *Liliaceæ* are "one of the most important orders of plants, since so many of its members including asparagus, onion, leek, garlic, chives, etc. are articles of food"; but the most remarkable feature of the article is the introduction of a beautiful figure of *Nymphæa stellata*, with the legend:—"The Starred Water-lily, a lovely example of this interesting group"!

The *Orchid Review* for September contains an interesting paper by Colonel Godfery on the plants which in this Journal for 1921 (p. 106) he named *Epipactis Muelleri*, separating it from *E. viridiflora* Reich. with which it had been confused, and expressing a doubt based on his very full investigation and description (*l. c.*) as to whether it did not constitute a distinct genus. This view has been adopted by W. Zimmerman, who has published it as *Parapactis epipactoides*. The specific name obviously cannot stand in view of the identity of the plant with *E. Muelleri*, but we leave to amateurs of "new combinations," or, better, to workers at Orchids, the making of the necessary alteration.

Hitherto the mathematical, physical, and biological papers submitted to the Cambridge Philosophical Society have been published in one series of Proceedings. In order to facilitate the publication of the results of biological research carried out in Cambridge, it has been decided to attempt the publication of a separate series of Bio-

logical Proceedings. The new series will consist largely of papers representing the results of completed work, and notices of preliminary investigations will be added as an Appendix. The first number of the new series (August) contains papers "On the Invasion of Woody Tissues by Wound Parasites," by F. T. Brooks, and "On the Structure of a Middle Cambrian Alga from British Columbia (*Marpolia spissa* Walcott)," by J. Walton.

An account of the addition of *Carex microglochin* Wahl. to the British Flora, with a full description of the plant, is given by Dr. Druce in a privately circulated "interim report" of the Botanical Society and Exchange Club. The discovery was made by Lady Davy and Miss Gertrude Bacon on Meall Garbh, Perthshire, in July last.

The *Bulletin de la Société Botanique de France* (lxx. 5, 6; Aug. 2) contains: "Développement de l'embryon chez le *Myosotis hispida*," by R. Sonèges; "Sur les chimères du *Cytisus Adami*," by L. Blaringhem; "Quelques *Carex* nouveaux de Madagascar," by H. Chermezon; "Sépiacées [*Rosa*] à pédicelles glanduleux," by L. Mugnier; "Au sujet d'un 'Faux-Cacao,'" by G. Noachovitch; "Euphorbiacées nouvelles" and "Le genre *Cleistanthus* (*Paracleisthus*, n. gen.)," by F. Gainepain; "*Cephalanthera* × *Schulzei*" and "Le genre *Iseilema*," by A. Camus; "Contribution à l'étude du genre *Premna*," by P. Dop; Précisions sur la *Viola nana* DC.," by E. L. Gerbault; "*Bifora radians*, étude anatomique," by P. Guérin; "*Neuropogon melaxanthus*," by J. Maheu and A. Gillet; "*Kerstingiella Tisserantii*, sp. n.," by F. Pellegrin: "Polytomie, polystélie, et accélération vasculaires dans les racines traumatisées," by A. Dauphiné.

The *Annals of Botany* dated July (xxxvii. no. 147) contains a continuation of Prof. Bower's "Studies on the Phylogeny of the Filicales"; "A New Method of investigating Fossil Plant Incrustations or Impressions" (1 pl.), by John Walton; "Morphology and Physiology of *Eidamia*," by A. S. Horne and H. S. Williamson; "The Origin of 'Golden' Oak" (*Eidamia*), by Helen S. Williamson (1 pl.); "The Replacement of the Terminal Bud in the Coco-nut Palm," by T. Petch and C. H. Gadd; "A Reversionary Character in *Matthiola incana*," by Edith R. Saunders; "The Fungus present in *Pellia epiphylla*," by W. F. F. Ridler; "The Reaction of Protoplasm to some Reagents," by W. Seifriz; "Diurnal Variations in the Total Nitrogen Content of Foliage Leaves," by A. C. Chibnall; "Growth in Culture of *Verticillium albo-atrum*," by H. Chaudhuri.

The *Kew Bulletin* (No. 9) contains a revision of "The Genus *Panicum* of the *Flora Australiensis*," by Miss D. K. Hughes, with descriptions of new species; Mr. L. A. M. Riley continues his "Contributions to the Flora of Sinaloa" (*Leguminosæ*); Mr. Sprague has "Notes on *Heliocarpus*" (with two new species); and Mr. L. A. Boodle writes on "The Bacterial Nodules of the *Rubiaceæ*."

In the latest instalment (lxviii.) of the *Contributions from the Gray Herbarium*, Dr. B. L. Robinson continues his "Records" of *Eupatoriaceæ*; Mr. I. M. Johnston prints "Studies in the *Boraginaceæ*, in the course of which he restores Opiz's genus *Hackelia* and monographs *Plagiobothrys* and *Antiphytum*. From the same writer we have descriptions of new Spermatophytes, mostly *Euphorbiaceæ*, including a new genus of *Phyllantheæ*, *Halliophytum*; a synopsis of *Hymenopappus*; and a new genus of *Compositæ* (*Eremonanus*) allied to *Dimeresia*.

Botany is usually somewhat sparingly represented in *Science Progress*, and the October issue forms no exception to the rule: Dr. Salisbury, however, gives a summary, somewhat belated, of papers that have appeared in various periodicals between November, 1922, and April of the present year.

We learn from the Annual Report for 1922 of the Field Museum of Chicago that the Department of Botany has received the large private herbarium, consisting of about 35,000 sheets mostly of European plants, of the late Edouard Jeanpert, formerly an assistant in Cosson's herbarium. The Report also contains an account of the expedition to British Guiana, for the purpose of securing botanical exhibition material and studies for the plant reproductions in the Department.

Dr. Georg Bitter publishes in Fedde's *Repertorium* a continuation of the papers on *Solana africana* contributed by him to Engler's *Jahrbuch*. To the great inconvenience of all who use the work, the headings of the pages are left entirely blank.

The Transactions of the Devonshire Association (liv. 291–342) contains a long and interesting paper by Messrs. Miller Christy and R. Hansford Worth, with numerous illustrations from photographs, on "The Ancient Dwarfed Oak Woods of Dartmoor."

The *Journal of the Kew Guild* for 1923 gives a biography and portrait of Mr. Ernest Henry Wilson, who by his collection in China has added so greatly to our botanical knowledge and to the treasures of our gardens.

The friends of the late Sir I. B. Balfour are anxious to perpetuate his memory by some tangible memorial, and it is proposed that this should take the form of a rest-house for the use of visitors to the site in Glenbranter Forest, Argyllshire, which was set aside by the Office of Works and the Forestry Commission for the cultivation of plants raised in the Edinburgh Botanic Gardens.

A reception, at which the Swedish Minister was present, was held on October 18 at the rooms of the Linnean Society as an informal opening of the Session just begun. The notice announcing the event intimated that "evening dress" was indispensable in those attending; this we venture to think was a mistake, and in this opinion we are not alone.

THE

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BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.C.S.G., F.L.S.

LATE SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM.

The Journal of Botany was established in 1863 by Seemann. In 1872 the editorship was assumed by Dr. Henry Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

Without professing to occupy the vast field of General Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains.

Until the beginning of the late War the Journal paid its way and even allowed a slight margin of profit; but during that period the subscribers were reduced in number, and the continental circulation almost ceased. It has now regained its position, but the increased cost of production, which has not as yet been substantially reduced, has resulted in an annual deficit which at one time became so serious that the continuance of the Journal was threatened. By the generosity of those who felt that its cessation would be a misfortune, especially for British botanists whose principal organ it has always been, the deficit has been met and an appeal is now made for an increased number of subscribers.

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THE VITALITY AND DISTRIBUTION OF SEEDS.

By J. C. Shenstone, F.L.S.

The "great Essex naturalist," John Ray, has placed on record that after the Great Fire of London *Sisymbrium Irio* came up in great abundance in 1667–68 amongst the ruins of the City. In Ray's time most doctors and apothecaries were botanists, and were quite familiar with our wild and cultivated plants; and there can be no doubt that this sudden profusion of a rare plant presented to them a most interesting problem. The only attempt at a solution of the problem, in Ray's time, appears to have been that of Robert Morison, Professor of Botany at Oxford, who included a very long dialogue upon the subject in his *Præludia Botanica* (1669). He suggests that the plants were produced by spontaneous generation from the fixed and volatile salts, sulphur, etc.—a solution which certainly would not appeal to any Oxford professor of the present day (see Baxter, Brit. Flowering Plants, ii. pl. 146; 1835).

The phenomenal appearance of a luxurious crop of plants, often new to the district, which almost invariably follows the making of railway-cuttings, the excavating of wells, the dredging of canals, or the levelling of building-sites, was as little understood by modern botanists as by those of the time of the Great Fire, until recent researches threw some light upon it.

The solution of the problem clearly depends upon two lines of enquiry:—(1) The length of time that seeds may retain their vitality when embedded in the earth at different depths under natural conditions; and (2) a more thorough investigation as to the distribution of seeds of wild plants.

The preservation of the latter obviously depends largely upon the successful deposition of their seeds in such a manner as to safeguard the rearing of future generations of the species. Had not the two hundred thousand known species of phanerogams succeeded in this during the many thousands of years of their existence, the world flora would have disappeared long ago. The problem must, therefore, be regarded as one of exceptional interest.

Vitality.

Practical agriculturists and horticulturists have learnt by experience that most seeds, when preserved for future use, quickly deteriorate under ordinary conditions. But until recently very little was known of the vitality of wild seeds in natural conditions. Our knowledge of seed-vitality has been extended by the researches of Becquerel, Ewart, and Duvel.

Becquerel (Ann. Sci. Nat. Bot. sér. 9, v. pp. 193–310; 1907) tested the germination of all the oldest seeds of known age (from 25 to 135 years) preserved in the Natural History Museum of Paris. The seeds of 500 species, included in 30 families, were tested, but only 50 of these produced seedlings, and all of these belonged to four families, mostly *Leguminosæ*, with a few *Nelumbiaceæ*, *Malvaceæ*,

and *Labiatæ* (see *New Phytologist*, viii. p. 31; 1909). A. Ewart (Proc. R. Soc. Victoria, xxi. 1–211; 1908) published a list of 4000 instances, 3000 of them are from his own observation. These were made mostly upon a store of seeds from 600 species, found in a cupboard at Melbourne, which had been sent out from Kew in 1856 for a projected botanical garden, but were never used (*New Phytologist*, l. c.). Ewart's experiments confirmed those of Becquerel, the *Leguminosæ* furnishing more than half of the number of cases of longevity. In most cases these were what are known as "hard" seeds; they do not swell in water, many Leguminous seeds being provided with a hard waterproof coating which must be broken before water can be imbibed.

J. W. T. Duvel published two very important papers on the subject in Bulletins 58 and 83 of the Bureau of Plant Industry of the U.S. Department of Agriculture. Bulletin No. 58 (1904) is on cultivated seeds, and the author finds that the average life of those varies greatly with different families, genera, and species; some lose their vitality in a few months, while others retain it for years. With proper treatment vitality might be prolonged for many years, but never for centuries. Climatic influence plays a most important part in preserving vitality, heat with moisture quickly destroying it, while a dry temperate climate prolongs it.

Duvel's second paper (Bulletin No. 83, 1905, on the vitality of buried seeds) records experiments made representing 109 species, 84 genera, and 34 families of cultivated and wild plants. He mixed each seed sample with dry clay soil and packed the mixtures in dry well-baked clay flower-pots, covering them with inverted clay saucers. The seeds had been harvested in 1902, and were buried at various depths in heavy clay soil in December of the same year. As a result of these experiments it is stated that wild seeds retain their vitality longer than those of cultivated plants, and that there are wide variations in the vitality of seeds of different species in the same genus, even amongst the wild forms. The pernicious character of a weed is usually proportional to the length of time its seeds remain viable when buried; the deeper the seeds are buried, the better is their vitality preserved, and hard seeds retain their vitality longer than soft ones.

These researches are of great interest in relation to the problem under consideration. The conclusions arrived at appear to favour the theory that deeply-buried seeds of wild plants under natural conditions *may* retain their vitality, in some cases even for a very long period, not germinating until brought to the surface. It must be noted that in Duvel's experiments on wild seeds, these were not submitted to the natural conditions of self-planted seeds. Had this been done, the conclusions would have been much more convincing.

The following unpublished observations should throw further light upon the problem we are considering:—

In a garden near Birmingham there used to be bushes of *Ulex europæus*, which were pulled up about twenty years ago and destroyed; yet, year after year, seedlings of *Ulex* have come up in that garden.

The seedlings have been weeded out each year, never being allowed to flower. The garden is not double-trenched, but is simply dug over superficially; *Ulex* seeds are too large to be transported by winds and are not known to be carried by birds. Upon considering this case in connection with recent researches we must first note that seeds of some Leguminosæ may retain their vitality for fifty years or longer; therefore, assuming that *Ulex* seeds have sufficiently hard coats, there is no reason why they should not continue to germinate in this garden for another quarter of a century, or even longer. Probably each year a certain number of the seeds which may have been deeply buried by the action of worms, rains, etc., have been brought to the surface by the fork or other agency. It would be interesting to double-trench a small portion of the area, in order to discover whether the number of seedlings following the operation is greatly increased in number. *Ulex* shoots it seeds a considerable distance, so probably we should find upon enquiry that the area covered by these seedlings is rather wide.

Some twenty years ago I was told by the occupier of the Bell Farm, Stanway, Colchester, that his garden had been double-trenched about once in five years for a long period of time; and that invariably, after the double-trenching, a great crop of *Adonis autumnalis* appeared. The plant gradually died off, but the crop again appeared after the next double-trenching. I visited the garden a year or two after a crop had appeared, and noticed that there were still a few specimens of *Adonis* scattered about. This occurrence appears to be consistent with the results of recent researches. The soil is naturally replenished with seeds every five years, a period which does not appear to be unduly long for seeds of wild plants to retain their vitality when self-buried under natural conditions.

About the same time I had an interesting conversation with a seed-grower at Colchester, who pointed to a seed-bed in which an alien plant of *Tropæolum majus* had appeared. (Seed-growers, of course, carefully exterminate any alien which appears in their seed-beds.) He said that it was strange that the seeds of *Tropæolum majus*, which lose their vitality very rapidly in seedsmen's packets (after two years ?), should continue to appear in the seed-bed for at least seven years after a crop of *Tropæolum* had been harvested. This observation appears to suggest that if Duvel had planted his cultivated and wild seeds in suitable soil, and under the natural conditions of self-planted seeds, he might have found the vitality of some of his seeds to be considerably prolonged. This indicates a line of research which might give important results. One would suggest the planting of seeds of both cultivated and wild species, under conditions approximating as closely as possible to Nature and in soil of the character preferred by the species, all seedlings being destroyed yearly as they appear. The length of vitality of different seeds in Nature could thus be determined with some accuracy.

How ancient many of our species are has been demonstrated by the work of Clement Reid on the seeds of geological strata (*The Origin of the British Flora*, 1899). His researches brought to our

knowledge the abundance of well-preserved seeds which occur in these ancient deposits, and proved that the plants which now clothe our island abounded in very early times. On the Dogger Bank, in the middle of the German Ocean, a peaty deposit, known as "moor log," becomes entangled in the fishermen's nets. In 1909 this deposit was carefully investigated by Mr. and Mrs. Reid (*Essex Naturalist*, xvi. p. 54; 1909), who found that it was rich in well-preserved seeds, mostly of riverside and water plants, such as *Menyanthes trifoliata*, all represented in our modern flora.

Distribution.

The mechanism by which individual seeds are distributed has been studied for a very long period and recorded in our text-books; but it is only recently that the colonisation of new areas on a large scale has been receiving attention. The classical instance is that of the Island of Krakatoa, the vegetation of which was completely destroyed in 1883 by a volcanic eruption. The immigration of its new flora was studied by Treub (Ann. Jard. Bot. Buitenzorg. vii. 1888), who reported that within a brief period the island became covered with vegetation, consisting at first of algæ, and soon almost entirely of ferns; and within ten years a flora of phanerogams followed (Penzig in *op. cit.* 1902; Ernst, New Flora . . . of Krakatau, Cambridge, 1908).

A recent experiment shows how well equipped seed-plants are for transferring themselves to new habitats (see Wheldon and Wilson, *Flora of West Lancashire*, 1907, p. 339; C. E. Moss, *Vegetation of the Peak District*, 1913, p. 159). A pond was made near Garstang in North Lancashire, and was carefully railed off against cattle; it was watched to see what plants would appear in it: within eighteen months, *Nitella opaca*, *Callitriche* sp., *Alisma Plantago*, *Glyceria fluitans*, *Juncus conglomeratus*, and *J. articulatus* had established themselves.

Some twenty-five years ago my attention was called by Mr. Trethewy, Lord Cowper's land agent, to a small oak-plantation near Colchester, which had originated as follows:—A portion of a field had been railed in, to prevent people walking on the enclosed space and to protect it from rabbits; very soon a spontaneous and plentiful crop of young oak seedlings appeared in the space. There are sandy tracts in that part of Essex, which when fenced off soon develop into similar oak plantations. These are believed to arise from acorns dropped by the larger birds, such as pigeons and rooks, in flying from one plantation to another; rooks, indeed, have been observed to drop acorns.

The influence of the soil in the alteration of a flora is to be seen near the brine springs at Droitwich, Worcestershire, and at Northwich, Cheshire, where the ground has become somewhat saline; the character of the flora has also changed and become maritime, as shown by the presence of halophytes, such as *Atriplex glabriuscula* var. *Babingtonii*, *Glaux maritima*, *Glyceria maritima*, *Juncus compressus* var. *Gerardi*, and *Spergularia salina* (Lord de Tabley,

Flora of Cheshire, 1899, p. 54; and Amphlett and Rea, *Botany of Worcestershire*, 1909, p. 59, xvi.). Nor must we overlook the fact that many of our sea-coast plants (Halophytes) occur also upon mountain heights, far removed from the sea-coast.

In 1885 Mr. J. W. White published (Proc. Linn. Soc. 1884–85, p. 108) a most interesting paper on the germination of seeds after prolonged submersion in salt water. The Dock-Harbour authority started dredging operations in the Avon, near Bristol, and dredgings were deposited in a disused stone quarry in the Avon Gorge. Immediately after the deposit was levelled in 1882, a luxuriant crop of varied vegetation appeared, consisting of some 50 species, native to the banks of the Avon above and below Bristol but not previously observed near the old quarry; with them was a sprinkling of maritime plants. The only explanation possible was that these seeds had been washed down from the higher reaches of the river, and had lain dormant for a time, immersed in salt water, still retaining their vitality.

Some thirty years ago the Colchester Corporation carried out dredging operations in the Colne estuary, and the dredgings were spread over the adjoining marshlands. Almost immediately a luxuriant crop of a somewhat rare and very local plant, *Lepidium latifolium*, covered these deposits; previously it had grown in small groups about the river-side and adjoining dykes; it would appear that from these groups the river-bed had become stocked with seeds. About the same time an abundant growth of the same species appeared near a small landing-stage on a narrow branch of the Blackwater estuary at Salcot and Virly, in Essex. Upon enquiry I was informed that the river-bed had been dredged and the dredgings deposited upon that spot. The explanation is doubtless the same as above.

The appearance of *Spartina Townsendi*, first recorded at Southampton Water by H. & J. Groves (Rep. Bot. Exchange Club, 1880–81, p. 37), and its remarkable spread along the south coast to Poole Harbour, is well described by Cary and Oliver (*Tidal Lands*, 1918, p. 177).

Mr. J. Adams has contributed to the *Irish Naturalist* (xiv. 80; 1305) some researches upon seeds he found underlying a pasture of twenty years' standing. He removed the turf in various parts of the field to a depth of three inches, and collected the subjacent soil to a further depth of three or four inches, altogether obtaining enough earth to fill a garden-barrow. The seeds contained in this soil were carefully removed by washing through sieves of various meshes, etc., and were examined and identified; 829 were found, representing the seeds found under an area of approximately one square yard: no doubt many seeds escaped, and the number would have been considerably multiplied if he had penetrated the ground to a depth of from 9 to 12 inches; for, as we know, the action of worms and rainfall carries seeds down to a considerable depth. The seeds identified represented 22 species, "such as Wheat, Ryegrass, *Polygonum Convolvulus*, and *P. aviculare*, *Rumex crispus*, *Ranunculus acris*,

White Clover, Fool's Parsley, and Yellow Rattle," some of which still occurred in the pasture. Very few of the species retained their vitality, and these included *Ranunculus acris* and *Polygonum Convolvulus*, which might well have deposited their seed quite recently. The research is interesting as showing that probably most of the surface-soil of our country contains an abundance of dormant seeds of some kind or other. Birch seeds were numerous, and, as the nearest birch trees were a quarter of a mile away, their presence gives rise to the question "how did they get there?" Had the birch trees sprinkled the whole surrounding area to a distance of over a quarter of a mile with their wind-carried seeds?, or were the seeds conveyed to this particular field by the agency of farm animals, which had previously been pastured near birch trees?

Dr. Winifred E. Brenchley (Rothamsted Experimental Station) has published (Journ. Agric. Science, ix. part 1, 1918) a full and careful research on "Buried Weed Seeds," dealing with the germinating capacity of seeds contained in soil under natural conditions and at different depths. Samples were taken, with every possible precaution against error, from old pasture, pasture originally arable, and arable lands. Conclusive proof was obtained that seeds of *Veronica hederæfolia* had retained their vitality after lying buried for ten years; and there was evidence that other seeds had survived burial for at least 58 years. The number of viable seeds obtained from one field, calculated from an average of the samples taken, amounted to 17 millions per acre. Further information upon buried weed seeds will be found in Dr. Brenchley's book "Weeds of Farm Land," and in the forthcoming work "Manuring of Grassland," which, she tells us, gives an analysis of the herbage of grassland after manuring for over sixty years, and which contains references to the earlier work on the same areas at Rothamsted of Lawes, Gilbert, and Masters.

Ewart has also made observations upon seeds buried below existing forest vegetation in Australia, and has found some at 18 inches below the surface which had retained their vitality (New Phyt. *l. c.*).

It is well known that when heavy clay fields are fertilized by spreading chalk over them, a chalk flora appears; but if quick-lime be used instead, it frequently happens that a crop of white clover makes its appearance (Pratt, *Flowering Plants of Great Britain*, i. p. 127; 1873); and practical farmers have told me that a crop of trefoils follows the treatment of fields with basic slag. Neither burnt lime nor basic slag can contain seeds, hence the inference is that the seeds originated from previous crops of white clover and trefoils.

It has been put on record that land reclaimed at Holderness at the mouth of the Humber yielded spontaneously a good growth of grass with an abundance of white clover within 3 years after enclosure (Proc. Inst. Civil Engineers, xxi. p. 454).

Much suggestive information concerning the distribution of seeds and the "peopling of new soil" will be found in Warming's *Œcology of Plants*, 1909, pp. 349, 352, 363; but space does not admit of further discussion of this important topic.

In conclusion, I may refer to some notable examples illustrating the problem under discussion. Of these, the London Rocket (*Sisymbrium Irio*) mentioned above is perhaps the most interesting. Its native habitat is possibly Afghanistan and Northern India, where it is abundant, but it has spread into Europe, where it is a weed of waste places and roadsides. Ray and Merrett expressly state that it occurred in the suburbs of London in the years preceding 1667, though then a recent introduction, and Parkinson in 1640 did not know of it as an English plant (Dunn, *Alien Flora of Britain*, 1905, p. 29). It is an established fact that this plant frequently appears after fires, and also after the levelling of building-sites, and it seems likely that the seeds are derived from plants lurking in the immediate neighbourhood, which very rapidly spread over cleared spaces favourable to their growth. But how are we to account for the sporadic appearance of the plant upon building-sites throughout so many centuries? In my paper on the "Flora of London Building Sites" (Journ. Bot. 1912, 117) it is reported to have occurred in fair abundance in Bloomsbury. The houses cleared from this area had basements or cellars, but it is not likely that the soil under these contained the seeds; the probability is that the plant lurked in the back gardens or yards in the vicinity. It is not a plant which would catch the eye of any but a skilled botanist; and as botanists have little opportunity of investigating the flora of London back yards, it may still exist unobserved in the older parts of the City.

Another well-known habitat of this plant is at Oxford. Baxter (*l. c.* 146) tells us that, when alterations were being made in the Oxford Botanical Garden in 1834, rubbish was removed to a space outside the walls of the Garden, and was frequently burning for two or three days at a time, a considerable quantity of ashes being produced. These ashes were spread over the surface and dug in, and very shortly an abundant and very luxuriant crop of the *Sisymbrium* appeared, though never before seen *in that part of the garden*. From his account one infers that plants did occur in other parts of the Garden, and these no doubt provided the seeds for starting the new colony.

During last winter a well 70 feet deep was dug at Saffron Walden, and the earth which was excavated became covered by a fine crop of Poppies; how did the seed get there? There are said to have been no Poppies previously in the immediate neighbourhood, and the crop followed so quickly after the excavation that one can scarcely escape the conviction that, in this case, the seeds must have been actually contained in the soil itself. This Poppy may, or may not, be one of the plants whose seeds retain their vitality for a very long period; but, in any case, poppies so frequently form part of rubbish-heap floras and hang about hedges or in odd corners that a few unobserved plants might within recent years have scattered a good supply of seeds on the site. Some years ago attention was called to the constant appearance of Poppies round about Cromer in Norfolk,

whenever the earth was deeply ploughed; and later, during the War, Poppies abounded upon the trenches in Flanders and in Gallipoli. The Poppy capsule contains very numerous small seeds; under the plate crowning the capsules, a ring of apertures will be found, and these serve to scatter the seed very effectively from the ripe capsules, when swayed by the wind. Thus a very few plants, scarcely noticeable, would suffice to provide seed for a very fine display on newly dug up earth, favourable to the growth of the species.

About 1910 the gay appearance of the Aldwych building-site in London attracted much attention. Unfortunately some mischievous persons added to the display by throwing garden-seeds over the palings enclosing the site, thus rendering the lists published in the newspapers valueless for scientific purposes. But there were some five or more other building-sites in the City and West End, to which public attention had not been called, that were also gay with an alien flora. These were quite free from any suspicion of having been tampered with. Reference to the article quoted above (Journ. Bot. 1912, 117) will show that the plants growing upon these sites could be separated into four groups—Forage plants, Small-seeded plants, Wind-distributed plants, and Escapes from cultivation; and that such plants would have had no difficulty in reaching these sites by ordinary means of distribution. The views there expressed received confirmation from Mr. Upton, of the Bedford Office, who had actually seen rough herbage being mown down near the Norfolk broads, and was informed that it was destined for use in towns for nose-bags, to keep the horses quiet, whilst tumbrils were being loaded; he later observed a row of horses, harnessed to tumbrils, actually scattering forage about upon the Bloomsbury site. Forage-plants were, as a fact, the most numerous on these sites.

Mr. A. B. Jackson states that when trees are grubbed up at Dawick, Peebles, for replanting, the Foxglove springs up. It is well known that a single plant of Foxglove produces many thousands of seeds. Groups of these plants, which have probably at some time existed in the park, could easily have impregnated the soil with an abundant supply of their seeds, and subsequent groups have, no doubt, renewed the supply of seeds from time to time; but one can scarcely resist the conclusion that the seeds must have retained their vitality for several years—as also in the instance narrated by Anne Pratt (*Flowering Plants*, iv. p. 121; 1873).

The woodlands in Essex and other eastern counties are chiefly what are known as Oak Associations, the timber trees being mostly oaks. Beneath them is a dense undergrowth of *Corylus Avellana*, *Carpinus Betulus*, and sometimes ash. So dense is this undergrowth that ground-vegetation remains in a moribund condition until a space is cleared, and light and air admitted. Each year a section of these woods is thus cleared, the undergrowth being cut down and sold and some of the timber trees felled. These sections are so arranged that the whole wood is cleared during a period of ten or fourteen years, so that each year one of the ten or fourteen sections is exposed to light

and air. Almost immediately after the clearance, the ground becomes carpeted with a grand show of *Primula vulgaris* (or, in one district, *P. elatior*), *Scilla nutans*, *Anemone nemorosa*, *Lychnis diurna*, and other species of woodland plants. As the underwood again grows up, these plants gradually become depauperated. Primrose plants with etiolated leaves, scarcely recognizable, may often be found in the thick undergrowth.

These woods should afford an admirable opportunity for experimental research. It is suggested that if a series of samples of the soil were taken from different depths, and also from each of the sections of the wood, and the vitality of the seeds carefully tested, some valuable results might be obtained. Possibly the proportion of seeds retaining their vitality, found in each section, might be shown to be directly proportional to the length of time which had passed since the section had been last cleared. The thick covering of the ground by the undergrowth of wood would certainly have afforded good protection from the access of seeds of a more recent date.

It would appear that we can scarcely claim that this ancient problem has been definitely solved; yet a consideration of recent researches leads to the conclusion that we have arrived at a probable solution of the riddle, and that some carefully devised series of experiments might carry us to the desired goal. In some of the cases, the areas upon which the alien plants appeared had evidently been well supplied with seeds from the near neighbourhood, within measurable period of the time when the crop of plants suddenly sprang up. We have also much evidence that the seeds of wild plants frequently retain their vitality for a sufficient length of time to enable them to take advantage of any favourable opportunity for germination.

Observations such as those suggested in connection with *Ulex* and *Tropæolum majus* should add much to our knowledge; and experiments as to the distribution of seeds in sufficient quantities to explain their abundance in excavated soil, in river-dredgings, and in geological strata might lead us to more definite conclusions.

The following experiments are suggested as likely to give fruitful results:—A flock of sheep or herd of cattle, after pasturing in a field open to the free seeding of trees or herbaceous plants, might be removed to an area proved to be quite free from these particular seeds. After a limited period, the soil from the latter area could be carefully washed and sifted, and the number of seeds found to be transported estimated. Open-air experiments under natural conditions, such as the exposure of adhesive plates to catch drifting seeds, should afford us valuable information as to the distance to which seeds are carried from any given source. Other experiments to trap the seeds carried by flowing streams or tides, or by animal transport (*e. g.*, by birds or the smaller mammals), could be easily devised and should afford much that is of interest regarding the subject of sporadic floras.

I wish to record my indebtedness to Mr. A. Gepp for suggestions and encouragement in the preparation of this paper and for supplying me with many references to the literature of the subject.

ORCHIS FUCHSII Druce.

By Colonel M. J. Godfery, F.L.S.

In the Report B. E. C. 1914 (p. 99) Dr. Druce sought to prove that *O. maculata* L. consisted solely of *O. ericetorum* Linton, to the exclusion of the common Spotted Orchis, which he re-named *Orchis Fuchsii* Druce. As he has rebuked me (B. E. C. Rep. 1921, 314) for not adopting his new name, the following is an attempt to reply to his criticism. It having been shown (Journ. Bot. 1921, 305) that *O. ericetorum* Linton is identical with *O. elodes* Grisebach, the latter name, which dates from 1846, is used throughout this paper for *ericetorum*. It would be mere insularity to attempt to maintain *ericetorum* in the face of a long prior and generally accepted name.

Linnæus's description of *O. maculata* runs (Sp. Pl. 942) :—

"*maculata*. 12. Orchis bulbis palmatis patentibus, nectarii cornu germinibus breviore: labio plano petalis dorsalibus erectis. *Act. Ups.* 1740, p. 14. *Fl. suec.* 729. *It. œl.* 48. *Dalib. paris. 274.

"O. palmata pratensis maculata. *Bauh. pin.* 85.

"O. palmata montana maculata. *Bauh. pin.* 86. *Vaill. paris.* t. 31. f. 9, 10.

"Satyrium basilicam fœmina. *Dod. pempt.* 240.

"*Habitat in* Europæ *pratis succulentis.*

"Petala 3 *exteriora erecta*; 2 *interiora conniventia.* Nectarii *lobium trifidum, planum*: *lobis lateralibus majoribus crenatis*: *intermedio angustissimo, integerrimo.*"

Dr. Druce's case rests on the last three words—mid-lobe extremely narrow, quite entire. In *elodes*, he argues, the mid-lobe is very narrow, therefore *O. maculata* L. is *elodes*; in *Fuchsii* it is not very narrow, therefore *Fuchsii* is excluded. He also states that the specimen of *O. maculata* in the Linnean herbarium is *elodes*.

Extreme narrowness of the mid-lobe is not a constant character in *elodes*, as Mr. T. A. Stephenson's beautiful drawings clearly show (Journ. Bot. 1920, t. 556; 1921, t. 559). Is there one of the figures of *elodes* in which the mid-lobe could be truthfully described as narrow in the superlative degree? In fig. 18, pl. 556, it is actually broader than long! The breadth also varies considerably in different specimens. Four drawings of single flowers found at Winchester in 1917 were labelled by Dr. Druce "All under *Fuchsii*," and in three of these the mid-lobe is actually narrower than in figs. 17 and 18, t. 556, and fig. 3, t. 559. The narrowness of the mid-lobe is not always sufficient to separate *elodes* from *Fuchsii*, for it is sometimes narrower in the latter than in *elodes*. The width of the mid-lobe is an unimportant and variable character, of no value as a ground of specific differentiation.

In his 1914 paper Dr. Druce writes :—"Had the descriptions in the continental floras been consulted, it could have scarcely escaped attention that the description of *O. maculata* in the majority of them

really applied to the Linnean plant, the *ericetorum* of Linton." The sole ground of this contention is that the mid-lobe is described as *smaller* than the side-lobes. Here he has somewhat changed his ground. No longer is *O. maculata* L. confined to the (*lobo*) *intermedio angustissimo* of Linnæus, but every description giving the mid-lobe as *smaller* than the side-lobes is claimed as referring to *elodes*. The first of his many quotations is as follows :—" For instance M. Rouy in the Flore de France, xiii. 153 (1912), describes it as *maculatus genuinus*, as having a 'labelle faiblement 3-lobé, le lobe médian plus petit que les latéraux.' " Now it is quite clear that Rouy here refers to *Fuchsii*, for the leaves are oblong and rounded at the apex, and the spur thick, which is true of *Fuchsii* but not of *elodes* ; and, moreover, on the next page he describes *elodes* as a separate race, quoting Britain as a habitat, thereby showing that he suspected that *elodes* was identical with *ericetorum*.

The following objections arise to the restriction of *O. maculata* L. to *O. elodes* Griseb. (*O. ericetorum* Linton) :—

(1) The great monographers of the *Orchidaceæ*, Reichenbach fil., Schulze, Barla, Camus, etc., and the authors of the two most modern and weighty European Floras, Rouy (Flore de France) and Ascherson & Graebner (Syn. Mitt. europ. Fl.) all consider *O. maculata* L. to be a single very variable species. As can be easily verified from their descriptions, *O. Fuchsii* Druce is nothing but their typical *O. maculata* L.—the *O. maculata genuina* of Reichenbach fil. (Icon. xiii. 65) and the *O. maculatus genuinus* of Rouy and of Ascherson & Graebner. They regard *elodes* as a distinct *race* of *O. maculata* L. but not as a valid species.

(2) Linnæus's diagnosis of *O. maculata* gives "*petalis dorsalibus erectis*" ; in his more detailed description he says "*petala* 3 *exteriora erecta.*" This duplication is so unusual that it would seem that he wished to lay stress on the point. Erect sepals, however, are characteristic of *Fuchsii*, not of *elodes*, in which they are spreading, or even drooping, as may be seen in Mr. Stephenson's figures. If "(*lobo*) *intermedio angustissimo*" proves that *O. maculata* L. was *elodes*, "*petalis dorsalibus erectis*" equally proves that it included *Fuchsii*.

(3) It is contrary to all we know of Linnæus's views to suppose that he would ever have admitted that *elodes* was specifically distinct from *Fuchsii*. He considered that *Ophrys apifera*, *aranifera*, *arachnites*, *muscifera*, etc., belonged to one and the same species, which he named *O. insectifera*. In *O. arachnites* the lip is undivided, in *muscifera* 3-lobed, in *apifera* sub-5-lobed, to say nothing of other differences very much more important than any between *Fuchsii* and *elodes*. Yet he wrote "qui vero has confert cum congeneribus, omnesque varietates simul inspicit primam originem ex una facile perspiciat"—whoever compares all these varieties will easily see that they sprang from a common origin. He believed that every species was a separate creation, so that all forms traceable to a common stock *must* belong to one and the same species. *Elodes* and *Fuchsii* certainly sprang from a common stock much less remote than that from which the various species of *Ophrys* are descended.

(4) It implies that Linnæus altogether omitted to describe *O. Fuchsii*, for if his *O. maculata* does not include it he certainly never mentioned it at all. As it grows throughout almost all Europe, extending North to Iceland, such an omission is incredible, and had it really occurred would promptly have been pointed out by his critics.

(5) The synonyms quoted show that Linnæus intended to include *O. Fuchsii*. *O. palmata pratensis maculata* Bauhin, pinax, 85, can only be the latter—we can hardly believe that Bauhin also omitted the commonest of European orchids. Rudb. elys. ii. p. 211, fig. 3, represents Bauh. pin. 85 (*vide* Linnæus's Flora suec. i. 729), and certainly is not *elodes* for the lip is narrow, whilst in *elodes* it is nearly orbicular. Vaill. paris. t. 31, fig. 10, is good *elodes*, but fig. 9 is a common form of *Fuchsii*, with erect sepals, angular side-lobes, and moderately broad mid-lobe. In Dod. pempt. 240 the leaves are broad, the sepals erect, the flower small, the mid-lobe half as wide as the side-lobes. It is not *elodes*.

(6) Linnæus seems to have thought *O. maculata* such a common and well-known orchid as to call for little attention, for his herbarium contains only one specimen, and that an imperfect one, without lower leaves or root. No date or locality is given; the specimen simply bears in Linnæus's handwriting "12 maculata." In its crowded spike it is impossible to see the exact shape of the lip, and the lowermost leaves (which differ in *Fuchsii* and *elodes*) are absent. Probably there were originally other specimens since lost or destroyed. In any case it is not sought to prove that *O. maculata* L. does not include *elodes*, and the admission that this specimen is *elodes* would not affect the argument.

(7) It involves (by substitution of another type) a virtual transfer of the name *O. maculata* from one species (*Fuchsii*) to another (*elodes*). The ambiguity thus created has compelled Dr. Druce himself to resort to such phrases as *O. maculata vera* to make his meaning clear. As to his statement that the name *elodes* is still-born, it is a duly-published name (supported by an unusually clear description) which has been in current use for seventy-seven years. "One regrets," he says, "to see such an untenable name suggested, which can only create confusion," and adds that he had considered *elodes* as an equivalent for *ericetorum*, but rejected it. But surely no author would ever dream of giving the name *elodes* to *ericetorum* unless the plants had been proved to be identical, which at that time was not the case. I leave others to judge which is most likely to lead to confusion—to adhere to existing universally recognised names, or to assign to *O. maculata* L. in England a meaning different from that which obtains everywhere else, and to give a quite unnecessary new name to what is universally regarded as typical *O. maculata* L.

I have botanised in France at many points from Toulon to Nice, including the mountainous regions of Vence, Thorenc, and St. Martin Vésubie, at Mantes near Paris, in Savoie, and throughout the Chamonix Valley, but, though I have seen thousands of *Fuchsii*, I have never seen anything which could be taken for *elodes* except a few

plants at Falaise in Normandy, which I somewhat doubtfully assigned to that species. I have also hunted for orchids in several places in Switzerland, and in Italy from Ventimiglia to Alassio, near Genoa, on the Portofino promontory, both sides of Lago Maggiore, and in the country between Pisa and Livorno, but have never seen a trace of *elodes*. It appears to be a Northern plant ("Videtur forma septentrionalis Rchb. icon. xiii. 67"). I often found *Fuchsii* with the mid-lobe smaller than the side-lobes. In 1741 Linnæus went to the island of Oeland, and on June 2nd botanised in a marsh near Rella. In his journal of this voyage (Iter. Oel. p. 48) he tells us he found three orchids there—*Orchis sambucina*, *O. latifolia*, and one "commonly called" *Orchis palmata maculata*. In his 'Flora Svecica,' ed. 1 (1745), immediately after his diagnosis of *O. maculata*, he quotes *Act. ups.* 1740, p. 14 (his earlier description of the species, in which the lip is described as *barba trilobo crenata interiore minore integerrimo*), and *It. oel.* 48, thus definitely conveying to us that the Rella plant was a type of his No. 729.

On June 19th, 1922, Mr. W. N. Edwards of the British Museum (Nat. Hist.) visited the marsh at Rella, where Linnæus botanised in 1741. He did not find *O. sambucina*—perhaps he was too late for that,—but he found the other two orchids, and brought home a series of *O. maculata*, which has been passed by Dr. Druce himself as "*O. Fuchsii*" Druce. As Linnæus tells us, by the citation of It. oel. 48, that the Rella plant was his *O. maculata*, and this now turns out to be "*O. Fuchsii*" and not *elodes*, perhaps Dr. Druce may now wish to reconsider his theory that *O. maculata* L. consisted solely of *O. elodes* Griseb. (*O. ericetorum* Lint.) in the light of this further evidence.

The most reasonable view appears to be that *O. maculata* L. was an aggregate species, embracing all forms and varieties. From this *elodes* was separated as a distinct species in 1845, and has been maintained as a race, subspecies, or variety ever since. What is left after the separation of *elodes* is the variable plant which Dr. Druce renamed *O. Fuchsii* Druce. This is universally regarded as the type of *O. maculata* L. The citation of the Rella plant by Linnæus makes it sufficiently clear that he held a similar view. The continental varieties *sudetica*, *Meyeri*, etc., are forms of *O. maculata* and not of *elodes*.

The idea that *Fuchsii* and *ericetorum* might still be retained as convenient terms of reference is much to be deprecated. When we find that we have unnecessarily given a new name to a plant which is everywhere known by the name given to it by Linnæus in 1753, the least we can do is to refrain from perpetuating it.

A KEY TO THE BRITISH SPHAGNA.

By W. R. Sherrin, A.L.S.

The following key to the species of *Sphagnum* is complementary to Wheldon's *Synopsis of the European Sphagna* (1917), in which the varieties and forms are fully dealt with. For a complete description of the species the student is referred to Warnstorf's *Sphagnologia Universalis* (1911). The beginner will find Dixon's *Handbook of British Mosses* of great help in taking up the family; the limited number of species described by him correspond more or less accurately with the leading or titular species of the groups in the following list:—

General Key to the Groups.

A. Branch leaves at the apex truncate and toothed.
  I. Chlorophyllose cells exposed on the upper (inner) or lower (outer) surfaces or on both.
    a. Chlor. cells of br. ls. in section triangular or trapezoid.
      Chlor. cells with the base of the triangle on the upper surface... Group Acutifolia.
      Chlor. cells with the base of the triangle on the lower surface.
        Stem cortex reddish; br. ls. squarrose, spreading ..... Group Squarrosa.
        Stem cortex pale yellowish; br. ls. mostly undulate ..... Group Cuspidata.
    b. Chlor. cells of br. ls. barrel-shaped to rectangular, exposed on both surfaces ..... Group Subsecundum.
  II. Chlor. cells completely enclosed ..... Group Rigida.
B. Br. ls. at apex cucullate (hooded) ..... Group Cymbifolia.

Group Acutifolia.

A. Most of the cortical cells of the stem with large non-bordered pores.
  I. Stem ls. spatulate, fimbriate on the rounded apex and on the lateral margins above ..... *S. fimbriatum* Wils.
  II. St. ls. lingulate, fimbriate at the apex only.
    a. Wood cylinder of the st. never red; st. cortex with large pores ..... *S. Girgensohnii* Russ.
    b. Wood cylinder red; st. cortex with smaller pores..... *S. Russowii* Warnst.
B. Cortical cells of the st. rarely with small scattered pores.
  I. St. ls. with narrow base; br. ls. dentate... *S. molle* Sull.

II. St. ls. with wide base; ls. entire.
a. St. ls. lingulate.
* St. ls. fibrillose; outer side of br. l. with large non-bordered pores ..... *S. rubellum* Wils.
** St. ls. without fibrils; outer side of br. l. with small bordered pores.
Br. ls. imbricate ..... *S. fuscum* Klinggr.
Br. ls. erecto-patent ..... *S. Warnstorfii* Russ.
b. St. ls. triangular to triangular-lingulate.
* Br. ls. minute, under 1 mm..... *S. subtile* Warnst.
** Br. ls. over 1 mm.
† St. ls. fibrillose.
St. cortex with pores ..... *S. tenerum* Sull.
St. cortex without pores ..... *S. acutifolium* Ehrh.
†† St. ls. without fibrils.
Wood cylinder never red; st. cortex porose ..... *S. quinquefarium* Warnst.
Wood cylinder reddish to dark purple; St. cortex rarely with pores ..... *S. plumulosum* Roll.

Group Rigida.

Chlor. cells completely enclosed; st. ls. minute. *S. compactum* DC.

Group Squarrosa.

A. Stem cortex 2–3-layered..... *S. squarrosum* Pers.
B. Stem cortex 3–4-layared..... *S. teres* Angstr.

Group Cuspidata.

A. Branch leaves narrow or widely lanceolate.
I. Chlor. cells. of the br. ls. trapezoid.
a. St. ls. equilateral, to isosceles, triangular.
St. cortex clearly differentiated.
St. ls. obtuse ..... *S. Dusenii* C. Jens.
St. ls. acuminate.
Br. ls. serrate..... *S. serratum* Aust.
Br. ls. entire ..... *S. cuspidatum* Ehrh.
St. cortex not clearly differentiated... *S. fallax* Klinggr.
b. St. ls. with the apex rounded and more or less lacerato-bifid ..... *S. riparium* Angstr.
II. Chlor. cells of the br. ls. triangular.
a. Chlor. cells not reaching the surface of the l.
St. ls. with narrow base ..... *S. Lindbergii* Schimp.
St. ls. wider at the base.
St. ls. obtuse.
St. ls. without fibrils ..... *S. obtusum* Warnst.
St. ls. fibrillose ..... *S. balticum* Russ.
St. ls. acuminate.

Br. ls. up to 6 mm. long, 6–9 rows of cells in the border. *S. Torreyanum* Sull.
Br. ls. up to 2 mm. long, 4–5 rows of cells in the border. *S. pulchrum* Warnst.

b. Chlor. cells of the br. ls. reaching the upper surface of the leaf.
St. ls. obtuse ..... *S. amblyphyllum* Russ.
St. ls. acuminate.
St. cortex in 1–2 well-defined layers; spreading branches 3 cm. long. ..... *S. riparioides* Warnst.
St. cortex in 2–4 indistinct layers or apparently absent... *S. recurvum* P. de Beauv.

B. Branch leaves widely ovate ..... *S. molluscum* Bruch.

Group Subsecundum.

A. St. cortex distinctly 2 or more layered.
St. ls. small, 0·7–1 mm. long × 0·5–0·8 wide; triangular-lingulate, fibrillose only near the apex ..... *S. contortum* Schultz.
St. ls. larger, 1–2 mm. long × 0·9–1 mm. wide; lingulate, generally fibrillose to base ..... *S. platyphyllum* Warnst.

B. St. cortex distinctly 1-layered except in *S. franconiæ*, which is 1–2-layered.
I. Br. ls. on both sides with few scattered pores or mixed with pseudopores.
a. St. cortex distinctly 1-layered.
* Br. l.s. with pseudopores mixed with true pores.
Upper surface of st. l. with few pores ..... *S. camusii* Warnst.
Upper surface of st. l. with many pores ..... *S. armoricum* Warnst.
** Br. ls. without pseudopores.
St. ls. ovate or oblong-ovate, 1·7–2·7 mm. long, multifibrose ... *S. obesum* Warnst.
St. ls. triangular-lingulate, 0·9–1·14 mm. long, efibrose, or fibrose in upper part only ..... *S. Holtii* Warnst.
b. St. cortex 1–2-layered ..... *S. franconiæ* Warnst.
II. Br. ls. with numerous true pores arranged in rows on one or on both surfaces.
a. Br. ls. with numerous true pores on one surface only.
* Br. ls. multiporose on the lower surface.
† St. ls. minute, 0·5–1 mm. long.
Br. ls. with pseudopores on upper surface..... *S. bavaricum* Warnst.
Br. ls. without pseudopores ... *S. subsecundum* Nees.

†† St. ls. larger, 1–2 mm. long.
a'. Cortical cells in section elliptical and strongly incrassate. *S. hercynicum* Warnst.
b'. Cortical cells subcircular with thin walls.
a''. St. ls. with large auricles. *S. auriculatum* Schimp.
b''. St. ls. without or with minute auricles.
St. ls. 1–1·3 long, fibrillose above the middle ..... *S. inundatum* Russ.
St. ls. 1·4–2 mm. long, fibrillose below the middle ... *S. aquatile* Warnst.
** Br. ls. multiporose on the upper surface ..... *S. crassicladum* Warnst.
b. Br. ls. with numerous true pores on both surfaces.
Br. ls. on outer surface with pores arranged in a continuous series ..... *S. rufescens* Nees & Hornsch.
Br. ls. on outer surface with pores arranged in an interrupted series..... *S. turgidulum* Warnst.

In order to examine the pore-structure of the stem cortex and of the branch leaves it is necessary to use a stain; methyl-blue gives the best result for this purpose. In ascertaining whether the pores are on the upper or lower surface of the leaf, a high power must be used, care in focussing is necessary, as the pores on the opposite surface may show through.

Group Cymbifolia.

A. Chlor. cells of the br. ls. free on the upper or on both surfaces.
I. Chlor. cells equilateral to shortly isosceles-triangular, not reaching the lower surface ..... *S. imbricatum* Russ.
II. Chlor. cells spindle-shaped, isosceles-triangular to trapezoid, reaching both surfaces.
a. Chlor. cells much thickened on upper wall.
Chlor. cells narrow up to 10 μ wide. *S. subbicolor* Hampe.
Chlor. cells wider up to 18 μ wide. *S. papillosum* Lindb.
b. Chlor. cells not thickened on the upper wall.
Chlor. cells papillose..... *S. hakkodense* Warnst. & Card.
Chlor. cells not papillose ..... *S. cymbifolium* Ehrh.
B. Chlor. cells completely enclosed by the hyaline cells on both surfaces of the leaf... *S. medium* Limpr.

SHORT NOTES.

Arum italicum in Sussex. When staying at Worthing in the spring of 1921, I attempted to discover this plant in the localities to the north of that town near Broadwater and Offington, mentioned in Arnold's *Sussex Flora*, but succeeded only in finding the yellow-spadixed variety of *A. maculatum* (var. *Tetrelii* Corb.). There is, however, a specimen in Mr. T. A. Dymes's herbarium from Broadwater, collected in 1881 by Mrs. B. M. Oakeshott, which is probably the true plant; the example is fastened down to the sheet and not easily examined. In exploring the country west of Worthing in the same quest, I came across a fine clump of leaves near Goring which seemed undoubtedly those of *A. italicum*; unfortunately I was too early for the flowers. This year (1923) my friend Mr. H. S. Salt has sent me fine flowers from the same spot gathered in May. *A. italicum* flowers considerably later than *A. maculatum*; Mrs. Oakeshott's Broadwater example is labelled "July." Mr. Salt has also discovered a fresh station for the plant near Arundel, from which neighbourhood its occurrence was reported in this Journal for 1920, p. 274.—C. E. Salmon.

Callitriche truncata Guss. This species, so rare in Britain was added to the flora of S. Somerset, v.c. 5, in 1907 (Journ. Bot' 1908, 255), when Marshall got it in good quantity, but without fruit at Chard Reservoir. It was subsequently found "fine and plentiful", in the Bridgwater and Taunton Canal. On August 9th this year I got it in v.c. 6, "N. Somerset," viz. in an old peat-digging on a small enclosure of peat near Glastonbury and Street. Thanks chiefly to Mr. A. G. Tansley's generosity and encouragement, this field, now called the "Sharpham Moor Plot," is being bought on behalf of some 33 subscribers in order to keep it for experimental purposes and to save the rare *Carex evoluta* from destruction. It will be managed by a Bristol and Somerset Committee, and probably vested in the Society for the Promotion of Nature Reserves; donations towards its upkeep will be gratefully received and acknowledged by the writer. When Mr. Tansley and I visited the plot on June 24 we listed about a hundred vascular plants on the varied surface. My peat-moor specimens of the *Callitriche* have no fruit, but Mr. J. W. White confirms the determination. *C. autumnalis*, which is not recorded from Somerset, is apparently the nearest ally.—H. Stuart Thompson.

REVIEWS.

Practical Plant Ecology; a Guide for Beginners in Field Study of Plant Communities. By A. G. Tansley, M.A., F.R.S., Pp. 228. Price 7*s.* 6*d.* net. London: George Unwin and Unwin Ltd.

The study of ecology as a special branch of botany may still be said to be in its infancy—so much so that the legitimate aims of the subject as such are even now much misunderstood. It is difficult to define ecology without seeming to encroach beyond the set limits of other branches of botany, but in this it differs only in degree from

the modern practice in almost every other branch. It may have been this difficulty of fully appreciating the special problems to be faced that has deterred many from its study; and the present volume, by the first President of the British Ecological Society and the editor of its Journal, is the first attempt to provide beginners with a guide to the field study of vegetation.

The history of the subject in this country is well known. Robert Smith having studied under Professor Flahault of Montpellier, who was making vegetation-maps based on the distribution of the chief trees, attempted to apply the method in Scotland, but found it more satisfactory to map the vegetation as a whole. Smith died in 1900 at the age of 26, and his brother William, then of Leeds, carried on the work, his first collaborators being C. E. Moss and W. M. Rankin. Other workers were attracted to this primary survey, and in 1904 a Central Committee for the study of British vegetation was formed to organise and facilitate work on these lines; the British Ecological Society was founded in 1913 to meet the demand made by increase in the number of botanists interested. An effort was made at one time to have vegetation-maps published by the Government similarly to the Geological Survey Maps; *Types of British Vegetation*, written principally by members of the old Vegetation Committee and edited by Mr. Tansley, represents very well the state of the subject in this country at that date (1911). It is a curious fact that the practical cessation of this type of study more or less synchronised with the formation of the Society, and workers began to specialize more on definite associations.

The present work concerns itself fully with the modern tendencies of the subject in this country, and will doubtless stimulate many to follow some at least of its suggestions. The book is divided into five parts: Introductory; Structure; Distribution and Development of Vegetation; Method of Studying Vegetation; Habitat; Ecology in Schools—an appendix deals with such important matters as Life Forms of Plants; Methods of Surveying Vegetation; Determination of Hydrogen Ion Concentration; Determination of Carbonates, of Magnesia, Lime and Potash, and of Salt (by H. J. Page); and classified lists of books and papers. The introductory part treats of what ecology is—"plant ecology in the wide sense is more a means of approach to a large part of detailed botanical study than a name for a special branch of the subject"—and with natural and semi-natural vegetation. The second part is concerned with the units of vegetation; the succession of vegetation, the account of which seems to be a little complicated by the interpolation of Clements's nomenclature; and an excellent outline of British vegetation which unfortunately is restricted to less than twenty pages. The third part is the one to which many will first turn. Here are described the scope and aims of ecological work, methods of primary survey, and intensive investigation by means of gridirons, quadrats and such like. The fourth part discusses habitat, analyses the environment and sorts out the factors. These are all treated in the modern style, but in biotic factors far too much stress appears to be placed upon the rabbit. To a casual observer it is very obvious that rabbits affect vegetation

considerably—are they not said to climb trees in Australia in their efforts to influence plant-life ?—and after Darwin's classical instance of cats and the fertilisation of clover, it is not surprising that rabbits where present should add to the complexity of the problems encountered. The author points out the practical difficulties of defining biotic factors; but where flowering plants are under consideration, the parts played by bacteria and moulds in bringing about decay and in other ways affecting the soil might well have received more than passing mention. Even when Krakatau was first visited, it was not considered necessary to take notice of any saprophytic organisms which might be present; and in the present work only the obvious "terrestrial algæ, lichens and mosses" are mentioned as the first colonists of dry areas. Also in such intensive study as is the main thesis of the book, the presence of mycorrhiza should at least have been hinted at.

The last portion of the book is an attempt to indicate the type of work which might profitably be accomplished in schools. It reads attractively, and should prove valuable to those for whom it has been written. The remarks on "The wrong way to teach" (p. 176) are to the point with regard to the absurd idea, still too prevalent, that a character must be "useful" or must be an "adaptation"—anthropocentric botany has had its day. The appendixes, which are more advanced in matter, a good list of references, and a full index, add to the usefulness of this well-printed convenient-sized book, which taken in conjunction with the *Types of British Vegetation* will lead to a more scientific knowledge of plants as living organisms in their natural homes.

J. R.

Dwarf and Slow-growing Conifers. By Murray Hornibrook. Pp. x–195, crown 8vo. (Country Life Library, 1923.) Price 10*s.* 6*d.* net.

The cultivation of pigmy conifers, a horticultural art we have chiefly learned from the Japanese gardener, is growing in popularity, no doubt largely owing to the present craze for rock-gardening in this country. Dwarf conifers are needed to complete every well-planned rock-garden, and it is therefore to the rock-gardener rather than to the botanist that this little book will appeal. There is, however, much in it that will interest the student of plant-variation, for conifers, like many other plants, vary enormously in the seed-bed. The author makes it clear at the outset that there are two kinds of pigmy conifers; viz., the artificially dwarfed trees one meets with in the florists' shops, and the natural dwarf sports or seedlings, most of which have arisen in cultivation; the book before us is concerned only with the latter class. An introductory chapter sketches the history of dwarf conifers in this country, and is followed by notes on their propagation and culture; then follow descriptions of 460 varieties and forms, with notes on their history and synonyms. Only about a dozen dwarf conifers were known to Loudon in 1838, and it is quite evident that a great number of the names now found in nurserymen's catalogues represent only a comparatively small number

of distinct or distinguishable forms. No less than 50 pages of the book are taken up with the genus *Picea*, there being over 60 dwarf forms of the common Spruce alone. In this connection it is significant to note that the forest-garden at Adlisberg, Switzerland, in 1913 contained a group of Spruce trees 13 years old, all of which had arisen from the seed of one tree of *Picea excelsa* ; about 53 per cent. of these were dwarf cushion-like plants varying from a few inches to a few feet, the others being more or less normal in habit.

Mr. Hornibrook has spent a good deal of time trying to disentangle the nomenclature, which is in great confusion largely owing to the fact that there are in some cases at least half a dozen names for the same variety. Again, owing to the increased demand for plants, many forms are masquerading under wrong names, the true plants having in many instances been lost to cultivation. Judging from our own experience of conifers, which is considerable, it is impossible to make out many of these dwarf garden forms from descriptions, often inadequate, of the shoots, buds and foliage ; indeed, the majority can only be distinguished by habit; hence it is in this direction that the exeellent photographs which illustrate the book will prove of value. The indiscriminate use of capitals for specific names somewhat offends the eye, but this is a minor defect in this well-written and valuable contribution to horticultural literature. A. B. J.

BOOK-NOTES, NEWS, ETC.

In issuing the second part of his *Danmarks Mosser* (Kobenhavn : Gyldendalske Boghandel, 1923 ; pp. xix, 569 ; 29 pls. & figs.) Herr C. Jensen completes his treatise on the Bryophyta of Denmark and the Faeroes. In the first part (1915) he described the Hepaticæ and Sphagnaceæ ; in the second he treats of the Andreaeales and Bryales. In attempting a natural classification the author has departed somewhat from the systems to which we are accustomed in this country: for instanee, he has placed the Pleurocarpi before the Acrocarpi. In dividing up the Bryineæ he has plaeed the thirty-six families in six sections —Hypnoideæ, Grimmioideæ, Dicranoideæ, Tortuloideæ, Funarioideæ, Bryoideæ—essentially in accordance with their gametophyte characters, the haplolepideous families occupying a median position ; the heterolepideous genus *Encalypta* is tacked on to the Tortuloideæ. In nomenclature, he tells us, he has followed the principle of priority, but in doubtful cases has chosen a more recent name. The following unfamiliar names will be found—*Stroemia* Hagen, *Paraleucobryum* Loeske for sections of *Orthotrichum* and *Dicranum* respectively ; *Tortella* Limpr. is used generically in place of *Mollia* ; *Aloina* Kindb. for a group detached from *Tortula* ; *Aulacomitrium* Mitt. in place of *Glyphomitrium*. The text is entirely in Danish, and therefore difficult for the English student. The descriptions of the species, genera, etc., appear to be quite adequate, and are illustrated with plenty of figures ; the identification of specimens is much facilitated by the ample provision of keys. Several northern species and genera and one family whieh have not yet been observed in Denmark are included in the work, in a distinetive smaller type.—A. G.

Prof. W. A. Setchell has made two additions to his algological output—*Parasitic Florideæ, II.* and *A Revision of the West North American Species of Callophyllis* (*University of California Publications in Botany*, x. Nos. 6 & 7, pp. 393–401, 1923). The former contains preliminary diagnoses of seven new species and three new genera—*Faucheocolax*, *Rhodymeniocolax*, and *Plocamiocolax*: the second comprises preliminary descriptions of fourteen new species of *Callophyllis* from the Pacific Coast and a key for their readier discrimination.—A. G.

Two posthumous papers, *Notes on a Collection of New Zealand Hepaticæ* and *More New Zealand Hepaticæ* (*University of California Publications in Botany*, x. Nos. 4 & 5, pp. 307–392, pls. 83–109, 1923), by the late Mr. W. H. Pearson of Manchester, have recently been issued, and probably represent the last research that he was able to carry to completion. They give an account of the collections made by Prof. W. A. Setchell in the Northern Island of New Zealand in 1904. Out of some 55 species studied, fifteen and a variety prove to be new to science; and several other species are redescribed and figured.—A. G.

At the meeting of the Linnean Society on Nov. 1, a paper was read by Mr. Sydney Garside on the forms of *Hypaxis stellata* L. f. (*Ianthe stellata* Williams; see Journ. Bot. 1901, 289). Four varieties were distinguished, one of them as yet undescribed; these have constant vegetative characters, but the flowers show a considerable range of colour variation of a "continuous" kind. Important cytological characters of the upper epidermis of the perianth lobes were described, with particular reference to the remarkable iridescent areas which occur in some varieties. The characters of the four varieties were briefly outlined, and the view was expressed that these are not distinct species, as some of the earlier botanists supposed. Support for this view is based upon the structure of the ovary; breeding experiments have not yet been made. Habitat may considerably influence the size of the plant, but the varietal characters remain constant.

At the same meeting Mr. W. N. Edwards read a paper "On the Cuticular Structure of the Devonian plant *Psilophyton*." Specimens of *Psilophyton princeps* Dawson, from Gaspé (New Brunswick) in which the cuticle is preserved, show that as in the early land plants of the Rhynie Chert the stem is provided with stomata. These resemble in size and distribution the stomata of *Asteroxylon* but have cuticular thickenings which have not so far been observed in either *Asteroxylon* or *Rhynia*. No stomata were seen on the highly cuticularized spines, but these spines do not resemble intumescences of *Rhynia*, and *Psilophyton* is probably nearer to *Asteroxylon*.

As intimated on p. 270, the Report of the British Bryological Society contained a notice of the late William Ingham, to which we are indebted for some of the following particulars:—He was born at Manchester in 1854 and died at York, where most of his life had been spent, on May 25 of this year. He was a B.A. of London University; he was Organising Inspector of Church Schools in the diocese of York, and later on the staff of the York Education Office.

An ardent bryologist and hepaticologist, he made an exhaustive study of the mosses and hepatics of Upper Teesdale and of the York district; the latter, with the freshwater algæ and fungi, appeared in his Handbook prepared for the meeting of the British Association at York in 1906. In 1903 Ingham became Secretary of the Moss Exchange Club—a post which he resigned on account of failing health in 1922; in connexion with this he edited the *Census Catalogue of British Mosses* (1907) and that of British Hepatics (1913). Although chiefly occupied with cryptogams, he was also interested in flowering plants; a note in this Journal (1907, 413) on *Sagina Reuteri* was followed (1908, 109) by the description and figure of a new variety (var. *glabra*) written in conjunction with Mr. J. A. Wheldon. He also contributed to our pages (1909, 178) a list of the Bryophytes of Somersetshire, and published numerous papers in other journals.

The *Journal of Genetics* for August contains the paper on the Genetics of *Primula sinensis* on which the late R. P. Gregory was occupied at the time of his death. The experiments on the plant which had engaged his attention since 1903 were partly published in 1911; the experiments for the present paper were undertaken by numerous workers; the paper itself also embodies the researches of Prof. Bateson and Miss de Winton, but "so much of the work owes its inception to Gregory that his name most properly stands at the head of the present publication." The paper is illustrated by eight plates of the high standard which characterises those of the *Journal*. With regard to the history of the plant, reference may be made to the note in this *Journal* for June last (p. 171); "the leaves on Lindley's plate, said to have been drawn by W. J. Hooker" (Journ. Gen. 241, n.) were executed by William Hooker the artist (1779–1832). In the same number M. B. Crane and A. E. Gairdner have a paper on species-crosses in *Cochlearia* with an account of their cytology—the original plants of *C. officinalis* and *C. danica* used in the experiments were collected at St. David's, Wales, and Hayling Island, Hants, respectively. The paper is illustrated by four plates.

The work upon Linnæus, on which Dr. Daydon Jackson has been for some years engaged, has appeared in a handsome volume published by Messrs. Witherby at 25*s*. n.; its full title runs: "*Linnæus*: the Story of his Life, adapted from the Swedish of Theodor Magnus Fries, Emeritus Professor of Botany in the University of Uppsala, and brought down to the present time in the light of recent research." We hope to notice it at length in our next issue. We have also received the handsome *Handbook of Coniferæ* (Arnold, 42*s*. n.) by Messrs. W. Dallimore and A. B. Jackson, a notice of which is also deferred.

The *Journal of the Indian Botanical Society* (September) includes a paper on the Smut of *Cynodon Dactylon*, by K. C. Mehta; a preliminary note on Epiphytical Succession in a Himalayan forest of *Quercus incana*, by Mr. Dudgeon; notes on a bulbiferous Cocoanut from Malabar, by M. O. P. Iyengar, and on a peculiar bulb of *Allium sativum*, by P. M. Debbarman.

In *The Flower-Lover's Guide to the Gardens of Hampton Court Palace* (Bell, 2*s*.) Mr. Ernest Law, the historian of the Palace, gives "an outline of their origin and history, a description of the lay-out, a full account of the bedding, and a list of all the plants in them." The list is astonishingly full, the contents of each bed and the names of each variety of rose, azalea, and the like being given; unless, which appears unlikely, the permanence of each arrangement is maintained for successive years, the practical utility of this seems doubtful. The little book is attractively illustrated with views and useful plans.

In *Torreya* (Sept. Oct.) H. W. Pretz gives details of the spread in the Philadelphia region of *Sonchus uliginosus*, which first made its appearance there in 1917 and is becoming a serious hindrance to agriculture: A. A. Hansen writes on the invasion of field crops by a woodland plant, *Phacelia Purshii*, which in Indiana is developing into a serious pest in small grains and clover.

In the *Annals of Botany* (xxxvii. no. 148 : October) Dr. Ruggles Gates continues his researches in *Œnothera*; H. S. Holden and Dorothy Benson write on "The Seedling Structure of *Acer Pseudoplatanus*"; Lady Isabel Browne discusses "Anomalous Traces in the Cone of *Equisetum maximum*"; F. E. Fritsch and F. M. Haines continue their investigations on "The Moisture-relations of Terrestrial Algæ."

At the meeting of the British Mycological Society at University College on Nov. 17, Mr. A. A. Pearson gave an account of the fungus foray of the French Mycological Society at Paris; Mr. W. J. Dowson described a new disease of Sweet Pea caused by a *Ramularia*-like mould forming white blotches on the leaves; Mr. J. Jackson Clarke discussed chromidia, dealing principally with *Synchytrium* and drawing comparisons with observations he had made in *Molluscum contagium*, cancer and other obscure diseases; Mr. Paulson recorded his field observations on the Mycorrhiza of trees, particularly of the Birch; Professor E. C. Stakman gave a talk on the work being done in the United States on the Black Rust of wheat, which causes tremendous havoc; Dr. A. S. Horne described a new species of *Eidamia* and contrasted its physiological characters with those of *E. acremonioidos*; and Miss R. Bracher gave an account of her work on the morphology of *Rhytisma*.—J. R.

Corrections. The author's proof of Mr. Lacaita's paper on Onosmas (pp. 280–83) unfortunately did not reach us until the number had gone to press: the following corrections are therefore necessary: p. 280, l. 17 from top, for "tigou" read "lies on"; l. 11 from bottom, after "mihi" add "inter"; p. 281, l. 9 from top, for "recurved" read "less curved"; l. 19, for "No. 2" read "*ambigens*": p. 282, l. 14 from top, for "there can be no doubt" read "it is probable"; l. 2 from top, for "Br." read "K."; l. 4 from bottom, for "revises" read "revives": p. 283, l. 3 from top, for "there" read "three."

DR. H. O. FORBES'S NEW GUINEA PLANTS.

INTRODUCTORY NOTE.

By A. B. Rendle, D.Sc., F.R.S.

Dr. Forbes's collection was made in 1885–1886, and in the latter year Mr. Ridley in this Journal (xxiv. 321; 1886) gave an account of the Monocotyledons. In the same volume (p. 289) Baron F. von Mueller described some new *Vacciniaceæ* from the collection, and Mr. Ridley stated in the introduction to his paper that "the greater portion of the flowering plants are being described by Baron von Mueller." This, however, was not done; and, though new species have been described from Dr. Forbes's plants from time to time in papers dealing with the Flora of New Guinea, the bulk of the collection has not been worked out.

In cases where new species have been previously described from Dr. Forbes's specimens, reference is made to the place of publication, and a bibliography will be given at the end of this communication.

Dr. Forbes also made (1878–83) extensive collections in the Malayan Islands, the first set of which was acquired by the British Museum. It is much to be regretted that the collections could not be worked out at the time, and that Dr. Forbes should not have received earlier the credit due for his pioneer work of botanical exploration in the Malayan Archipelago.

During the past few years the staff of the Department of Botany has devoted considerable time to the determination of the various collections; the present account of the New Guinea plants will be followed by one dealing with those from the Malayan Islands.

The information as to habit, colour of flowers, &c. is taken from the collector's notes.

DICOTYLEDONS.

POLYPETALÆ

By E. G. Baker, F.L.S.

Ranunculaceæ.

Clematis Vitalba L. Sogere, 686, 738 *a*.

Dilleniaceæ.

Tetracera volubilis Merr. Mt. Koikoko, 3000 ft., 673. Large climber; widely spread in the Philippine Islands.

Saurauja papuana K. Schum. Sogere, 473.—S. uniflora Ridley. Sogere, 321.

Magnoliaceæ.

Michelia Forbesii Bak. fil., sp. n. *Arbor* alta ramulis teretibus novellis pubescentibus; *foliis* chartaceis ellipticis apice subito acuminatis basi rotundatis vel late cuneatis novellis pubescentibus demum petiolis exceptis fere glabris, lamina 15–19 cm. longa, 8–10 cm. lata, nervis lateralibus utrinque 12–14, petiolo hirsuto 25–28 mm. longo; *floribus* ignotis; *carpellis* inter minores generis in capitulum linearioblongum coalitis numerosis lignosis 7–8 mm. longis et latis 1–2-spermis bivalvatim dehiscentibus; *seminibus* glabris ±6 cm. longis.

Sogere, 442 *a*. A tall tree. Fruit greenish orange, 5–10 cm. long, composed of numerous sessile 1–2-seeded carpels, which are smaller than those of *M. Champaca* L.

Himantandraceæ.

Himantandra nitida Bak. fil. & Norman, sp. n. *Arbor* alta ramis nigrescentibus lepidotis; *foliis* petiolatis coriaceis supra insigniter nitidis subtus squamulis cupreo-nitentibus omnino obtectis ovalibus basi rotundatis apice obtusis vel subacutis, lamina 7·5–10·5 cm. longa, 4·0–5·5 cm. lata, petiolo 18–20 mm. longo, nervis lateralibus a costa utrinque numerosis arcu intramarginali conjunctis marginibus siccitate inflexis; *floribus* axillaribus solitariis pedunculatis; *calyptris* duabus 18–20 mm. longis extus squamulis cupreo-nitentibus obtectis apice subobtusis; *staminibus* numerosis extimis sterilibus anguste elongato-liguliformibus 24–25 mm. longis deinde staminibus fertilibus æquilongis staminodiis linearibus genuflexis hinc inde glandulosis; *ovariis* confertis, stylis brevibus, stigmatibus carnosis.

Sogere, 2000 ft., 828 *a*.

Differs from *H. Belgraviana* Diels by the shining broader coriaceous leaves and much longer stamens.

Himantandra parvifolia Bak. fil. & Norman, sp. n. *Arbor* alta ramis griseis lepidotis glabris; *foliis* anguste oblongis apice subacuminatis basi cuneatis papyraceis subtus squamulis cupreis obtectis, lamina 5–6·5 cm. longa, 17–23 mm. lata, petiolo 10–12 mm. longo, nervis lateralibus inconspicuis a costa utrinque numerosis arcu intramarginali conjunctis; *floribus* parvinsculis solitariis pedunculatis; *calyptris* duabus ±10 mm. longis extus squamulis cupreis

obtectis apice acutis; *staminibus* 10 mm. longis, staminodiis æquilongis; *ovariis* paucis.

Meroka, 355.

A close ally of *H. baccata* Diels from N. Australia, but differs in the small leaves and flowers. 704 from Mt. Wori-wori is a form of this.

H. Belgraviana Diels.

Koikoko range, 2500 ft., 795. Large tree; flowers white.

Anonnaceæ.

Uvaria Rosenbergiana Scheff. Sogere, 493.

Polyalthia Forbesii F. Muell. ex Diels in Engl. Jahrb. xlix. 131 (1912). Sogere, 3000 ft., 836 & 833 *b*. Large tree; flowers pale yellow.

Eupomatia laurina R. Br. Sogere, 1750 ft., 551. Fairly large, rather straggly shrub; fruit blue-green.

Cyathocalyx novoguineensis Bak. fil., sp. n. *Arbor* ramulis lenticellosis in juventute sparsissime pubescentibus mox glabratis; *foliis* majusculis petiolatis ellipticis vel ovalibus chartaceis supernc glabris nervis utrinque 9–11, lamina 16–23 cm. longa, 6·5–8 cm. lata, petiolo 10–12 mm. longo; *floribus* fasciculatis, pedicellis strictis 15–18 mm. longis; *sepalis* triangularibus; *petalis* angustissimis longissimis 35–50 mm. longis, 1–1·5 mm. latis; *carpellis* numerosis, ovariis pluriovulatis.

Mt. Gawada, 544. Tree, flowers pale green. Allied to *C. Havilandii* Boerl., from Borneo, but differs especially in the numerous carpels; also allied to *C. obtusifolius* Becc. & Scheff., but the petals are narrower.

Cyathocalyx obtusifolius Becc. & Scheff. var. nov. **angustipetalus** Bak. fil. *Ramuli* cortice nigrescente obtecti; *foliis* chartaceis ellipticis vel ovato-ellipticis apice obtusis vel acutis glabris nervis utrinque 8–10, costa supernc impressa, petiolo 15–18 mm. longo; *floribus* axillaribus fasciculatis, pedicellis 20–25 mm. longis; *sepalis* 3 crassiusculis extrinsecus pubescentibus; *petalis* angustissimis fusco-pubescentibus 20–23 mm. longis, 1·5–2·0 mm. latis basi dilatatis; *orulis* numerosis; *staminibus* numerosis ±1 mm. longis; *carpellis* maturis ignotis.

Sogere, 661.

Noticeable on account of the long pedicels and narrow petals.

Rauwenhoffia Forbesii Bak. fil., sp. n. *Frutex* erectus, ramulis teretibus; *foliis* amplis, subcoriaceis, oblongis, glabris, apicem versus attenuatis, basi cuneatis vel subrotundatis, 27–29 cm. longis, 6–7·5 cm. latis, petiolis crassis 10–12 mm. longis; floribus lateralibus paucis; sepalis 3, coalitis, pubescentibus; *petalis* interioribus 3, crassiusculis ovatis, petalis exterioribus oblongo-ovatis quam interioribus paullo majoribus, pubescentibus; *staminibus* numerosis; *ovariis*, circ. 5–6, carpellis oblongis 4–5 cm. longis, plurispermis.

Sogere, 561. Shrub erect, flowers in bud reddish-brown; 927. The special features are the long glabrous leaves and oblong fruit with rusty-brown pubescence outside.

MENISPERMACEÆ.

PARABÆNA MYRIANTHA K. Schum. Sogere, 684.

CHLÆNANDRA OVATA Miq. Sogere, 184.

VIOLACEÆ.

SCHUURMANSIA MICROCARPA L. Cap. Sogere, 677.—S. HENNINGSII K. Schum. Sogere, 613.

ALSODEIA ASTROLABES Laut. & K. Schum. Sogere, 2000 ft., 121; 2500 ft., 134. Small tree: fruit dark green, immature.

BIXACEÆ.

Cochlospermum Gillivraei Benth. var. nov. **papuanum** Bak. fil. *Rami* lignosi; *foliis* 3–5 rarissime 7, palmatilobis pro genere parvisculis longe petiolatis, lamina 4–6 cm. longa, utrinque glabra, lobis apice subacuminatis 35–50 mm. longis margine integris vel hinc inde serratis, petiolis 4·5–7·5 mm. longis; *floribus* hermaphroditis ad apices ramorum paniculatis; *sepalis* 5, crassis inæqualibus, imbricatis, interioribus quam exterioribus majoribus; *petalis* 5, ovatis vel oblongo-obovatis 35–40 mm. longis; *staminibus* numerosis, filamentis filiformibus, antheris 3–4 mm. longis, basifixis apice poro dehiscentibus; *ovarii* placentis parietalibus; *capsula* ignota.

Port Moresby, sine no.

Differs from typical C. GILLIVRÆI Benth. by the leaves being smaller and the sepals unequal in length, the outer being shorter than the inner.

TERNSTRŒMIACEÆ.

TREMANTHERA DUFAURII F. Muell. in Vict. Nat. 1886, 168. Sogere, 1750–2000 ft., 260, 681, 783 *b*. Mt. Meroka, 2000 ft., 365. An erect shrub or tree up to 40 ft.; flowers pink or pink-purple.

Ternstrœmia sogerensis Bak. fil., sp. n. *Ramuli* cicatricibus foliorum delapsorum notati; *foliis* ad extremitates ramulorum dispositis coriaceis oblanceolatis vel oblanceolato-spathulatis glabris apice obtusis vel subacutis basi in petiolum attenuatis cum petiolis 5–6·5 cm. longis, 15–20 mm. latis; *pedunculis* brevibus 1-floris; *sepalis* 5 valde imbricatis rotundatis vel suborbicularibus rugosis glabris; *petalis* 5 basi connatis; *staminibus* numerosis; *antheris* glabris basifixis vix 2 mm. longis; *fructu* ignoto.

Sogere, 660.

Noticeable for the oblanceolate coriaceous leaves and solitary very shortly pedunculate flowers.

Differs in shape of leaf from *T. papuana* Lauterb. & *T. Britteniana* F. Muell.

Adinandra Forbesii Bak. fil., sp. n. *Arbor* alta, ramulis cinereo-corticatis glabrescentibus; *foliis* crassiusculis, lamina ovato-oblonga fere glabra apice subobtusa basi late cuneata 5–8·5 cm. longa, 3–3·5 cm. lata, petiolo 5–8 mm. longo; *floribus* majusculis solitariis axillaribus pedunculatis, pedunculis 4–5 cm. longis apicem versus bracteis 2 munitis; *sepalis* semiorbicularibus valde imbricatis; *petalis* crassiusculis imbricatis ±2 cm. longis; *staminibus* numerosis pentadelphis; *ovario* glabro 5-loculari apice in stylum sensim abeunte, ovulis in loculis numerosis; *fructu* ignoto.

Mt. Gawada, 5000 ft., 545. A great tree; flowers in bud pink-purple; leaves glabrous, rather thick; flowers showy with stamens in 5 phalanges. *A. holosericea* Diels has much smaller flowers, shorter peduncles, and a densely silky ovary.

Dipterocarpaceæ.

Anisoptera Forbesii Brandis in Journ. Linn. Soc. xxxi. (1895) 45. Sogere, 373.

Shorea Forbesii Brandis, *op. cit.* p. 92. Sogere, 861.

Malvaceæ.

Urena sinuata L. Sogere, 837 *a*.

Sterculiaceæ.

Sterculia Edenfeltii F. Muell. Owen Stanley Range, 9, 116, 752, 824.

S. oncinocarpa F. Muell. & Forbes in Vict. Nat. iii. 49. Owen Stanley Range, 680.

Sterculia ampla Bak. fil., sp. n. *Arbor* alta ad *S. macrophyllam* Vent. accedens; *ramis* crassis; *stipulis* conspicuis persistentibus acuminatis; *foliis* simplicibus petiolatis, lamina ovata basi cordata apice acuminata 25–30 cm. longa, 16–18 cm. lata, petiolis hirtis longitudinaliter canaliculatis; *floribus* unisexualibus paniculatis, paniculis amplis 20–35 cm. longis, pedunculis pedicellisque ferrugineo-hirtis; *calyce* parviusculo flavo urceolato extus pilis stellatis vestito ±5 mm. longo 5-mero, lobis brevibus recurvatis; *fl. femineis*, ovario extus hirto, stylo brevi erecto apice stigmatoso; *fl. masculis*, columna staminea apice antheras annulatim congestas ferente; *folliculis* 4 lignoso-coriaceis extus ferrugineo-tomentosis ±6 cm. longis.

Sogere, Mt. Wori-wori, 4000 ft., 213, 819. Large tree; flowers yellow.

A large tree allied to *S. macrophylla* Vent. with persistent stipules, cordate-ovate leaves, and an ample panicle of small yellow flowers with an urceolate calyx and small recurved lobes.

Brachychiton Carruthersii F. Muell. in Vict. Nat. iii. 46. Sogere, 904, 476.

Pterocymbium Beccarii K. Schum. Sogere, 530.

Pterygota Forbesii F. Muell. *l. c.* Owen Stanley Range, 441.

Abroma angusta L. Sogere, 2500 ft., 245. Erect shrub; flowers purple; fruit green to black when ripe.

Tiliaceæ.

Sloanea Nymanni K. Schum. Sogere, Mt. Gawada, 2000 ft.–4500 ft., 571, 743, 195. Large tree; flowers greenish-cream with light orange centres; fruit yellowish green from hairs on the cuticle.

S. Schumanni Warb. Sogere, Mt. Gawada, 5000 ft., 524. Large tree with rich orange anthers.

S. Forbesii F. Muell. in Vict. Nat. viii. 164. Sogere, 3000 ft., 273. Great tree; flowers white with pale green tinge.

Sloanea sogerensis Bak. fil., sp. n. *Arbor* altissima, ramulis novellis tomentosis; *stipulis* conspicuis; *foliis* coriaceis oblongo-ovatis vel ovalibus basi cordatis vel subcordatis demum superne fere glabris, 15–20 cm. longis, 9·5–11 cm. latis, petiolo tomentoso 5–7 cm. longo; *racemis* simplicibus 15–20 cm. longis, pedicellis tomentosis 20–25 mm. longis; *floribus* sæpissime nutantibus; *sepalis* ovatis tomentosis; *petalis* ovatis tomentosis haud incisis; *staminibus* multiserialibus apiculatis; *ovario* tomentoso; *capsula* lignosa 4-loculari extus echinata, spinis 5–7 mm. longis.

Sogere, 341, 607, 794, 949.

A great tree with greenish-white flowers and orange stamens. 607, a moderately large tree.

Differs from *S. Forbesii* in the smaller flowers and entire petals; from *S. Nymanni* K. Schum. by the larger flowers and leaves and conspicuous stipules.

Elæocarpus sogerensis Bak. fil., sp. n. *Arbor* magna, ramulis glabris; *foliis* oblongo-lanceolatis vel elliptico-lanceolatis apice acuminatis basi rotundatis vel late cuneatis utrinque glabris margine serratis vel obsolete serratis, lamina 5–7 cm. longa, 2·0–2·5 cm. lata, petiolo 20–28 mm. longo; *racemis* laxis sæpissime 4–5 cm. longis, rhachi glabra; *pedicellis* 5–6 mm. longis; *alabastris* 7–9 mm. longis; *sepalis* lineari-lanceolatis ±9 mm. longis; *petalis* apice laciniatis laciniis angustis; *ovario* bilocular glabro; *fructu* ignoto.

Mt. Wori-wori, 5000 ft., 717. Great tree; flowers white.

Has much the aspect of *E. Munroi* Wight, but the ovary is glabrous. The petals are laciniate, about 10 mm. long. Allied to *E. Gjellerupi* Pulle, from which it differs in its smaller leaves with shorter petioles.

E. Muellerianus Schlechter (*E. Ganitrus* F. Muell. non Roxb.). Sogere, 676.

Aceratium Muellerianum Schlechter (*E. edulis* Teijsm. & Binn.) Meroka Ranges, 2500 ft., 896. Considerable tree; fruit dark green. Mt. Gawada, 5000 ft., 580. Large tree; flowers in bud dark purple. Mt. Wori-wori, about 5000 ft., 705. Great tree; flowers rich lake-scarlet. Sogere, 295. Small tree; flowers pale yellow.

Linaceæ.

Erythroxylon ecarinatum Burck. Sogere, 878.

Malphighiaceæ.

Ryssopterys microstema A. Juss. Sogere, 943.

Rutaceæ.

Evodia (Trifoliolatæ) **Forbesii** Bak. fil., sp. n. *Arbor* alta ad *E. tetragonam* K. Schum. et *E. speciosam* Zoll. accedens; *foliis* trifoliolatis petiolatis glabris, foliolis terminalibus obovatis basi cuneatis apice rotundatis ±19 cm. longis et 11 cm. latis, nervis lateralibus numerosis circ 15 parallelis, petiolo communi 5–6 cm. longo; *paniculis* e ligno vetere ortis 5 cm. longis pedunculis pedicellisque glabris; *sepalis* 4 rotundatis glabris; *petalis* 4 ovatis ±5 mm. longis; *ovario* 4-loculari hirto; *stylo* centrali erecto; *fructu* ignoto.

Koikoko Range, 2000 ft., 902 *a*, 815, 917. Flowers pink-purple Aspect of *E. tetragona* K. Schum., but the staminal filaments are flattened and somewhat hairy. Also allied to *E. speciosa* Zoll. from Java.

Evodia altissima Bak. fil., sp. n. *Arbor* altissima, ramulis juvenilibus pubescentibus; *foliis* trifoliolatis discoloribus, foliolis ellipticis vel oblongo-ellipticis apice acuminatis basi cuneatis 12–15 cm. longis, 5–6·5 cm. latis, petiolo communi pubescente 5–8 cm. longo, nervis lateralibus tenuibus utrinque 12–15; *paniculis* axillaribus 5–6 cm. longis; *sepalis* ovatis extus pubescentibus; *petalis* 4 ovatis in specimine nostro vix evolutis ±2 mm. longis; *filamentis* glabris; *stylo* erecto; *ovario* 4-loculari; *fructu* ignoto.

Mt. Wori-wori, Sogere, 7000 ft., 706. Great tree; flowers in bud lilac. Allied to *E. tetragona* K. Schum. and *E. Forbesii*, but the flowers are much smaller, branchlets somewhat flattened, especially at the nodes, leaflets very discolorous in the dried state; petiolules 5–7 mm. long.

Evodia latifolia DC. var. nov. NOVOGUINEENSIS Bak. fil. *Arbuscula*; *foliis* trifoliolatis longiuscule petiolatis, foliolis terminalibus ellipticis vel elliptico-lanceolatis, apice acuminatis, 20 cm. longis, 9 cm. latis, petiolo communi puberulo nec lanuginoso ±6 cm. longo; *paniculis* e ramis vetustioribus ortis 8 cm. longis; *petalis* ovato-oblongis 1·5 mm. longis.

Sogere, 826. Small trees; flowers white. Closely allied to *E. bintoco* Blanco (*E. mindanaensis* Merr.).

E. TETRAGONA K. Schum. Sogere, 791.

ZANTHOXYLUM OVALIFOLIUM Wight (forma). Sogere, 875.

OCHNACEÆ.

BRACKENRIDGEA FORBESII Van Tiegh. Sogere, 237.

BURSERACEÆ.

Canarium gawadaense Bak. fil., sp. n. *Arbor* magna; *foliis* imparipinnatis trijugis cum impari, foliolis terminalibus ovatis vel elliptico-ovatis circ. 17 cm. longis, et ±7·5 cm. latis, foliolis lateralibus distalibus oblongo-ovatis apice acuminatis basi late cuneatis nervis lateralibus 10–11 arcuatis, petiolulis circ. 2·5 cm. longis, foliolis proximalibus paullo minoribus 11–12 cm. longis, 5·5 cm. latis, omnibus glabris; *floribus* ignotis; *inflorescentia* elongata pauciflora circ. 30 cm. longa; *drupis* magnis circ. 6 cm. longis, et 3·5 cm. latis, externe glabris.

Mt. Gawada, 519. Large tree; fruit blue-black.

There are no flowers to this specimen, which is distinguished by the trijugate imparipinnate leaves, glabrous subcoriaceous leaflets, petiolules 2·5–2·7 cm. long, and large trigonous drupes about 6 cm. long, glabrous externally.

Allied to *C. patentinervium* Miq. and *C. amboinense* Hochreut.

MELIACEÆ.

DYSOXYLUM LONGICALYCINUM C. DC. in Bull. Herb. Boiss. 1903, 165. Sogere, 892.—D. ARBORESCENS Miq. Sogere, 65 (Hb. DeCand.). —D. LONGIPETALUM C. DC. *l. c.* Sogere, 576.—D. AMOOROIDES, Miq.

Sogere, 59 (Hb. DeCand.).—D. STELLATO-PUBERULUM C. DC. *l. c.* 167. Sogere, 525.—D. KUNTHIANUM Miq. Sogere, 694.

Dysoxylon (EUDYSOXYLON) **lactiflorum** Bak. fil., sp. n. *Arbor* alta; *foliis* 3-jugis, foliolis ellipticis vel ovatis vel oblongis apice acutis vel subacuminatis basi cuneatis chartaceis glabriusculis, nervis lateralibus subtus prominulis utrinque 13–16 erecto-patulis, parallelis; *foliolis* distalibus, 12–14 cm. longis 4–4·5 cm. latis, proximalibus minoribus 8–9 cm. longis; *petiolulis* 5 mm. longis; *paniculis* cum foliis oriundis multifloris; *calyce* 6·5 mm. longo, lobis latis; *petalis* 5 extus sericeis 10 mm. longis; *disco* tubuloso; *tubo staminea* extus glabro; *antheris* 10, intra marginem tubi; *ovario* piloso; *stylo* erecto; *stigmate* capitato.

Mt. Wori-wori, 5000 ft., 731. Great tree; flowers cream-white.

The noticeable features are the leaves with about 3 pairs of leaflets, the many-flowered panicle of cream-white flowers, the 5 petals externally sericeous, glabrous staminal tube, and prominent disc.

Chisocheton sogerensis Bak. fil., sp. n. *Arbor* mediocris; foliis multijugis (10–16), foliolis lineari-oblongis, 3–8 cm. longis, 1–1·5 cm. latis, sessilibus vel subsessilibus, foliolorum rhachi hirsuta; *inflorescentia* 2–7 cm. longa, gracillima, pedunculis pilosis; *floribus* pedicellatis, calyce dentato, externe hirto in toto 3–4 mm. longo; *petalis* 4, rarissime 3, 8–9 mm. longis externe hirtis; *antheris* 8, ±1 mm. longis, staminorum tubo externe glabro 8–9 mm. longo; *fructu* externe hirsuto, 10–12 mm. longo, 8–10 mm. lato.

Mt. Gawada, 6000 ft., 518 (in flower). Sogere, 852 (in fruit). Moderate tree, flowers pure white. A rather anomalous species with linear-oblong leaflets, in 10–16 pairs; flowers slender, petals generally 4, rarely 3; ovary surrounded by a tubular disc.

C. FORBESII C. DC. in Bull. Herb. Boiss. 1903, 168. Sogere, 714 (Hb. DeCand.).—C. NOVOGUINEENSE C. DC. *l. c.* 169. Sogere, sine no. (Hb. DeCand.)

Dasycoleum Forbesii Bak. fil. & Norman, sp. n. *Arbor* alta; *foliis* magnis in specimine nostro 4-jugis an pluribus, foliolis magnis, 25–35 cm. longis 4–8 cm. latis apice breviter acuminatis papyraceis utrinque glabris, nervis lateralibus utrinque 14–18 subtus cum costa prominentibus, petiolulis 5–8 mm. longis; *paniculis* elongatis multifloris usque ad 40–45 cm. longis ramis inferioribus 10 cm. longis superioribus brevioribus; *floribus* albis ±1 cm. longis; *calyce* cupuliformi dentibus subnullis ±3 mm. longo; *petalis* angustis subcohærentibus 10 mm. longis; *tubo staminea* extus cum petalis aliquid cohærentibus 7 mm. longis, antheris longiusculis ±3 mm. longis; *ovario* hirto 4-loculari superne in stylum hirtum attenuato, stigmate circulari; *fructu* ignoto.

Sogere, 2000 ft., 834; Mt. Wori-wori, ±5000 ft., 714. Great tree with white flowers.

AMOORA ROHITUKA W. & A. Sogere, 2000 ft., 384. Large tree; fruit very bright scarlet; seeds capsular, light red.

Amoora sogerensis Bak. fil., sp. n. *Arbor*; *foliis* petiolatis imparipinnatis ±3-jugis cum impari, petiolo communi subtereti foliolis membranaceis glabris oblongis vel ellipticis apice acuminatis vel obtusis basi cuneatis lamina foliorum distalium ±15 cm. longa

4–5 cm. lata, proximalium 8–9 cm. longa 3·5–4 cm. lata, petiolis ±5 mm. longis, nervis lateralibus foliolorum majorum utrinque 10–13, subtus prominulis *panicula mascula* laxa 20–25 cm. longa, racemos florifcros gerente floribus pedicellatis 5–7 mm. longis; *calyce* 5-mero in toto 3 mm. longo, sepalis rotundatis; *petalis* 3 primum pilis extus vestitis, antheris 6 mm. longis *floribus fœmineis* ignotis.

Sogere, 418.

The noticeable features are the imparipinnate trijugate leaves with prominent lateral nerves, the lax panicle of male flowers—the pedicels 5–7 mm. long.

Aphanamixis macrocalyx Harms ex descript. Sogere, 3000 ft., 766. Requires comparison with type. Erect shrub about 10 ft.; fruit bright scarlet.

Aglaia Forbesiana C. DC. in Bull. Herb. Boiss. 1903, 174. Sogere, sine no.—A. subminutiflora C. DC. *l. c.* 175. Sogere, 51. Probably also Mt. Wori-wori, 5000 ft., 72.—A. parviflora C. DC. *l. c.* 176. Sogere, 55.—A. leucoclada C. DC. *l. c.* 172. Sogere, 52, 61.—A. myristica C. DC. *l. c.* 176. Sogere, sine no.—A. novo-guineensis C. DC. descript. Sogere, 2000 ft., 6, 277. Tree small; flowers inconspicuous, pale orange.

Aglaia cinnamomea Bak. fil., sp. n. *Arbor* grandiuscula; *foliis* imparipinnatis, ±50 cm. longis, caulibus lignosis, cinnamomeo-pubescentibus, petiolis crassis, ±17 cm. longis, foliolis proximalibus ±10 cm. longis, ±3 cm. latis, foliolis distalibus ±19 cm. longis, ±3 cm. latis, omnibus oppositis, coriaceis, glabris, 5-jugis, anguste oblongo-lanceolatis, basi cuneatis, apice longe acuminatis, foliolo terminale ±20 cm. longo, ±4 cm. lato, petiolulis foliolorum lateralium ±1 cm. longis, terminalium ±2 cm. longis, crassis et contortis; *inflorescentia* paniculata, cinnamomeo-pubescente, paniculis 9–12 cm. longis axillaribus; *floribus* densissimis, parvis, alabastris viridibus, pube cinnamomeo tectis; *calyce* ±1 mm. longo, pubescente, dentibus rotundatis, *staminibus* 5, petalis vix evolutis ±1 mm. longis, rotundatis; *fructu* ignoto.

Sogere, 197.

Allied to *A. Kingiana* Ridl., differing by its longer leaflets, shorter and pubescent panicles, and smaller flowers.

Flindersia papuana F. v. Muell. Sogere, 421.

Pittosporeæ.

Pittosporum sinuatum Bl. Sogere, 2000–2500 ft., 34, 241, 472. Large shrub; fruit orange with scarlet seeds.

Guttiferæ.

Calophyllum inophyllum L. Sogere, 928, 930.—C. spectabile Willd. Sogere, 412.

Garcinia sarawhensis Pierre. Sogere, 649, is probably a form of this.—G. Mangostana L. Mt. Gawada, 5250 ft., 539.

Ochrocarpus ovalifolius Anders. Mt. Gawada, 5000 ft., 540.

Olacineæ.

Polyporanda Hansemanni Engler. Sogere, 2000 ft., 265. Small tree; flowers in bud, pale orange green.

Rhytidicarum molle K. Schum. Sogere, 471. Flowers are required to confirm this.

Iodes sogerensis Bak. fil., sp. n. *Frutex* alte scandens ramulis teretibus; *foliis* oppositis integerrimis ovalibus vel ovati-obovatis rigidis apice acuminatis basi late cuneatis, nervis lateralibus utrinque circ. 6 subtus conspicuis arcuatis, nervis secundariis sub angulo recto primariis conjungentibus, lamina 7–10 cm. longa, 3·5–4·5 cm. lata, petiolo 10–14 mm. longo; *floribus* ignotis; *pedunculis* supra axillaribus; *fructu* oviformi, 17–20 mm. longo, 12–14 mm. lato-pubescente.

Sogere, 2000 ft., 376.

Largish climber; fruit lemon-coloured. Leaves rigid with well-marked nerves below. Flowers not seen.

Ilicineæ.

Ilex Forbesii Bak. fil., sp. n. *Arbor* alta; ramis cortice cinereo obtectis, ramulis applanatis pilis sparsissime obtectis; *foliis* subcoriaceis, ellipticis vel ovato-ellipticis, superne glabris, subtis pilis sparsissime obtectis, apice acutis basi cuneatis, nervis lateralibus utrinque 5–6 arcuatis, ante marginem inter se conjungentibus, nervis secundariis inconspicuis, lamina 10–12 cm. longa, 4–6 cm. lata; petiolo 10–12 mm. longo, *inflorescentia* 3–13-flora, pedunculis 13–15 mm. longis, glabris, pedicellis 5–6 mm. longis; *ovario* 6-loculari, loculis 1-spermis; *fructu* in vivo pallide viridi, in sicco nigro, 5–8 mm. longo, 4–6 mm. lato.

Sogere, 2000 ft., 383. Large tree, fruit pale green, closely allied to *I. Maingayi* Hook. fil., differing by the fewer lateral nerves of the leaves.

Celastrineæ.

Salacicratea papuana, Loes. Mt. Koikoko, 3000 ft., 667.

Hippocratea sogerensis Bak. fil., sp. n. *Frutex* scandens ad *H. macrantham* Korth. accedens; *ramis* cortice plumbeo obtectis; *foliis* coriaceis ellipticis vel elliptico-obovatis, glabris apice sæpius acutis rarius obtusis, superne nitidis, lamina 5–6·5 cm. longa 2·5–3·5 cm. lata, petiolo 8–10 mm. longo; *inflorescentia* laxa axillari; *bracteis* basi pedicellorum parvis acutis; *calyce* parvo; *petalis* 5, lanceolatis ±4 mm. longis, crassiusculis; *staminibus* 3, filamentis apice recurvis; disco cupulari ovarium circumdante; *ovario* 3-loculari; *stylo* erecto; *fructu* ignoto.

Sogere, 440. Climber with orange flowers. Differs from *H. macrantha* Korth. in the shape of the leaves and colour of the flowers.

Rhamnaceæ.

Alphitonia excelsa Reiss. Sogere, 332 (no fruit).

Gouania microcarpa Bl. Sogere, 268. Tree about 40 ft.; flowers in bud, pale orange.

Zizyphus Forbesii Bak. fil., sp. n. *Arbor* ramis teretibus lenticellosis; *foliis* oblongis vel oblongo-lanceolatis, apice acuminatis basi cuneatis subcoriaceis longitudinaliter 3-nervis glabris, lamina 10–14 cm. longa 3–4 cm. lata, petiolo 5–7 mm. longo; *floribus* ignotis; *fructu* globoso apiculato pedicellato, sicco 7–8 mm. diam., 1-loculari, 1-spermo.

Species ad *Z. calophyllum* Wall. accedens, differt primo intuitu fructu diverso.

Mt. Gawada, 2500 ft., 910. Considerable tree; fruit orange, becoming lake-scarlet.

Allied to *Z. calophyllum* Wall. and *Z. inermis* Merr. Noticeable on account of the glabrous acuminate trinerved leaves and globose fruit. Differs from *Z. papuanus* Laut. and *Z. diamuensis* Laut. in the shape of the leaves.

Ampelidaceæ.

Cissus penninervius Bl. Sogere, 671.—C. nervosa Bl. Sogere, 772.—C. discolor Bl. Sogere, 924.—C. nodosa Planch. Mt. Wori-wori, 5000 ft., 727. Climber; flowers greenish yellow.

Vitis semicordata Wall. var. Scortechinii King. Sogere, 526.

Leea macropus K. Schum. Sogere, 400.

Sapindaceæ.

Allophylus micrococcus Radlk. Sogere, 837.

Erioglossum edule Bl. Mt. Gawada, 579.

Guioa rigiduscula Radlk. in Sitz. Math-Phys. Acad. Meunch. xx. (1890) 361. Sogere, 413.

G. aryterifolia Radlk. Mt. Gawada, 3000 ft., 870. Small tree; fruit blue-green.

Cupaniopsis curvidens Radlk. *l. c.* 359. Sogere, 308.

C. platycarpa Radlk. *l. c.* Sogere, 790.

Sarcopteryx melanophlœa Radlk. *l. c.* 266. Meroka Range, 2500 ft., 897. Great tree; flowers white. Mt. Gawada, 3000 ft., 907. Moderate tree; fruit brown-red.

Jagera serrata Radlk. *l. c.* 264. Sogere, 750.

Mischocarpus paradoxus Radlk. *l. c.* 268. Sogere, 310.

Toechima livescens Radlk. *l. c.* 266. Koikoko Range, Sogere, 2800 ft., 804, 939, 637, 761, 374. Large trees; flowers pale pink.

Lepidopetalum xylocarpum Radlk. *l. c.* 269. Sogere, 379, 383.

Harpullia angustifolia Radlk. *l. c.* 279. Base of Owen Stanley's Range, 831, 751. Large shrub; fruit green.

Leguminosæ.

Mucuna (Carpogon) **macropoda** Bak. fil., sp. n. *Caulis* volubilis pilis sparse vestitus; *foliis* trifoliolatis foliolis terminalibus ovatis apice acutis chartaceis demum superne glabris subtus pilis vestitis 10–13 cm. longis 6·5–9 cm. latis, foliolis lateralibus inæquilateralibus 10 cm. longis 5·5–7 cm. latis, foliorum terminalium petiolulis pilis vestitis 20–25 mm. longis lateralium ±5 mm. longis petiolo communi 5–5·5 cm. longo; *racemis* flexuosis longis pedicellis 2–3 mm. longis; *calycis tubo* campanulato, dentibus lanceolatis; *legumine* lineari-oblongo longitudinaliter alato haud transverse lamellato apice apiculato pilis urentibus vestito 19–20 cm. longo, 4–4·5 cm. lato.

Sogere, 3200 ft., 289. Climbing shrub; fruit yellowish green and longitudinally winged, not transversely lamellate. Allied to *M. bracteata* DC.

Mucuna (Citta) **Forbesii** Bak. fil., sp. n. *Herba* perennis ad *M. monosvermam* DC. valde accedens; *ramis* ferrugineo-tomentosis;

foliis trifoliolatis, foliolis terminalibus obovatis vel suborbiculari-obovatis apice breviter acuminatis subtus ferrugineo-tomentosis, nervis lateralibus 4–6 subtus prominulis 9–11 cm. longis 6–10 cm. latis, foliolis lateralibus inæquilateralibus 9–11 cm. longis, 6–9 cm. latis, petiolulis foliolorum terminalium 3–4 cm. longis, lateralium 7–9 mm. longis, petiolo communi rufo-tomentoso 7–12 cm. longo; *floribus* ignotis; *legumine* 6–8 cm. longo facie plicis urentibus vestito.

Sogere, 1750 ft., 148. Fruit covered with dense brown hairs.

Closely allied to *M. monosperma* DC.; differs in the more oblong pod, and stem, petioles, and nerves on under-sides of leaves rufescent-tomentose.

No. 252 from Sogere is closely allied to this.

Cæsalpinia (Guilandina) **sogerensis** Bak. fil., sp. n. *Frutex* diffusus ramulis novellis setis densissime obtectis; *foliis* bipinnatis pinnis 14–18-foliolatis, foliolis ovato-lanceolatis vel oblongo-lanceolatis interstitiis inter foliolorum 10–13 mm. longis, basi rotundatis apice subacuminatis, subsessilibus vel petiolulis brevissimis, subtus rufo-tomentosis, lamina 3·5–4·0 cm. longa, 15–18 mm. lata, pinnarum rhachi aculeata, aculeis brevibus uncinatis; *floribus* ignotis; *leguminibus* ±6 cm. longis et 4± cm. latis setis spinescentibus densissime obtectis, setis 8–10 mm. longis; *pedunculis* 10–16 cm. longis, pedicellis crassiusculis brevibus.

Sogere, 3000 ft., 112. Spreading shrub; fruit with long thick hairs.

Leaflets ovate-lanceolate or oblong-lanceolate, densely rufo-tomentose below; pods densely covered with spinescent setæ.

Archidendron Forbesii Bak. fil., sp. n. *Arbuscula*; *foliis* bipinnatis, foliolis glabris alternis majusculis oblongis vel ovato-oblongis apice acuminatis basi cuneatis vel rotundatis petiolulatis, lamina 10–15 cm. longa 4–7, cm. lata; *inflorescentiis* axillaribus pluri- vel multi-floris e ramis vetustioribus ortis 8–12 cm. longis ramosis; *calyce* tubuloso cupulari truncato 12–14 mm. longo; *corollæ lobis* crassiusculis lanceolatis; *staminibus* numerosissimis filamentorum tubo incluso; *carpellis* circiter 5 subsessilibus pubescentibus anguste lineari-lanceolatis in stylum longissimum attenuatis.

Sogere, 395.

A very striking plant with large glabrous alternate leaflets and about 5 ovaries. Calyx 12–14 mm. long, truncate; corolla rather thick, about 3 cm. long.

Archidendron sogerense Bak. fil., sp. n. *Arbor* ad *A. bellum* Harms accedens, differt primo intuitu petalis altius connatis, ovariis sæpissime 5; *foliis* bipinnatis, rhachi circ. 28–30 cm. longa, foliolis subcoriaceis glabris oblongis vel elliptico-oblongis 8–11 cm. longis 3–4·5 cm. latis basi cuneatis vetere apice acutis petiolulis brevibus; *floribus* albis pedunculatis e ligno vetere ortis, pedunculis plurifloris pedicellis 3–5 mm. longis; calyce externe glabro 10 mm. longo, breviter 4–5 dentato; *petalis* calyce longioribus apice cucculatis; *staminibus* numerosis; *carpellis* 5, stylis elongatis filiformibus; *fructu* ignoto.

Sogere, 615. Tree; flowers white.

Hansemannia gawadensis Bak. fil., sp. n. *Arbuscula*; *foliis* paripinnatis, foliolis majusculis, apice acuminatis, basi cuneatis, nervis lateralibus utrinque 7–8 subtus conspicuis, lamina 18–22 cm. longa 8–9·5 cm. lata, petiolulis 4–7 mm. longis; *floribus* e ligno vetere ortis, paniculis brevibus; *calyce* externe glabro ±5 mm. longo; *petalis* 14–15 mm. longis connatis; *staminibus* numerosis alte connatis, petala excedentibus; *carpellis* pluribus.

Mt. Gawada, 2500 ft., 908. Small tree. Flowers white, on stem and thick branches.

ROSACEÆ.

Angelesia papuana Bak. fil., sp. n. *Ramuli* tenues; *stipulis* lanceolatis; *foliis* alternis, membranaceis, ellipticis vel oblongo-ellipticis, basi cuneatis, apice acuminatis, nervis lateralibus utrinque 10–12, ante marginem arcuatis, et inter se conjungentibus, lamina 12–15 cm. longa, 4·5–5·5 cm. lata, petiolo 2–3 mm. longo; *floribus* in paniculis dispositis, pallide viridibus, paniculis folio brevioribus; *staminibus* 10; *ovario* hirto, stylo laterali.

Sogere, 2500 ft., 257. Flowers pale green. Allied to *A. splendens* Korth. (Ic. Bogor. t. xciv). Differing in the larger leaves with longer acuminate points.

PYGEUM FORBESII Koehne in Engl. Jahrb. li. 210. Sogere, 529.—P. ALBIVENIUM Koehne. Sogere, 655.

RUBUS ROSÆFOLIUS Sm. Sogere, 2000 ft., 122. Climbing shrub; fruit scarlet.

PARINARIUM NONDA F. v. Muell. Sogere, 638. Probably a form of this species, but flowers are required to confirm the identification.

SAXIFRAGACEÆ.

ARGYROCALYMNA ARBOREUM Laut. & K. Schum. Mt. Wori-wari, 5000 ft., 735. Larger tree; flowers in bud dark green; calyces dark green.

POLYOSMA FORBESII Valeton in Nova Guinea, viii. pt. 2, 821. Sogere, 700. Large shrub; flowers in bud greenish white.

P. INTEGRIFOLIA Bl. forma. By river, Sogere, 1750 ft., 692. Slender tree; flowers white.

Polyosma gigantea Bak, fil., sp. n. *Arbor* alta, ramis teretibus, ramulis paullo applanatis; *foliis* subcoriaceis, ellipticis, hinc inde serratis, apice acutis, basi cuneatis, nervis lateralibus utrinque 10–12, subtus prominulis, lamina 6–9 cm. longa, 2–3 cm. lata, petiolo 10–14 mm. longo; *pedunculis* multifloris, pedicellis brevissimis; *calyce* 3–4 mm. longo, dentibus triangularibus acutis; *petalis* extus pubescentibus, angustis, 12–13 mm. longis, 1·25 mm. latis; *stylo* tenuissimo hirto; *fructu* ignoto.

Mt. Wori-wori, 5000 ft., 716.

Great tree; flowers pale whitish yellow, tube tinted with rose. Very closely allied to *P. brachyantha* Merr. from Amboina, but pedicels shorter, flowers and peduncles longer.

COMBRETACEÆ.

COMBRETUM GOLDIANUM F. v. Muell. Port Moresby, sine no.

Terminalia sogerensis Bak. fil., sp. n. *Arbor* ad *T. rubiginosam* K. Schum. accedens; *ramis* teretibus vel subteretibus cortice griseo obtectis; *foliis* ad apices ramorum confertis oblongis vel oblongo-oblanceolatis superne glabris subtus rubiginoso-pubescentibus, nervis lateralibus utrinque 8–10 inter se 7–10 mm. distantibus, lamina 7–9 cm. longa 3–4 cm. lata, basi cuneata apice subacuta vel obtusa, petiolis pubescentibus 12–15 mm. longis; *fructibus* in spicas laxas dispositis, spicis 9–11 cm. longis pubescentibus ovoideis lignosis compressis et ±22 mm. latis pubescentibus sessilibus 1-spermis.

Sogere, 636.

Allied to *T. rubiginosa* K. Schum., but differs in more pointed leaves being with longer petioles, more rubiginous-pubescent below; the lateral nerves are rather more distant.

MYRTACEÆ (EUGENIA by S. Greves).

DECASPERMUM PANICULATUM Kurz. Sogere, Mt. Gawada, 4500 ft., 582, 662, 820. Large tree; flowers white with purplish stamens; flowers in bud purplish-grey.

Decaspermum Forbesii Bak. fil., sp. n. *Frutex* elatus ad *D. microphyllum* Merr. accedens, ramulis teretibus cortice cinereo obtectis; *foliis* parviusculis ovatis punctatis acutis basicuneatis supra nitidis, lamina 15–20 mm. longa, 7–10 mm. lata, petiolo brevissimo; *floribus* paucis pedicellatis pedicellis pilis albidis obtectis; *calycis tubo* infundibuliformi pilis obtecto lobis ovato-triangularibus acutis; *petalis* roseo-albis orbiculari-ovatis margine ciliatis valde imbricatis; *staminibus* numerosis antheris ·3 mm. longis; *stylo* curvato glabro; *ovario* ±7-loculari; *fructu* in sicco nigrescente ±6 mm. lato ±mm. longo sepalis coronato.

Mt. Gawada, 521, alt. 5000 ft. Erect shrub; flowers pinkish white, pistils pink.

Allied to *D. microphyllum* Merr., from Mindanao, but differs in shape of leaflets.

Eugenia, Section *Jambosa*.

Eugenia altipeta Greves, sp. n. *Fruticosa* erecta *ramis* et *ramulis* teretibus rugosis cortice brunneo obtectis glabriusculis; *foliis* ovato-ellipticis basi cuneatis coriaceis 15–22 cm. longis 6–9 cm. latis in sicco supra brunneo-viridibus costa et venis impressis, subtus pallidioribus costa et venis maxime conspicuis, venis 20–30 5–7 mm. inter se distantibus ad 5–7 mm. infra marginem dichotomis ita venam marginalem formantibus; petiolo ·5–1 cm. longo, 2–3 mm. crasso; *floribus* ignotis; *bacca* 5 cm. longa (fide cl. detectoris) viridi.

Sogere, 2000 ft., 111. Erect shrub, fruit green.

Apparently allied to *E. malaccensis*, but has much thicker leaves with more robust midrib. The specimen had no flowers, but bore a solitary fruit on a peduncle 3·5 cm. long.

E. ARFAKENSIS Gibbs. Sogere, Mt. Gawada, 5000 ft., 520. Shrub; flowers cream-white.

EUGENIA CINNAMOMEA Vid., var. nov. **novoguineensis** Greves. A typo discrepat ob folia longiora interdum usque 16–18 cm. longa et petiolos paullo longiores et crassiores, reticulo pagina inferiore valde eminente.

Sogere, Mt. Wori-wori, ±5000 ft., 739. Considerable tree, flowers white.

Eugenia coalita Greves, sp. n. *Arbor ramis* teretibus glabris; *ramulis* ultimis acute tetragonis ad nodos aliquanto tumidis cortice brunneo obtectis; *foliis* parvis lanceolatis longe acuminatis basi acutis 9–13 cm. longis, 2–3·5 cm. latis in sicco supra rubro-nigrescentibus costa impressa subtus pallidioribus costa conspicua utrinque glabris venis inconspicuis cum vena marginali 1 mm. a margine conjunctis, petiolo 5–8 mm. longo striato; *floribus* in cymas satis laxas pauciforas dispositis; *pedunculis* 3–4 mm. longis, ramis lateralibus 1·5–2 cm. longis, pedicellis 2–5 mm. longis; *calycis tubo* 1–1·5 cm. longo infundibuliformi extus punctis crebris onusto, lobis rotundatis inequalibus, 2 minoribus 3 mm. longis 5 mm. latis, 2 majoribus 6 mm. longis 1 cm. latis; *petalis* 4 albis 1 cm. longis 8 mm. latis punctulatis margine scarioso; *staminibus* 1–2 cm. longis, antheris ellipticis, filamentis exterioribus coalitis truncatis et subpetaloideis; *ovario* turbinato 5 mm. longo, loculis polyspermis, *stylo* ±3 cm. longo stamina superante truncato.

Sogere, 1750 ft., 28. Flowers white.

Allied to *E. Jambos* L., but differs in the unequal calyx-lobes and in the petaloid structure formed by the filaments of the outer stamens.

Eugenia daphnoides Greves, sp. n. *Arbuscula ramis* et *ramulis* cortice brunneo obtectis glabriusculis; *foliis* lineari-lanceolatis longe acuminatis basi acutis 8–12 cm. longis 2–3 cm. latis in sicco fusco-viridibus utrinque glabris, costa impressa subtus pallidioribus, costa et venis conspicuis, venis ±13 et 5–10 mm. inter se distantibus cum vena 2–4 mm. a margine conjunctis, vena infima a basi emissa venam intramarginalem tenuem constituente, petiolo 3–8 mm. longo; *floribus* in racemos pauciflores satis elongatos ad apicem ramulorum brevium pseudoterminales dispositis; *bracteis* minutis; *pedunculis* 5–8 cm. longis, pedicellis florum inferiorum 3–10 mm. longis, florum superiorum fere obsoletis; *calycis tubo* 5 mm. longo turbinato extus punctulato, lobis 4 margine scarioso 4 mm. longis; *petalis* roseis (fide cl. detectoris) 5 mm. longis 5 mm. latis extus punctulatis margine scarioso et undulato; *staminibus* 1–1·2 cm. longis; *ovario* turbinato 5 mm. longo, *stylo* 2 cm. longo.

Sogere, 1750–2500 ft., 22, 32, 146. Small tree, flowers pink.

Var. nov. **latifolia** Greves. Sogere, 1750 ft., 164. Small tree; flowers (in bud) faded lake with purplish-pink envelopes.

Allied to *E. Daphne* Ridley, but of more slender habit, thinner leaves with more distinct veins, and much smaller flowers.

Eugenia duplomarginata Greves, sp. n. *Arbuscula ramis* gracilibus teretibus cortice griseo, *ramulis* complanatis cortice brunneo obtectis; *foliis* lanceolatis apice acuminatis basi cuneatis 18–24 cm. longis 5–7 cm. latis, in sicco supra griseis costa impressa subtus viridibus costa et venis conspicuis utrinque glabris venis 12–14 et 1–2 cm. inter se distantibus vena infima a basi emissa venam intramarginalem tenuem constituente vena proxima ad apicem ducta venas reliquas patulas recipiente, petiolo 4–5 mm. longo rugoso supra sulcato; *floribus* solitariis terminalibus; *bracteis* multis 3–4 mm. longis 2 mm. latis acuminatis; *pedunculis* 5 mm. longis; *calycis tubo* 1 cm. longo infundibuliformi extus rugoso lobis 4 semi-ellipticis

1·5 cm. longis 1·5 cm. latis extus rugosis; *petalis* 2–3 cm. longis extus punctulatis margine scarioso undulato; *staminibus* 2–2·5 cm. longis; *ovario* turbinato 8 mm. longo loculis polyspermis; *stylo* stamina superante.

Sogere, 494.

Allied to *E. nutans* K. Schum., but differs in the two distinct marginal veins and in the peculiar undulate petals.

Eugenia Forbesii Greves, sp. n. *Arbor ramis* gracilibus teretibus cortice pallide brunneo obtectis glabriusculis; *foliis* ellipticis apice acuminatis basi acutis 12–15 cm. longis 4–5 cm. latis in sicco supra brunneo-viridibus costa impressa subtus pallidioribus viridibus costa conspicua utrinque glabris venis 5–6 circa 1·5–3 cm. inter se distantibus, petiolo 5–8 mm. longo striato; *floribus* paucis subsessilibus; *pedunculis* pergracilibus 2 mm. longis basi bracteis 2 (?) minutis stipatis; *calycis tubo* 15–16 mm. longo infundibuliformi extus glabro lobis 4 rotundatis 3–4 mm. longis; *ovario* loculis polyspermis; *stylo* circa 2·5 cm. longo puberulo.

Sogere, 2500 ft., 31; petals and stamens wanting.

Allied to *E. formosa* Wall., but has smaller non-shining leaves, sessile or sub-sessile flowers, and a somewhat different calyx.

E. GONIOCALYX Laut. Sogere, 2000 ft., 382. Large tree, fruit light green.

E. JAMBOS L. Sogere, 455.

E. MALACCENSIS, L. Sogere, 2500 ft., 71. Considerable tree, flowers white with pink flush on sepals.

Eugenia merokensis Greves, sp. n. *Arbuscula ramis* gracilibus teretibus cortice griseo obtectis ramulis complanatis bisulcatis cortice brunneo obtectis; *foliis* ellipticis apice acuminatis basi acutis 10–15 cm. longis 4·5–6·5 cm. latis in sicco supra rubra-nigrescentibus nitidis costa impressa subtus pallidioribus costa et venis valde conspicuis utrinque glabris venis 14–16 circa 5–13 mm. inter se distantibus ad 3–4 mm. a margine dichotomis ita venam marginalem formantibus, petiolo 5 mm. longo; *floribus* magnis paucis e ligno vetere ortis pedunculis 1·5 cm. longis pedicellis 7–8 mm. longis; *calycis tubo* 2–2·3 cm. longo campanulato lobis rotundatis 1·5 cm. longis 1·4 cm. latis; *ovario* cylindrico 3–4 mm. longo; *stylo* circa 2·5 cm. longo; *bacca* (fide cl. detectoris) fusco-purpurea.

Sogere, Meroka, 358. Small tree; fruit dark lake.

Allied to *E. decoriflora* Diels, but differs in having larger leaves distinctly veined with a well-defined marginal vein, and a much shorter peduncle.

Eugenia Miqueliana, nom. nov. (*Jambosa condensata* Miq.). Sogere, Mt. Wori-wori, ±5000 ft., 720. Great tree; flowers on stem and thick branches, greenish-white on dirty russet pedicels.

Eugenia pergamacea Greves, sp. n. *Arbor* magna ramis gracilibus teretibus cortice castaneo obtectis; *foliis* papyraceis apice acuminatis basi cuneatis 13–18 cm. longis 6–7 cm. latis in sicco supra brunneis costa et venis impressis subtus pallidioribus costa et venis conspicuis utrinque glabris venis 8–12 circa 1·2 cm. inter se distantibus interjectis parvis paulo minoris valoris ad venam marginalem indistinctam conjunctis, petiolo 1 cm. longo; *floribus* in cymas

laxas bis trichotomas dispositis; *pedunculis* 5–6 cm. longis ramis complanatis 2–4 cm. longis, pedicellis florum inferiorum ±1·5 cm. longis florum superiorum fere obsoletis; *calycis tubo* infundibuliformi 5 mm. longo lobis late ovatis ±3 mm. longis et latis extus punctulatis; *petalis* 4 albis ovatis ±1 cm. longis, 4 mm. latis extus punctulatis margine undulato; *staminibus* 2·5 cm. longis; *ovario* turbinato; *stylo* 2·2 cm. longo.

Sogere, Mt. Koikoko, 2800 ft., 805. Large tree; flowers white. A very distinct species.

Eugenia porphyrocarpa Greves, sp. n. *Arbuscula ramis* teretibus novellis quadrangularibus cortice brunneo obtectis glabriusculis; *foliis* lineari-lanceolatis longe acuminatis basi rotundatis vel leviter cordatis 12–27 cm. longis 2·5–6 cm. latis in sicco supra fusco-viridibus glabris costa et venis impressis subtus pallidioribus costa et venis conspicuis et pilosis venis ±20, 5–20 mm. inter se distantibus ad 1 cm. a margine dichotomis ita venam marginalem formantibus, petiolo 4–5 mm. longo piloso; *floribus* immaturis purpureo-roseis (fide cl. detectoris) verisimiliter 2–3 terminalibus pedunculatis bracteis 5 (?) 1 cm. longis 2 mm. latis pilosis; *pedunculo* 1–1·2 cm. longo; *calycis tubo* 1·5 cm. longo infundibuliformi extus velutino lobis 4 semi-ellipticis 5–7 mm. longis 1–1·5 cm. latis extus velutinis; *stylo* 5 cm. longo; *bacca* (fide cl. detectoris) splendide purpurea.

Sogere, Mt. Wori-wori, ±5000 ft., 298. Petals and stamens wanting.

Allied to *E. megalosperma* Laut. & K. Schum., but has a much larger flower and purple fruit.

Eugenia pterocalyx Greves, sp. n. *Arbuscula* erecta *ramulis* ultimis gracilibus teretibus cortice brunneo obtectis glabris; *foliis* elongato-lanceolatis apice longe acuminatis basi acuminatis 20–25 cm. longis 3–3·5 cm. latis in sicco supra viridibus costa impressa subtus pallidioribus costa conspicua utrinque glabris venis ±30 et 5–8 mm. inter se distantibus cum vena marginali ±2 mm. a margine conjunctis, petiolo 1·5–2 cm. longo; *floribus* conspicuis solitariis terminalibus pedunculo ±5 mm. longo; *calycis tubo* ±2·5 cm. longo turbinato alato lobis 7 mm. longis 5 mm. latis; *petalis* conspicuis ±3 cm. longis 1·2 cm. latis; *staminibus* ±3 cm. longis; *ovario* turbinato 8 mm. longo.

Sogere, ±2000 ft., 773. Flowers lake-purple. Erect shrub.

Allied to *E. nutans* K. Schum., but differs in the characters of the calyx.

Eugenia pyrocarpa Greves, sp. n. *Arbor* ramis teretibus cortice brunneo tenue obtectis glabriusculis ramulis complanatis bisulcatis; *foliis* ellipticis obtuse acuminatis basi cuneatis nitidis coriaceis 29–33 cm. longis 11–14 cm. latis in sicco supra brunnescentibus glabris costa impressa subtus castaneis costa et venis ultra 40 conspicuis 5 mm. inter se distantibus ad 4–5 mm. a margine conjunctis venis secondariis inconspicuis, petiolo 1–2 cm. longo valide alato; *floribus* subsessilibus in cymas compactas e ligno vetere dispositis bracteis 2 mm. longis 2 mm. latis; *calycis tubo* 1–1·2 cm. longo

subcylindrico extus rugoso; *stylo* crasso; *bacca* (fide cl. detectoris) pallide rubra.

Sogere, 2000 ft., 99. Fruit very pale light red in bunches on the stem.

Allied to *E. xylantha* Greves, but differs in the colour and venation of the leaves and distinctly winged petioles.

Eugenia Schumanniana comb. nov. (*Jambosa Schumanniana* Niedenzu, *E. neurocalyx* K. Schum. non A. Gray).

Mt. Wori-wori, ±5000 ft., 722.

Eugenia sogerensis Greves, sp. n. *Arbor ramulis* gracilibus teretibus cortice pallide brunneo obtectis; *foliis* ellipticis apice acuminatis basi acutis 11–13 cm. longis 4·5–6 cm. latis in sicco supra rubronigrescentibus costa impressa subtus pallidioribus costa valde conspicua utrinque glabris venis conspicuis 14–18 circa 4–6 mm. inter se distantibus ad 3–4 mm. a margine dichotomis ita venam marginalem formantibus, petiolo 4–5 mm. longo; *floribus* 1–3 e ligno ramulorum; *pedunculo* 1·5–2 cm. × 1–2 mm. crasso rugoso; *calycis tubo* 1 demum 2 cm. longo infundibuliformi lobis rotundatis 1–1·5 cm. longis 8–15 mm. latis; *petalis* 4; *ovario* cylindrico 5 mm. longo.

Sogere, 2000 ft., 372, 408. Mt. Wori-wori, ±5000 ft., 725. A large or moderate tree; flowers in bud, rose-coloured tips to petals; fruit purple.

Allied to *E. decoriflora* Diels, but differs in having much darker leaves distinctly veined with a prominent marginal vein.

E. subalata Ridley. Sogere, Mt. Meroka, 353, 399. Small tree. Flowers and stamens purplish-scarlet.

Eugenia xylantha Greves, sp. n. *Arbor* alta gracilis *ramis* et *ramulis* valde quadrangularibus et bisulcatis cortice brunneo obtectis glabriusculis; *foliis* ovato-lanceolatis obtuse acuminatis basi cuneatis nitidis coriaceis 26–30 cm. longis 12–13 cm. latis in sicco brunneis glabris costa supra impressa subtus maxime conspicua venis ultra 20 1 cm. inter se distantibus pagina superiore parum pagina inferiore magis perspicuis interjectis pluribus paullo minoris valoris ad 3–5 mm. a margine cum vena intramarginali conjunctis, petiolo 1 cm. longo leviter alato; *floribus* subsessilibus in cymas laxas e ligno vetere ortis; *pedunculis* validis rugosis ±8 cm. longis ramis lateralibus 2–3 cm. longis; *bracteis* 4 mm. longis 4–5 mm. latis; *calycis tubo* 8–10 mm. longo, campanulato extus rugoso; *stylo* 1·5 cm. longo; *bacca* (fide cl. detectoris) pallide rubra.

Sogere, 325. Petals and stamens wanting.

Allied to *E. pachyclada* Laut., but differs from it in the shorter petiole, narrower leaf with distinct marginal vein, more compact inflorescence, and red fruit.

Section *Syzygium*.

Eugenia bibracteata Greves, sp. n. *Arbor* magna *ramis* teretibus glabris; *ramulis* ultimis tetragonis ad nodos aliquanto tumidis cortice griseo obtectis; *foliis* oppositis ovatis apice rotundatis basi acutis 11–12 cm. longis 4–5 cm. latis in sicco supra brunneo-viridibus costa impressa subtus viridibus costa conspicua et robusta utrinque glabris venis inconspicuis cum vena marginali 1 mm. a margine conjunctis

petiolo 1–1·5 cm. longo 2 mm. crasso; *floribus* parvis in cymas satis laxas pauciloras paniculam foliis breviorem referentes dispositis; *bracteis* oppositis decussatis 2 mm. longis; *pedunculis* 4 cm. longis pedicellis 3–5 mm. longis; *calycis tubo* 2–3 mm. longo infundibuliformi extus punctato lobis 4 semi-ellipticis 1–1·5 mm. longis 1 mm. latis; *petalis* albis 4 rotundatis 2–3 mm. longis punctulatis margine undulatis; *staminibus* 4 mm. longis.

Sogere, Mt. Wori-wori, ±5000 ft., 729. Large tree; flowers white.

Allied to *S. confertiflora* Koord. & Valet, but differs in having narrower leaves with rounded apices and a smaller number of flowers in the inflorescence.

E. CLAVIFLORA Roxb. Sogere, 2700–3000 ft., 108. Small tree, flowers white, fruit pale orange.

E. MICRANDRA Ridley. Sogere, Mt. Gawada, 5000 ft., 546, 947. Great tree; fruit pale green (even whitish-green).

Eugenia nivifera Greves, sp. n. *Arbor* magna *ramis* gracilibus teretibus cortice brunneo obtectis glabriusculis; *foliis* ovatis obtuse acuminatis basi cuneatis 5·3–5·5 cm. longis 2·5–3 cm. latis in sicco supra fusco-viridibus costa impressa subtus brunneis costa conspicua utrinque glabris venis inconspicuis cum vena marginali 1 mm. a margine conjunctis, petiolo 8–10 mm. longo; *floribus* in cymas laxas bis trichotomas pauciloras dispositis; *pedunculis* 4·5–5 cm. longis ramis complanatis et sulcatis 1·4–2 cm. longis pedicellis 5–10 mm. longis; *bacca* globosa loculis polyspermis alba (fide cl. detectoris).

Sogere, Mt. Gawada, 5000 ft., 547. Great tree, fruit chinese-white in colour.

Apparently allied to *E. cymosa* Lam., but differs in shape of leaf and in inflorescence. Flowers too imperfect to describe.

Eugenia salpingantha Greves, sp. n. *Arbuscula* ±5 met. alta *ramis* et *ramulis* gracilibus teretibus cortice brunneo obtectis glabriusculis; *foliis* lanceolatis apice longe acuminatis basi acutis ±20 cm. longis 5–6 cm. latis in sicco supra viridibus costa impressa subtus pallidioribus costa et venis conspicuis utrinque glabris venis ±30 et 4–7 mm. inter se distantibus ad 2–3 mm. a margine dichotomis ita venam marginalem formantibus, petiolo 4–5 mm. longo; *floribus* in cymas compactas pauciloras terminales dispositis; *pedunculis* 2 mm. longis, pedicellis 1 mm. longis; *calycis tubo* ±1 cm. longo 3 mm. lato infundibuliformi extus punctato; *stylo* 8 mm. longo.

Sogere, 2000 ft., 267. Small tree ±20 ft.; flowers purple-red. Flowers too imperfect for satisfactory description.

Allied to *E. ruminata* Koord. & Valet., but differs in size and shape of leaf.

E. SYLVANA Ridley. Sogere, 807 *a*.

Eugenia trichotoma Greves, sp. n. *Arbor* magna *ramis* et *ramulis* gracilibus teretibus cortice castaneo obtectis glabriusculis; *foliis* lanceolatis apice acuminatis basi acutis 6–9 cm. longis 1·5–2·5 cm. latis in sicco utrinque glabris brunneis costa et venis conspicuis venis ±10 et 4–8 mm. inter se distantibus interjectis pluribus paulo minoris valoris ad 2–3 mm. a margine conjunctis aliquando vena infima a basi emissa venam intramarginalem tenuem constituente, petiolo 1–1·5 cm.

longo; *floribus* in cymas laxas bis trichotomas paniculam foliis longiorem constituentes dispositis; *pedunculis* ±2 cm. longis; *calycis tubo* 2–3 mm. longo infundibuliformi; *bacca* (fide cl. detectoris) viride.

Sogere, Mt. Koikoko, 2500 ft., 792. Large tree, fruit immature; green. This specimen had only imperfect flowers and young fruits.

Allied to *E. sylvana* Ridley, but differs in the size and venation of the leaf.

Section *Eu-Eugenia.*

Eugenia koikokoensis Greves, sp. n. *Arbor* sarmentosa *ramis* et *ramulis* gracilibus teretibus cortice griseo obtectis glabriusculis; *foliis* lanceolatis apice acuminatis basi cuneatis 7–9·5 cm. longis 2·5–5 cm. latis in sicco supra griseo-viridibus costa impressa subtus viridibus costa et venis conspicuis utrinque glabris venis 7–8 circa 8–10 mm. inter se distantibus ad 3–5 mm. a margine dichotomis ita venam marginalem formantibus, vena infima a basi emissa venam intramarginalem tenuem constituente, venis reliquis inconspicuis reticulum formantibus, petiolo 3–5 mm. longo; *floribus* 3 terminalibus vel lateralibus; *pedunculis* 2–2·5 cm. longis; *calycis tubo* 1 cm. longo infundibuliformi extus punctulato lobis 4 semi-ellipticis 2 mm. longis 3 mm. latis punctulatis margine scarioso; *petalis* 4 albis late ovatis 5 mm. longis 4 mm. latis punctulatis margine scarioso et undulato; *staminibus* 1·5 cm. longis; *ovario* turbinato; *stylo* stamina superante.

Sogere, Mt. Koikoko, 2500 ft., 619. Straggling tree, flowers white.

Allied to *E. flavescens* Ridley, but has longer and narrower leaves with two marginal veins, slender round peduncles, petals not calyptrate, and red stamens.

Eugenia racemoides Greves, sp. n. *Arbuscula ramis* et *ramulis* gracilibus teretibus cortice brunneo obtectis glabriusculis; *foliis* lanceolatis obtuse acuminatis basi cuneatis 8–11·5 cm. longis 3·5–4 cm. latis in sicco supra viridibus costa impressa subtus pallidioribus costa conspicua utrinque glabris venis paulo conspicuis cum vena marginali 1 mm. a margine conjunctis, petiolo 1–1·5 cm. longo; *floribus* in paniculas elongatas paucifloras pseudolaterales dispositis; *pedunculis* 6–8 cm. longis, pedicellis florum inferiorum 1·5–2 cm. longis florum superiorum fere obsoletis; *calycis tubo* 3 mm. longo turbinato lobis 4 semi-ellipticis; *petalis* 4, 3 mm. longis 3–4 mm. latis.

Sogere, 707.

Allied to *E. daphnoides* Greves, but differs in the texture and venation of the leaves.

Lecythidaceæ.

Barringtonia Forbesii Bak. fil., sp. n. (§ *Butonica*). *Arbor* alta, *foliis* alternis oblongo-obovatis, glabris margine integris nervis lateralibus utrinque 9–12, lamina 10–14 cm. longa, 4–6 cm. lata, petiolo 2–3 cm. longo; *floribus* mediocribus albis in racemos circ.

30–35 cm. longos dispositis; *pedicellis* ±1 cm. longis; *alabastris* globosis; *calyce* cupuliformi, calycis tubo turbinato; *petalis* 30–35 mm. longis imbricatis calyce 2–3-plo longioribus; *staminibus* numerosissimis multiseriatis, antheris parvis; *stylo* longiusculo tenui; *ovario* 4-loculari.

Koikoko Range, 2800 ft., 803.

Large tree; flowers white; leaves oblong-ovate, petiolate; racemes 30–35 cm. long, laxly flowered; pedicels ±1 cm. long.

B. flava Laut. differs in its sessile flowers, and *B. tetraptera* Laut. in its two-celled ovary.

Melastomaceæ.

Melastoma malabathricum L. Sogere, 217, 825.

Dissochæta novoguineensis Bak. fil., sp. n. (§ *Diplostemones*). *Frutex* scandens ramis junioribus teretibus fusco-furfuraceis; *foliis* ellipticis vel oblongo-ellipticis subcoriaceis breviter petiolatis 5-plinerviis supra nitentibus apice obtusis basi rotundatis, costa subtus primum fusco-furfuracea, lamina 5–5·7 cm. longa, 2·8–4·6 cm. lata, petiolo fusco-furfuraceo 10–12 mm. longo; *floribus* in paniculam terminalem amplam dispositis; *bracteis* mediocribus 3–4 mm. longis; *calyce* in toto 4 mm. longo tubo primum furfuraceo limbo truncato lobis subnudis; *petalis* 4 in alabastris ±4 mm. longis primum viridi-albis (sec. cl. detector.) ovatis apice acutis; *staminibus* 8 in speciminibus nostris vix evolutis; *baccis* subglobosis 5 mm. longis, limbo calycis coronatis.

Sogere, Mt. Wori-wori at about 5000 ft., 708, 809.

Medinilla triplinervia Cogn. Sogere, 932, 654.

M. macrocarpa Bl. Sogere, Meroka, 479. Koikoko Range, 2500 ft., 786. Large shrub; fruit scarlet-purple. Sogere, 940, 423, 303. Trailing shrub; flowers rich rose-pink.

M. Forbesii Bak. fil. in Trans. Linn. Soc., Bot. ser. 2, ix. 55. Meroka Range, 2500 ft., 895. Climber; flowers pink-scarlet. Mt. Wori-wori, 5000 ft., 757. Small tree or trailing shrub; flowers rose-pink; stamens pale yellow.

M. sogerensis Bak. fil. *op. cit.* 56. Sogere, 3000 ft., 305. Large straggling shrub; flowers rose-pink or reddish purple; calyces persistent; fruit nervature covered with white silvery hairs. Mt. Koikoko, 3000 ft., 596.

Astronia arborea Bak. fil., sp. n. *Arbor* alta (sec. cl. detector.) ad *A. ferrugineam* Elmer valde accedens; *ramis* teretibus cortice griseo tectis; *foliis* majusculis 13–16 cm. long. 3·5–6·5 cm. lat. ellipticis vel oblongo-oblanceolatis 3-nerviis manifeste discoloribus supra nitentibus subtus insigniter rubro-brunneo-pubescentibus apice subacutis basi cuneatis petiolo mediocri 1–3 cm. long. præditis; *floribus* in paniculas mediocres dispositis; *bracteis* parviusculis vel mediocribus dense ferrugineo-pubescentibus; *calycis tubo* ±5 mm. long. campanulato extus dense ferrugineo-pubescente dentibus ±1 mm. long.; *petalis* 5 suborbiculari-obovatis in speciminibus nostris vix evolutis; *fructu* subgloboso.

Koikoko Range, 806. A tall tree; leaves shining above, covered below with a reddish-brown pubescence; flowers (in our specimen

only in bud) white in panicles, rhachis and pedicels covered with brownish red-pubescence.

Memecylon conocarpa Laut. & K. Schum. ex descript. Sogere, 407.

Samydaceæ.

Casearia sogerensis Bak. fil., sp. n. *Arbor*; ramulis pubescentibus; *foliis* oblongo-lanceolatis apice acuminatis apice ipso obtusis basi truncatis vel late cuneatis subtus pubescentibus nervis lateralibus prominentibus arcuatis utrinque 8–10, lamina 18–20 cm. longa, 6–7·5 cm. lata, petiolis 3–4 mm. longis; *floribus* axillaribus viridibus pedicellatis; *calyce* pentamero in toto ±5 mm. longo, lobis ovato-lanceolatis; *staminibus* 10 filamentis pubescentibus; *antheris* parvis; *fructu* pallide viridi purpureo-maculato ±2·5 mm. longo angulato.

Sogere, 2000 ft., 377. Tree; flowers greenish white; fruit pale green; purplish markings on flowers and fruit. Allied to *C. cinerea* Turcz. and *C. contermina* Miq.

Begoniaceæ.

Begonia sogerensis Ridley in Journ. Bot. lii. 289 (1914). Sogere, 157, 261, 444. Mt. Meroka, 890. Flowers white or greenish white.

Araliaceæ.

Schefflera Forbesii Ridley, *op. cit.* 290. Sogere, Mt. Woriwori, 5000 ft., 297. Moderate tree; flowers purple-pink.

S. bractescens Ridley, *l. c.* Sogere, 2500 ft., 47. Small tree. Sogere, 300 ft., 115.

Polyscias Forbesii Bak. fil., sp. n. *Species* ad *P. nodosam* Seem. accedens. *Arbor* (?) *foliis* elongatis glabris 40–50 cm. longis multijugis, *foliolis* numerosis lanceolatis vel oblongo-lanceolatis margine crenato-serratis apicem versus attenuatis apice ipso obtusis basi late cuneatis petiolulatis, lamina 8–10·5 cm. longa, 16–20 mm. lata, petiolulis 3–4 mm. longis; *inflorescentia* 16–20 cm. longa foliis subduplo breviore, umbellulis racemosis numerosis ramis lateralibus 17–19 mm. longis; *floribus* ignotis; *umbellularum pedicellis* 7–12 strictis puberulis 4–5 mm. longis; *fructu* 3-loculari in sicco nigrescente subgloboso 3–4 mm. diam., *stylis* 3 distinctis demum recurvo-patentibus.

Sogere, 452.

Eschweileria sessiliflora, comb. nov. (*Boerlagiodendron sessiliflorum* Laut.). Mt. Gawada, 4500 ft., 581. Tall tree; fruit from green to lake-purple.

E. novoguineensis Boerlage. Sogere, 915. Meroka Mt., 2500 ft., 20.

Leaves palmate, apparently 7-lobed; fruit broadly ovoid, glabrous, 9–10-celled, ribbed, pedicels 10–14 mm. long. Differs from *E. Lauterbachii* Harms in the umbel not being subracemose.

Eschweileria gawadensis Bak. fil., sp. n. *Arbor* vel *frutex*?; *ramis* cortice lutescente obtectis; *stipulis* acutis; *foliis* papyraceis heteromorphis, lamina 20–27 cm. longa et lata sæpius palmatim profunde 3–5-lobata, lobis apice acuminatis margine serratis, petiolo superne canaliculato 15–17 cm. longo; *umbellis* compo-

sitis pro genere parvinsculis, pedunculo brevi, radiis primariis basi bracteatis 10–13 mm. longis scabridis; *fructibus* 4-locularibus in capitula dispositis.

Sogere, 645. Mt. Gawada, 4000 ft., 570. Flowers in bud reddish purple.

Allied to *B. trilobatum* Merr., from the Philippine Islands, and to *B. monticolum* Harms.

Heptapleurum venulosum Seem. Sogere, 2500 ft., 233. Large tree; fruit bright orange.

Plerandra Stahliana Warb. Sogere, 2500 ft., 220. Small tree; fruit deep pink.

GAMOPETALÆ.

By Spencer Moore, F.L.S.

Rubiaceæ.

Nauclea Chalmersii F. Muell. Sogere, 2000–2500 ft., 8, 191. Large shrub or small tree.—N. tenuis Havil. in Journ. Linn. Soc. xxxiii. 55. Mt. Gawada, 5000 ft., 535.

Uncaria pedicellata Roxb. Sogere Hills, 2000 ft., 104. Climbing shrub with greenish-gamboge flowers. — U. Forbesii Wernh. in Journ. Bot. lvi. 68 (1918). Mt. Meroka, 2500 ft., 906.

Uncaria Havilandiana S. Moore, sp. n. Videtur *frutex* scandens; *ramulis* patentissimis compressis striatis glabris cortice læte brunneo circumdatis; *foliis* petiolatis (pet. 1·5–2 cm. long.) late ovatis cuspidato-attenuatis apice obtusis basi rotundatis parumque obliquis pergamaceis supra nitidis subtus opacis pag. utraque læte brunneis glabris 12–14 × 8–9·5 cm. costis lateralibus utrinque 5 supra planis subtus eminentibus costulis more *Brideliarum* percurrentibus pag. sup. costulis interpositis reticulum maxime prominens constituentibus; *stipulis* ——; *pedunculis sterilibus* ——; *pedunculis fertilibus* axillaribus raro terminalibus solitariis quam petioli sæpissime brevioribus (circa 1 cm. long.) basi tumidis maximeque complanatis; *capitulis* multifloris 2 cm. diam. floribus sessilibus; *bracteolis* linearibus dorso copiose setosis 2·5 mm. long.; *ovario* turbinato dense appresse setoso; *calycis* limbo ovario æquilongo (2·5 mm. long.) campanulato extus minute sericeo necnon dilute puniceo-brunneo quam lobi rotundati plane longiore; *corollæ* tubo 7 mm. long ipso sub limbo dilatato uti lobi 2 mm. long. late oblongi obtusissimi extus sericeo; *antheris* subinclusis 1·25 mm. long.; *stylo* exserto glabro 10 mm. long.; *stigmate* cylindrico 1·5 mm. long.

Sogere, 416.

This is the plant Haviland notes (*op. cit.* 82) as a possible variety of *U. pteropoda* Miq., some of the chief differences from which, and enough for the present purpose, he mentions. The citation of *Forbes* 416 for *U. pteropoda* in the line preceding the note just mentioned is an obvious mistake.

Dolicholobium Forbesii Wernh. *op. cit.* 69. Gawada Mt., 3000 ft., 853.

Xanthophytum papuanum Wernh. *op. cit.* 70. Mt. Wori-wori, 5000 ft., 769.

Oldenlandia Heynei G. Don. Sogere, 3000 ft., 287.

Mussænda macrantha Valet. Sogere, 1950–2500 ft., 30, 207. The specimens, which are without flowers, were seen by Valeton, who identified them as above, though in the absence of flowers naturally with some doubt.

M. Scratchleyi Wernh. *op. cit.* 70. Sogere, 5.—M. ferruginea K. Schum. Bosi-bosi, sine no.

Mussænda Forbesii Wernh. MS. in Herb. Mus. Brit., sp. n. *Frutex*; *ramulis* ultimis aliquantulum complanatis pube hirsutula indutis deinde glabrescentibus; *foliis* amplis (usque 20 × 8·5 cm.) petiolatis (pet. 1–4 cm. long.) oblongo-ovatis acuminatis apice obtusis basi late rotundatis (sæpe in petiolum subito angustatis) membranaceis pag. sup. læte viridibus sparsim puberulis pag. inf. decoloribus in costis costulisque albo-pubescentibus costis lateralibus utrinque 8–10 aperte arcuatis reticulo sublaxo; *stipulis* triangularibus acutis dorso hirsutulis 5–6 mm. long.; *cymis* foliis brevioribus (usque 8 cm. long.) bis-trichotomis pauciflоris floribus sessilibus breviterve pedicellatis; *ovario* hirsutulo 8–10 mm. long. fere 2 mm. lat; *calycis* segmentis lineari-subulatis hirsutulis ±5 mm. long. segmento foliaceo suborbiculari 7-nervi 4 cm. lat. verisimiliter dilute flavo ungui circa 2 cm. long. insidente; *corollæ* tubo superne paullo dilatato extus appresse hirsutulo in alabastro circa 3 cm. long. lobis lanceolatis acuminatis in alabastro solum visis et tunc circa 7 mm. long.; *stylo* glabro verisimiliter circiter 4 cm. long.

Bosi-bosi, sine no.

A very distinct species. The specimen, though not a good one, seems sufficiently good to warrant description.

Lucinæa Forbesii Wernh. *op. cit.* 71. Mt. Wori-wori, ±5000 ft., 712.

Urophyllum britannicum Wernh. *op. cit.* 72. Mts. Koikoko and Meroka, 248, 330, 346, 366, 601, 627, 787, 930.

Gouldia papuana Wernh. *op. cit.* 129. Sogere, 442.

Tarenna hameliæblasta Wernh. *op. cit.* 73. Mt. Wori-wori, ±5000 ft., 728. Koikoko Ranges, 2800 ft., 807.

Randia anisophylloides Wernh. *op. cit.* 74. Sogere, 626.—R. Ixoræflora Wernh. *op. cit.* 74. Sogere, 2800 ft., 89, 180.

Gardenia Gjellerupii Valet. Sogere, 467. Referred here by Valeton with some doubt.—G. tropidocarpa Wernh. *op. cit.* 75. Mt. Wori-wori, ±5000 ft., 738, 926.

Timonius koikokensis Wernh. *op. cit.* 130. Mt. Koikoko, 3000 ft., 593.—T. laugherioides, Wernh. *op. cit.* 131. Sogere, 2000 ft., 386.—T. merokensis Wernh. *op. cit.* 130. Sogere, 1750 ft., 699. Mt. Meroka, 931.—T. sericeus K. Schum. var. tomentosa Valet. Sogere, 2000 ft., 129.—T. heptamerus Wernh. Sogere, 770. Specimen incomplete; probably a var. of this Dutch New Guinea species.

Canthium caudatum S. Moore, comb. nov. (*Plectronia caudata* Valet.) Koikoko Range, 2500 ft., 798. Mt. Meroka, 2500 ft., 889. Small tree with green fruit.

Canthium Valetonianum S. Moore, sp. n. *Arbuscula*; *ramulis* subteretibus bene foliosis cortice cinereo circumdatis; *foliis* lanceolato-oblongis vel oblongo-oblanceolatis breviter acuminatis apice obtusis (acumine circa 7 × 2·5 mm.) basi in petiolum 2–3 mm. long. cuneatim coarctatis membranaceis glabris in sicco griseolo-viridibus 8–10 × 3–4 cm. costis lateralibus tenuibus utrinque 5 pag. inf. prominentibus sæpe in axillis domatia minuta foventibus reticulo haud visibili; *stipulis* fugaceis a basi lata linearibus glabris usque 7 mm. long.; *floribus* in fasciculos sessiles perpaucifloros dispositis; *pedicellis* quam petiolos paullulum longioribus (3–4 mm. long.) basi bracteolis minutis stipatis; *ovario* subgloboso glabro 1·25 mm. long.; *calycis* limbo ·4 mm. long., minute 5-dentato; *corollæ* tubo extus glabro intus albo-pubescente ore villoso 5 mm. long. lobis ovato-oblongis obtusis vel obtusiusculis ima basi exempta glabris 3 mm. long.; *antheris* sessilibus ori ipso insertis ovatis obtusis ægre 1 mm. long.; *stylo* glabro 6 mm. long.; *stigmate* peltato breviter exserto 1·5 mm. diam.

Sogere, 2500 ft., 61. Flowers greenish yellow.

Valeton (Nov. Guin. viii. 477) mentions this Forbes specimen as probably referable to *Plectronia barbata* K. Schum. (*Canthium barbatum* Benth.), a Polynesian species with leaves which dry black, peduncled inflorescences, and corollas with a considerably longer tube among its chief peculiarities. He was apparently led to this by noting that Schumann (Fl. Deutsch. Schutzgeb. 569) gives this plant for N.E. New Guinea; but this, as represented in the British Museum (*Lauterbach* 873, according to Schumann 2873), does not turn black in drying, and has small flowers in sessile fascicles, thus being evidently conspecific with *C. Valetonianum*, although its somewhat broader leaves often reach 5 cm. in width. From the fact of Eastern Australia being included by Schumann within the distribution area of *P. barbata*, he would appear to have regarded the Australian *C. coprosmoides* F. Muell. as unworthy of specific rank; but, as Bentham (Fl. Austral. iii. 422) has shown, without good reason. The Australian plant, it may be added, dries black, and although its fascicles are sessile, the corollas are much larger than those of *C. Valetonianum*. Valeton (Ic. Bogor. ii. tab. cxliv) figures and describes a var. *keyensis* of *P. barbata* from Kei island which, however, is different in several points from *C. Valetonianum*.

Pavetta tarennixora Wernh. (*op. cit.* 76). Sogere, 454.

Morinda leptocalama Wernh. *op. cit.* 77. Mt. Gawada, 4000 ft., 864.

Morinda triandra S. Moore, sp. n. *Frutex* scandens, glaber; *ramulo* unico scrutato bene folioso striatulo cortice cinereo circumdato; *foliis* brevipetiolatis (pet. ±5 mm. long.) oblongo-lanceolatis acuminatis apice acutis basi obtusis tenuiter coriaceis 7–12 × 2·5–4 cm. nitidis in sicco pag. sup. fuscis pag. inf. griseis costis lateralibus utrinque 5–6 ascendenti-arcuatis utrobique sat perspicuis; *floribus* (anne semper?) unisexualibus ad apicem ramuli in umbellam 6-cruram digestis cruribus quam folia multo brevioribus (fere 2 cm. long.) quoque flores tres capitulatim confluentes fulciente; *calyce* cupulari truncato circa 1 mm. alt.; *corollæ* rotatæ tubo brevi intus villoso superne levissime

ampliato vix 2 mm. long. lobis ovato-oblongis obtusis intus villosis 4 mm. long.; *staminibus* 3 faucibus insertis filamentis brevibus antheris obtusis 2·5 mm. long.; *stylo* 0.

Sogere, 487.

This plant is peculiar in its unisexual trimerous flowers; the latter peculiarity it shares with the Sandwich Islands *M. trimera* Hillebr. The flowers of *Morinda* are *occasionally* unisexual, and that may well be the case here, although four flowers were examined without yielding sign of ovules or of a style. In several respects *M. triandra* is not unlike *M. polyneura* Miq.

Psychotria beccarioides Wernh. *op. cit.* 132. Sogere, 3000 ft., 316.—P. Beccarii K. Schum. Sogere, 2500 ft., 176, 199.—P. gawadacephaelis Wernh. *op. cit.* 133. Mt. Gawada, 4500 ft., 513.—P. resurrecta Wernh. *op. cit.* 133. Mt. Wori-wori, 5000 ft., 711, 740. Mt. Gawada, 3000 ft., 869.

Psychotria exsculpta S. Moore, sp. n. *Frutex* omnimodo glaber; *ramulis* compressis striatis pallidis ad nodos aliquanto tumidis; *foliis* 8–11 × 2·5–3 cm. oblongo-lanceolatis acuminatis (acumine circa 7 mm. long.) apice obtusis basi in petiolum 6–10 mm. long. cuneatim angustatis coriaceis in sicco flavo-viridibus subtus pallidioribus costis lateralibus utrinque 12 pag. sup. impressis pag. inf. optime exsculptis reticulo pag. sup. arcto pag. inf. ægre aspectabili; *stipulis* lanceolatis acuminatis usque 10 mm. long.; *floribus* subsessilibus vel brevipedicellatis in paniculas cymosas pedunculatas (ped. 3·5–4 cm.) laxas multifloras foliis circa æquilongas (8 × 10 cm.) digestis; *bracteis* subulatis plerisque 1·5–4 mm. long.; *ovario* turbinato 1·5 mm. long. vel paullulum breviori; *calyce* 1 mm. long. dentibus 5 brevibus deltoideis acutis; *corolla* lactea vix pansa 4 mm. long. lobis oblongis acutis apice inflexis tubo æquilongis tubo juxta medium pulvinis 5 induto; *antheris* oblongis 1·5 mm. long.; *bacca* parva globosa calyce persistente coronata viva saturate viridi sicca brunnea alte paucisulcata 4 × 4 mm.; *seminibus* dorso subobscure obtuse 3-costatis ventre fere planis albumine fusco carnoso æquabili præditis.

Mt. Meroka, 365 *a*.

This must be near *P. amplithyrsa* Valet., of which no specimen has been seen. The chief differences lie in the shorter free (not connate) stipules of the new plant, its much shorter and shorter-peduncled inflorescences, the corollas with tube no longer than the lobes, and the larger globose fruit.

P. (§ *Grumilea*) cornifer Wernh. *op. cit.* 134. Sogere, 2500 ft., 136.—P. (*G.*) Scratchleyi Wernh. *op. cit.* 134. Sogere, without number.—P. (*G.*) sogerensis Wernh. *op. cit.* 135. Sogere, 465.—P. (*G.*) direpta Wernh. *op. cit.* 135. Sogere, 2500 ft., 49.

P. montana Bl. var. gracillima Wernh. *op. cit.* 135. Sogere, 2500 ft., 37, 38. Wernham suggests that this may be a new species. It is certainly not a var. of *P. montana* Bl., judging from the seeds, which are 4-ribbed at back, while those of *montana* have but one dorsal rib. In the absence of flowers it is impossible to proceed further with the material at hand.

Geophila herbacea K. Schum. Sogere, 1750–2000 ft., 280, 842.

Amaracarpus acuminatus S. Moore, sp. n. *Frutex* (?) ramosus novellis minute rufo-pubescentibus; *ramulis* bene foliosis rufo-puberulis; *foliis* parvulis subsessilibus oblongo-ovatis brevissime acuminatis apice obtusis basi breviter cuneatis membranaceis costa centrali pag. inf. rufo-puberula exempta glabris plerisque 7–9 × 4–5 mm.; *stipulis* minutis mox evanidis oblongis obtusis circa 1–1·5 mm.; *floribus* pedunculatis ramulos solitatim terminantibus; *fructu* glabro sicco læte brunneo 7 × 6·5 mm. pedunculis tenuibus minute rufo-puberulis 7–9 mm. long. insidentibus; *pyrenis* plano-convexis dorso rugosis costisque 3 prominentibus donatis; *semine* compresso brunneo 2·25 × 1·75 mm.

Sogere, 657.

Close to *A. novo-guineensis* Valet.; differing chiefly in the acuminate leaves, the longer peduncles to the flowers, and the larger fruits.

Saprosma sogerense S. Moore, sp. n. *Frutex* glaber; *ramulis* gracilibus ad nodos aliquanto tumidis; *foliis* lanceolatis breviter acuminatis basi in petiolum circa 3 mm. long. attenuatis papyraceis pallide nitidis in sicco olivaceo-griseis plerisque 6–7 × 1·5–2 cm. costis lateralibus pag. inf. magis aspectabilibus utrinque circa 8 marginem versus arcuato-conjunctis reticulo satis laxo; *stipulis* ovatis obtusis circa 1 mm. long.; *floribus* breviter pedicellatis in umbellas pedunculatas perpaucifloras digestis; *pedunculo* compresso sursum dilatato apice bracteis 2 linearibus circa 1 mm. long. onusto summum 7 mm. long.; *pedicellis* 1·5 mm. long.; *ovario* turbinato pedicello æquilongo; *calyce* 5-dentato ovario paullo breviore; *corolla* fœtida in toto 6 mm. long. tubo 4 × 1 mm. faucibus villosulis lobis ovato-oblongis obtusis utrinque glabris 2 mm. long. vel paullulum ultra; *staminibus* brevissime exsertis antheris oblongis obtusis 1 mm. long.; *stylo* subincluso glabro breviter 2-ramoso 4 mm. long.

Mt. Koikoko, 3000 ft., 666.

S. novo-guineense Laut. & K. Schum., of which a specimen has not been seen, is described as having, besides larger and differently-shaped leaves, several-flowered umbels of larger flowers with the corolla lobes villous on the inner side.

No. 347 from Mt. Meroka looks at first sight very like *S. sogerense*, but its caudate-acuminate leaves are broader and have many more side-nerves. This may perhaps be *S. syzygiifolium* Valet., but the material is not sufficiently good to decide the point.

Compositæ.

Vernonia cinerea L. Sogere, 948.—V. Klossii S. Moore in Trans. Linn. Soc., ser. 2, Bot. ix. 80. Sogere, 2500 ft., 59 *a* (cited as 59 *loc. cit.* in error).

V. arborea Ham. var. obovata var. nov., S. Moore. Folia oblongo-obovata subitò brevitèrque acuminata basi obtusa firme membranacea supra (costa media exempta) fere glabra subtus in costa costulisque minute velutina 8–10 × 4–5 cm. (petiolis 2·5 cm. long. exclusis). Mt. Wori-wori, 5000 ft., 719.

To the same var. and from the same region belongs No. 653 with leaves narrowing below into the petiole and thus more markedly

oblong-obovate; also apparently No. 523 with very young inflorescence.

Adenostemma viscosum Forst. Sogere, 858, 866.

Siegesbeckia orientalis L. Sogere, 2000 ft., 141.

Goodeniaceæ.

Scævola Lauterbachiana K. Krause. Sogere, 2000 ft., 361. This is probably the "*Scævola oppositifolia* Roxb." of Mueller's Descript. Notes on Papuan Pl. ix. 63.—S. Forbesii K. Krause in Pflanzenreich, Monog. Good. 133. Sogere, 1800 ft., 952.

Vacciniaceæ.

Catanthera lysipetala F. Muell. in Journ. Bot. xxiv. 289 (1886). Sogere, Mt. Gawada ±5000 ft., 419, 451.

Dimorphanthera Forbesii F. Muell. Descr. Notes Papuan Pl. ix. 63 (1890). Mt. Wori-wori, ±5000 ft., 296, 768.

D. Moorhousiana F. Muell. Sogere, 3000 ft., 764. Koikoko Range, 2500 ft., 784.

Myrsinaceæ.

Mæsa sogerensis S. Moore, sp. n. Arbuscula glabra; *ramulis* sat gracilibus foliosis lenticellis permultis prominentibus signatis; *foliis* oblongo-obovatis acuminatis apice ipso obtusis basi in petiolum circa 5 mm. long. attenuatis margine integris undulatisve membranaceis pag. utraque opacis lineis nervilliformibus crebro percursis pleraque 7–11 × 2·5–4·5 cm.; *racemis* axillaribus simplicibus vel ima basi solum ramosis foliis multo brevioribus (±1 cm. long.); *bracteis* bracteolisque subulatis circa ·5 mm. long.; *pedicellis* robustis 1 mm. long.; *calycis* segmentis ovatis obtusissimis margine minute crenulatis dense rubro-lineatis ·6 mm. long.; *corolla* medium usque divisæ 1·5 mm. long. lobis suborbicularibus dilute aurantiacis lineis rubris radiantibus eleganter percursis; *staminibus* sat alte insertis antheris ovatis obtusissimis ·5 mm. long. filamentis circa æquilongis; *ovario* anguste ovoideo stylo abbreviato incurvo levi coronato.

Sogere, 2850 ft., 174.

Close to *M. striata* Mez; different *inter alia* in the inflorescences simple except at the very base, the smaller orange-coloured flowers on short stout pedicels and the narrower smooth ovary with smooth style.

M. rubens S. Moore in Journ. Bot. lii. 291 (1914). Sogere, 90.

Ardisia (§ *Akosmos*) **tristanioides** S. Moore, sp. n. *Frutex* erectus, glaber; *ramulis* subteretibus cortice fusco-brunneo obductis; *foliis* breviter valideque petiolatis (pet. circa 5 mm. long.) lanceolatis gradatim acuminatis apice obtusis basi obtusis tenuiter coriaceis utrobique nigropunctatis minutissimeque lepidotis 10–15 × 3–4 cm. costis lateralibus plurimis marginem versus arcuatis velut reticulum mediocriter eminentibus; *inflorescentiis* axillaribus (nonnunquam extra-axillaribus) sat longe pedunculatis (ped. 3–7 cm. long.) quam folia sæpius brevioribus laxe paucifloris floribus longipedicellatis (pedicellis 1–1·5 cm. long.) secus ramos racemosim ordinatis; *calycis* ultra medium divisi segmentis late oblongis obtusissimis margine

ciliolatis nigropunctatis 1 mm. long.; *corollæ* fere usque basin lobatæ lobis ovatis obtusis crebro punctatis fere 4 mm. long.; *antheris* filamentis 1 mm. long. insidentibus sagittulatis apiculatis 2·5 mm. long.; *ovario* 1 mm. stylo 2 mm. long.; *drupa* globosa coccinea nigro-punctata 5–6 mm. diam.

Sogere, 2000 ft., 381.

Apparently near the Javan *A. lævigata* Bl., differing in the foliage, small flowers, &c. Nos. 255 and 690, both flowerless, most probably belong here.

A. SQUARROSA Mez in Pflanzenreich, Monog. Myrs. 110. Meroka, 363. Mt. Gawada, 5000 ft., 548.

A. FORBESII S. Moore, *op. cit.* 291. Sogere, 120, 335, 351, 483, 656. Nos. 670 from Mt. Koikoko, 3000 ft., and 695 from Eira River, Sogere, 1750 ft., are probably this in fruit.

A. VENUSTA S. Moore, *op. cit.* 292. Sogere, 54, 118, 364, 490, 665, 791.

Conandrium Forbesii S. Moore, sp. n. *Arbuscula* vel *frutex* amplus, glaber; *ramulis* subteretibus sat crebro foliosis cortice griseo obductis; *foliis* oblanceolatis vel lanceolato-oblongis acuminatis apice obtusis basi in petiolum crassiusculum ±6 mm. long. attenuatis papyraceis pag. utraque punctis magnis maxime perspicuis omnimodo signatis pallide nitidis ±10 × 4 cm. costa media supra insculpta subtus eminente costis lateralibus plurimis uti reticulum sat densum utrinque prominentibus; *inflorescentiis* terminalibus laxissimis usque 10 × 10 cm.; pedicellis ±1 cm. long. cito recurvis sub fructu elongatis; *calycis* segmentis dextrorsum obtegentibus suborbicularibus margine ciliolato-crenulatis margine exempto nigro-punctatis 1 mm. long.; *corollæ* saturate purpureæ lobis basi connatis ovatis obtusis perspicue punctatis 2·5 mm. long. (adhuc haud pansis); *antheris* connatis apice liberis inferne dorso tuberculis nigris confluentibus onusto superne glabro 1·5 mm. long.

Mt. Koikoko, 3000 ft. 597.

This seems different from, although certainly closely allied to, *C. polyanthum* Mez, which, according to the figure and description, has larger leaves tubercular-punctulate upon the underside, longer less lax inflorescences, larger flowers and anthers with scattered (not confluent) tubercles on the back.

A Sogere (2000 ft.) specimen, No. 554, with shorter and fewer-flowered inflorescences is conspecific; as also is probably No. 205, without flowers, but bearing blue-black fruits 10 mm. in diameter borne on purple-red pedicels sometimes reaching 15 mm. in length.

Discocalyx conferta S. Moore, sp. n. *Frutex* erectus verisimiliter polygamus vel dioicus; *ramulis* robustis teretibus longitrorsum striatis fusco-brunneis 4–5 mm. diam.; *foliis* brevipetiolatis ovatis breviter acuminatis apice obtusis basi obtusis tenuiter coriaceis glabris costis lateralibus utrinque circa 12 supra impressis subtus eminentibus pag. utravis mediocriter visibilibus 14–17 × 6·5–8·5 cm.; *floribus* 4-meris breviter pedicellatis in racemos valde abbreviatos pseudo-terminales vix omnino glabros 1 cm. vel paullulum ultra long. digestis; *bracteis* linearibus cito deciduis circa 1·5 cm. long.; *pedicellis* crassiusculis glabris 2 mm. long.; *calycis* anguste campanu-

lati 2 mm. long. segmentis per anthesin apertis deltoideis obtusiusculis margine nudis perspicue glanduloso-punctatis vix 1 mm. long.; *corollæ* paullo ultra medium divisæ 4 mm. long. lobis æstivatione leviter dextrorsum obtegentibus oblongis obtusis apice paucipunctatis; *staminibus* inclusis juxta basin lobis insertis subquadratis ·6 mm. long. filamentis æquilongis; *ovario* ——; *stylo* crassiusculo 1·5 mm. long.

Sogere, 1750 ft., 614.

The very short racemes of congested flowers and the non-sessile anthers, although curious features, are not of sufficient importance to warrant a special genus for this plant.

Most probably to be referred here is No. 135 (Sogere, 2500 ft.) with ovate-lanceolate, acute, 13–16 × 4·5–6·5 leaves and globular ribbed fruits 4 mm. in diameter.

Nos. 202 and 256, also from Sogere, are probably congeneric. These have large, papery, lanceolate, acuminate, up to 25 × 8 cm. leaves and strongly ribbed purple-red fruits measuring 8 mm. across. Almost all the species of *Discocalyx* are natives of the Philippine Islands; the one described above would seem to be the first from New Guinea.

Sapotaceæ.

Sideroxylon Forbesii S. Moore, sp. n. *Arbuscula*, *ramis* subtetragonis mox puberulis; *foliis* sat longipetiolatis (pet. supra late canaliculatis 3·5 cm. long.) ovato-oblongis obtusissimis nisi retusis breviterve cuspidatis basi obtusis tenuiter coriaceis pag. utravis glabris pallideque nitidis 12–19 × 5·5–9 cm. costis lateralibus utrinque 20 intervallis inter sese sæpissime 7–9 mm. uti reticulum bene visibilibus; *fasciculis* exaxillaribus pluriflоris floribus 6–7-meris; *pedicellis* tenuibus ±6 mm. long. uti calyx subtilissime fulvis; *alabastris* crudis solum cognitis depresse globosis 2·5 mm. diam.; *calycis* segmentis suborbicularibus obtusis; *corollæ* lobis ovatis obtusis; staminibus subsessilibus sagittulatis apice breviter appendiculatis; *staminodiis* filiformibus quam antheræ brevioribus; *ovario* depresso villosulo; *stylo* glabro.

Mt. Wori-wori, ±5000 ft., 756.

From *S. novo-guineense* K. Schum. this is known by the larger leaves with more numerous and closer-placed lateral nerves; also *inter alia* by the longer pedicels to the flowers. *S. Kaernbachianum* Engl. is in some respects more like it in foliage, but the leaves are described as being cuneately narrowed from the middle, and they stand on a much shorter stalk.

Ebenaceæ.

Diospyros papuana Valet.? Sogere, 3000 ft., 276. A great tree: fruit white with a tinge of green. (Determined by Mr. Hiern.)

Symplocaceæ.

Symplocos sogerensis Brand in Pflanzenreich, Monog. Sympl. 49. Sogere, 1650 ft., 652.

STYRACEÆ.

BRUINSMIA CELEBICA Koord. (ex descript.). Mt. Wori-wori, ±5000 ft., 703. A great tree with white flowers. This has the long anthers (2 mm. long or slightly more) and filaments hairy inside of *B. celebica*, which Miss Perkins suggests, and apparently with good reason, may be a mere variety of *B. styracoides*. *B. celebica*, it is believed, up till the time of writing, has not been reported outside Celebes.

APOCYNACEÆ.

CLITANDROPSIS *Apocynacearum* e tribu *Carissearum* gen. nov. *Calyx* parvus, segmentis 5, ovatis, intus basi (omnibus ?) biglandulosis. *Corolla* hypocrateriformis; tubus basi angustatus superne cylindraceus, intus ore squamis perspicuis 5 instructus; lobi 5, late ovati, sinistrorsum obtegentes. *Stamina* juxta medium tubum affixa; filamenta brevia; antheræ parvæ, liberæ, subsagittatæ loculis basi obtusis. *Discus* parvus, cupularis. Ovarium 1-loculare, ovulis pluribus parietalibus. *Stylus* superne dilatatus, appendice plane bifido onustus. *Fructus* ——. *Frutex* glaber. *Folia* opposita, penninervia, pluricostulata. *Flores* parvi, in cymulas parvas breves paucifloras axillares vel pseudoterminales ordinati.

C. papuana S. Moore, sp. unica, *ramulis* cortice fusco obductis; *foliis* petiolis circa 5 mm. long. insidentibus oblongo-ovatis longiuscule acuminatis apice obtusis papyraceis ±9 × 3·5 cm. costis lateralibus utrinque ultra 20 paullo perspicuis costa media pag. inf. optime eminente; *cymis* summum 1·5 cm. long. pedunculis abbreviatis nonnunquam subobsoletis fultis; *pedicellis* gracilibus 2–3 mm. long.; *bracteis* parvulis ovatis vix 1 mm. long.; *calyce* usque $\frac{2}{3}$ diviso lobis ovatis obtusis margine ciliolatis; *corollæ* tubo in toto 5 mm. long. (basi angustata 1 mm.) intus glabro squamis integris vel bifidis circa 1 mm. long. lobis obtusis 2·5 mm. long.; *filamentis* ·5 mm. antheris 1·5 mm. long.; *ovario* ovoideo 1 mm. long.; *stylo* in toto 1·5 mm. long.

Sogere. 485.

This genus is close to *Chilocarpus*, which has an eglandular calyx, a corolla without scales at the throat, no disk, and an almost entire appendix to the stigma. From *Melodinus* it differs in its one-celled ovary with parietal placentation. It seems to approach the Javanese *Otopetalum* most nearly, a genus with glandular calyx, but with a 5-lobed disk and apparently no scales at the mouth of the corolla. There are several points of divergence from the Bornean *Urnularia* Stapf.

MELODINUS MONOGYNUS Roxb. Sogere, 2000 ft. 385.

Alyxia sogerensis Wernh. MS. in Herb. Mus. Brit. *Frutex* ramosus glaber; *ramulis* gracilibus patulis cortice sordido obductis; *foliis* oppositis brevipetiolatis (pet. 2–4 mm. long.) lanceolatis vel anguste ovato-lanceolatis acuminatis (acumine ±10 mm. long.) apice obtusis basin versus gradatim angustatis basi acutis tenuiter coriaceis nitidis subtus paullo pallidioribus plerisque 6–10 × 2·5–3·5 cm. costis lateralibus (pag. sup. magis visibilibus) utrinque ultra 40 interveniente reticulo valde laxo; *cymis* perpaucifloris pseudoterminalibus quam

folia multo brevioribus; *pedunculis* ±1 cm. long., sub fructu circa usque 2 cm. elongatis; *bracteis* subulatis 1–1·5 mm. long.; *pedicellis* 2 mm. long.; *calycis* 2 mm. long. segmentis triangularibus obtusis dorso carinulatis; *corollæ* tubo calycem triplo excedente juxta medium dilatato superne intus villoso lobis ovato-oblongis obtusis circa 2 mm. long.; *staminibus* paullo infra medium tubum affixis antheris acuminatis 1·3 mm. long.; *ovario* subgloboso ·4 mm. diam.; *stylo* brevissimo; *stigmate* capitato-oblongo apice breviter bifido ·5 mm. long.; *bacca* nunc simplici nunc moniliformi segmentis subglobosis apice subito acutis vivis dilute flavescenti-viridibus 8–12 × 5–8 mm.

Mt. Koikoko, 3000 ft. 591.

The opposite comparatively lengthily acuminate very closely-nerved leaves afford an easy means of distinguishing the species.

No. 668, also from Mt. Koikoko, in fruit and very early inflorescence, appears to belong to an undescribed species of this genus.

Cerbera Odollam Gaertn. Sogere, 2000 ft. 822.

Alstonia ficifolia S. Moore, sp. n. *Arbor* glabra circiter 8-metralis; *ramulis* subteretibus vel angulatis primo vernicosis; *foliis* ternatim verticillatis petiolatis (pet. 1·5–2 cm. long.) obovato-oblongis apice obtusissimis nisi breviter cuspidato-acuminatis ipsoque obtusis basi in petiolum angustatis plerisque 9–12 × 4–6 cm. papyraceis costis lateralibus utrinque 8–12 aperte arcuatis pag. inf. (uti costa media) optime visis additis pluribus intervenientibus minus perspicuis usque ± 10 mm. a costa media progredientibus tunc in reticulum laxum transeuntibus; *cymis* plurifloris quam folia multo brevioribus (usque 3 cm. long.) pseudoterminalibus verticillatis pedunculis 1·5–2 cm. long. insidentibus; *bracteis* pusillis ovatis circa 1 mm. long.; *pedicellis* validis 3–4 mm. long.; *calyce* 3 mm. long. lobis ovatis obtusissimis 2 mm. long.; *corollæ* tubo 13 mm. long. faucibus leviter dilatatis intus infra staminum insertionem piloso ceterum glabro lobis dextrorsum obtegentibus oblongis obtusis 8 mm. long.; *staminibus* paullo infra fauces insertis antheris acutis 1·4 mm. long.; *ovario* glabro e carpellis 2 sejunctis constituto circa 1 mm. diam.; *stylo* filiformi 8 mm. long.; *stigmate* oblongo apice breviter bifido ·65 mm. long.

Sogere, 2800 ft. 74.

On a cursory inspection this might be mistaken for *A. macrophylla* Wall., but a closer view shows the leaves to be broader and provided with fewer side-nerves, each pair separated by usually two or three nerves, less conspicuous, which run outwards for a little distance before being lost in the reticulum. The flowers of the two are quite different.

Apparently allied to this is a flowerless specimen (No. 125 from Sogere, 2000 ft.) with follicles reaching nearly two feet in length. This may perhaps be *A. longissima* F. Muell., of which I have seen no specimen.

Voacanga papuana K. Schum. Sogere, 480; 599 *a*.

Ervatamia montensis, sp. n. *Arbuscula* glabra; *ramulis* gracilibus subteretibus cortice cinereo obductis; *foliorum* paribus sæpe aliquanto disparibus lamina oblongo-lanceolata vel oblongo-oblanceolata acumi-

nata (acumine ±10 mm. long.) apice obtusa basi in petiolum 5–10 mm. long. angustata pag. inf. punctis hebetibus inspersa membranacea plerumque 6–9 cm. long. (raro 10 cm. paullo excedente nonnunquam usque 3 cm. reducta) 2–3·5 cm. lat. costis lateralibus utrinque 10–12 pag. utravis obviis; *cymis* pseudoterminalibus simplicibus vel ramosis plurifloris quam folia brevioribus (circa 3–3·5 × 2–3 cm.) pedunculis ±1·5 cm. long. fultis; *bracteis* ——; *pedicellis* tenuibus 3–6 mm. long.; *calyce* parvo 2 mm. long. vix usque medium in lobos rotundatos diviso; *corollæ* parvæ tubo angusto ad fauces leviter dilatato 9 mm. long. humectato 1·5 mm. diam. (faucibus ægre 2 mm.) lobis oblongo-spathulatis 5 mm. long.; *staminibus* supra medium tubum insertis antheris apiculatis 1·75 mm. long.; *stylo* glabro 7 mm. long.; *stigmate* apiculo bipartito terminante; *folliculis* vivis aurantiacis parvis anguste ovoideis recurvis rostro compresso recto vel curvato 2–3 mm. long. onustis dorso anguste sulcatis lateribus 2 subalatis 10–17 mm. long.

Sogere, 2000 ft. 478 (flower), 833 *a* (fruit).

The dotted leaves with the small corollas scarcely swollen at the throat and the small almost two-winged follicles are notable features of the species.

Parsonsia curvisepala K. Schum. Sogere, 2000–3000 ft. 851, 865.

Micrechites novo-guineensis K. Schum. (ex descript.), Meroka. 348. A large tree. Flowers light red.

Ichnocarpus sogerensis Wernh. MSS. in Herb. Mus. Brit. *Frutex* scandens ramulis gracilibus ultimis tenuibus subtilissime ferrugineis mox glabrescentibus; *foliis* ellipticis papyraceis acutis vel breviter acuminatis basi obtusis vel subrotundatis plerisque 6–8·5 × 3–4 cm. petiolo gracili (uti costa centralis pag. inf.) pubescente ad 13 mm. long. insidentibus costis lateralibus utrinque 6–8 reticulo arcto subtus manifesto; *floribus* in cymulas paucifloras paniculam sat elongatam foliis intermixtam constituentes dispositis; *pedunculis* ultimis brevibus; *pedicellis* gracilibus ad 3 mm. vel longioribus; *calyce* extus pubescente infra medium in lacinias lineari-lanceolatas acutas diviso in toto vix 2 mm. long.; *corollæ* tubo 4 mm. long. inferne graciliter tubulari superne inflato lobis lineari-oblongis 3·5 × 1 mm.

Mt. Gawada. 944.

The close reticulation of the leaves and the comparatively long and narrow calyx-segments are two characteristic features of this species. No. 689, from River side, Sogere, 1750 ft., is apparently a form of this with larger leaves up to 12 × 6·5 cm.

Ichnocarpus bertieroides Wernh. MSS. in Herb. Mus. Brit. *Frutex* fere glaber, alte scandens; *ramulis* gracilibus primo ferrugineis mox glabrescentibus; *foliis* chartaceis ellipticis vel elliptico-oblongis breviter acuminatis apice obtusis basi acutis vel obtusis vel etiam subrotundatis 6–11 × 3–4 cm. petiolatis (pet. ad. 1·5 cm. long.) costis lateralibus utrinque 8–10 subtus prominulis; *floribus* saturate sanguineis in cymulas pedunculatas paucifloras paniculam terminalem elongatam angustam fastigiatam referentes usque ad 20 cm. long. digestis; *cymarum pedunculis* ad 6 mm. long.; *pedicellis* vix 5 mm.

attingentibus; *calyce* in lobos subrotundos fere ad basin diviso vix 3 mm. long.; *corollæ* tubo late subcylindrico superne vix dilatato nec inflato circa 4 mm. long. limbo ±5 mm. diam.

Sogere, 3000 ft. 859. Meroka. 941.

The long fastigiate inflorescence characterises the species.

Asclepiadaceæ.

Gymnema geminatum R. Br. Mt. Gawada, 5000 ft., 534, This is the Australian species which, as N. E. Brown (Fl. Trop. Afr. iv. i. 414) says, and as examination of the type confirms, is different from the Indian *G. sylvestre* R. Br., although Bentham (Fl. Austral. iv. 343) considered the two conspecific. *G. geminatum* has since been re-described by Schlechter under the name of *G. tricholepis*.

Tylophora perlaxa Schlechter (ex descript.). Sogere, 1750 ft., 149, 193.

Flowers pale green, those of No. 193 in bud only. The specimens agree fairly well with the description.

Marsdenia lorea S. Moore, sp. n. Scandens, *caule* volubili distanter folioso hispidulo-piloso deinde glabro cortice brunneo obducto; *foliis* majusculis petiolatis (pet. hispidulo-piloso 3–7 cm. long.) oblongo-ovatis breviter acuminatis (acumine circa 7 mm. long.) basi alte aperte cordatis firme membranaceis in sicco griseo-viridibus pag. utraque scabriusculis 13–18 × 7–9 cm. reticulo maxime laxo; *inflorescentiis* in una axilla subsessilibus plurifloris; floribus majusculis primo in cymam umbelliformem sessilem digestis mox secus rhachin robustam simplicem nodulosam usque 15 mm. long. approximatis pedicellis circa 3 mm. long. insidentibus; *calycis* intus glandulis paucis onusti fere basin usque partiti segmentis lanceolatis vel ovato-lanceolatis obtusiusculis dorso carinatis pilosisque 7 mm. long.; *corollæ* tubo brevi campanulato 8 × 9 mm. lobis e basi sat lata longe loriformibus superne gradatim attenuatis (mediø circa 1 mm. lat.) in sinubus prominenter incrassatis utrinque glabris circa 4 cm. long.; *coronæ* phyllis carnosis oblongis basi cordatis superne in appendicem brevem erectam oblongam obtusam antheras paullulum superantem exeuntibus in toto 6 mm. long. fere 2·5 mm. lat.; *antherarum* appendicibus parvulis ovatis vix 1 mm. long.; *stigmate* anguste conoideo bifido gynostegium leviter superante; *polliniis* pyriformibus ·75 mm. long. ope caudiculæ ·2 mm. long. glandulæ subcaudatæ ·5 mm. long. conjunctis.

Sogere, 2000 ft., 635. A large climber with very dark magenta purple flowers.

This is a remarkable plant allied to *M. arachnoidea* Schlechter, excellently figured in Bot. Jahrb. l. 151. The large leaves, the thick flowering rhachis, with the short and broad calyx-segments and much longer thong-like lobes of the corolla are the prominent features. In foliage and inflorescence it is almost a counterpart of *Thozetia racemosa* F. Muell. from N. Queensland, each having the flowers arranged on a thick rhachis, the inflorescence thus, at least in its later stages, being technically racemose. But the flowers of the two are quite different; indeed, the Queensland plant more resembles *M. arachnoidea* in this respect. The only reason for keeping *Thozetia*

distinct from *Marsdenia* is an alleged but unconfirmed difference in the æstivation of the corolla; but inasmuch as some species of *Marsdenia* may have valvate or at least subvalvate æstivation, there does not seem sufficient ground for the retention of *Thozetia* which, as Bentham observes (Fl. Austral. iv. 347), is a *Marsdenia* so far as concerns the corona.

Hoya sogerensis S. Moore in Journ. Bot. lii. 293 (1911). Sogere, 1750–2000 ft., 500, 691, 837 *b*, 925 (partim). Flowers pale purple.—H. coronaria Bl. Mt. Gawada, ±6000 ft., 516. Flowers rich dark purple lake.—H. lactea S. Moore, *l. c.* Mt. Gawada, 3000 ft., 872, 925 (partim). Flowers rich cream-colour.—H. pachypus S. Moore, *op. cit.* 294. Sogere, 510.

Dischidia cyclophylla Schlechter in Bot. Jahrb. xl. Beibl. 92, 8. Forbes sine no. Neither at the Museum nor at Kew is there material corresponding to Schlechter's description of this plant.

Loganiaceæ.

Fragræa Woodiana F. Muell. in Austral. Journ. Pharm. 1886, 323. Mt. Wori-wori, ±5000 ft., 744. Large tree. Flowers rich cream-white. This was overlooked by Gilg and Benedict in their recent monograph of Papuan *Loganiaceæ* (Bot. Jahrb. liv.). It seems different from all the species described therein.

Fagræa ampla S. Moore, sp. n. *Frutex* erectus, glaber; *ramis* validis subteretibus ad nodos aliquantulum tumidis cortice brunneo obductis; *foliis* opacis oblongo-ovatis vel obovato vel obovato-oblongis apice subito breviter acuminatis (acumine acuto 3–6 mm. long.) basi obtusis carnoso-coriaceis usque 10×5 cm. (paucis modo 6×2·5 cm.) costa media subtus eminente costis lateralibus etiam sub lente difficile aspectabilibus petiolis 1–2 cm. long. validis supra leviter canaliculatis basi lamina rigida stipuliformi ovata obtusa 3 mm. long. onustis in sicco (uti folia ipsa) brunneis vel brunneo-griseis; *floribus* ad apicem ramorum in cymam perpaucifloram (2–3) sessilem digestis; *pedicellis* robustis solemniter 2–3·5 cm. long. supra medium bracteis 2 ovatis acutis 4–6 mm. long. præditis; *calyce* anguste campanulato circa medium usque diviso in toto 13 mm. long. lobis rotundatis margine scariosis undulatisque 7×6 mm.; *corollæ* coriaceæ saturate purpureo-brunneæ tubo superne gradatim ampliato 2·2 cm. long. inferne 3–4 mm. faucibus 8 mm. diam. lobis obovatis obtusissimis 15×10 mm.; *antheris* breviter exsertis ægre 10 mm. long.; *stylo* inferne dilatato superne attenuato sub stigmate 2-lobo iterum dilatato circa 3·5 cm. long.; *bacca* subglobosa sub apice coartata polita circa 2 cm. diam.

Mt. Gawada, 5000 ft., 528.

Allied apparently to *F. annulata* Hiern, described as having chartaceous leaves with visible though slender side-nerves, interpetiolar stipules, 7–15 flowered cymes and differently-shaped white flowers as well as oblong berries. It is also near *F. Bodenii* Wernh., a species characterised by its pointed fruits, of which the material is very imperfect. *F. Bodenii* is one of three Papuan species described by Wernham (Trans. Linn. Soc., Bot. ix. p. 111) in a memoir read in May 1914, but not published till August 1916. The memoir of

Gilg and Benedict noticed above is dated Oct. 1916; it contains descriptions of no less than eleven new species of *Fagræa* from New Guinea, but of course does not include Wernham's three. The poor material of these last is a matter for regret.

Fagræa affinis S. Moore, sp. n. *Arbor* magna, glabra; *ramulis* tetragonis cortice griseo obductis; *foliis* opacis obovato-oblongis apice rotundatis nisi subito cuspidulatis apiceque ipso acutis basi obtusis crasse coriaceis solemniter 12–15 × 6–7 cm. costa centrali crassa costis lateralibus nequaquam perspicuis utrinque circa 12 petiolis incrassatis supra haud vel obscure canaliculatis 1·5–2·5 cm. long. lamina stipuliformi rigida ovata obtusissima 8 mm. long. præditis; *cyma* pauciflora sessili absque corollis circa 4·5–5 × 4·5 cm. pedicellis validis aliquanto compressis 1·5–4 cm. long. supra medium 2-bracteatis ovatis obtusissimis circa 7 mm. long.; *calyce* turbinato in toto 13 mm. long. lobis rotundatis margine scariosis 5 mm. long.; *corollæ* coriaceæ lacteæ tubo angusto sursum leviter ampliato circa 3·5 cm. long. inferne (in sicco) 2 mm. sub faucibus 5 mm. lat. lobis in alabastro solum visis ut videtur tubo duplo brevioribus; *antheris* fere 1 cm. long.; *stylo* superne attenuato 4·5 cm. long.; *stigmate* plane bilobo.

Mt. Gawada, 5000 ft., 550. No. 302, a fruiting specimen from Sogere, 3000 ft., appears to be conspecific with this. The shining bright green berries are globose, suddenly sharpened at the end with the apex itself truncate, in fact very like those of *F. ampla* except for their greater size (3 cm. in diameter). The affinity is with *F. ampla*.

Fagræa amabilis S. Moore, sp. n. *Arbor* ?; *ramulis* subteretibus cortice cinereo circumdatis ad nodos leviter tumidis; *foliis* oblongo-ovatis vel obovato-oblongis obtusis basi breviter cuneatis chartaceis in sicco brunneo-vel griseo-viridibus pag. sup. pallide nitidis costa centrali supra impressa subtus eminente costis lateralibus pag. utraque mediocriter visibilibus utrinque 6–7 reticulo obsoleto petiolis sat validis anguste canaliculatis 1–3 cm. long. lamina stipuliformi 2·5 mm. long.; *cymis* plurifloris foliis brevioribus subsessilibus pedunculo 2–3 mm. long.; *pedicellis* ±10 mm. long. ultra medium bibracteatis bracteis inferne connatis rotundatis margine scariosis usque 5·5 mm. long.; *calyce* anguste campanulato in toto 7 mm. long. lobis rotundatis margine scariosis 4 × 5 mm.; *corollæ* tenuiter coriaceæ verisimiliter albæ tubo 2·5 cm. long. dimidio sup. ampliato deorsum cylindrico 4 mm. lat. sub faucibus 9 mm. lobis oblongo-obovatis obtusissimis 15 × 12 mm.; *staminibus* subinclusis antheris 4·5 mm. long.; *ovario* oblongo 4 mm. stylo 22 mm. long.; *stigmate* capitellato-truncato.

Sogere, 420.

Besides the foliage this can be told easily from *F. ampla* and *F. affinis* by the small calyces and white flowers.

Strychnos Forbesii A. W. Hill in Kew Bull. 1909, 360. Sogere, 2000 ft., 230.

Borraginaceæ.

Ehretia papuana S. Moore, sp. n. *Frutex*? glaber; *ramulis* fistulosis superne aliquantulum compressis; *foliis* petiolis gracilibus 3–6 cm. long. fultis late ovato-rotundatis basi cuneatis vel late

truncatis margine integris nisi hac atque illac repandis papyraceis opacis in sicco viridibus plerisque 6–8 × 5–7 cm. costa media subtus eminente costis lateralibus utrinque 4–5 (quorum 2 vel 3 basi approximatis) pag. utravis bene obviis reticulo satis arcto pag. inf. eminente; *floribus* in cymas axillares (in axillis summis) breves paucifloras quam folia multo breviores (circa 2·5 × 2 cm.) digestis; *bracteis* foliaceis lanceolatis inferioribus ad 1 cm. long. ultimis modo 2–3 mm.; *pedicellis* ±2·5 mm. long.; *calycis* vix usque medium divisæ 5·5 mm. long. lobis ovatis obtusiusculis; *corollæ* tubo calyce breviore (2·5 mm. long.) lobis oblongo-spathulatis 3 mm. long.; *staminibus* ori insertis breviter exsertis antheris oblongis obtusis 1·25 mm. long.; *ovario* depresse globoso 2-loculari loculis 2-ovulatis 1 mm. diam.; *stylo* 2·5 mm. long. ramis abbreviatis divaricatis ·25 mm. long.

Near Kerepunu, sine no.

This is believed to be the first recorded occurrence of the genus in New Guinea. The broad rotundate leaves together with the short axillary few-flowered inflorescences serve to distinguish the species.

Tournefortia sarmentosa Lam. Sogere, 2500 ft., 156.

Convolvulaceæ.

Erycibe Helwigii Prain. Sogere, 439. Fruit rich orange-red. Mt. Koikoko, 3000 ft., 669.

Solanaceæ.

Solanum biflorum Lour. Meroka Mts., 2500 ft., 882.—S. verbascifolium L. Sogere, 2000 ft., 10.

Solanum turræfolium S. Moore, sp. n. Frutex? inermis; *ramis* gracilibus bene foliosis arcte breviterque stellato-tomentosis; *foliis* sæpe geminatis geminis inter se inæqualibus brevipetiolatis (pet. tomentosis 5–8 mm. long.) oblongo-oblanceolatis breviter acuminatis acumine obtuso margine lobulatis vel lobulato-undulatis basi cuneatis pag. sup. glabris in sicco viridibus brunneisve subtus tomento stellato brevi arcto fulvo vel fulvo-griseo obsitis plerisque 7–10 × 2·5–3·5 cm. rarius 3–6 × 2–2·3 cm. costis lateralibus pag. inf. eminentibus utrinque 5–6 prope marginem dichotomis costaque intramarginali hac atque illac incompleta valde anfractuosa efformantibus; *floribus* in racemos laterales (sc. plane extra-axillares) paucifloros fulvo-tomentosos 3–4 cm. long. digestis; *pedicellis* tenuibus usque 15 mm. long. sed sæpe brevioribus; *calycis* campanulati tomentosi 4 mm. long. segmentis 5 late triangularibus acutis marginibus membranaceis 1·5–2 mm. long.; *corolla* alte partita (tubo circa 2 mm. long.) lobis oblongis obtusis 6·5 × 1·5–2 mm.; *antheris* superne attenuatis 6 mm. long.; *ovario* ovoideo 1 mm. long.; *stylo* 1·5 mm. long.

Near Kerepunu, sine no.

One of the specimens has evidently borne a fruit, as marks on the sheet indicate. This fruit appears to have measured about 15 mm. in diameter; the supporting pedicel is 2 cm. long and swollen in its distal half.

A very distinct species, in shape of leaf recalling *Turræa heterophylla* Sm. The Papuan Solanums have been monographed recently by Bitter (Bot. Jahrb. lv. 59–113), most of the 23 species enumerated

being new. Of course, Bitter does not include Wernham's 3 spp. (Trans. Linn. Soc. ix. 119), both memoirs having been published during the war, ours in 1916 and the other 15 months afterwards. Together with the sp. here described, the affinity of which appears to be with *S. torricellense* Bitt., 27 Solanums are now known from New Guinea.

Scrophulariaceæ.

Lindernia crustacea F. Muell. Sogere, 918.

Striga lutea Lour. Sogere, 921.—S. parviflora Benth. 848.

Cyrtandraceæ.

Æschynanthus nummularia K. Schum. (*Trichosporum nummularium* Burkill & S. Moore in Journ. Bot. xxxvii. 178; 1899). Sogere, 2000–2500 ft., 114, 181, 301, 511. Flowers scarlet or purple-red.—Æ. Forbesii K. Schum. (*Trichosporum Forbesii* S. Moore, *op. cit.* 172). Sogere, 43, 218 *a*, 880.

Dichotrichum Chalmersii F. Muell. Sogere, 776.

Bœa Lawesii H. O. Forbes in Journ. Bot. xxv. 347 (1887). Astrolabe Range, 3500 ft., on steep escarpment, 850.

Cyrtandra Schraderi K. Schum. Sogere, 796.

Bignoniaceæ.

Neosepicæa viticoides Diels. Sogere, 437. A climber. Flowers pale orange spotted with crimson.

Tecomanthe gloriosa S. Moore, sp. n. *Scandens*; *caule* subtereti cortice sordido obducto 7–8 mm. diam.; *foliis* paripinnatis petiolo saltem 7 cm. long. una cum rhachi foliolifera tereti necnon pubescente 2 mm. diam. foliolis 10 inferioribus quam superiora paullo minoribus (illis 9–10 × 3–4 cm. his 11–12 × 4·2–4·5 cm.) omnibus oblongo-ovatis acuminatis (acumine ±1 cm. long.) apice acutis basi obtusis integris papyraceis in costa centrali pag. sup. itaque in costis pag. inf. strigilloso-pubescentibus alibi sparsim strigillosis costis lateralibus utrinque circa 9 pag. inf. pallidiori uti reticulum optime visibilibus petiolulis 5 mm. long. pubescentibus; *racemis* e caule defoliato ortis plurifloris basi squamis parvulis subulatis perpaucis auctis circa 2 cm. long.; *bracteis* setaceis ±4 mm. long.; *pedicellis* sub calyce aliquanto tumidis microscopice pubescentibus 5–12 mm. long.; *calyce* campanulato in toto 23 × 11 mm. lobis triangularibus acuminatis 12 mm. long.; *corollæ* tubulosæ ore necnon tubi parte sup. lacteæ parte inf. equidem roseo-purpureæ tubo 7 cm. long. fere a basi dilatato juxta basin incurvo et 5–8 mm. lat. superne adusque 3·5 cm. ampliato deorsum puberulo lobis late triangularibus 12–15 mm. long. postico plane breviore; *capsula* haud visa.

Mt. Koikoko, 3000 ft., 495, 622.

A very distinct species with the five pairs of pinnæ to its leaves and flowers different in several respects from its few described congeners.

Tecomanthe venusta S. Moore, sp. n. *Scandens*; *caule* 3–5 mm. diam. crebro tuberculoso-lenticellifero; *foliis* paripinnatis foliolis 4 oblongo-ovatis acuminatis (acumine 5–10 mm. long.) basi obtusis integris papyraceis utrobique glabris 7–8 × 3·5–4 cm. costis lateralibus

circa 7 pag. inf. eminentibus reticulo obscuro petiolo glabro 4 cm. petiolulis 5 mm. long.; *racemis* plurifloris caule nudo insidentibus circa 2 cm. long. squamis bracteisque præcedentis; *pedicellis* usque 12 mm. long.; *calyce* præcedentis sed minore (in toto 15–17 mm. long. 8 mm. lat.) lobis 7 mm. long.; *corolla* ore lacteo exempto roseo-purpurea 6 cm. long. sub limbo 2 cm. lat. reliquis fere uti præcedentis.

Mt. Gawada, 5000 ft., 857.

Near the last, but with several differences in foliage and flower.

Mueller (Descr. Notes Papuan Pl. ix. 64) mentions *Tecoma dendrophila* Bl. (i. e., *Tecomanthe dendrophila* K. Schum.) as collected by Forbes (no number given) near the base of the Owen Stanley Range. There is no Forbes specimen answering to Blume's description and the beautiful drawing in *Rumphia*, iv. t. 190. According to these *T. dendrophila* has glabrous trifoliate leaves with racemes in their axils; moreover, while the leaflets are a good deal like those of *T. venusta*, in flower characters there is greater resemblance to *T. gloriosa*, whose plurijugate hairy leaves are entirely different.

Acanthaceæ.

Ruellia Forbesii S. Moore in Journ. Bot. lii. 294. Sogere, 2000 ft., 509, 839 *a*.

R. bracteata R. Br. Foot of Astrolabe Range, 1200 ft., sine no. Flowers white. Two small specimens of this tropical Australian plant hitherto apparently not recorded from New Guinea.

Aporuellia versicolor S. Moore, *op. cit.* 295. Sogere, 1750–2000 ft., 73, 781. Flowers cream-colour or orange.

Hemigraphis reptans T. And. Sogere, 2000 ft., 841.

Acanthus ilicifolius Linn. Sogere, 927 *a*.

Justicia Chalmersii Lindau (ex descript.). Bosi-bosi, sine no. —J. cardiochlamys Lindau (ex descript.). Sogere, 1750–1800 ft., 629, 782. Flowers white or cream-colour.

Graptophyllum Gilligani S. Moore (*Justicia Gilligani* Bail.). Sogere, 2500 ft., 51.

Calycacanthus Magnusianus K. Schum. (ex descript.). Mt. Gawada, 3000 ft., 887. A small tree. Flowers pink with lake calyx.

Hulemacanthus Whitei S. Moore. Sogere, 2500 ft., 33.

Verbenaceæ.

Geunsia farinosa Bl. Sogere, 3000 ft., 92, 481.

Premna nitida K. Schum. Sogere, 1750 ft., 165.

Faradaya papuana Scheff. ex descript. Sogere, 2000 ft., 81. Flowers white. Agrees with the description so far as that goes, but Scheffer did not describe the calyx fully. Hence a little doubt must attach to the identification.

Clerodendron utakwense Wernh. Mt. Wori-wori, 2500–3000 ft., 734, 767. Flowers and bracts scarlet.

C. Lindawianum Laut. Mt. Gawada, 4500 ft., 575. Undershrub. Flowers white with neck of tube purple. No. 874, said to be a small tree with dark green fruit, from Sogere at 2500 ft. is conspecific.

Labiatæ.

Ocimum canum Sims. Sogere, sine no.

MONOCHLAMYDEÆ.

By Spencer Moore, F.L.S.

Nyctaginaceæ.

Pisonia Muelleriana Warb. Sogere, 1800–2500 ft., 167, 398.

Amarantaceæ.

Deeringia indica Zoll. Sogere, 1750 ft., 77.
Alternanthera denticulata R. Br. Sogere, 2000 ft., 843.

Nepenthaceæ.

Nepenthes maxima Reinw. Mt. Wori-wori, 4000 ft., 643.

Aristolochiaceæ.

Aristolochia pithecurus Ridl. in Journ. Bot. lii. 296. Mt. Koikoko, 2500 ft., 621. Sogere, 2200 ft., 762.

Piperaceæ.

Piper (§ *Eupiper*) **sogerense** S. Moore, sp. nov. *Ramulis* sat robustis (4 mm. crass.) ad nodos geniculatis striatis glabris; *foliis* brevipetiolatis (pet. validis plerumque circa 15 mm. long.) ovatis vel ovato-oblongis acuminatis acumine obtuso basi rotundatis sæpe levissime cordulatis membranaceis glabris multiplinervibus nervo centrali ad 2·5–3·5 cm. ultra basin utrinque nervum apicem attingentem emittente nervis reliquis utrinque 2 a basi solutis reticulo laxo subtus eminente 17–22 × 10–13 cm. foliis summis usque ad 7 × 2–3 cm. reductis; *spicis* fem. oppositifoliis elongatis pedunculis circa 3 cm. long. fultis 18–21 cm. × 6–10 mm.; *bractea* peltata apice solum libera 5 mm. diam.; *ovariis* oblongo-ovoideis arcte congestis pulposisque in stylum firmum apice capitulatum circa 1 mm. long. attenuatis.

Sogere, 2500 ft., 76.

Apparently near *P. Rueckeri* K. Schum. which has somewhat different foliage and shorter and thinner spikes.

No. 147, represented by two small specimens each consisting of a reduced leaf and a shorter spike about 10 × 5 cm., seems to be conspecific.

Piper (§ *Eupiper*) **obesispicum** S. Moore, sp. nov. *Ramulis* validis (6–7 mm. crass.) inferne tetragonis vel subteretibus superne compressis eximie striatis glabris; *foliis* petiolatis (pet. 2 cm. long. ima basi vaginantibus) late oblongo-ovatis acuminatis apice obtusis basi late rotundatis pag. inf. præsertim in nervis minute brunneo-pubescentibus multiplinervibus nervis 2 utrinque fere a basi solutis reliquis utrinque 4–5 pari proximali a basi 1·5 cm. distante pari distali ad apicem (ceteris fere ad apicem) ducto usque 23 × 10 cm.; *spicis* fem. oppositifoliis pedunculo patulo sat valido minute pubescente 13 mm. long. insidentibus maturis 4 cm. × 8–12 mm.; *rhachi* glabra; *bractea* libera limbo suborbiculari fere 1 mm. diam. pedicello 2 mm.

long.; *ovario* libero oblongo 2 mm. long.; *stigmatibus* 2 minutis; *bacca* sessili obovoidea 1·5 mm. diam.

Sogere, 2500 ft., 35.

P. Rodatzii Laut. & K. Schum. ex descript. Mt. Meroka, 1750 ft., 933.

No. 55 from Sogere, 2500 ft., is a pepper with ovate, papyraceous, glabrous leaves, 7·5–10 × 3·5–4·5 cm. (the uppermost reduced to ±4 × 2 cm.) on petioles of nearly 1 cm. Mature ♂ spikes 3 cm. × 2 mm., on stalks 6 mm. long. Stamens 2, lateral. Pedicel of bract pilose, ·4 mm. long, the shield orbicular and ·5 mm. in diameter. In the absence of ♀ spikes it is deemed prudent not to give this a name.

Myristicaceæ.

Gymnacranthera Zippeliana Warb. Sogere, 2000–2500 ft., 236, 329, 375. Mt. Meroka, 4000 ft., 350. Mt. Wori-wori, 7000 ft., 709. A considerable or great tree. Fruit bluish or yellowish green, orange at base.

Myristica globosa Warb. Sogere, 2500 ft., 212. A large tree. Fruit faded orange.—M. lepidota Bl. Sogere, 2000–2500 ft., 242, 396. Mt. Koikoko, 3000 ft., 592. Mt. Wori-wori, 4000 ft., 647. Fruit yellowish green or faded cinnamon colour.—M. subalulata Miq. Sogere, 3000 ft., 404. Mt. Meroka, 2500 ft., 916.

Monimiaceæ.

Levieria Beccariana Perk. in Pflanzenreich Monogr. Monim. 21. Mt. Wori-wori, 5000 ft., 732.—L. Forbesii Perk. *op. cit.* Nachtr. 7. Mt. Wori-wori, 5000 ft., 713.—L. nitens Perk. *op. cit.* 21. Riverside, Sogere, 1750–1800 ft., 702, 814. Tree about 9 in. in circumference at 2 ft. from ground. Fruit and receptacle bright green.

Steganthera thyrsiflora Perk. in Bot. Jahrb. xxv. 565. Mt. Wori-wori, 4000 ft., 726. A large tree.—S. oblongifolia Perk. *op. cit.* 566. Koikoko Range, 2800 ft., 810. A large tree. Flowers yellowish green.—S. Forbesii Perk. Nachtr. 23. Mt. Koikoko, 1850 ft., 608.

Anthobembix oligantha Perk. in Bot. Jahrb. xxv. 568. Sogere, 3000 ft., 312. Mt. Meroka, 362. Mt. Wori-wori, 5000 ft., 721. A small or large tree. Flowers bright or cream yellow. Fruit black on orange peduncles.—A. hospitans Perk. *op. cit.* 567. Sogere, 1750–2500 ft., 52, 701. A tallish very slender tree. Fruit black on orange receptacle.

No. 107, an erect shrub with blue-black fruits from Sogere Hills at 2000 ft., is probably an undescribed species of *Matthæa*. Leaves oblong, very shortly petioled, up to 20 × 2·5 cm. Drupes shortly stalked, 11 × 9 mm. Nos. 117 and 469, from Sogere, are fruiting specimens of uncertain position in the Order.

Lauraceæ.

Cryptocarya fagifolia Gamble in Kew Bull. 1910, 145. Sogere, 2500 ft., 218. No. 650 from Mt. Wori-wori (in fruit) seems

to be conspecific. A small tree; flowers faded green colour.—C. Forbesii Gamble, *op. cit.* 146. Mt. Wori-wori, 4000 ft., 640.—C. apamæfolia Gamble, *l. c.* 146. Sogere, 3000 ft., 401.

Cryptocarya rarinervia S. Moore, sp. n. *Frutex* crebro ramosus; *ramulis* tenuibus (1–2 mm. diam.) subteretibus mox glabris cortice rubido obductis; *foliis* sat longe petiolatis (pet. 1–1·5 cm. long.) ovatis caudato-acuminatis acumine obtuso nisi obtusissimo basi breviter cuneatis tenuiter coriaceis in sicco castaneis supra nitidulis pag. utravis glabris 6–7 × 2·5–3·5 cm. costis supra leviter impressis subtus prominentibus lateralibus utrinque 2–3 adscendenti-arcuatis juxta marginem anfractuosis aliis minoris valoris interpositis costulis paucis fere rectis pag. sup. uti reticulum sublaxum evanidis; *inflorescentiis* axillaribus terminalibusve foliis brevioribus (circa 4 × 2·5 cm.) pauciramosis ramis patentibus uti pedicelli floresque minute fulvo-tomentosis; *pedicellis* summum 2 mm. long.; *bracteolis* ·75 mm. long.; *perianthii* tubo cylindrico 1 mm. long. segmentis ext. anguste ovato-oblongis intus pubescentibus 1 mm. long. int. obtusissimis quam ext. latioribus; *staminibus* serr. I et II ·5 mm. long. antheris suborbicularibus ·3 mm. diam. ser. III. ·6 mm. long. filamentis pubescentibus; *staminodiis* breviter acuminatis basi pubescentibus dorso pilosis ·4 mm. long.; *ovario* anguste oblongo-ovoideo glabro ·75 mm. long.; *stylo* 1 mm. long.: *stigmate* truncato.

Mt. Koikoko, 3000 ft., 590.

Near *C. fagifolia* Gamble. The more prominent points of difference are found in the shape and nervation of the leaves and in the longer pedicels to the flowers of *C. rarinervia*.

Cryptocarya myrcioides S. Moore, sp. n. *Arbor*?; *ramulis* subteretibus longitrorsum striatis sulcatisve mox glabris corticeque cinereo obductis; *foliis* sparsis vel suboppositis (petiolis pubescentibus vel fere glabris 7–10 mm. long.) oblongo-lanceolatis raro oblongo-obovatis sæpius breviter acuminatis apice basique obtusis 7–12 × 3·5–4·5 cm. coriaceis in sicco castaneis supra glabris nitidisque subtus præsertim in nervis sparsim fulvo-pubescentibus costis lateralibus utrinque 10–12 pag. inf. uti costulæ eminentibus; *inflorescentiis* axillaribus vel lateralibus foliis brevioribus (7 × 4 cm.) pluriramosis minute fulvo-pubescentibus pedunculo 1–2 cm. long. ramis sæpius oppositis vel suboppositis patentibus minute bracteatis; *pedicellis* ±1·5 mm. long.; *perianthii* extus fulvo-pubescentis tubo brevi turbinato 1·25 mm. long. segmentis intus basi pubescentibus ext. ovatis obtusissimis int. ovato-oblongis obtusiusculis omnibus 2 mm. long.; *staminibus* serr. I et II 1·5 mm. long. connectivo obtusissimo filamento piloso ser. III 2 mm. long.; *staminodiis* cordatis acutis postice pubescentibus antice glabris; *ovario* oblongo glabro 1·5 mm. long.; *stylo* 1 mm. long.

Sogere, 410.

Easily distinguished from *C. Forbesii* Gamble by the smaller leaves narrowed at the base and the small flowers with short perianth tube.

Endiandra Forbesii Gamble, *op. cit.* 153. (*E. papuana* Laut. in Nov. Guin. Bot. viii. 819 (1911).) Mt. Gawada, 5000 ft., 543.

Dryadodaphne celastroides S. Moore in Journ. Bot. lxi. 109 (1923). Mt. Wori-wori, 5000 ft., 724.

Phœbe Forbesii Gamble, *op. cit.* 227. Sogere, 2500 ft., 215. Mt. Meroka, 1750 ft., 698. Gamble also quotes No. 805 for this, at the Museum *Eugenia pergamacea* Greves.

Massoia aromatica Becc. Mt. Meroka, 2500 ft., 913. Beccari, ex litt. in herb. Kew, considered No. 800 (Koikoko Range, 2500 ft.) referable to this genus. Both specimens are very poor. The genus is but imperfectly known.

Litsæa papuana K. Schum. ex descript. Mt. Koikoko, 2500 ft., 624.

Litsæa collina S. Moore, sp. n. *Arbor* majuscula; *ramulis* validis cito glabris cortice striato cinereo obductis 4–7 mm. diam. ultimis aliquanto compressis circa 2–3 mm. diam.; *foliis* alternis petiolatis (pet. fuscis 1·5–2·5 cm. long.) late ovatis nisi obovatis apice rotundatis basi obtusis coriaceis glabris supra in sicco castaneis nitidisque subtus opacis 9–13 × 6·8·5 cm. costis utrinque 5–6 tenuibus pag. inf. leviter eminentibus sub margine arcuatis costulis reteque arctissimo utrinque subevanidis; *glomerulis* axillaribus (pluribus ex axillis rami jam defoliati) rhachi nodosæ 4–8 mm. long. insidentibus pedunculatis (ped. circa 5 mm. long.) 4-floris; *involucri* phyllis 4 glabris ext. minoribus orbiculatis in alabastro solum visis 3 mm. diam. int. 4·5 mm. diam.; *floribus* subsessilibus; *perianthii* tubo turbinato lobis 6 ovato-oblongis obtusis; *staminibus* 9 introrsum spectantibus intimis biglandulosis; *staminodiis* 3 cordatis minutis; *floribus* ♀ ignotis.

Mt. Gawada, 5000 ft., 538.

The foliage is different from that of Papuan species hitherto described. The flowers being only in early bud, measurements are not given.

Proteaceæ.

Helicia Forbesiana F. Muell. in Vict. Nat. iii. 63 (1886). Meroka, 343. Sogere, 387. Mt. Wori-wori, 5000 ft., 723. Koikoko Range, 2500 ft., 799. A large tree. Flowers in rich white trusses.

Thymelæaceæ.

Phaleria sogerensis S. Moore, sp. n. *Frutex* glaber; *ramulis* gracilibus teretibus bene foliosis; *foliis* subsessilibus (pet. 4 mm. long.) oblongo-lanceolatis apice angustatis ipso acutis basi cuneatis tenuiter coriaceis in sicco brunneis vel brunneo-viridibus 7–12 × 3–4·5 cm. costa media subtus valde prominente costis lat. utrinque circa 8 uti reticulum apertum tenuibus; *floribus* sessilibus in capitula pseudoterminalia pauciflora pedunculis 5–8 mm. long. insidentia digestis; *perianthio* anguste infundibulari 14 mm. long. ima basi 1·5 mm. juxta medium vix 1 mm. sub limbo 3·25 mm. lat. limbi lobis late oblongis obtusis intus minute pubescentibus 5 mm. long.; *filamentis* exsertis antheris linearibus obtusis 1·5 mm. long.; *ovario* oblongo apice villoso 2 mm. long.; *stylo* glabro 16 mm. long. stigmate 1·25 mm. diam.

Sogere, sine no.

The relatively small oblong leaves and small flowers are the chief points about this species.

Loranthaceæ.

Elytranthe longifolia K. Krause (ex descript.). Sogere, 499.

Elytranthe (§ *Macrosolen*) **sogerensis** S. Moore, sp. n. *Frutex* parasiticus; *ramulis* oppositis vel sæpius verticillatis teretibus sat crebro foliosis in nodis tumidis glabris; *foliis* petiolis 5 mm. long. fultis oppositis ovatis vel ovato-oblongis obtusis ima basi attenuatis coriaceis pag. utraque opacis minute pustulatis pag. inf. sæpe rubiginosis 8–10 × 3·5–5 cm. costis lat. utrinque 3–4 pag. inf. paullo elevatis; *floribus* rubris mediocribus in axillis paucis fasciculatis pedicellis 3 cm. long. insidentibus; *bractea* ——; *bracteolis* 2 ima basi connatis suborbicularibus dentatis vel denticulatis fere 2 mm. long.; *calycis* tubo ovoideo 2·5 mm. long. limbo denticulato 1·5 mm. long.; *corolla* in toto 2·7 cm. long. tubo medio inflato 5 mm. lat. paullo supra basin 2·5 mm. sursum 3 mm. lat. lobis 6 lanceolato-loratis obtusis reflexis 1·5 cm. long.; *staminibus* 6 antheris anguste linearibus 6 mm. long.; *stylo* filiformi 2·6 cm. long. stigmate simplici.

Mt. Wori-wori, ± 5000 ft., 715. Flowers bright red. No. 682, side of River, Sogere, 1700 ft., with purple-pink flowers is to be referred here, as also is probably No. 642 with apparently smaller though not yet fully-grown corollas 1·5 cm. long. Until last year the only known Papuan species of this section was *E. suberosa* Laut., a species with *inter alia* much smaller leaves and flowers. K. Krause (Bot. Jahrb. lvii. 464–495) has now added 6 more: from all these *E. sogerensis* can be told on sight by its larger flowers.

Notothrixos leiophyllus K. Schum. (*N. subaureus* F. Muell. Descr. Notes Papuan Pl. ix. 61 non Oliv.). Sogere, 1750 ft., 779. Schumann's description (Fl. deutsch. Schutzgeb. Nachtr. 260) is fragmentary, and the hiatus is not filled up by K. Krause in his memoir cited above. There being no authentic material in this country, the determination must be regarded as somewhat doubtful. The Forbes plant certainly is not, as F. Mueller thought it was, conspecific with the Australian *N. subaureus*, which has much smaller leaves and flowers. The leaves of our plant are mostly 6–10 × 3–5 cm.; the female flowers 2 × 1·5 mm., and fruits 5 mm. long.

Euphorbiaceæ.

Cleistanthus myrianthus Kurz. Mt. Gawada, 5000 ft., 549. Mt. Koikoko, 3000 ft., 639.

Breynia cernua Müll. Arg. Sogere, 2500 ft., 29, 954.—B. acuminata Müll. Arg. Sogere, 1750 ft., 150, 477.

Glochidion eucleoides S. Moore, sp. n. *Frutex* diffusus novellis subtiliter griseo-pubescentibus; *ramulis* teretibus crebro foliosis fulvo-pubescentibus tandem glabrescentibus; *foliis* oblongis nisi anguste oblongo-ovatis brevipetiolatis (pet. velutino 4 mm. long.) sæpius breviter cuspidato-acuminatis apice obtusis basi aliquanto obliquis obtusis vel subrotundatis in sicco brunnescentibus firme

membranaceis supra mox (costa centrali exempta) glabris subtus in costis costulisque sparsim pubescentibus plerisque 5–8 × 2–3·5 cm. costis lateralibus utrinque 8–9 pag. sup. planis pag. inf. eminentibus costulis more fere *Brideliarum* costas annectentibus; *floribus* in fasciculos pulvinatos axillares vel extra-axillares plurifloros masculos nisi bisexuales digestis; *bracteis* minutis pubescentibus; *pedicellis* ♂ filiformibus pubescentibus 5 mm. long.; *sepalis* ♂ inter se similibus oblongis obtusis reflexis 1·5 mm. long.; *columna staminea* perbrevi modo ·3 mm. long. antheris 3 minutis appendice carentibus; *pedicellis* ♀ in glomerulum binis vel solitariis sat validis superne dilatatis pubescentibus sub flore circa 1·5 cm. sub fructu 2·5–3 cm. long.; *sepalis* ♀ dorso pubescentibus ext. ovatis obtusis 3 mm. long. int. ovato-oblongis 2 mm. long.; *ovario* depresse globoso pubescente circa 2·5 mm. diam.; *stylo* crasso 1·5 × 1·5 mm. obscure 6-fido: *capsula* depresse globosa puberula 8 mm. diam.; *seminibus* coccineis planoconvexis ægre 3 mm. long.

Sogere, 3000 ft., 862. No. 405 also belongs here. The flowers were noted as yellow and the capsules green.

Phyllanthus (*Nymania*) **effusus** S. Moore, sp. n. *Arbuscula*; *ramulis* crebro foliosis minute fulvo-puberulis dein glabris; *foliis* ovatis vel ovato-oblongis acuminatis (acumine obtuso ±12 mm. long.) basi in petiolum 2–4 mm. long. angustatis tenuiter coriaceis utrobique glabris necnon nitidis in sicco subcastaneis plerisque 7–10 × 4–6 cm. costis lat. utrinque circa 8 uti utriculus valde laxus pag. inf. magis visibilibus; *stipulis* lanceolato-oblongis obtusis circa 5 mm. long.; *floribus* in paniculam usque 20 cm. long. effusam terminalem (partim itaque axillarem) digestis; *floribus fem.* solum cognitis pedicellis filiformibus sursum incrassatis plerumque 1–2 cm. long. insidentibus; *sepalis* ovato-oblongis obtusis sub fructu reflexis 1·5 mm. long.; *disco* lobato; *ovario* alte 6-sulcato 3-loculari 3 mm. diam.; *stylo* brevi ·5 mm. long.; *stigmatibus* 3 perbrevibus; *capsula* depresse globosa 3-sulcata 6-sperma 6·5 mm. diam.; *seminibus* brunneis dorso rotundatis ventre acutis foramineque perspicuo donatis 3 × 1·75 mm.

Sogere, 2000 ft., 226.

To this is referred No. 251 (also from Sogere) with leaves somewhat broader and rotundate at base, which may sometimes reach to 16 × 7·5 mm. In this case also there are no male flowers. The affinity is with *P. Gjellerupii* J. J. Sm., which, *inter alia*, has relatively broader leaves, shorter axillary panicles, and smaller capsules and seeds. The disk is probably cupular at first, like that of *P. Gjellerupii*; in the earliest state seen it had already been divided up by the swelling ovary.

Phyllanthus (*Nymania*) **oreadum** S. Moore, sp. n. *Frutex* parvus glaber; *ramulis* subteretibus striatis cortice brunneo obductis; *foliis* ovatis vel late ovato-oblongis acuminatis apice obtusis basi rotundatis petiolis validis 4 mm. long. fultis pergamaceis pag. sup. punctis fuscis copiose inspersis 10–14 × 4–6 cm. costis lat. utrinque 7–8 interjectis pluribus minoribus difficile visis reticulo perlaxo pag. inf. solum aspectabili; *stipulis* oblongis obtusis 5 mm. long.; *floribus* ♀ (masc. ignotis) in paniculas laxas axillares vel terminales quam folia breviores

conflatis; *pedicellis* capillaceis ±7 mm. long.; *sepalis* inter se fere æqualibus obovato-oblongis obtusissimis 1·5 mm. long.; *disco* cupulari ore denticulato 1 mm. alt.; *ovario* late ovoideo glabro 3-loculari ·75 mm. long.; *stylo* crasso ovario vix æquilongo breviter 3-fido.

Sogere, 2000 ft., 838.

Differing from *P. effusus* in foliage and inflorescence. Flowers yellow on purple pedicels.

Baccaurea plurilocularis J. J. Sm. ex ic. et descript. Bosibosi, sine no.

Antidesma polyanthum K. Schum. & Laut. Sogere, 617, 696, 955.

Antidesma megalocarpum S. Moore, sp. n. *Frutex* vel *arbuscula* ?; *ramulis* subteretibus striatis appresse puberulis deinde glabris; *foliis* oblongo-obovatis cuspidato-acuminatis (acumine obtuso 1–1·5 cm. long.) basi obtusis chartaceis pag. utraque glabris 16–18 × 6–7 cm. costis lateralibus utrinque 7–9 aperte arcuatis uti costulæ reticulumque sat laxum in pag. ambabus bene visis petiolis validis 5–10 mm. long.; *stipulis* ——; *floribus* in spicas simplices vel paniculiformes appresse fulvo-pubescentes foliis æquilongas digestis; florum ♀ solum cognitorum; stigmate brevi terminali; *drupa* sessili ovoidea aliquantum compressa appresse puberula in sicco griseo-brunnea reticulatoque rugosa 18 × 13 cm.; *albumine* carnoso dilute-brunneo.

Sogere, 497. No. 417, also from Sogere, is clearly conspecific, as is No. 225 in hb. Kew.

The large drupes at once serve to distinguish this among Papuan species. In the absence of flowers its position in the genus must remain doubtful.

Antidesma prægrandifolium S. Moore, sp. n. *Frutex* cauliflorus spicis exceptis glaber; *caule* cortice cinereo-brunneo obducto circa 1 cm. diam.; *ramulis* aliquantulum anfractuosis brunneo-corticatis politis; *foliis* magnis (usque 32 × 15 cm.) ovatis cuspidato-acuminatis obtusis basi latissime rotundatis interdum leviter cordatis pergamaceis nitidis margine integris revolutis costa media pag. inf. maxime prominente costis lat. utrinque circa 12 quorum 2 infimis basalibus omnibus uti reticulum arctum utrobique bene visis petiolis 5–6 cm. long. basi apiceque dilatatis; *stipulis* ovatis inæquilateralibus diutule persistentibus 2 cm. long.; *spicis* (♂ solum visis) e caule fasciculatim oriundis sat densifloris fulvo-pubescentibus usque 7 cm. long.; *pedunculo* 1 cm. long.; *bracteis* florum suborbicularibus fuscis circa 1 mm. long.; *sepalis* 4 ovatis vel ovato-oblongis obtusis (quarto equidem lanceolato) fulvo-pubescentibus ægre 1 mm. long.; *staminibus* plerumque 3 disco minutissimo insertis filamentis 2·5 mm. long. antheris ·75 mm. long.

Sogere, 250.

Without the ♀ flowers the affinity of this is uncertain; it may perhaps be nearest *A. grandistipulum* Merr. The large leaves with very broad base and the cauliflorous spikes are the most salient features.

Acalypha (*Acrandræ* § *Palmatinerviæ*) **protracta** S. Moore, sp. n. *Arbuscula* monoica; *ramulis* fulvide velutino-tomentosis deinde glabrescentibus; *foliis* petiolis velutinis 1–5 cm. long. fultis late ovatis cuspidato-acuminatis apice obtusis basi late truncatis nonnunquam obscure cordulatis margine denticulatis 5–7-palmatinervibus membranaceis supra pubescentibus tandem glabris subtus molliter velutinis plerisque 5–11 × 4·5–9 cm. costis lateralibus (absque basalibus) utrinque 4–5 prope marginem arcuatis costulis (uti costæ) pag. inf. optime visis inter costas fere recte ductis; *stipulis* fugaceis triangularibus obtusis fulvo-tomentosis 2 mm. long.; *spicis* axillaribus unisexualibus gracilibus tomentosis; *spicis* ♂ sat laxifloris ±5 cm. long. cito usque ad 18 cm. protractis; *spicis* ♀ floribus inter se circa 1 mm. distantibus florescentibus circa 2·5 cm. long.; *bracteis* ♀ pusillis oblongis vel oblongo-ovatis extus tomentosis tridentatis vel integris 1–1·5 mm. long.; *sepalis* 3 anguste triangularibus extus tomentosis vix 1 mm. long.; *ovario* globoso tomentoso 1·5 mm. diam.; *stylo* subevanido; *stigmatibus* brevissime plumulosis ·75 mm. long.

Sogere, 2000 ft., 127. Flowering spikes green.

Differs from *A. longispica* Warb. chiefly in the smaller not cordate leaves, the tiny fugacious stipules and the short ♀ spikes with larger at most 3-toothed (not 3-partite) bracteoles. Possibly the ♀ spikes may grow out after flowering as do the ♂, but the only flowering ♀ spike found on the specimen is as described.

A. HISPIDA Burm. Sogere, sine no.

Acalypha (*Acrandræ* § *Penninerviæ*) **sogerensis** S. Moore, sp. n. *Frutex* monoicus novellis fulvo-tomentosis; *ramulis* subteretibus minute pubescentibus tarde glabrescentibus cortice fusco obductis; *foliis* petiolatis (pet. tomentosis 1–2 cm. long.) ovato-oblongis apicem versus angustatis apice obtusis basi rotundatis nonnunquam obscure cordulatis penninervatim 3–5-nervibus pergamaceis supra costis sparsim pubescentibus exemptis scabriusculis subtus præsertim in costis fulvo-pubescentibus 10–18 × 5–7·5 cm. costis lat. (basalibus neglectis) utrinque 4–6 ascendenti-arcuatis uti costulæ reticulumque laxum pag. inf. eminentibus; *stipulis* fugaceis caudato-lanceolatis fulvo-tomentosis usque 7 mm. long.; *spicis* ♂ sat densifloris tomentosis circa 5 cm. long. 2 mm. lat. flores diam. circa 2 mm. foventibus; *spicis* ♀ subdensifloris (floribus tandem inter se 1 cm. vel minus distantibus); *bracteis* ♀ unifloris reniformibus post anthesin auctis prominenter 10–12-dentatis dente terminali ceteris sæpius longiore dorso fulvo-hispidulis plurinervibus primo 3 × 2·5 mm. deinde usque 7 × 6 mm.; *sepalis* 3 lanceolatis 1 mm. long. dorso hispidulis; *ovario* subgloboso ante anthesin ·75 mm. long.; *stylis* 3 pectinatis ovario æquilongis; *capsula* globosa rugulosa pubescente 3·25 mm. diam.; *stylis* brevibus persistentibus.

Sogere, 2000 ft., 13.

Affinity with *A. insulana* Mull. Arg.; distinguishable *inter alia* by the ♀ bracts and short styles. The same plant was collected by Mr. C. T. White at Mafulu (472 in herb. Kew.) who notes it as a

"shrub 4 feet with single stem. Bracts green at base, reddish above."

Macaranga (§ *Mecostylis*) **dalechampioides** S. Moore, sp. n. *Frutex*? ; *ramulis* teretibus dense velutino-pubescentibus; *foliis* longipetiolatis (pet. velutino-pubescentibus 2·5–3·5 cm. long.) rhombeo-ovatis sursum acuminatis (acumine obtuso plerumque 2–3 cm. long.) basi truncato-rotundatis obscurissime cordulatis eglandulosis 5-nervibus (nervis ext. abbreviatis int. ad tertiam partem folii ductis) firme membranaceis pag. utravis præsertim vero inf. ubi crebro glandulosis molliter velutinis 6–10 × 5–6 cm. costis lateralibus (pari basali excluso) 4–5 ascendenti-arcuatis uti costulæ pag. inf. eminentibus; *stipulis* lineari-lanceolatis pubescentibus 3–5 mm. long.; *inflorescentia* ♀ pedunculo gracili pubescente 5–6·5 cm. long. fulta; *bracteis* paucis arcte confertis ovatis breviter acuminatis prominenter glanduloso-dentatis utrinque minute velutinis 14 × 10 mm.; *bracteis florum* linearibus ±2 mm. long.; *calyce* urcellato subtruncato vel breviter 3–4-lobo minute pubescente; *ovario* 1-loculari globoso minute pubescente superne glandulis subsparsim insperso necnon processubus mollibus pubescentibus 3-serialibus præditis; *stylo* incurvo breviter plumoso 2–3 mm. long.; *floribus* ♂ ignotis.

Sogere, 397.

Nearest *M. densiflora* Warb., a plant with leaves glabrous except for the nerves and with two prominent glands at their base, smaller less deeply toothed bracts of the inflorescence and rhombic floral bracts.

Macaranga fimbriata S. Moore, sp. n. *Arbor* alta; *ramulis* subteretibus prima juventute ferrugineo-tomentosis cito glabris dein cortice cinereo rimoso cicatricibus foliorum delapsorum signato obductis; *foliis* ovato-oblongis nisi ovatis cuspidato-acuminatis (acumine acuto circa 7 mm. long.) basi haud longe trinervi cuneatis prominenterque biglandulosis tenuiter coriaceis utrobique citissime glabris pag. sup. in sicco griseis nitidis pag. inf. viridi-brunneis pustulisque crebris minutis inspersis 9–12 × 5·5–7 cm. costis lat. (pari proximali exempto) utrinque 5–6 aperte arcuatis uti costulæ frequentes parum curvatæ pag. utraque eminentibus petiolis teretibus citissime glabris solemniter 5–6 cm. long.; *stipulis* caducis oblongis obtusis ferrugineo-tomentosis fere 1 cm. long.; *floribus* ♂ in paniculas axillares laxe ramosas racemiformes minute fulvo-tomentosas quam folia breviores (usque 6–7 cm. long.) digestis; *bracteis inflorescentiæ* subulatis integris vel subintegris circa 3 mm. long.; *bracteis florum* glomerulos multifloros arcte stipantibus sæpe 5 pro glomerulo ambitu ovatis vel suborbicularibus margine optime fimbriatis (fimbriis circa 12 plerumque 1·5–2·5 mm. long.) basi glandula perspicua elevato-marginata præditis uti inflorescentiæ rami minute fulvo-tomentellis fimbriis inclusis usque 9 × 6 mm.; *sepalis* 3–4 2 vel 3 sepæ coalitis inde 2–3-fidis extus minute fulvo-tomentellis; *staminibus* 5–8 antheris 4-locularibus; *floribus* ♀ haud visis.

Sogere, 247. A great tree with pale cream-coloured flowers.

In appearance very like *M. montana* Pax & K. Hoffm. (*M. javanica* var. *montana* Müll. Arg.) which has flowers in several respects

different. It does not seem to come under any of the sections proposed by Pax & K. Hoffm. in their Pflanzenreich Monograph, and until ♀ flowers come to hand its position in the genus must remain doubtful.

Mallotus cochinchinensis Lour. Sogere, 1750 ft., 196.

Homalanthus brachystachys Pax & K. Hoffm. ex descript. Sogere, 2000 ft., 871. Small tree. There are no ♂ flowers; hence the determination is somewhat doubtful.

Ulmaceæ.

Trema orientalis Bl. Sogere, 2000 ft., 324.

Moraceæ.

Ficus § *Palæomorphe.*

Ficus subulata Bl. Sogere, 1750–2500 ft., 60, 62, 179, 223, 264, 283, 833. Stipules short (about 2 cm. long) like those of *F. Decaisneana* Miq., but most of the *subulata* specimens in the London herbaria have short stipules.

Ficus pteleæphylla S. Moore, sp. n. *Arbor*; *ramulis* primo ferrugineis hispidulis tandem glabrescentibus cortice cinereo obductis; *foliis* alternis brevipetiolatis (pet. fulvo-hispidulis 6–10 mm. long.) ovato-oblongis breviter acuminatis apice acutis basi valde obliquis distincte etsi breviter cordatis 5- (obscure 7-) nervibus margine dentatis pergamaceis utrobique asperrimis plerisque circa 10 × 6 cm. costis lateralibus utrinque (basalibus exemptis) 6–7 juxta marginem arcuatis angulo sat lato insertis uti costulæ reticulumque arctum pag. inf. optime eminentibus; *stipulis* subulatis acuminatis extus hispidulis 4–5 mm. long.; *receptaculis* axillaribus plerumque solitariis globosis osteolo parvo fere plano extus scabridis intus villosulis pedunculo scabrido juxta medium bracteis 2 parvulis onusto 5–7 mm. long. insidentibus; *floribus* ♀ solum visis; *calycis* alte partiti segmentis achænium excedentibus spathulato-oblongis obtusis dilute puniceo-punctatis 2 mm. long.; *achæniis* obovoideis stramineis glabris 1·25 × 1 mm.; *stylo* laterali 1 mm. long.

Sogere, 3000 ft., 106. A tree 35 feet high. Figs bright orange. Differs from *F. pisifera* Wall. in the smaller very scabrous leaves not gradually narrowed in the lower half, and with closer and more prominent reticulation upon the lower face, and the bright orange figs, the ♀ flowers with a markedly lateral not almost terminal style. It is because of this presumed affinity that the plant, in the absence of ♂ and gall flowers, is placed provisionally in this section.

§ *Urostigma.*

F. hesperidiiformis King in Journ. As. Soc. Bengal, lv. ii. 401. Mt. Wori-wori, 5000 ft., 737. A large tree; figs a rich orange flushed with lake purple.—F. Edelfeltii King, *op. cit.* 402. Sogere, 2500 ft., 59, 65, 409. A large tree; figs green.

Ficus frondosa S. Moore, sp. n. *Arbor*? vel arbuscula? glabra; *ramulis* subteretibus cortice brunneo-cinereo obductis; *foliis* alternis amplis petiolatis (pet. 8–10 mm. long.) oblongo-ovatis breviter cuspidato-acuminatis obtusis basi æquilateraliter obtusis 5–7-nervibus (basalibus vero tenuibus) pergamaceis pag. inf. leviter scabriuscula exclusa glabris pallide nitidis supra in sicco griseis subtus griseo-viridibus sed junioribus ibidem læte brunneis 16–24 × 8–12 cm. costis lateralibus utrinque 9–10 prope marginem arcuatis pag. utravis conspicuis costulis reticuloque sat arcto pag. inf. solum facile visis; *stipulis* lanceolatis acuminatis glabris 2·8 cm. long.; *receptaculis* solitariis axillaribus depresse globosis rugosis glabris circa 12 × 20 mm. pedunculo compresso glabro apice minute bracteato 13 mm. long. fultis; *floribus* ♂ uti flores gallini pedicello compresso brunneo circa 2 mm. long. insidentibus; *calyce* inequaliter 3–4-partito segmentis ovatis circa 1 mm. long.; *anthera* subrotunda ·6 mm. diam. filamento crassiusculo ·4 mm. long.; *floribus gallinis* calyce 4-lobo lobis oblongis vel oblongo-obovatis rubro-brunneis circa 2 mm. long.; *ovario* globoso glabro; *stylo* laterali bifido sæpe usque 2 mm. long.; *floribus* ♀ sessilibus vel pedicello interdum usque 3 vel etiam 4 mm. long. fultis; *calyce* fll. gall.; *ovario* obovoideo 1·8 × 1·2 mm. glabro; *stylo* laterali (nonnunquam fere basali) bifido. fll. sessilium sæpe usque 2·5 mm. long. fll. pedicellatorum breviore sc. sæpe usque ·4 mm. abbreviato.

Sogere, 474.

Affinity with *F. Edelfeltii* King, but with shorter-stalked glabrous leaves, much longer stipules, and larger differently-shaped figs.

F. Lawesii King, *op. cit.* 403. Sogere, 3000 ft., 85. Leaves of the Museum specimen smaller than described by King, only 6–10 × 2·5–5 cm. and stipules longer (2·5–3·5 cm.).

F. casearioides King, *op. cit.* 403. Mt. Gawada, 5000 ft., 568. A moderate-sized tree. Figs dark green.

§ *Synœcia.*

F. Scratchleyana King, *op. cit.* 404. Meroka Range, 2500 ft., 900. A large climber. Fruit pale green.

§ *Sycidium.*

F. Armiti King, *op. cit.* 404. Sogere, 1750 ft., 609. Climber. Figs pale pink with slight green ground-colour.

Ficus cinnabarina S. Moore, sp. n. *Arbuscula* fere glabra; *ramulis* striatis cortice rubescente circumdatis; *foliis* alternis petiolatis (pet. circa 1 cm. long. ramentis parvulis brunneis præditis) subæquilateraliter oblongo-cordatis acuminatis apice obtusis margine leviter undulatis 7-nervibus (jugo proximali vero vix ejusdem valoris) pergamaceis supra in sicco pallide viridi-griseis subtus brunneis 12–17 × 5·5–7 cm. costis lat. utrinque 6 costulis uti costæ pag. inf. prominentibus reticulo nisi sub lente parum aspectabili; *stipulis* subulatis dense pubescentibus 3 mm. long.; *receptaculis* verisimiliter axillaribus solitariisque depresse globosis rugoso-verrucatis piloso-

hispidis intus pubescentibus 2·5 × 3 cm. osteolo nequaquam prominente 4 mm. diam. pedunculo paullo supra basin bracteato piloso-hispido 1·5 cm. long.; *floribus* ♀ sessilibus vel sæpius pedicellatis pedicellis 1·25–3 mm. long.; *calycis* alte partiti segmentis (anne semper?) 4 oblongis obtusis fuscis circa 2 mm. long.; *ovario* oblongo-obovoideo glabro 1·75 × ·75 mm.; *stylo* sublaterali 1–2·5 mm. long. florum sessilium interdum 5 mm. attingente.

Sogere, 171. A small tree. Figs vermilion, covered with short hairs.

This is evidently closely related to *F. conspicabilis* King, which King refers to § *Sycidium*, although (like the plant under notice) only its female flowers are known. From that it can be told by the somewhat smaller, narrower, more shortly petioled leaves cordate at the base, the somewhat smaller longer stalked figs not concave at base and apex, the four not three segments to the calyx (if, indeed, the number given be constant, a point often difficult to determine owing to the slightness of their attachment) and the lateral not terminal position of the style. Judging from the specimen the fruit would seem to be glabrous except for a very few rather coarse fulvous hairs near the top; but from the collector's note one learns there is no difference in the indumentum upon the fruit of the two, for it says the figs are covered with hairs in their natural state.

F. HYSTRICICARPA Warb. in K. Schum. & Laut. Fl. deutsch. Schutzgeb. Nachtr. 244.

New Guinea, *Forbes*, sine no. This is evidently related to the plant just described. Its leaves are said to be oblong, lengthily acuminate at apex, obtuse or subrotundate at base; the stipules are much longer and the figs, on stalks only ⅓ the length of those of *F. cinnabarina* and only 13–16 mm. wide, are covered with hispid setæ alluded to in an accompanying note as almost prickly bristles. There is nothing among the New Guinea material at the Museum answering to these details.

§ *Covellia.*

F. RIBES Reinw. Sogere, 2000 ft., 209, 239. Mt. Meroka, 2500 ft., 894.—F. MIQUELII King. Meroka Range, 2500 ft., 903. Tree, 25 ft. more or less. Fruit dark brown.

F. CHALMERSII King, *op. cit.* 406. Sogere Hills, 3000 ft., 100. Tree about 35 ft. Figs on trunk, rich purple-lake with white dots.

F. CASEARIA F. Muell. Sogere, 3000 ft., 94, 461.

Ficus hispidioides S. Moore, sp. n. *Arbuscula*?; *ramulis* teretibus nodulosis pilis appressis strigillosis albis obtectis dein glabris novellis appresse albo-hispidulis; *foliis* petiolatis (pet. scabriusculis 2–3 cm. long.) plerisque oppositis 5-nervibus late ovato-oblongis apice rotundatis vel breviter cuspidatis et tunc apice ipso obtusis basi rotundatis obscureque cordulatis margine undulatis pergamaceis supra in sicco griseis scabriusculisque (in nervis scabridis) subtus griseo-brunneis scabridis costis lat. utrinque 5–6 parum arcuatis uti costulæ

reticulumque laxum sat prominentibus; *stipulis* lanceolatis acuminatis dorso appresse albo-hispidulis 1 cm. long.; *ramulis florentibus* breviter ramosis nodosis spec. unici visi summum 6 cm. long. et 4–5 mm. crass.; *receptaculis* fasciculatis globosis pedicello verisimiliter nudo usque 7 mm. long. insidentibus albo-tomentosis circa 23 mm. diam. osteolo leviter prominulo; *floribus* ♂ pedicellatis (ped. circa 2 mm. long.); *calyce* 3-partito segmentis oblongo-ovatis obtusissimis circa 1 mm. long.; *anthera* subsessili oblongo-ovoideo 1 mm. long.; *floribus gallinis* nudis (rarissime calyce minutissimo præditis) nunc sessilibus nunc pedicellis nonnunquam usque 2·5 mm. long. sustentis; *ovario* ovoideo glabro 1·5 mm. long.; *stylo* brevi terminali modo ·2–·3 mm. long.

Near Kerepunu, sine no.

Very close to *F. hispida* Bl.; differing in the relatively broader leaves rounded at the top, the short fig-bearing branches, if indeed the whole length is shown by the specimen, the fruiting pedicels apparently devoid of apical bracts and the pedicellate ♂ and gall-flowers, the latter with a lateral (not a terminal) style. Female flowers not seen.

F. Bernaysii King, *op. cit.* 406. Koikoko Hills, 2500 ft., 625. A tree about 40 ft. high. Slender faded-purple figs growing on stem.

§ *Eusyce.*

F. Pantoniana King, *op. cit.* 407. Sogere, 2500 ft., 185. Large tree about 40 ft. Fruit rich vermilion ripening purple-black.

F. Bauerleni King, *op. cit.* 408. Sogere, 2000 ft., 378. Large tree. Figs pale green below with white dots, on top purplish with whitish dots.

F. duriuscula King. Sogere, 2000–3000 ft., 132, 435, 562, 765.

F. Odoardi King. 2000 ft., 830. A large climber. Figs pale carmine.

F. rhizophoræphylla King, *op. cit.* 410. Mt. Gawada, 4500 ft., 578. Mt. Koikoko, 2500 ft., 929. Figs bright orange.

F. opposita Miq., near Kerepunu, sine no. F. Mueller noted this Australian species as probably Papuan (Descr. Notes Papuan Pl. iv. 60), but, in the absence of figs, certainty was not possible.

White (Proc. R. Soc. Queensland, xxxiv. 23) records a Forbes Papuan specimen of *F. fistulosa* Reinw. as being at Melbourne. Perhaps *F. subulata* Bl. is meant, a species externally very like *F. fistulosa*.

Cudrania spinosa Koord. Mt. Gawada, 4000 ft., 574.

Parartocarpus papuana S. Moore, sp. n. Verisimiliter *arbor* glaber; *ramulis* subteretibus cortice griseo copiose lenticellifero obductis; *foliis* alternis petiolatis (pet. 1–1·5 cm. long.) oblongis vel anguste oblongo-ovatis acuminatis (acumine obtuso 1–2 cm. long.) basi aliquantulum obliqua rotundatis margine leviter undulatis subtus creberrime tesselatis pergamaceis in sicco castaneis vel subcastaneis costis lat. utrinque 10–16 pag. utravis eminentibus reticulo laxo bene viso maxime arcto; *capitulis* ♀ solitariis paullulum exaxillaribus

globosis florescentibus circa 1·5 cm. diam. pedunculis sat validis minutissime ferrugineis 3–7 cm. long. fultis; *bracteis* ext. nullis int. pluribus floribus arcte appressis linearibus pilosis 3 mm. long. apice peltato ·3 mm. diam.; *perianthio* obovoideo bracteas mox superante breviter 4-dentato tempore florendi 5 mm. long. dentibus approximatis foramen parvulum relinquentibus; *ovario* ovoideo glabro fere 2 mm. long.; *stylo* microscopice puberulo vix 1 mm. long. stigmatibus 2 inclusis aliquanto compressis obtusis crassiusculis 1·5 mm. long.; *ovulo* ab apice pendulo; *achæniis* pro capitulo plerumque pluribus (nonnunquam vero modo 1 vel 2) liberis subglobosis in sicco fuscis usque 1 cm. diam.; *seminibus* testa tenuiter membranacea cinctis subglobosis 8 mm. long. cotyledonibus inter se æqualibus carnosis.

Sogere, 331, 411, 503.

In the absence of the male plant it is somewhat doubtful to say with certainty to what genus this belongs, but *Parartocarpus* seems the most likely position for it.

Artocarpus incisa L. f. Sogere, 1750 ft., 158.

Urticaceæ.

Laportea mammomisetosa H. Winkl. Sogere, 403.

Elatostemma sesquifolium Hassk. Sogere, 2500 ft., 36.

Poikilospermum amboinense Zipp. River side, Sogere, 1750 ft., 685. Large climber. Fruit purple.

Pipturus argenteus Wedd. Sogere, 2000–2500 ft., 80, 126, 457. Winkler (Bot. Jahrb. lvii. 588) quotes No. 50 for this, apparently a mistake for 80.

Villebrunea trinervis Wedd. Sogere, 2500 ft., 131.

Leucosyke capitellata Wedd. Sogere, 2000 ft., 426, 458.

Juglandaceæ.

Engelhardtia lepidota Schlechter. Sogere, 3200 ft., 291. Koikoko hills, 3000 ft., 595. A small or considerable tree. Fruiting bracts pale green.

Casuarinaceæ.

Casuarina papuana S. Moore, sp. n. *Ramulis* erectis gracillimis (·5 mm. crass.) tetraquetris glabris internodiis 2–4 mm. long. dentibus pro nodo 4 abbreviatis (·6 mm. long.) triangularibus acutis glabris; *strobilis* globosis glabris 1·5 cm. diam.; *bracteis* ovatis 4 mm. long. apice truncato-incrassatis triangularibus rugosisque circa 4 × 2 mm.; *bracteolis* oblongo-ovatis obtusis dorso striatis glabris usque ad 4 mm. e bracteis eminentibus; *seminibus* ovoideis 4 × 2·5 mm. testa brunnea striolata tectis alaque æquilonga ovato-oblonga apice mucronulata præditis.

South Cape. 913 *a*.

Affinity with *C. nodiflora* Forst. and *C. Rumphiana* Miq.; easily distinguished from both by the bracts.

FAGACEÆ.

QUERCUS JUNGHUHNII Miq. Sogere, 1850 ft., 600. A moderate tree, 50 feet more or less. Flowers in yellowish-green catkins.

Pasania (§ *Eupasania*) **sogerensis** S. Moore, sp. n. *Arbor* magna; *ramulis* subteretibus minute griseo-pubescentibns mox glabrescentibus corticeque griseo-fusco obductis; *foliis* brevipetiolatis (pet. circa 5 mm. long.) oblongo-ovatis obtusis vel breviter cuspidatis basi rotundatis nisi obtusis integris cito glabris supra griseo-brunneis pallidissimeque nitidis subtus subglaucis plerisque 7–9 × 3·5–5 cm. costis lat. tenuibus utrinque 6–8 pag. sup. parum visibilibus pag. inf. eminentibus reticulo facie utravis maxime arcto fere modo *Endiandrarum* etsi obscuriore; *spicis* simplicibus (anne semper?) glabris verisimiliter circa usque 10 cm. long.; *florum* ♀ solum cognitorum involucro campanulato mox circa 6 × 4 mm. e squamis multiseriatis lanceolatis acuminatis sursum inter se liberis sistente; *perianthio* urceolato minute griseo-lepidoto 5 mm. diam. hujus limbo 1·5 mm. long. brevissime lobato; stylis 3 substrictis induratis fere 1 mm. long.; *cupula* pedicello crasso squamoso circa 5 mm. long. insidente glabra 13 mm. alt. 25 mm. diam. hujus squamis inferioribus obscure zonatis omnibus late triangularibus apicibus liberis induratis fuscis circa 1 mm. long.; *glande* 27 × 25 mm. quadrante inferiori cupula immersa ovoidea apice umbone parvulo 1 mm long. donata in sicco læte brunnea nitida longitrorsum striolata.

Sogere, 3200 ft., 300. A great tree. Acorns bright green in grey cups.

Nos. 354 from Mt. Meroka, a very large tree with (very early) dirty green inflorescences (♂) and 527 from Mt. Gawada, 5000 ft., a large tree, young involucres pale green, are indeterminable Pasanias.

MONOCOTYLEDONS.

By Dr. A. B. Rendle, F.R.S.

Forbes's Monocotyledonous plants were enumerated and described in 1886 by Mr. H. N. Ridley in this Journal (xxiv. p. 321, 353); but some revision has been found necessary in the light of more recent work.

BURMANNIACEÆ.

BURMANNIA LONGIFOLIA Becc. Sogere, South Cape, no number.

ORCHIDACEÆ.

OBERONIA HAMADRYAS Ridl. in Journ. Bot. 1886, 322.

Sogere, South Cape, no number. Flower white, column and lip orange.

LIPARIS LONGIPES Lindl. Sogere, 1800 ft., 394.

DENDROBIUM (§ *Cadetia*) TRIQUETRUM Ridl. *l. c.* Sogere, 755. Flowers gamboge-green.

D. ALBIFLORUM Ridl. *l. c.* 323. Sogere, 587, 736. Flowers white.

D. LONGICOLLE Lindl. Sogere, South Cape, 532, and 1750 ft., 424, with flowers purple.

D. RIDLEYANUM Schlechter in Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. (1905). *D. reptans* Ridl. *l. c.* (non Franch. & Savat.). *D. humifusum* Kranzl. in Pflanzenreich iv. 50, ii. B, 21, p. 280. Sogere, 1750 ft., 531.

D. FORBESII Ridl. *l. c.* Sogere, Mt. Korkoko, 3000 ft., 634, 648.

D. ANTENNATUM Lindl. No locality nor number. Specimen in fruit only.

D. UNDULATUM R. Br. Sogere, no number.

D. TRICHOSTOMUM Reichenb. f. Sogere, 1700 ft., 82, 393; Mt. Korkoko, 3000 ft., 774.

D. PUNICEUM Ridl. *l. c.* 324. Sogere, Mt. Wori-Wori, 5000 ft., 425; Mt. Korkoko, 3000 ft., 598.

D. CERASINUM Ridl. *l. c.* Sogere, Mt. Gawada, 6000 ft., 517.

D. LEONTOGLOSSUM Schlechter, Orchid. Deutsch-Neu-Guinea, 575. *Trichoglottis leontoglossa* Ridl. *l. c.* 355. Sogere, 2000 ft., 839.

BULBOPHYLLUM KERMESINUM Ridl. *l. c.* 325. Sogere, 1750–1800 ft., 433, 755.

B. CORNUTUM Ridl. *l. c.* Sogere, South Cape, sine no.

ERIA FOLIOSA Ridl. *l. c.* 326. Sogere, Mt. Gawada, 3000 ft., 867.

E. PUBERULA Ridl. *l. c.* Sogere, South Cape, sine no.

PHREATIA ALBIFLORA Ridl. *l. c.* Sogere, Mt. Korkoko, 675.

P. PAPUANA Ridl. *l. c.* 327. Sogere, 616.

RIDLEYELLA PANICULATA Schlechter, *op. cit.* 949. *Bulbophyllum paniculatum* Ridl. *l. c.* 326. Sogere, 1800 ft., 392, 573.

SPATHOGLOTTIS STENOPHYLLA Ridl. *l. c.* 354. Sogere, 2000 ft., 514.

S. PLICATA Bl. Sogere, Mt. Korkoko, 2000 ft., 630.

ACANTHEPHIPPIUM SPLENDIDUM J. J. Sm. in Naturk. Tijdschr. Nederl.-Ind. lviii. 360 (1898) (under *A. javanicum* Bl., Ridl. *l. c.* 354). Sogere, 2000 ft., 389, 390.

EULOPHIA PAPUANA J. J. Sm. in Nova Guinea, viii. 26 (1909). *E. macrorhiza* Bl. var. *papuana* Schlechter, *op. cit.* 417; *Cyrtopera papuana* Ridl. *l. c.* 354. Sogere, 1000 ft., 391.

CŒLOGYNE FRAGRANS Schlechter, *l. c.* 102 (under *C. Rumphii* Bl. Ridl. *l. c.* 353). Sogere, 2000 ft., 24, 388.

C. PUSTULOSA Ridl. *l. c.* Sogere, South Cape, sine no.

APPENDICULA DISTICHA Ridl. *l. c.* 354, t. 270. Sogere, South Cape, sine no.

GOODYERA PAPUANA Ridl. *l. c.* Sogere, 2500 ft., 64.

CORYMBIS VERATRIFOLIA Reichenb. f. Sogere, 763.

NEUWIEDIA CALANTHOIDES Ridl. *l. c.* t. 271. Sogere, Meroka, 2000 ft., 777.

Zingiberaceæ.

Curcuma sp. Sogere, 1050 ft., 244. Erect herb. Flowers bright orange in purple spathes.

This specimen was formerly assigned (Ridl. *l. c.* 356) to *C. aromatica* L., but Mr. Ridley agrees with me that it does not represent that species. It is about 5 dm. high, and bears a pair of long-stalked leaves with base tapering into the petiole, the blade 22–25 cm. by 9–13 cm., between which springs a rather dense flower-spike, 11 cm. long, excluding the stalk, by 3·5 cm., greatest width. The spike is lanceolate in outline, with a very blunt apex. The upper bracts still show the purple colour in their upper halves. The flowers have dropped.

Riedelia decurva Valet. in Engl. Bot. Jahrb. lii. 77 (1914). *Alpinia decurva* Ridl. *l. c.* 357. Sogere, 2000–2800 ft., 41, 53, 57, 229, 231, 253.

R. affinis K. Schum. in Pflanzenreich, iv. 46, 373 (1904). *A. affinis* Ridl. *l. c.* Sogere, 2500 ft., 2, 58.

Costus speciosus Sm. var. hirsuta Bl. Sogere, Korkoko Range, 2500 ft., 797.

Tapeinochilus pubescens Ridl. *l. c.* 356. Sogere, 3000 ft., 143 *b*, 144 *a*.

T. pungens Miquel. Sogere, 3000 ft., 142, 143 *a*, 144, 145.

Marantaceæ.

Donax cannæformis K. Schum. *Clinogyne grandis* Benth. (Ridl. *l. c.* 357). Sogere, river-side, 1750 ft., 683.

Phrynium aff. pedunculato Warb. Sogere, 326. Flowers too young for determination.

Dioscoreaceæ.

Dioscorea pentaphylla Lam. Sogere, Meroka Mts., 2500 ft., 888.

Liliaceæ.

Smilax. Three species are represented in the collection. One (Sogere, 2500 ft., 178, 189) was determined by Mr. Ridley (*l. c.* 358) as *S. leucophylla* Bl., but is probably not that species; the specimen is in very young fruit. A second, bearing fruit (Sogere, 2500 ft., 63, 334, 338), is perhaps *S. papuana* Lauterb. (in Engl. Jahrb. l. 300), which is described from a male specimen only. A third (Sogere, 1700–2500 ft., 70, 214, 263) is also represented by fruit only.

Dracæna angustifolia Roxb. Sogere, 2000 ft., 274, 754.

Cordyline terminalis Kunth. Sogere, 2000 ft., 18. Fruiting specimen.

C. angustissima K. Schum. in Nachtr. Fl. deutsch. Schutzgeb. Südsee 63 (1905). A specimen without flowers from Sogere, 3000 ft., no. 177, perhaps belongs to this species. It is an erect shrub with scarlet fruit and long narrow leaves rather wider than in the type, to 12 mm. broad.

C. Forbesii Rendle, sp. n. *Frutex* erecta, caudice sub apice 8 mm. crass. ; *foliis* anguste oblanceolatis apice acutis basi in petiolum longum attenuatis, 50–65 cm. long. (cum petiolo), 2·2–3 cm. lat., supra nitida striato-nervosa ; *petiolo* 12–15 cm. longo margine alato basi amplexicaule ; inflorescentia terminalis pauci-ramosa, 12 cm. longa, ramis 2 brevibus (vix 3 cm. long.) ; *floribus* . . . . ; *bacca* subglobosa 6–8 mm. diam. rubescente breviter pedicellata, pedicello vix 2 mm. long., 3-loculare, seminibus 3–4 in quoque loculo, nitide atris, angulatis, 3 mm. longis. *Dracæna* sp.? Ridl. *l. c.* 358.

Sogere, 1800 ft., 258. Erect shrub, fruit from green to light red. October.

Well distinguished from the other Papuan species by the long narrowly lanceolate leaves and the short scarcely branched inflorescence.

Dianella sp. Sogere, 2000 ft., 327. Flowers dark purple-blue.

This specimen was assigned by Ridley, *l. c.* 358, to *D. ensifolia* Red., but agrees more closely with the description and figure of *D. carinata* Hallier, in *Nova Guinea*, viii. 999, t. 186, though the panicle is much longer, exceeding the leaves. There are no perfect flowers on the specimen.

Commelinaceæ.

Cyanotis capitata C. B. Clarke. South Cape, 919.

Flagellariaceæ.

Flagellaria indica L. Sogere, river-side, 1750 ft., 688, flowers white and greenish white ; and at 2000 ft., 19, yellowish-white fruit.

Palmaceæ.

Ptychosperma caryotoides Ridl. *l. c.* 358. Sogere, 2500–3000 ft., 93, 166, 307.

P. Ridleyi Becc. in Nuov. Giorn. Ital. xx. 179 (sub *P. litigiosa* Becc. ; Ridl. *l. c.*). Sogere, 2500 ft., 72.

Linospadix flabellatus Becc. Sogere, 2500 ft., 235.

L. Forbesii Ridl. *l. c.* Sogere, 2500 ft., 163, 211. Flowers green, fruit orange-red.

Calamus wari-wariensis Becc. in Ann. Roy. Bot. Gard. Calcutta, xi. App. 71, t. 38. Sogere, Mt. Wori-wori, 5000 ft., 741. A climber with whitish-yellow flowers.

The collection contains two other species, one with young male flowers only, referred by Mr. Ridley to *Nenga* (Sogere, 2000 ft., 17), and one in fruit (Sogere, without number).

Pandanaceæ.

Freycinetia angustissima Ridl. *l. c.* 359. Sogere, 2000 ft., 3.

F. Forbesii Ridl. *l. c.* Sogere, Mt. Koikoko, 2500 ft., 628 *a* ; Mt. Meroka, 352. Fruit bright scarlet.

Freycinetia sogerensis Rendle, sp. n. *Frutex* scandens vel ascendens, *ramo* 6 mm. crass. in sicco nitente, internodiis 7–11 mm. long.; *foliis* ascendentibus, subflexuosis, submembranaceis, anguste lineari-lanceolatis 2·5–3 dm. long. 9–13 mm. lat. superne sensim attenuatis inferne ad basin amplectentem paullo angustatis; auriculis 2·5–3 cm. long. cito in fibras solutis; *laminæ* marginibus in parte inferiore et sub apice sparsius denticulato-spinulosis, costa media supra impressa infra prominente et sparse spinulosa; *spadicibus fœmineis* ternis in apice ramulorum brevium, pedicellis ad 1·5 cm. long. subangulatis plus minus spinuloso-rugosis; *syncarpiis* immaturis elliptico-oblongis 1–1·4 cm. long. 8–10 mm. crass., pistillis 3 mm. longis apice subconicale annulo pallidiore coronato, stigmatis sæpius 2–4, interdum 5.

Sogere, 2500 ft., 75. Climbing or ascending shrub, fruit green.

From the description apparently closely allied to a New Pomeranian species, *Freycinetia nova-pomeranica* Martelli, which differs among other points in having smooth pedicels to the syncarps.

Araceæ.

Epipremnum magnificum Engler. Sogere, 2000 ft., 128, 828. Fruit green to orange and scarlet.

Raphidophora Forbesii Rendle, sp. n. Herba scandens, *caudice* (3 dm. ab apice) 13 mm. crass. e nodis radicante in sicco rugoso; *foliorum petiolo* laminam paullo excedente, specimine 23–27 cm. long., vagina membranacea mox lacerata inferne latiuscula sursum angustata haud ad geniculi basin attingente instructo; *lamina* late obovato-elliptica apice breviter acuta basi late cuneata inæquilaterale 22–23 cm. long. 11–13·5 cm. lat., altero latere circa $\frac{1}{5}$ latiore, nervis lateralibus primariis quam nervi secundarii numerosi vix crassioribus angulo circa 60°–70° a costa subtus prominente abeuntibus marginem versus arcuatis; *pedunculo* 3 cm. long. crasso; *spadice* haud stipitato cylindrico sursum paullo attenuato apice rotundato, 6 cm. long. basi 1·5 cm. crass.; *pistillis* prismaticis vertice pluri-angulatis 5 mm. long. stigmate orbiculari in stylo 1 mm. longo elevato; *ovulis* e placenta membranacea oriundis funiculo longo elevatis.

Sogere, 2500 ft., 323. Fruit (very young) greyish white.

Doubtfully referred by Ridley, *l. c.* 309, to *R. Peepla* Schott, but a broader-leaved species, and characterised by the stigma being conspicuously elevated on a stylar process of the top of the pistil.

Aponogetonaceæ.

Aponogeton Loriæ Martelli, forma. Sogere, in an affluent of the Laragi, sine no.

This was determined by Ridley, *l. c.* 359, as *A. crispus* Thunb., a species from Southern India and Ceylon. I have seen no authentic specimen of *A. Loriæ*, which is recorded by Martelli from South-east Guinea and North-east Queensland, but, judging from Martelli's description, I think Forbes's plant may be a small form of the species. The narrow linear-lanceolate leaves are about 10 cm. long

excluding the petiole (about 2 cm.), and up to 1·3 cm. broad; the apex is blunt. The peduncle, 5 cm. long, bears a short dense spike (1·5 cm. long) subtended by a strongly-nerved persistent (?) blunt spathe about ·5 cm. long.

Gramineæ.

Leptaspis urceolata R. Br. Sogere, 2000 ft., 160.

Dendrocalamus Forbesii Ridl. *l. c.* 360. Sogere, 2500 ft., 153.

GYMNOSPERMS.

Gnetum Gnemon L. Sogere, sine no.

Podocarpus latifolia Wall. Sogere, Meroka ranges, 2500 ft., 911.

FILICES.

By Antony Gepp, M.A., F.L.S.

Trichomanes bilabiatum Nees and Blume. Sogere, on Otomionumu Hill, 2500 ft., 631.

Davallia pentaphylla Blume. Mt. Koikoko, 2500 ft., epidendric, 620.

Davallia Forbesii Carruthers MS., sp. n. Rhizoma breve; stipites approximati 10–15 cm. longi 1·5–2·0 mm. crassi leviter muriculati glabri brunneoli; frondes 23–29 cm. longæ 10–12·5 cm. latæ ovato-deltoideæ quadripinnatisectæ pinnis utrinque 15–20 (apicem versus reductis) contiguis instructæ; pinnæ c. 10 cm. longæ stipitatæ lanceolato-deltoideæ acuminatæ rachi superne anguste alatâ pinnulas 12–15 sursum decrescentes utrinque gerente; pinnulæ stipitatæ bipinnatisectæ 2·5–3 cm. longæ 1·5 cm. latæ e costâ anguste alatâ et utrinque segmentis c. 5 alte pinnatisectis 1 cm. longis compositæ; segmentula ultima c. 4 cm. longa cuneato-oblonga apice bidentato et veno furcato prædita. Textura papyracea; paginæ glabræ; venatio dichotoma inferne prominula. Sori (immaturi) ovoidei solitarii segmentuli lobo laterali terminales.

Mt. Koikoko, 3000 ft., terrestrial, 663.

The affinity of this species is uncertain. In general habit it rather resembles the Indian *Aspidium fœniculaceum* Hook.

Tapeinidium pinnatum Christ. var. tripinnata Rosenstock.

Mt. Koikoko, 3000 ft., 623.

Hypolepis aculeata Gepp, sp. n. Rhizoma et stipites ignoti. Frons magna (pars tantum visa) rachibus rufo-brunneis antice canaliculatis postice aculeolatis; pinna 60 cm. longa 30 cm. lata deltoideo-lanceolata stipitata (5 cm.); pinnulæ primariæ usque ad 17 cm. longæ 7·5 cm. latæ suboppositæ lanceolatæ acuminatæ acroscopice curvatæ pinnulis secundariis fere 20 vix contiguis utrinque instructæ; pinnulæ secundariæ usque ad 4·5 cm. longæ ±1 cm. latæ alternatæ

lanceolatæ ±obtusæ segmentis 10–12 instructæ; segmenta alternata, basi ±adnata acroscopice parum auriculata, oblonga obtusa utrinque obtuse 2–3 lobata. Textura chartacea; color pallide brunneus; pagina superior glabra, rachibus costisque ±pubescentibus; raches costæ venæque postice pilis articulatis præditæ; venatio dichotomo-pinnata. Sori solitarii vel bini terminales in marginis loborum acroscopici sinu dispositi. Indusium minutum membranaceum.

Otomionumu Hill, 2000 ft., 555.

Little more than one pinna of a large frond, the size and shape of which are, like the rhizome and stipes, unknown. Apparently distinct from *H. papuana* Bailey.

Doryopteris concolor Kuhn. Narinumu village, 2500 ft., on rocks, in damp crevices, 849.

Pteridium aquilinum Kuhn var. lanuginosum Hook. Sogere, 3200 ft., terrestrial, 304.

Asplenium stipitiforme Gepp, sp. n. Rhizoma breviter repens paleis fusco-brunneis lanceolatis acuminatis obtectum; frondes approximatæ simplices fere sessiles 22–30 cm. longæ, e laminâ 3–4 cm. latâ elliptico-lanceolatâ acuminato-cuspidatâ inferne in costam anguste alatam stipitiformem 8–13 cm. longam 2 mm. latam sensim attenuatâ compositæ, margine superne irregulariter crenato-serrato. Textura chartacea; paginæ glabræ glauco-virides; venæ simplices rare furcatæ patentes ad marginem attingentes. Sori copiosi subcontigui laminæ dorsum (exceptis acumine marginibusque) obtegentes, et in parte stipitiformi fere usque ad basim sparsius dispositi.

Sogere, epidendric and terrestrial, 443.

The frond is remarkable for its narrowed stipitiform lower half, upon the alæ of which the sori are continued almost to the base. The plant is perhaps most nearly allied to *A. squamulatum*, but is smaller, has a smaller development of lamina in its frond, has a pronounced cuspidate apex, and sori which run from the costa almost to the margin.

A. salignum Blume. Sogere, epidendric, 1750 ft., 611. This appears to be nothing but a large form with stipes 37 cm. long 2·5 mm. thick; frond 40–42 cm. long, composed of 6–7 alternate shortly stalked or subsessile pinnæ 17–20 cm. long, cuspidate at apex.

A. tenerum Forst. Sogere, terrestrial, 1700 ft., 449, 604.

Also var. acuminatum v. Ald. v. Ros. Sogere, 584.

A. pellucidum Lam. Sogere, epidendric, 1750 ft., 606.

A. macrophyllum Sw. Sogere, epidendric, 585.

A. laserpitiifolium Lam. Mt. Koikoko, terrestrial, 3000 ft., 672.

Asplenium tenuisectifolia Gepp, sp. n. Stipites approximati 7–10 cm. longi 1 cm. crassi fusci sparse et minute paleacei; frondes 15–22 cm. longæ 7–10 cm. latæ lanceolatæ tripinnatisectæ pinnis utrinque c. 20 instructæ; pinnæ c. 5 cm. longæ 1–2 cm. latæ contiguæ subsessiles lanceolatæ caudato-acuminatæ patentes pinnulis utrinque c. 12 instructæ; pinnulæ inferiores 1–1·5 cm. longæ in segmenta 4–7 cuneato-oblonga binervata apice bidentata profunde

dissectæ, pinnulis superioribus decrescentibus et simplificatis. Textura papyracea; rachis firma fuscescens antice canaliculata sparse paleolacea. Sori in segmentis solitarii usque ad 2 mm. longis; indusium membranaceum.

Sogere, 560.

The affinity of this fern appears to be with dissected forms of the South-American *A. cicutarium* Sw. and the Indian *A. tenuifolium* Don.

Diplazium sorzogonense Presl. Sogere, terrestrial, 1750 ft., 603. Mt. Gawada, 2500 ft., 883. In this species the length of the sori is evidently variable; in the present specimens they reach about halfway from margin to costa; in some Malayan examples from costa to margin; and in Himalayan examples halfway from costa to margin.

D. (*Anisogonium*) proliferum Thouars. Sogere, 1700 ft., terrestrial, 448.

Dryopteris (*Nephrodium*) cucullata Christ. Sogere, 2000 ft., terrestrial, 480.

Dryopteris (*Nephrodium*) **sogerensis** Gepp, sp. n. Rhizoma breviter repens; stipites robusti c. 60 cm. longi straminei glabri auriculis parvis paucis remotis præditi; frondes c. 75 cm. longæ c. 30 cm. latæ lanceolato-oblongæ; pinnæ sessiles 15–19 cm. longæ 1·5–2·0 cm. latæ lineari-lanceolatæ acuminatæ basi subtruncatæ margine ad $\frac{1}{2}$ alæ et ultra inciso-lobatæ, lobis subtruncatis integris patentibus 3·0–3·5 mm. latis. Textura papyracea; paginæ glabræ; rachis et costæ antice parum villosæ; venæ utrinque 8–10, basalibus 1–2 anastomosantibus. Sori inframediales utrinque 7–8.

Sogere, terrestrial, 1700 ft., 446.

Closely related to *D. truncata* O. Kuntze, but differs in its narrower pinnæ more deeply incised and with quite glabrous undersurface. And with it must be ranged two specimens of smaller dimensions which differ in having only 6 pairs of veins in the lobes; they are labelled:—Otomionumu Hill, 2000 ft., 556, and Sogere, Otomionumu Hill, 2500 ft., 559.

Aspidium (*Sagenia*) decurrens Presl. Mt. Koikoko, terrestrial, 3000 ft., 594.

Oleandra cuspidata Baker. Sogere, terrestrial, 3200 ft., 294.

Polypodium (*Goniophlebium*) verrucosum Wallich. Mt. Koikoko, terrestrial, 3000 ft., 664.

P. (*Pleopeltis*) Annabellæ Forbes in Journ. Bot. xxvi. p. 33, pl. 280 (1888). Above the Musgrave River at 2000 ft., epiphytic on tree-stems.

P. (*Pleopeltis*) glossipes Baker. Koikoko, 3000 ft.

P. (*P.*) nigrescens Blume. Sogere, terrestrial, 450. Otomionumu Hill, 2000 ft., 558.

Polypodium (*Selliguea*) **albarium** Gepp, sp. n. Rhizoma longe repens albicans, paleis e basi peltata scario-marginata longe subulatis (ad 8 mm.) patentibus fuscis albescentibus; stipites 2·5–6 cm. longi (fertiles ad 9 cm.) glabri nitentes pallide brunnei; frondes subdimorphæ ±12·5 cm. longæ 2·5–3 cm. latæ (fertiles c. 12 cm. longæ

c. 1·4 cm. latæ) lanceolatæ longe acuminatæ, basi subito angustatæ et breviter decurrentes, margine anguste callosæ. Textura coriacea; paginæ glabræ nitentes; venæ et areolatio ex utraque pagina manifestæ, venis rectis vel sinuolatis marginem haud attingentibus. Sori superficiales lineares (rare interrupti) inter venas singulariter dispositi e costa ad marginem percurrentes.

Sogere, 3200 ft., on rocks, 290.

Very near *P. Feei* Mett., but differing in the white-coated rhizome with subulate scales, the areolation distinctly visible on both surfaces of the frond, and the sori reaching both costa and margin.

Dipteris conjugata Reinw. Sogere, terrestrial, 293.

Drynaria sparsisora Moore. Sogere, 1750 ft., epidendric, 780.

Monogramma paradoxa Beddome. Sogere, epidendric, 586.

Antrophyum alatum Brack. Sogere, 2000 ft., epiphytic, 123. Sogere, Otomionumu Hill, 2500 ft., on rocks, 564.

Vittaria scolopendrina Thwaites. Sogere, 1750 ft., epidendric, 605.—V. elongata Sw. Sogere, 2000 ft., epidendric, 262.

Stenochlæna palustris Bedd. Sogere, 2000 ft., climbing, 271.

Leptochilus (*Chrysodium*) axillaris Kaulf. On the ranges in front of the Owen Stanley Range, western side (no number).

Platycerium grande J. Sm. Sogere, 2000 ft., epiphytic, 152.

Lycopodium ingens Gepp, sp. n. Planta epiphytica gigantea. Caulis robustus 135 cm. longus, basi 6 mm. versus apicem 1 mm. crassus, cum foliis 2·5–4 cm. crassus, ter quaterve furcatus. Folia longissima (25–31 mm.) conferta erecto-patentia coriacea ovato-lanceolata longe subulato-acuminata versus basin c. 6 mm. lata, marginibus integris valde involutis, postice straminea sulcata, antice ±glauca nervo prominente. Spicæ 15–25 cm. longæ, ±2·5 cm. latæ; sporangia in axillis foliorum elongatorum, quæ caulinis omnino subsimilia sed confertiora $\frac{1}{3}$ breviora viridia sunt, disposita.

Sogere, 1800 ft., epiphytic on trees, 142.

This specimen approaches *L. Dalhousianum* Spring, but is at once distinguished by its great size and robust habit and by the long subulate leaves and sporophylls. The transition from stem to spikes is very gradual.

L. filiforme Roxb. Sogere, 2000 ft., epidendric, 633.—L. phlegmaria L. Sogere, a sterile scrap, without number.—L. cernuum L. Sogere, 1750 ft., 275.

MUSCI.

By H. N. Dixon, M.A., F.L.S.

Macromitrium (*Eumacromitrium*) **brachystele** Dixon, sp. n. *M. Leratii* Broth. & Par. forsan affine. Sat robustum. *Rami* erecti, strictissimi, circa 3 cm. alti, simplices vel, præcipue fructiferi, apice brevissime fasciculato-ramulosi. *Folia* confertissima, madida patentia, subfalcata, optime spiraliter inserta; sicca arcte incurvo-contorta et spiraliter ad instar funiculi torta, dorso ob margines

reeurvos atque costam prominentem velut biplicata; circa 4 cm. longa, e basi latiore concava sensim in laminam lingulato-lanceolatam subfalcatam angustata, acuta vel subobtusa, integerrima; costa percurrente vel brevissime excurrente. Cellulæ basilares alte papillosæ, infimæ tantum lineares, angustissimæ, superiores omnes subquadrato-rotundæ, læves vel leniter mamillosæ, 10–12 μ latæ, subpellucidæ, optime seriatæ, parietibus firmis, parum inerassatis, marginales sæpius serie una multo minores, irregulares, sæpe elongatæ. *Setæ* apud apicem ramorum et ramulorum plures, sæpe binatæ, brevissimæ, 2–3 mm. longæ, læves. *Calyptra* parcissime pilosa. *Theca* ovato-globosa, lævis vel siccitate leniter plicata, microstoma; operculum longe aciculatum; peristomium externum e dentibus breviusculis sæpe bifidis, fuscis, opacis, instructum.

Sogere, 2000 ft., epidendric, 515 *a*.

A fine and distinct species, near perhaps to *M. Leratii* Broth. & Par., and *M. longicaule* C. M., but very marked in its straight, erect, rigid branches, the distinctly spiral arrangement of the crowded leaves, with their tips, when moist, often falcate and homomallous; and when dry closely incurved with the tips strongly enrolled, frequently showing their spiral arrangement rather distinctly; and also in the extremely short seta.

M. crinale Broth. & Geh. has among other differenees the nerve longly excurrent and the upper cells elongate.

Macromitrium (*Cometium*) **papuanum** Dixon, sp. n. *M. hispidulo* Mitt. affine, paullo robustius, ramis erectis, perstrictis, 2 cm. vel paullo ultra longis, fusco-rufis, apice brevissime fastigiate ramulosis. Folia erecto-patentia, haud patentia, sicca arete spiraliter contorta, quam ea *M. hispiduli* paullo latiora, brevius, latius acuminata; areolatio per totum folium fere homogenea, cellulæ basilares vix elongatæ; omnes obscuræ. Phyllautoicum. Fructu *Cometii*.

Sogere, 2000 ft., epidendrie, 515 *b*. With the last species.

No species of the small and very distinct subgenus *Cometium* has hitherto been recorded from New Guinea. It is confined to the Malayan and Oceanic tropieal regions, the nine or ten species being very closely related to one another; *M. orthostichum* Nees may be considered the type of the group. Most of the species, including *M. hispidulum* Mitt., which in size and habit is the nearest to the present plant, have at least a few of the basal cells elongate and more or less pellueid (the drawing of the basal eells of *M. orthostichum* in the Bry. jav. Tab. evii. fig. 11, is quite incorrect, and is probably drawn from a different species). This eharacter, together with the erecto-patent, not horizontally spreading leaves, the straight erect branches, and the short seta, will separate it from any of the other species of the subgenus.

Polytrichum juniperinum Willd. (Without number.) New, I believe, to New Guinea. Its distribution is almost universal in the colder and temperate regions of the world, rare in the tropics.

Spiridens Reinwardtii Nees. Sogere region.

Trachyloma tahitense Besch. Mt. Otomionumu, 3000 ft., 431, p.p.

Aerobryopsis longissima (Doz. & Molk.) f. pseudo-lanosa (Broth. & Geh.) Fleisch. (*Aerobryum pseudo-lanosum* Broth. & Geh.). On branch of shrub, Sogere Hills, 2000 ft., 111.

Floribundaria floribunda (Doz. & Molk.) Fleisch. Mt. Otomionumu, 3000 ft., 428.

Neckeropsis nano-disticha (Geh.) Broth. Sogere, on leaf-stalks of tree, 945.—N. Lepineana (Mont.) Fleisch. Mt. Otomionumu, 3000 ft., 432.

Camptochæte porotrichoides (Besch.) Broth. Sogere, 2500 ft., fragments only on branches of shrub, 31.

Chætomitrium cygneum C. M. Sogere, 2000 ft., on branch of flowering plant, 22, with 705.

The New Guinea plant is undoubtedly one of the forms or derivatives of *C. leptopoma* (Schwaegr.). Fleischer (Musci der Flora von Buitenzorg, iii. 1048) considers *C. leptopoma*, *C. muricatum* Bry. jav., and *C. orthorrhynchum* (Doz. & Molk.) as segregates—with difficulty defined—of a single aggregate species, and the present plant strongly supports that view. It is perhaps nearest to *C. leptopoma*, but it is in some ways intermediate between that and *C. muricatum*; and I have received an exactly similar plant from the Malay peninsula.

C. elegans Geh. Sogere, 3500 ft., on branches of trees, 26.

Dimorphocladon bornense Dixon in Journ. Bot. lx. 109 (1922). Sogere, 2500 ft., on branches of 32.

A very interesting discovery, the plant (the sole species of the genus) being only known from its original station in Borneo. The present specimen, though fragmentary, and with only a single seta, agrees exactly with the original plant; the narrow leaves with bigeminate denticulation above, and the sporophyte characters, being identical, while the long, hyaline, jointed, filamentous gemmæ, tufted among the upper leaves, are very conspicuous.

Meiothecium hamatum (C. M.) Broth. Sogere, 2000 ft., epidendric, 515 *c*.

New to New Guinea. *Distr.* Java; Sumatra; Ceylon.

LICHENES.

By Robert Paulson, F.L.S.

Stictina quercizans Nyl. Sogere, 169 *a*.

Sticta demutabilis Krempelh. Sogere, 3000 ft., 430.

Ricasolia intermedia Nyl. Sogere, no number.

Parmelia perlata Ach. Sogere, 588.—P. corniculans Nyl. Sogere, with 660.

Usnea florida var. strigosa Ach. Sogere, no number.

Cerania vermicularis S. F. Gray. Sogere, no number.

Pyrenula sanlensis Müll. Arg. Sogere, on branch of No. 30.

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