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KARL EBERHARD RITTER VON GOEBEL.

BY F. E. WEISS, F.R.S., P.L.S.

GOEBEL was born in 1855 in Bietigheim in Baden, but, as his family came from Reutlingen in Würtemberg, he was sent to the neighbouring university of Tübingen, where as a student he came under the inspiring influence of Hofmeister, for whom he preserved a lasting admiration. To this he was able to give memorable expression at the centenary of Hofmeister's birth in 1924, when as last surviving pupil he published an admirable biography of his great master, a translation of which was issued by the Ray Society in 1926. Like other German students, he did not confine his studies to one university, but proceeded to Strassburg, where, under De Bary's tuition, he took his Ph.D. degree, presenting a thesis on the development of the prothallus of *Gymnogramme leptophylla*. Subsequently Goebel became Sachs's assistant and privatdozent in Würzburg, and after brief periods of teaching in Leipzig and Strassburg was appointed Professor in the University of Rostock in 1882. A further move to Marburg preceded his appointment in 1891 to the Professorship in Munich, where he remained for the rest of his fruitful scientific career, responsible for considerable developments in his department and particularly for the laying out of the new and extensive botanical gardens at Nymphenburg on the outskirts of Munich.

Travels to India, Brazil, Venezuela, Australia, and New Zealand brought him into close contact with many different types of vegetation, and greatly extended his knowledge of the living plant in its natural surroundings. The experience thus gained coloured the whole of his later work and he became the foremost exponent of the modifications of structure exhibited by plants in their adaptation to their surroundings and also in the course of their individual development. This attitude

of mind is well illustrated by the two volumes of 'Pflanzenbiologische Schilderungen' (1889–1893), which contain many and varied biological and morphological studies based largely upon observations made and material collected in various parts of the world. Goebel's interest in Morphology had shown itself already when he was invited in 1882 to collaborate in a new edition of Sachs's 'Textbook of Botany,' of which four editions had appeared between 1868 and 1882. The Physiological section was continued by Sachs, but Goebel contributed the second part under the title of 'Outlines of Classification and Special Morphology.' He also contributed in 1884 in Schenk's 'Handbuch der Botanik' a volume entitled 'Vergleichende Entwicklungsgeschichte der Pflanzenorgane.' This may be considered the forerunner of his *magnum opus* 'Die Organographie der Pflanzen,' the various parts appearing between 1898 and 1903, and of which an English translation was published by the Oxford University Press (1900–1905).

The importance and value of this work is attested by the fact that three editions of the German edition have been called for, each one embodying much new matter on which Goebel was incessantly at work. The morphological considerations in this monumental book are never formal, but are always dealt with in a vivid and living manner and related to the ontogeny of the organism described. Many of the problems which troubled the older morphologists disappeared when Goebel put forward the view now generally adopted that the sporangium is an organ "sui generis," which may originate on either leaf or stem. He was also ready to consider some organs as of an indeterminate nature like the rhizophores of *Selaginella*, which may bear either roots or leaves, and the curious lateral organs of some Utricularias which may become leaves or roots. The Organography is entirely free from dogmatic assertions, and shows a most balanced judgment of observations and experiment.

Developmental and causal morphology led Goebel to experimental methods, and the results of some of these were embodied in his 'Experimentelle Morphologie der Pflanzen' (1907). As indicated in the extended title and also emphasized in the preface, this book is to be considered as an introduction to experimental Morphology, "a more or less new country," as he says, "in which the path has to be found, and in which unexpected discoveries are to be made with simple experimental methods." In this new field of research Goebel became a pioneer and without doubt many vexed questions will be solved by those who follow after him.

It is interesting to note that in all his morphological books Goebel deals neither with the relationship of plants nor with their evolution. He seems reluctant to deal with phylogenetic

considerations, leaving these matters to the systematists and the palæobotanists. Fossil plants are not used for comparison. He is, *par excellence*, the student and exponent of the living plant. Confining himself to the latter, especially to the Archegoniatæ and Spermatophyta, he has worked diligently throughout a long and busy life without finishing his quest. Even the voluminous 'Organography' could not contain all he had to tell us, and two Supplementary Volumes were published, one in 1924 dealing with the Movements of Unfolding in Plants and their teleological explanation and a second volume in 1931 dealing with the Formation of Flowers and Inflorescences.

Goebel's eminence as a botanist was early recognized in England, and he was invited in 1884 to contribute the article on Muscineæ to the IXth edition of the 'Encyclopædia Britannica.' In 1892 he was elected a Foreign Member of the Linnean Society and in 1926 of the Royal Society. In 1930 he was awarded the Linnean Gold Medal. In his own country he received many honours and occupied the Presidency of the Bavarian Academy of Sciences.

Tall and well built von Goebel had a charm of personality and manner which ensured him of an ever-ready welcome on his not infrequent visits to this country, the last of which was on the occasion of the International Botanical Congress at Cambridge. He had a kindly nature, and many friends in this country will cherish his memory, as they mourn the loss of one of the most distinguished of botanists. His death on October 9, at the age of 77, removes a still active worker and a leading figure in the botanical world.

REMARKS ON TYPE-SPECIMENS, AND ON A NEW SPECIES OF GRASS FROM HAWAII.

By A. S. Hitchcock, D.Sc.

Under the present system of botanical nomenclature it is required by one rule that the earliest specific name for a species be used if the resulting binominal is not invalidated by some other rule. Many early names have been ignored, because the original description could not definitely be co-ordinated with a known species. It is now coming to be regarded as obligatory to identify such early descriptions by a study of the type-specimens, when these can be found. I will here call attention to three cases in which an examination of the type has resulted in reducing to synonymy a well established name and validating a poorly or erroneously described species. A fourth case involves the shift of a name and the description of a new species.

Glyceria melicaria.

A grass of the eastern United States was known commonly for most of the last century by the name *Glyceria elongata* Trin. For nomenclatural reasons this name was changed at different times to *Panicularia elongata*, *Glyceria Torreyana*, and *Panicularia Torreyana*. In 1907 I visited the herbarium of the Muséum d'Histoire Naturelle in Paris to study the types of American grasses, among them those described by Michaux in his 'Flora Boreali-Americana' (1803). One of these was that from which the description of *Panicum melicarium* was drawn. This species had been ignored, because the description did not seem to apply to any known species of *Panicum*. The part of the description that made the identification difficult was (translating the Latin) "a minute rudimentary floret empty and stipitate from the base of the perfect flower." No species of *Panicum* is known to have such a rudiment. In some genera, such as *Calamagrostis*, there is a rudiment of this kind which is a prolongation of the rachilla. Michaux's type-specimen was at once recognized as the species commonly called *Glyceria elongata*. The description could now be interpreted. The spikelet of *Glyceria* has several florets which separate at maturity by the disarticulation of the rachilla. In Michaux's specimen the spikelets, being over-mature, had lost all the florets except the lowest. The rachilla-joint remaining behind the floret was the "rudiment" of the description. Michaux erred in placing this species in the genus *Panicum*, even on the supposition that there was one floret with a rudiment behind, since there were only two glumes, whereas *Panicum* has two glumes and a sterile lemma which looks like a glume. Because of this identification it was now necessary to take up the specific name *melicarium* and the species accordingly became, under the American Code, *Panicularia melicaria* (Michx.) Hitchc. But since *Glyceria* is a conserved name, under the International Rules, the accepted name is *Glyceria melicaria* (Michx.) Hubbard. Michaux's species would have remained unidentifiable if the type-specimen had not been available for consultation.

Trisetum irazuense.

A few years ago I published a new species of *Trisetum* from Colombia*. I had good specimens and wrote a complete description. The species is found from Costa Rica to Ecuador. After the publication of this species I had occasion to examine some of Kuntze's types at the New York Botanical Garden. I was then preparing an article on the Grasses of Central America, and was especially desirous of knowing the identity of *Calamagrostis irazuensis* Kuntze (Rev. Gen. Pl. ii. 763, 1891) from Costa Rica. The detailed description did not appear to fit

* *Trisetum scabriflorum* Hitchc. Contr. U.S. Nat. Herb. xxiv. 358 (1927).

any known species of *Calamagrostis* from Costa Rica—nor, for that matter, from any other country. The specimen was found, and to my astonishment it proved to be the same species as my *Trisetum scabriflorum*. The name was therefore changed to *Trisetum irazuense* (Kuntze) Hitchc. (Proc. Biol. Soc. Washington, xl. 82, 1927). The type-specimen was over-mature and the spikelets had disarticulated, leaving only the glumes and lowest floret. The pilose rachilla-joint between the first (lowest) and second florets remained attached behind the floret as a little stem. The genus *Calamagrostis*, to which Kuntze referred the species, is characterized by one-flowered spikelets with (in the section *Deyeuxia*) a slender usually pilose prolongation of the rachilla behind the floret. The over-ripe spikelets of Kuntze's specimen show many characters of *Calamagrostis*. However, the pubescence of the lemmas was different from what is found in *Calamagrostis*, and Kuntze himself says his species differs in this respect from any known species of *Calamagrostis* mentioned by Fournier from Mexico and from any species of the genus from Central America to be found at Kew. A careful examination of the prolongation of the rachilla behind the floret of Kuntze's specimen shows the scar or disarticulating surface at the top, where this joined the base of the floret above. If Kuntze had been more familiar with grasses he would have detected this scar and would not have referred his plant to the wrong genus. As in the preceding case, Kuntze's species was unidentifiable without an examination of the type-specimen.

Poa laxiflora.

In 1927, while at Sol Duc Hot Springs, in the Olympic Mountains, Washington, I found a beautiful specimen of a *Poa*, which did not seem to belong to any species known to me. After a study of our representatives of the genus, I published the species as *Poa remissa* Hitchc. (Proc. Biol. Soc. Washington, xli. 158, 1928). At that time this collection was the only one known. Later the species was found in the Humboldt National Forest, Nevada.

In 1863 Buckley published a series of new species of plants, mostly from Oregon and Texas, one of which was *Poa laxiflora* (Proc. Acad. Phila. 1862, 96 (1863)). Gray, in his review of Buckley's plants, says of this species, "*Poa laxiflora*—the name appropriated from Nuttall, as usual,—whatever else it may be, accords with *P. leptocoma* Trin. from Sitcha. It is probably a woodland form of an old species." So for many years it rested as a probable synonym of *Poa leptocoma*.

In the early part of this century Piper examined the type-specimen in the herbarium of the Philadelphia Academy of Natural Sciences, and referred it to *Poa leptocoma* with a query, but doubted the locality (it was said to come from the Columbia Woods, Oregon). He was familiar with the states of Washington

and Oregon, and knew that *Poa leptocoma* did not grow along the Columbia River. I saw a photograph of the type, which consists of a culm with a panicle and two leaves, but was doubtful as to its being *Poa leptocoma*, although I could not place it elsewhere. This year I examined Buckley's types and discovered to my chagrin that his *Poa laxiflora* was the same as my *P. remissa*. Since *P. laxiflora* is valid it must displace *P. remissa*, even though the description of the former is meagre and the type unsatisfactory. The difficulty here was that Buckley's species is exceedingly rare, being known in 1928 only from his incomplete specimen and the Sol Duc Hot Springs material. Only an examination of the Buckley type by a specialist would show that this and my Sol Duc specimens belonged to the same species.

Panicum Beecheyi.

In 1922 I published an account of the grasses of the Hawaiian Islands*. Among other species in the genus *Panicum* I included *P. Beecheyi* Hook. & Arn. and *P. kauaiense* Hitchc. (sp. nov.). At the time of my visit to Kew in 1930, I examined the type-specimen of *P. Beecheyi*. This proved to be the plant I had called *P. kauaiense* and not the one I had described as *P. Beecheyi*. Hence the synonymy stands as follows :—

Panicum Beecheyi Hook. & Arn. Bot. Beechey Voy. 100 (1832). Originally described from the " Sandwich Islands."

Panicum kauaiense Hitchc. Mem. Bishop Mus. viii. 187, f. 76 (1922). Type, Forbes 703, from Kauai.

This leaves without a name the species I described (*op. cit.*) as *Panicum Beecheyi*. I am therefore describing this as new.

Panicum ramosius Hitchc., sp. nov. Planta annua ; culmi 20–30 cm. alti ramosi diffusi glabri vel puberulentes, nodis villosis ; *vaginæ* glabræ ; *laminæ* glabræ vel scaberulæ 4–10 cm. longæ 2–4 mm. latæ ; *paniculæ* numerosæ angustæ 5–10 cm. longæ pallidæ, axibus ramisque paulum villosis ; *spiculæ* acuminatæ 4 mm. longæ ; *glumæ* æquales 5-nerves acuminatæ longe villosæ, pilis patulis 1–2 mm. longis, apice solum pubescentes ; *lemma* sterile quam glumæ paulo brevius 7-nerve pubescens ; lemma fertile 2 mm. longum.

Type in the U.S. National Herbarium, no. 1,535,767, collected at Manili, island of Lanai, Hawaiian Islands, May 2, 1918, by George C. Munro.

Other specimens in the U.S. National Herbarium are : Lanai, Munro 301, 6, 6½, 6 *b* ; Molokai, Munro in 1903.

This species was described as *P. Beecheyi* (" Grasses of Hawaii," Mem. Bishop Mus. viii. 184, f. 73, 1922).

The above examples illustrate the difficulties encountered in applying the type-method, and show the necessity of consulting types if nomenclature is to be placed on a stable basis.

* " Grasses of Hawaii," Mem. Bishop Museum, viii. 101–230 (1922).

I have been asked by beginners in taxonomy, How do you know where to look for a type-specimen ? I have replied that the answer to this question involves the whole subject of herbaria and their contents, and that this subject is a part of his research problem. There is no one book which gives the location of all types, though there are books that aid one to find them. The student must acquire his knowledge concerning the location of types as he does that of other branches of taxonomy—by the gradual accumulation of evidence. Another question the beginner asks is, How do you know a type when you see it ? The revised edition of the International Rules, now in preparation, will probably contain a definition of a type-specimen. My own definition is—A type-specimen of a species is the specimen or one of the specimens which the author had chiefly in mind when preparing the original description. The student must learn to use discretion in the interpretation of type-data, especially when dealing with the types of the early authors. Sometimes an author has misinterpreted his specimen and has written an erroneous description. The type-specimen may explain such discrepancies. If a supposed type-specimen does not agree with the description, at least within explainable limits, it is not the actual type. The description takes precedence over the specimen when there is a conflict of evidence. In this Journal (lxii. 166, 1924) I published an example illustrating the conflicting evidence occasionally shown between the specimen cited and the description. Ordinarily, the single cited specimen would be accepted as the type. But it was shown by an examination of Beal's herbarium that the type of *Arundinella Palmeri* Vasey, Beal, was not the specimen erroneously cited, which belonged to a different species, but an unmentioned specimen in his herbarium which bore the name in Beal's script and which answered to the description.

U.S. Department of Agriculture.

NOTE ON *CHENOPODIUM GLAUCUM* L.

By Eric Drabble, D.Sc.

Examination of the material of *Chenopodium glaucum* in my own herbarium and in that at the British Museum has failed to discover any seeds—whether upright or horizontal—with acutely keeled edge, although they are thus described in most Floras. Mr. J. E. Little (*in litt.*) reports a similar experience with his own specimens, and in Rep. B. E. C. 1931 (1932) 839, he writes in reference to certain plants from Lurgashall, Sussex, " The keel mentioned by Coste is not evident in the fresh fruit ; and comparing it with a sheet of *C. glaucum*, Isle of Wight, 1915, J. W. Long, the latter also has no acute keel, but is rounded off or only obscurely keeled."

Not one of my specimens shows any keel; the margin is *rounded*. The many specimens examined in Herb. Mus. Brit. are exactly similar. An attempt has therefore been made to find the source of the error so generally repeated in the Floras, both British and Continental. In this search Mr. Wilmott has given me invaluable aid, and to him I tender my sincere thanks.

No reference to a keel is made in any of the following works :— Pollich, Hist. Plant. in Palat. nasc. incepta, i. (1776); Leers, Fl. Herborn. (1789); Lamarck, Fl. Fr. ed. 2, iii. (1795); Withering, Brit. Plants, ii. (1801); De Candolle, Fl. Fr. ed. 3, iii. (1815); Smith, Fl. Brit. ed. 2, i. (1804); Smith, E. B. ed. 1, xxi. and plate 1198 (1805) (the seed in this plate is not keeled); E. B. ed. 2, ii. and plate 362 (1835), with the same figure as in ed. 1.

Turning to Moquin-Tandon's 'Chenopodearum Monographia,' 31 (1842), we read "Semina margine acuto." Koch, Syn. Fl. Germ. ed. 2 (1843), does not embody this, ignoring the margin of the seed altogether, nor do Boreau, Fl. Centre, ed. 3, ii. (1857), nor Bentham, Handb. Brit. Fl. ed. 1 (1858), but from 1842 onwards this erroneous description appears in slightly varying form in most Floras. Babington, who is known to have worked with Moquin-Tandon's Monograph, writes in Bab. Man. ed. 1 (1843) "acutely keeled at the margin"; in ed. 4 and onwards to ed. 8 it appears as "acutely keeled at the edge," and this is continued into the re-edited edition of 1904 (ed. 9). Similar descriptions are found in many other Floras, *e.g.*, De Candolle, Prodr. 13, part 2 (1849), "semina margine acuto"; Grenier et Godron, Fl. Fr. 3 (1855–56), "à bord aigu"; E. B. ed. 3, viii. (1868), "bluntly keeled"; Hooker, Stud. Fl. ed. 3 (1884), "acutely keeled"; Coste, Fl. Fr. iii. (1906), "à bords caréné-aigu"; Rouy, Fl. Fr. xii. (1910), "à bords caréné."

A remarkable result of this general error seems to be shown in E. B. ed. 3, viii. 23 (1868), where Syme writes "the vertical ones bluntly keeled . . . . the horizontal ones larger but in other respects similar," though the same figure is used as in ed. 2, which correctly shows a seed with no trace of keel. Seeds actually detached by Syme himself and enclosed in packets on his own sheets now in Herb. Mus. Brit. are keelless. It would seem that Syme was influenced by the description given by Moquin-Tandon and his followers, and tried to combine the keel, which according to them ought to be present, with the keelless condition as he saw it, giving as a compromise "seeds . . . bluntly keeled." A similar explanation may perhaps account for Hegi's description (Illust. Fl. Mitteleuropa, iii. 1909–12), "am Rande schwach gekielt." A still more remarkable comment is that by Fraser in Rep. B. E. C. 1931, 839 (1932), "the tiny seeds have a very narrow keel, but not all botanists are agreed about this."

It must be stated plainly that the seeds of *Ch. glaucum* are not keeled; the margin in both horizontal and vertical seeds is rounded. When the seed is looked at *in surface view* the position of the embryo, coiled round in the perisperm, can occasionally be seen, but there is no *keel* whatever.

It was at first suspected that two plants, one with keeled, the other with keelless seeds, had been confused under the name *Ch. glaucum*, but examination of plants from many parts of Europe has failed to find any with keeled seeds, and it seems certain that the seeds are characteristically keelless.

The seeds in all my specimens are dark brown or almost black; Smith, E. B., describes them as "blackish"; Grenier and Godron as "brunes"; Rouy as "brunes"; Hegi as "schwarzbraun"; Babington says they are "reddish," but this applies only to the unripe seeds.

Ch. glaucum is described in Hooker's 'Student's Flora' as "6–18 in., prostrate . . . . usually spreading, widely branched"; in Babington's 'Manual' as "spreading, often prostrate." I have grown the plant from seed, and find that the stem may be upright or slightly decumbent at the base, and have seen plants at Newport, Isle of Wight, with branches 15–17 in. in length, more distinctly prostrate at the base, then ascending. Mr. J. W. Long has found at Newport an entirely prostrate and widely spreading form which seems to be a distinct variety, var. *prostratum* Beck, Fl. Nied. Oester. 331 (1890).

The form of the leaf varies; Hooker calls it "oblong or ovate-oblong sinuate-lobed, obtuse or rounded, base cuneate"; Babington, "oblong sinuate-dentate"; Hayward "oblong-toothed"; Moss (Cambridge Brit. Fl.) "oblong, margin sinuous, obtuse." All these forms are to be met with, while also the leaves may be not obtuse, but distinctly acute; indeed, Hegi (*loc. cit.*) describes the leaves of var. *typicum* Beck as "spitz oder zugespitzt." Further, the margin may be very slightly sinuate or almost entire, as in H. C. Watson's specimen from St. Sampson's, Guernsey, Aug. 1865, in Herb. Drabble. Usually the leaves on the flowering branches are much smaller and narrower than those on the main stems; they may even be sublinear, entire, and very long-stalked, as in a specimen in my herbarium from Newport, Isle of Wight, J. W. Long, 1929. There is an apparently distinct variety with all the leaves small, narrow, and acute, with sharply toothed margin; this plant, which was found by Mr. J. W. Long at Newport, seems to come under var. *microphyllum* Murr. Hegi (*loc. cit.*) mentions many varieties, but the descriptions seem to suggest that some of them are states of growth and not distinct varieties. It may be wise to defer a consideration of these until more of them have been tested in cultivation.

NOTES ON *LATHYRUS APHACA* L.

By B. Barnes, Ph.D., F.L.S.

Lathyrus Aphaca is a well-known morphological curiosity, notable because of its large stipules and because of its leaves, normally represented on mature plants by filiform petioles, devoid of leaflets, and running out into unbranched tendrils. A small patch of this plant was found in the summer of 1918 on calcareous soil near Bruay, Pas-de-Calais, France. Ripe pods were collected, and in 1920 plants were raised from some of the seeds. Seeds were saved from one of these plants, and since 1921 plants have been grown each year, usually from seeds ripened in the previous season.

The seeds germinate readily, and the manner of development has been the same in the hundreds of seedlings which have been looked over. The germination and seedling development of *Lathyrus Aphaca* has been described by a number of authors (16, 20, 21, 25, 31, 36, 37) *, all of whom agree in their main details. The cotyledons are hypogeal, and the first two or three leaves on the aerial stems are scale-like, usually trifid. These leaves are followed by two or three compound leaves, each bearing one pair of broadly lanceolate leaflets, placed one on each side of the aristate tip of the rachis ; the stipules of these juvenile leaves are small and asymmetrical. At each of the three or four nodes next above the uppermost juvenile leaf, the stem bears a pair of stipules, the rest of the leaf being reduced to a very short petiole with a pointed tip. The members of each pair are larger and more symmetrical than those of the pair next below. A pair of normal symmetrical stipules and a petiole ending in an ordinary tendril develop at the eighth to tenth node. The internodes of this primary stem are short, and almost always the whole stem has a somewhat wilted aspect. The primary stem seldom lasts long, and in my plants has never flowered. By the time that normal stipules begin to form on the primary stem lateral branches have arisen from buds in the axils of the scale-leaves; these branches, and their branches, develop pairs of large stipules from the first, and soon flower. The primary stem and the juvenile leaves wither before the first flower opens, so that a mature plant is quite without leaflets.

The degeneration of the primary stem is a characteristic and puzzling feature of *Lathyrus Aphaca*. The plant is probably a native of the Levant and Western Asia. A specimen in the Kew Herbarium, collected by John Stuart Mill in Greece in March 1862, bears juvenile leaves and flowers. The early flowering suggests that the plant had developed very rapidly, and, maybe, in a warm climate, with conditions favouring rapid growth from the start, the

* The figures in parentheses refer to the Bibliography, which will appear at the end of this article.

primary stem may often survive and form part of the permanent shoot-system of the plant. In the south of France, according to Lombard (36), the primary stem normally disappears, as it does in this country. It is well known that the seedlings of many plants, checked in early growth, often fail to give strong plants. In *Lathyrus Aphaca* the loss of the primary stem, weakened by the checks caused by the low average temperature of a northern spring, is probably hastened by the competition of the lateral branches, formed a little later, when conditions favour their rapid growth. Comparable phenomena may be seen in plants of *Antirrhinum majus* overwintered out of doors ; the stems which have passed the winter, and which, from their crowded and often malformed leaves heavily charged with anthocyanin, seem to be unhealthy, are often crowded out and replaced in May by young and vigorous shoots arising from the base of the plant.

My stock of *Lathyrus Aphaca* started from one seed ripened in 1920. The plants have shown much divergence in the dimensions of their parts ; some have been distinguished by the production of particularly large or particularly small stipules, and some have developed branches bearing large stipules and others bearing small ones. Mature stipules ranging in breadth from 1 cm. to 2·5 cm. have been noted. The flowers have varied in length within rather narrow limits ; the range is 0·8 cm. to 1·3 cm. The corolla has varied in depth of colour from cream to a full yellow, and there has been much minor variation in the extent of development of faint purple streaks in the standard. Purple-black seeds, brown-purple seeds variegated with yellow stripes, and seeds of intermediate character have been obtained. These divergences have been shown by plants growing side by side under identical conditions, and therefore are not due merely to accidents of the environment.

The plants have been frequently and closely examined during growth. Only one marked variation has been seen. This occurred in 1928, on a plant belonging to a line started from a black seed. The plant was strong, with six long stems each bearing about a dozen petioles ending in tendrils. One petiole inserted on the upper half of a stem bore a single lateral leaflet a trifle over 1 cm. long. The leaflet was linear-lanceolate, with a stout and somewhat hollowed base, in texture and colour it agreed with the stipules. The petiole was of normal size and ended in a functional tendril ; its basal part, below the insertion of the leaflet was about twice as thick as the stoutest part of the tendril (fig. 1, p. 12).

The plant was watched until it withered in August 1928. It did not produce any more leaflets. Only eight seeds ripened, six black and two black with a few light flecks. These were germinated, but the seedlings were killed by severe weather in the spring of 1929.

The casual production of a leaflet by one plant only, in a stock of which hundreds had been grown, suggested that the occurrence was worth further investigation. Reference to the well-known treatises on plant-teratology (38, 39, 41, 44, 57) did not yield anything relevant, but when the systematic books were consulted it was found that the condition, though rare, is not unknown. Specimens of *L. Aphaca* bearing one or more lateral leaflets have been examined in the herbaria at Kew, the British Museum, Edinburgh, Cambridge, and the Linnean Society.

During the search for records of leaflets in *L. Aphaca*, specimens and descriptions were found of foliate varieties of the plant, characterised by the development of terminal leaflets on all the petioles of adult plants. It soon became apparent that there is much confusion in the literature respecting the nature and nomenclature of these foliate plants. Fortunately, several specimens have been available for examination, and the results

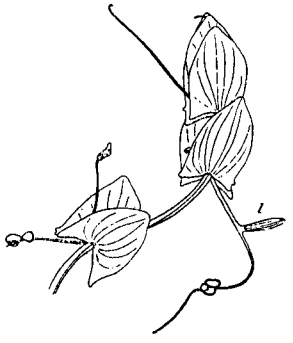


Fig. 1.—*Lathyrus Aphaca* showing the lateral leaflet, *l*, as it appeared on 4th June, 1928. Half nat. size.

of this examination, together with the information gained from an extensive search in the books, make possible an attempt to clear up a small but complicated tangle. I have tried to see or to obtain trustworthy copies of all the published statements on this subject. It is possible that something has been overlooked, but I do not believe that anything essential has been missed.

The history of the foliate plants of *L. Aphaca* begins with Chauvin (17), who described to the Linnean Society of Normandy a peculiar form of the plant found by him at Mouen, near Caen, in 1843. His account of the plant does not seem to have been printed. Hardouin, Renou, and Leclerc (29) give some details of Chauvin's plants. They also mention the discovery by Durand Duquesney at Lisieux, in 1845, of a few peculiar specimens, and record a further find, by de Brébisson, near St. Pierre-sur-Dive, in 1848. These authors relate that Chauvin found an abundance

of specimens, and that, although he searched, he was unable to find a plant with both tendrils and leaflets; every abnormal plant had all its tendrils replaced by terminal leaflets. Their note gives all the information that seems to be available about the plants found by Durand Duquesney; these plants bore two lateral leaflets in addition to tendrils, and as Hardouin's account is accompanied by a reference to statements by de Candolle (15, 33), that *L. Aphaca* occasionally bears paired leaflets, it is probable that the specimens from Lisieux were plants with a few casual leaflets. They may, of course, have been young plants retaining their juvenile leaves. De Brébisson gives somewhat scanty details of his plants in the second and subsequent editions of his 'Flore de la Normandie' (12, 13, 14). Chauvin's plants are also mentioned. It is not clear from the information given by de Brébisson that he distinguished between the form found by Chauvin, with all the tendrils converted into terminal leaflets, and specimens bearing a few leaflets only. He nowhere uses a varietal name. Perrier (45), another member of the Linnean Society of Normandy, is unfortunately almost equally vague. He says that the most usual leafy form of *L. Aphaca* is one with the end of the tendril replaced by a leaflet, and that it is possible to find plants of this species showing all the kinds of compound leaves met with in the genus *Lathyrus*. An important piece of information is that abnormal forms of *L. Aphaca* have persisted for many years on clayey soils near Bayeux.

Specimens communicated by S. R. Lenormand to Babington, in 1846, now in the Cambridge Herbarium, yield more definite information about the Norman variety. His specimens, labelled *L. Aphaca* L. (*foliifer*), came from Caen, and are almost certainly specimens of Chauvin's form, for they agree with the description given by Hardouin (29). The Cambridge Herbarium has a specimen of the plant distributed as no. 1474 *bis* of Billot's 'Flora Galliæ et Germaniæ exsiccata,' a plant to be discussed presently. Comparison of Lenormand's plants and Billot's no. 1474 *bis* shows that they differ only in size. The differences in size are no greater than I have seen in my plants, and they cannot be of systematic importance. The two plants undoubtedly belong to the same variety. Friedel (20), who examined numerous specimens of foliate plants of *L. Aphaca* in herbaria at Paris, including one collected near Bayeux, and others from Western France, the source of Billot's specimen, came to the same conclusion.

Lloyd (35) mentions, without a varietal name, a form of *L. Aphaca* bearing petioles ending in terminal leaflets: this plant had been found at Bougon by Sauzé, and near Port Louis by Thépault. Lloyd had seen the herbarium formed by Sauzé and Maillard, and therefore was personally acquainted with the variety. Sauzé and Maillard supplied specimens of the variety

to Billot, which were distributed as no. 1474 *bis* of his 'Flora Galliæ et Germaniæ exsiccata,' with a label referring them to Lloyd's variety. Thépault seems to have published nothing about his plants, and I know of no specimen collected by him. Godron (24), in his comprehensive survey of the flora of the neighbourhood of Port Louis, does not mention *L. Aphaca*. In this connection, however, a specimen preserved in the Edinburgh Herbarium is of interest. It belongs to the same variety as the plants from Caen and Bougon; the only information given with the specimen is the locality, Carnac. Possibly the plant was collected by J. Miln or one of his associates, when the excavations at Carnac were in progress. Be that as it may, Carnac is not far from Port Louis, and this specimen helps to bridge the geographical gap between Bougon in Western France and the localities in Normandy.

An important specimen in the British Museum Herbarium (ex Herb. B. Auerswald) was collected by Vetter at Schleitheim, near Schaffhausen, in June 1859, and passed through the collection of Julius Schlickum, an apothecary at Winnigen. The label bears the name *Lathyrus Aphaca* L. *foliatus*, and states that the plant was found in company with the normal form. A note on the back of the label, in an unidentified handwriting, runs as follows :—" Es ist kein Cirrhus foliaceus, denn ich besitze ein Exemplar, woran der Cirrhus neben dem Blatte, am Ende sich befindet." Neither Schlickum nor Auerswald seem to have published anything about this plant, but Vetter (55) described it with the name *L. Aphaca* var. *foliata*. Vetter says that he had sent about eighty specimens into Germany some twenty-five years previously, but that, so far as he knew, no one had published any account of the variety. He also says that a local botanist had recently obtained a few more specimens for him at some distance from the original locality. Vetter's plant has been compared with the specimen of Billot's no. 1474 *bis* in the British Museum Herbarium; both belong to the same variety, though Billot's plant is smaller than Vetter's specimen.

There are two specimens mentioned in the literature which I have been unable to see. Borbas (10) notes a foliate plant preserved in the Herbarium, Natural History Museum, Budapesth, collected by Delacour at Avignon. Delacour does not seem to have described his specimen, and I have found no accounts of foliate plants of *L. Aphaca* in floras of Avignon. Friedel (20) examined specimens from that locality; he considered that they belonged to the same variety as the plants from Western France and from Normandy; in the absence of personal experience of the plants from Avignon, his opinion is accepted. Rouy (51) mentions a specimen (Exsicc. Dauph. no. 2441) with the tendrils replaced by terminal leaflets. I have been unable to obtain any further information about this plant.

A number of varietal names have been applied to foliate plants of *L. Aphaca*; these names will now be discussed.

Nyman (43) applies the varietal name *ecirrhosa* to Billot's specimen no. 1474 *bis*: the name is invalid, as it is not accompanied by a description, but we are left in no doubt about the plant to which it was given. Rouy (51) cites the name as *ecirrosa* Nym., refers to Billot no. 1464 *bis*, and describes the variety as having short petioles ending in a tendril reduced to a mucro. These statements need comment. First, the identity of Billot's no. 1464 *bis* must be established. Billot distributed specimens of normal *L. Aphaca* in the fifteenth century of his Fl. Gall. et Germ. exsicc. In the list of the plants making up this century (6) nos. 1464 and 1464 *bis* are occupied by *L. Aphaca*: the succeeding numbers, consecutively to 1474, belong to various members of the Leguminosæ and Rosaceæ, no. 1474 being *Potentilla grandiflora* L. In a later list (7) Billot indicates that no. 1464 was *L. Aphaca* from a French locality, no. 1464 *bis* from a Swiss one. Billot often distributed specimens of the same plant from different localities, distinguishing them by the addition of *bis*, *ter*, and so on, to the number first allocated to the plant. The Herbaria at the British Museum and at Cambridge contain sheets of normal *L. Aphaca*, distributed by Billot, and coming from French and Swiss localities. Both plants are numbered 1464—apparently Billot used no. 1464 *bis* in his lists, and not on his labels. A list dated May 1864, issued after Billot's death by Bavoux and others (3), shows that no. 1474 *bis* was distributed in the 34th and 35th centuries of the Fl. Gall. et Germ. exsicc. Billot was preparing these centuries for distribution during his last illness (8), and his annotations to them, if made at all, were lost after his death (4). The number 1474 *bis* is probably a slip for 1464 *ter*, made under the stress of illness. There is no evidence that Billot's no. 1464 *bis* was a plant of abnormal character.

(To be continued.)

SHORT NOTES.

CORYNEPHORUS CANESCENS Beauv. ON THE MORAY COAST.—In this country *Corynephorus canescens* is held to be native only in East Anglia. It has, however, been recorded from near Port Talbot in South Wales and from South Lancashire, both cases possibly being introductions resulting from shipping activities. In view of this very restricted distribution and of the fact that its native area extends only as far north as Norfolk on the East Coast, it is of interest to record the fact that it occurs in great abundance over extensive tracts of sandy shingle to the east of Lossiemouth. It is found chiefly in the "lows" between the east-west parallel ridges of sand; associated with it are *Calluna*,

Festuca rubra, many lichens, especially Cladonias, and mosses. The sand-ridges are mostly covered with gorse, broom, *Psamma*, and *Carex arenaria*, but the *Corynephorus* is also found quite frequently on the barer parts of the sand.

It appears to extend over many square miles of land, and its normal density in the "lows" is 6–10 plants to the square yard, and such that it is a predominant factor in the landscape. Owing to its abundance, there can be no doubt that it has been in the district for many years, but it was first noticed by the writer in the summer of 1929.

The Rev. G. Birnie of Speymouth has informed the writer that some thirty-five years ago he saw a few plants of *Corynephorus* at Kingston-on-Spey and a solitary plant on the west side of Lossiemouth; it is probable that this was, in the first place, another instance of casual introduction at a port, but its occurrence in this district is now remarkable for the abundance and vigorous growth exhibited so far north of the natural limit of the species.—E. H. Chater.

Notes from Glamorgan.—*Rumex rupestris* Le Gall. In August 1932, the writer was directed to the habitat of a dock, growing in considerable profusion on the extensive sand dunes at Kenfig, by Miss E. Vachell, to whom it had been shown by Miss E. M. Thomas of Porthcawl. It proved to be *Rumex rupestris* Le Gall, a species new to the county.

The dock occurred in crescent-shaped communities in dry sand at the landward end of several of the dune-slacks which abound at Kenfig. Some of these communities consisted of pure *R. rupestris*, while others contained also *R. crispus* var. *trigranulatus* Syme, and plants, presumably hybrids, intermediate between the two species.

The Kenfig plants, in comparison with herbarium specimens from other localities, both British and Continental, are somewhat stouter and more bushy in habit, the tubercles are very large (usually covering the whole of each perianth-segment), and the leaves, which remain fresh and green into September, when plants of Cornish populations are withered (*fide* Miss Vachell), have a distinctly glaucous hue, a character not mentioned in any description of the species seen by the writer. Seeds of the Cornish and Kenfig plants (including the supposed hybrid) have been sown at Kew, to see if there is any genotypical difference between the two populations.

R. rupestris, a plant of rocky, stony, and sandy shores, has a Western European distribution, having been recorded from Spain, Portugal, western France, Channel Isles (Jersey), Cornwall (including the Scilly Isles), North and South Devon, and Dorset. The records from Sussex and Hampshire are almost certainly errors.

The fact that such a conspicuous community has not been previously recorded suggests the possibility that the plant may have been recently introduced, perhaps by birds, from its nearest habitat at Braunton Burrows, N. Devon. It is, however, thoroughly well established in at least half-a-dozen slacks, and it must, in the writer's opinion, have been there for at least five or six years.

Cirsium tuberosum All. × *C. palustre* Scop. Mr. J. L. Bruce showed the writer this hybrid growing with both parents in the well-known locality for *C. tuberosum* near Nash Point, where he has noticed it for some years. Though not previously recorded from Britain, this hybrid has been long known in France, Switzerland, and Germany, and numerous segregates from the cross have been described under different names, the earliest of which seems to be *Cirsium semidecurrens* Richter in Klett u. Richter, 'Flora von Leipzig,' 673 (1830). The Glamorgan plant was apparently quite sterile.—J. S. L. Gilmour.

Alleged Change of Colour in Primula vulgaris.—The following experiment has been carried out in order to test the accuracy of the statement often made that if a yellow-flowered plant of *P. vulgaris* is planted upside down the flowers produced the following year will be pink. Two plants of an F_1 generation were selected normal for colour, but heterozygous in that the cross was made between a normal and a plant with enations. No coloured plant appeared in the F_2, so it was known that for colour the plants were probably homozygous, but segregation for the enating character took place.

The plants were divided and the divisions labelled A, B, C, D. A and C were planted in the normal way, their divisions B and D upside down, and in order that there should be no possible mistake the latter were planted in wire cages. All four plants flowered and all produced flowers of the normal colour. The flowers of the divisions B and D were examined to see if a chimerical effect might have been produced and enations formed; this, however, did not occur.

It is suggested that in cases of reported change of colour care has not been taken to ensure accuracy of observation. The probable explanation is that a seedling or plant with coloured flowers growing near is mistaken for the inverted plant; in some cases plants so treated do not live. Unless very good evidence to the contrary is forthcoming it may be assumed that the alleged change of colour does not take place.—Eric M. Marsden-Jones.

Cirsium heterophyllum × palustre in Inverness.—A specimen of this rare hybrid, found in W. Inverness near Tomich, has been presented to the British Museum Herbarium by the collector (R. Knowling). It has sub-entire (not pinnatifid)

leaves. From the same district was also presented a peculiar form of *C. palustre* (L.) Scop., a slender plant 60 cm. tall, unbranched except for two small flowering shoots at the apex, with practically entire linear leaves about 12 by 1·3 cm. when fully developed, weakly spinose ciliate on the slightly sinuate, weakly toothed margin. I should be glad to receive information should similar plants have been noticed elsewhere.—A. J. WILMOTT.

REVIEWS.

The Mechanism of Creative Evolution. By C. C. HURST. Roy. 8vo, pp. xxv, 365; with frontisp. and 199 figs. Cambridge University Press, 1932. Price 21*s*.

THE last year or two has seen several hastily compiled books aiming to deal with certain aspects of genetics. The present work is of wider scope. Its intention is to present the main developments in genetics during the last decade as they bear on evolution, and to indicate the present position as the author sees it. Dr. Hurst's experience with the plant, the animal, and the human side has enabled him to produce a very readable and profusely illustrated work which is worthy in some respects to stand beside Bateson's 'Mendel's Principles of Heredity,' which marked the progress of an earlier decade. If there remain any sceptics concerning the part played by chromosomes in connection with hereditary processes they should read this book.

The author has not always shown the same reticence of statement as characterized Bateson's work, and some of his views regarding the gene would not be acceptable to all geneticists. Nevertheless, he has produced a volume which records many important advances in simple terms clearly expressed. On many topics the statements are not as full as the geneticists could wish, but the aim was evidently rather to produce a work of more general character. In this the author has succeeded so well that every biologist who wishes a summary of recent genetical work should read his book.

Having said so much, a few criticisms will be in place. In discussing sex-chromosomes the letters WZ are retained for animals in which the female is the heterogametic sex. This is really an unnecessary complication, and there is no reason why the terms XY should not be retained in all animals and plants. Although the figures are nearly all well chosen, a few of them have either been too much reduced or have otherwise suffered in roproduction. This applies, for instance, to figs. 52 and 61. There are now *more* than seven types of trisomic mutations in *Oenothera* (p. 88), and this is to be expected since 12 of the 14 chromosomes in *O. Lamarckiana* are regarded as unlike. The aberrant chromosome-numbers of the speltoid wheats are mentioned

(p. 94), but there is no reference to the similar conditions found in fatuoid oats. A notable omission is the work of Punnett in showing that the number of linkage-groups in the sweet pea corresponds with the number of chromosome pairs. Certain other topics, such as sex in fungi, if mentioned at all, should have been more adequately treated.

The twenty chapters into which this work is divided include such topics as chromosomes and genes, translocations, polyploids, hybridization, and mutations, all in their relation to the production of new species. The chapter on "genes and genetics" includes a useful summary of the genetics of colour in rabbits and sweet peas, as well as the inheritance of musical temperament and general ability in man. The roses come in for considerable treatment, but Hurst's conception of the genetic species requires further justification.

The last four chapters take on a more speculative and general character. The author takes the rather extreme view of the gene (p. 185) as "the organizer and the foundation of life," later developing the conception that genes were the earliest living particles. Suffice it to say that this is only one of the possible conceptions of their evolution.—R. RUGGLES GATES.

The Pteridophyta of Madagascar. By CARL CHRISTENSEN. With Contributions of H. PERRIER DE LA BÂTHIE (Distribution), A. H. G. ALSTON (*Selaginella*), and JOHS. IVERSEN (*Isoëtes*). Dansk Botanisk Arkiv, vii. Roy. 8vo, pp. xv, 253, 80 plates. H. Hagerups Boghandel: Copenhagen, 1932. Price 50 kr.

IN this work we have a competent revision of the Pteridophyta of Madagascar. During the past three years Carl Christensen has made a careful study of all available material, has examined all the types of the endemic species, and has compared the non-endemics, so far as possible, with authentic specimens. He was thus able to supply, as requested, a revised enumeration of the whole group on a broad and safe basis for inclusion in Perrier de la Bâthie's 'Catalogue des Plantes de Madagascar' (Tananarive, 1932). That, however, was little more than a list of names, and necessitated the preparation of a more detailed account containing descriptions of the new species, critical notes on specific delimitations, and on numerous changes of nomenclature. Such is the origin of the present work. It does not provide descriptions of species other than novelties; this lack, however, is largely compensated for by the provision of excellent species-keys, descriptive notes, and a liberal supply of illustrations. There are, in fact, figures of 267 species, mostly endemic, which have never been delineated before; the drawings have been made

by the author himself from type-specimens, and show the most important specific characters. Moreover, for most of the other species an easily accessible figure is cited, chiefly from Hooker's 'Species Filicum,' the 'Icones Plantarum,' and T. R. Sims's 'Ferns of South Africa.' Thus we have a straightforward and consistent account which will be of the greatest assistance to all students of Madagascar ferns.

The keys under the larger genera, such as *Asplenium*, *Dryopteris*, *Polypodium*, *Elaphoglossum*, *Selaginella* (by Mr. Alston), are of great value in facilitating the naming of species. And still more valuable is the author's treatment of the Cyatheaceæ, a difficult group, the classification of which has hitherto been confusing and unsatisfactory, owing to the incompleteness of the material in herbaria and the instability of some of the characters employed for distinguishing the species, such as the degree of division of the pinnæ, and the texture and pubescence of the frond. Christensen has been able to examine the actual types of all Cyatheaceæ described from Madagascar as well as the very complete specimens of tree-ferns collected by Perrier de la Bâthie in every part of the island. From a study of these Christensen has concluded that the most trustworthy specific characters are the structure of the stipe-base as well as of the scales and hairs of the frond, the venation and serration, the position of the sori, the indusium, the height and thickness of the trunk, the leaf-scars, and the adventitious roots. There were 43 species to be investigated; these he has now reduced to 29. Further, he has leagued himself with Copeland and Domin in abolishing the barriers between *Cyathea*, *Hemitelia*, and *Alsophila*. He refers all but four of the Madagascar species to *Cyathea*, as the indusium has proved to be too variable and too misleading a character for generic delimitation. The residual four species, which form a distinct group, are left temporarily in *Alsophila*.

The distribution of the species within the island is reviewed in a separate chapter by Perrier de la Bâthie; and the affinities of the species are analysed by Christensen. There are 505 species in all, as many as 233 of these being endemic, and their geographical affinities are roughly as follows:—one-seventh are Mascarene, one-fifth African, one-third Asiatic, one-fifth American, one-tenth pan-tropical, and a few South African and cosmopolitan respectively.

A valuable feature of the book is the interesting account of the various collectors of Madagascar plants, their dates, their districts, and what became of their collections. Most of the ferns collected before 1900 were described by J. G. Baker, and the type-specimens are preserved in the Kew Herbarium. As to the extensive material which has been gathered subsequently, it was worked out by Prince Roland Bonaparte, whose herbarium, including that of Christ, is now in the Paris Museum.—A. Gepp.

Lily Year-Book, 1932. Edited by F. J. Chittenden, F.L.S., V.M.H. Roy. 8vo, pp. 125, frontispiece and 27 figs. Royal Horticultural Society: London, 1932. Price 5*s.* paper; 6*s.* cloth.

Though primarily addressed to the cultivator this attractive brochure issued by the Royal Horticultural Society contains much botanical information. The publication inaugurates the work of a Committee appointed by the Society to encourage the cultivation and the study of Lilies, Fritillarias, and *Nomocharis*. A Lily Conference has also been arranged to be held in July 1933. Of the twenty-five short articles, some deal with cultivation of the plants at home and in America; the editor, F. J. Chittenden, writes on the lily disease (*Botrytis*), and there are articles dealing with individual species or groups of species—Capt. Kingdon Ward, for instance, writes on *Lilium hyacinthinum* Wilson in its Burma-Tibet mountain home. A. Grove contributes an index to illustrations of species of *Lilium*, W. B. Turrill a tentative list of species and synonyms of *Fritillaria*, and Sir Wm. Lawrence a general account of its species, many of which he has himself grown. There are also several pages of notes from correspondents at home and abroad. A portrait of the late Henry John Elwes—"the father of modern Lily cultivators"—forms an appropriate frontispiece; the text-figures are mainly habit illustrations of species growing in cultivation.

A Handbook of some South Indian Weeds, containing complete Descriptions and short Notes on some of the common Weeds indigenous and introduced in South India. By C. Tadulingam, F.L.S., and G. Venkatanarayana, B.Sc. 8vo, pp. viii, 356, pls. 132. Government Press: Madras, 1932. Price 4 rupees.

The Director of Agriculture, Madras, Mr. R. D. Anstead, who has taken an active interest in the preparation and publication of the book, supplies a Foreword indicating its aims. These are to place at the disposal of the farmer a knowledge of the nature and habits of the common weeds of cultivation, so that he may be able to control them or possibly to turn them to his use. It should also serve as a useful text-book for teachers in the Presidency who are engaged in attempts to conduct school gardens and teach nature study. The authors are officials of the Agricultural College and Research Institute, Coimbatore.

There are six introductory chapters, in which are described in simple language the parts of a plant, the system of binary nomenclature and means of determination, the classification of weeds according to their period of life, habit, or habitat,

the loss caused by weeds and the uses to which they may be put, their means of spreading and methods of controlling them. The last chapter contains some useful enlarged drawings (the magnification is indicated) of more than a hundred common weed seeds, and also of a few of the seedlings.

In the descriptive portion (pp. 62–328) a concise description of each family precedes the account of the species. The latter includes a good botanical description, notes on occurrence, habitat, and method of propagation, an estimate of the number of seeds per plant, indication of means of control and of economic importance, if any. English and native names are cited. A clear full-page plate illustrates the habit of the plant and details of structure of the flower and fruit. There are a useful glossary and separate indexes of botanical, English, and native names.

Considerable care has evidently been given to the preparation of the work, which should fulfil the objects indicated in the Foreword.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY OF LONDON.—At the General Meeting on November 24 Dr. A. B. Rendle gave an account of the Herbarium and Manuscripts bequeathed by John Gerhard Koenig to Sir Joseph Banks. Koenig, who went to India in 1768 as Surgeon and Naturalist in the Danish service at Tranquebar, was in 1774 appointed naturalist to the Madras establishment of the Hon. East India Company, which he served until his death in 1785. He was an indefatigable collector and an able botanist. During his life he sent specimens to Banks, Solander, and other European botanists, one of whom, Prof. Retzius of Lund, published in his 'Observationes Botanicæ' many novelties collected by Koenig. The herbarium is a rich collection of the flora of India and Ceylon. The Manuscripts, which were arranged and annotated by Dryander, Sir Joseph's librarian, are in nineteen volumes, and contain elaborate descriptions of the genera and species represented in the herbarium, with notes on Koenig's travels and his observations on natural history, medicine, &c.

The Discussion on Dr. Hamshaw Thomas's paper on "The Old Morphology and the New" was continued. The Fellows are indebted to Dr. Thomas for an exposition of the newer points of view, which at first sight seem subversive of standard conceptions of flowering plant morphology, which postulate a uniform value for floral and foliage leaves. The newer conceptions are at present somewhat vague, but the divergence of views may ultimately prove not to be so great as now appears.

At the meeting on December 8 papers were read by Mr. W. J. C. Lawrence on "The Origin and Genetics of the Garden Dahlia" and by Dr. B. F. Barnes on "Variation in *Antirrhinum*."

'THE GARDENS' BULLETIN, STRAITS SETTLEMENTS,' vii. pt. 1 (Sept. 1932), contains a substantial contribution to our knowledge of Malayan Orchidology by Mr. C. E. Carr. The first paper contains descriptions of a new genus, *Cheirorchis*, of 25 new species and three new varieties from the Malay Peninsula, and 26 new records for the Peninsula of previously described species. The new genus contains five species, three are described for the first time and two are transferred from *Sarcochilus* and *Dendrocolla* respectively. There are three new Dendrobiums and nine new Bulbophyllums. Eight new combinations are published, and there are critical notes on previously known species. The new species and records are largely of Mr. Carr's own collecting; others are based on specimens collected by officers of the Singapore gardens. The second paper is a taxonomic account of the genus *Taeniophyllum* in the Malay Peninsula. In Ridley's 'Flora of the Malay Peninsula' four species of the genus are enumerated. Since the publication of that work thirteen additional species have been found, chiefly in Pahang, twelve of which are regarded as new. The new species are described and figured, references are given to those previously known, and a key is supplied to the subgenera, the sections, and the 17 species now known from the Peninsula.

The descriptions are very full, but the frequent absence of a collector's name and number and the omission to indicate the type-specimen may lead to confusion in the future. Many of the novelties are described from living plants; this is a great advantage, and the author has doubtless at the same time prepared adequate herbarium material for future record.

'THE JOURNAL OF THE ROYAL HORTICULTURAL SOCIETY,' lvii. pt. 2, contains several papers of special interest to botanists. C. V. B. Marquand enumerates, with a key and full descriptions, the thirty-five species of *Gentiana* known in cultivation from China and the Himalaya. There are some excellent photographs of Gentians by Mr. D. F. Merrett from the Camla Gardens, Sussex. Lt.-Col. Enever Todd continues his 'Survey of the Genus *Viola*,' dealing with the *Chamaemelanium* and *Melanium* sections. Contributions from the Wisley Laboratory comprise continuations of Dr. Tincker's experiments on the response of plants to the daily period of light and D. E. Green describes a Smut disease, *Entyloma Dahliae*, which seriously affected the collection of Dahlias in the autumn of 1931. An interesting appreciation of the late George Forrest and his work of botanical exploration in South-West China, by Sir W. Wright Smith is reprinted from "The Rhododendron Society Notes."

'TRANSACTIONS OF THE BRITISH MYCOLOGICAL SOCIETY,' xvii. pt. 3, Nov. 1932.—The organism causing bacterial canker of plum trees, *Pseudomonas mors-prunorum*, is described in detail by H. Wormald. T. Petch supplies a classified list of British Entomogenous Fungi, which includes several new species, and Malcolm Park sends from Ceylon a discussion of the characters and nomenclature of *Tuber zeylanicum* and *Sclerotium* spp. Kathleen Sampson records observations on a new *Olpidium* in the root-hairs of *Agrostis*, and R. C. Woodward describes the occurrence of *Cercospora Fabae* on Field Beans in England. Dorothy Dixon-Stewart, of Melbourne University, describes five new species of *Montierella* isolated from soil, and B. L. Chona his observations on growth and sporulation of *Aspergillus glaucus* and a Potato Wilt caused by *Fusarium oxysporum*. An authoritative note on common names of plant-diseases insists on a distinction in nomenclature between the disease and the pathogen which causes it.

'COUNTRY-SIDE.'—The winter number of this journal includes several popular articles of botanical interest; but a note on "Unnamed Varieties of Common Plants" by our old friend Mr. J. F. Rayner calls for protest. Discouraged by the verdict of expert authority on some of his finds, the author proposes varietal names for unusual forms of three common plants with the plea "Must make ourselves conspicuous somehow!" Fortunately, as the method of publication does not conform with the Rules of botanical nomenclature, the names proposed are invalid.

MISS GERTRUDE JEKYLL, who died on December 10 in her 90th year, would probably not have claimed to be a botanist, but she numbered many botanists among the friends whom she welcomed to her beautiful gardens at her home, Munstead Wood, near Godalming. An artist born and trained, she developed the use of colour-effects in gardens, and her writings, 'Colour in the Flower-garden,' 'Colour Schemes for the Flower-garden,' 'Wood and Garden,' and others, earned for her the title of "The Mother of Modern Gardening," and were a powerful influence on its development as an art. In 1897 the Royal Horticultural Society awarded her their Victoria Medal of Honour and twenty-five years later the Veitch Memorial Gold Medal. An appreciation of her work and a portrait appeared in the 'Gardeners' Chronicle' for December 17.

WE offer congratulations to our contributor Mr. F. RILSTONE of Polperro who has been awarded the gold medal of the Royal Institution of Cornwall for his work on the Cornish brambles.

Also to Dr. HERMANN CHRIST, the doyen of Swiss naturalists, who entered on his 100th year on December 12.

NOTES ON *LATHYRUS APHACA* L.

BY B. BARNES, PH.D., F.L.S.

(Concluded from p. 15.)

IT is not at all clear why Rouy asserted that the variety *ecirrosa* had the peculiar characters he assigned to it. The condition he described is a normal developmental phase of the plant, and needs no varietal name.

Beck von Mannagetta (48) has the name *ecirrhosus* Nyman with a reference to Billot no. 1474 *bis*; like Rouy, he says that the tendril is changed into a mucro. Ascherson and Graebner (2) have similar statements about the morphology, but Billot's plant is placed under var. *phyllophorus* Borbas. Friedel (20) repeats Rouy's name and description; he dismisses the variety with very little comment. Hegi (30) gives the name *ecirrhosus* Nyman, the statement that the tendril is reduced to a point, and no reference to a specimen. Finally, Bonnier (9) lists the variety *cirrhosa* Nyman, a curious transformation of the name, since he alludes to the absence of tendrils.

All this confusion started from Billot's specimen no. 1474 *bis*, a plant whose tendrils are replaced by terminal leaflets. I have found no evidence of the existence of a variety of *L. Aphaca*, whose petioles characteristically end in a tendril reduced to a short point. As comparison of specimens shows that Vetter's plant and Billot's plant belong to the same variety, both should bear the same name. Vetter's varietal name has preference over Nyman's name, because it was accompanied by a description. The subsequent applications of the name *ecirrhosus* must be rejected, for they have been used to distinguish a variety which does not seem to exist.

A second varietal name, *foliolosus*, or some variant of the word, has been used by several authors. It seems to have been introduced, in the form *foliolosa*, by Gremli (26), who attributed it to de Brébisson. Gremli attached the name to Vetter's variety, but, probably influenced by the rather vague statements in de Brébisson's 'Flore de la Normandie,' he described a plant with one or two leaflets at the tips of only some of the tendrils. Vetter (55) clearly described a plant with the general conversion of the tendrils into terminal leaflets, and his specimen supports his description. Vetter (56), in his French translation of Gremli's book, adopted the name *foliolosa* without comment. Borbas (10) used the name *foliolosa* Bréb. to distinguish the foliate plant collected near Avignon by Delacour, and referred as authority to de Brébisson (14). De Brébisson does not use a varietal name in that edition—nor, indeed, in any edition of his flora. Hallier (32) seems to use the name *foliolosa* Bréb. for the ordinary juvenile

condition of the plant, a curious use of the name. Rouy (51) distinguishes the variety *foliolosa* Bréb. from the variety *ecirrosa*, and mentions the specimen (Exsicc. Dauph. no. 2441) already alluded to: he too cites de Brébisson (14) as authority. Beck von Mannagetta (48) uses the name *foliolosus*, and gives the same information as does Rouy. Ascherson and Graebner (2) and Hegi (30) apply the varietal name to a plant with both leaflets and tendrils, and so, presumably, to a condition here regarded as a casual one, not of varietal rank.

Friedel (20), after examining many specimens, held that the variety *foliolosa* Bréb. is the only definite variety of *L. Aphaca*: he described it as having the upper leaves in the form of a short petiole ending in a well-developed terminal leaflet. Had Friedel examined a plant showing the characters he ascribed to the variety *ecirrosa*, he would hardly have stated that the variety *foliolosa* is the only well-marked variety of *L. Aphaca*. His brief allusion to var. *ecirrosa* indicates that he never saw a specimen of it: this is further evidence of the non-existence of that variety.

Corbière (18) gave the Norman localities already noted, and distinguished the plant by the varietal name *foliosa*. Bonnier (9) used this name in his text, ascribing it to de Brébisson, while, in the description of the corresponding plate, he used the name *foliolosa*; his figure would fit any of the foliate plants I have seen.

Reasons have already been given for regarding the Norman plant, as exemplified by Lenormand's specimen, as identical with Vetter's plant. Vetter's name antedates Gremli's name by two years, and therefore the name *foliolosus* and its derivatives must give way to *foliatus*. There is no evidence that any definite variety of *L. Aphaca* exists with leaflets on some petioles and tendrils on others; if such a variety is shown to exist, the varietal name *foliolosus* Gremli should be given to it.

There is, in southern Europe, a robust and large-flowered plant of somewhat doubtful status. It has been regarded as an independent species, with the name *Lathyrus affinis* Guss. (28), and it has been regarded as a form of *L. Aphaca*. The status of this plant will not be discussed here; it seems best to regard it as a form of *L. Aphaca*. Borbas (10) regarded var. *foliolosus* as belonging to *L. affinis*, and, as the specimen on which he relied came from southern France, it may well have been a strong plant. He proposed the varietal name *phyllophorus* for Billot's no. 1474 *bis*. As this name was accompanied by a description, it would replace *ecirrhosus* Nyman, but it is antedated by *foliatus* Vetter. Beck von Mannagetta (48) does not appear to accept the name *phyllophorus*; Ascherson and Graebner (2) and Hegi (30) accept it in the sense proposed by Borbas.

Two other varietal names need brief mention. The first, *unifoliatus*, occurs in Goebel's 'Organography' (25); I have not found it elsewhere. It appears to apply to the foliate plants, but it is antedated by names already discussed, and is therefore unnecessary.

The other, *unifoliolatus*, is found in Penzig's 'Pflanzen-Teratologie' (44), and is repeated in the second edition. Both Vetter and Morière (42) are mentioned, and the plant is clearly indicated by these references. In this literature list, Penzig cites Vetter's paper by its proper title (55), and yet has *unifoliolatus* in his text: this name is presumably a transformation of his own. The same mixture occurs in Worsdell (57), *unifoliolatus* in the text, *foliata* in the literature list. The name appears to be without authority. Penzig has another statement of doubtful value. He says that Morière (42) described the foliate variety. The paper referred to is an obituary notice of A. Perrier: in it, Morière merely remarks that Perrier discovered the foliate variety at Mouen. This seems to be a faulty statement. Perrier (45) published a short paper on the foliation of *L. Aphaca*, based on plants from around Bayeux, not from Mouen: he makes no claim to priority in that paper. According to Hardouin (29) and to de Brébisson (12), Chauvin first found the plant at Mouen: as their accounts were written soon after the event, they are more likely to be correct.

It appears, then, that there is in Western Europe, scattered over a wide area, a rare variety of *Lathyrus Aphaca*, bearing terminal leaflets on all its petioles, and therefore without tendrils. The oldest name for this plant, accompanied by a description, seems to be *L. Aphaca* L. var. *foliatus* Vetter. This varietal name applies to all the foliate plants I have examined, and replaces the varietal names which have been discussed.

Two further points will be briefly dealt with—the colour of the ripe pods and the colour of the testa in *L. Aphaca*.

Grenier and Godron (27), Godron (23), and Bonnier (9) describe the ripe pods as yellowish. After examination of many ripe pods of cultivated material in the Chelsea Physic Garden, in my own garden, of wild material from Torquay, Windlesham, and Bruay, and of much herbarium material, it seems that greenish brown, as stated by Hegi (30), is nearer to the truth for recently matured pods; later, the pods turn brown.

The testa varies greatly in colour. The original sample of seeds collected near Bruay consisted mainly of purple-black seeds; about one-third of the sample had purple-brown testas variegated with yellow, and a few were intermediate: one of the intermediates was black on one side, variegated on the other, the rest were purple-black with one or two small yellow flecks. It was hoped that it might be possible, by selection, to isolate strains producing black and variegated seeds respectively. So far, this has not been successful, though some hundreds of plants have been grown, and the seeds for the

next crop, taken from plants in which the tendency to give either black or yellow seeds, seemed to be most strongly expressed.

At first, attempts were made to obtain complete counts of the seeds from the individual plants, together with details

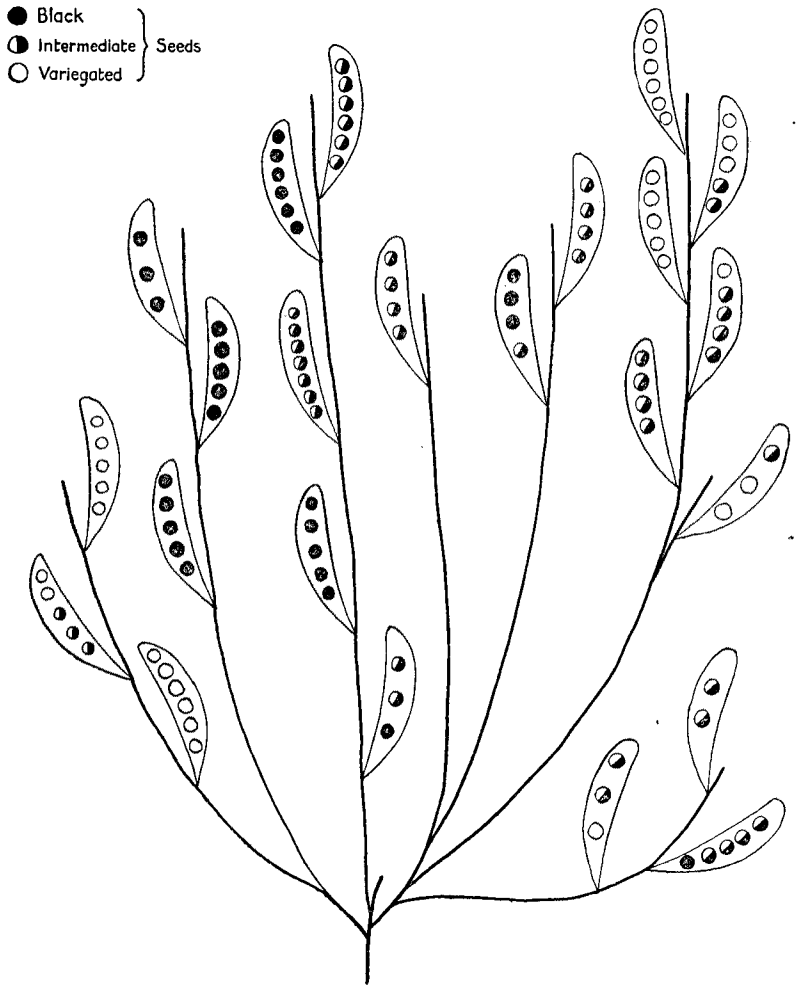


Fig. 2.—Diagram of a plant of *Lathyrus Aphaca* L., grown from a variegated seed in 1920. The positions of the pods on the plant and of the seeds in the pods are indicated.

of the position of each seed in the pods. The plants have not been difficult to grow, for germination has been good and flowering abundant, but the crop of ripe seeds has been poor, because many

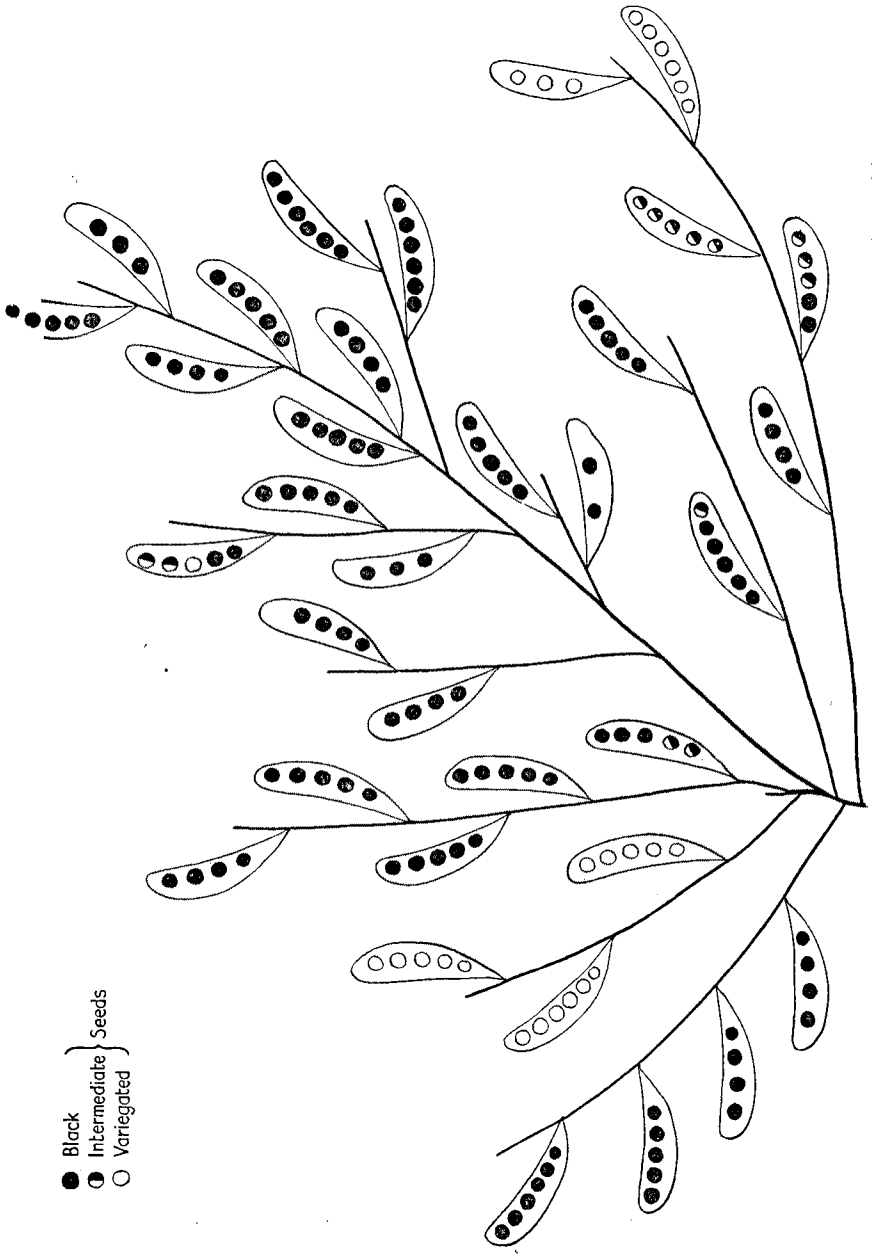


Fig. 3.—Diagram of a plant of *Lathyrus Aphaca* L., grown from a black seed in 1931. The positions of the pods on the plant and of the seeds in the pods are indicated.

of the pods have dried up before the seeds were fully formed. This has occurred on plants sown in autumn and on plants sown in spring; watering in dry weather has not improved the crop. Complete counts have therefore been obtained from only a few plants; two counts chosen at random from the records are represented in diagrammatic form in figs. 2 & 3.

Usually plants raised from black seeds give more black seeds than do plants raised from variegated seed; the latter generally give a fair number of variegated seeds. There are vague indications that variegated seeds may occur most freely on some branches or parts of branches, but, not infrequently, black and variegated seeds occur separately in pods on the same branch, and, less often, black and variegated seeds occur in the same pod. Rarely a seed is obtained with one half of the testa purple-black, the other variegated. Such a seed mixed with either black or variegated ones cannot be distinguished from the others if it lies undisturbed with the appropriate side turned uppermost. At present the mechanism which determines the distribution of testa colour on a plant of *L. Aphaca* is quite obscure. If somatic segregation occurs, it must sometimes be of a complicated character.

In a vague way, also, it seems that the tendency to produce black seeds is associated with a weakness in vegetative vigour; plants or branches with small stipules and short internodes usually give a preponderance of black seeds; plants or branches with stipules approaching or exceeding 2 cm. in breadth, and with long internodes, may give a good proportion of variegated seeds. The relation is not, however, a simple one, for efforts to influence the colour of the testa by encouraging or depressing the vegetative activity of the plant, by rich or by poor feeding, have not yielded consistent results. A strain of plants cultivated in the Chelsea Physic Garden produces very constantly light yellowish seeds faintly marked with purple streaks, and another strain grown there gives black seeds sometimes faintly flecked with yellow or grey; evidently there are strains of *L. Aphaca* which show much constancy in the sort of testa they produce.

Many of the authors who describe *L. Aphaca* do not mention the colour of the testa. The table has been compiled from twenty descriptions chosen in such a way that they give an account of material drawn from a wide area, and also indicate the historical aspect of the matter.

Probably some at least of the descriptions are taken from herbarium material, and this renders uncertain any generalisations from the table. Black seeds of my stock, ripened in 1920 and then dully purplish, now agree well with the description coal-black, applied by Koch. On the other hand, variegated seeds ripened in that year, and then showing yellow areas (Ridgway, XXX. 21″. *k.*), have changed in colour to reddish brown (Ridgway, II. 7. *m.*).

Testa colour in Lathyrus Aphaca *L.*

			Testa colour. Bl.	Br.	Var.
Dodoens (Lyte) (19)	1619.	N. Europe (?) ..	×	..	..
Tournefort (Martyn) (54) ..	1730.	Europe and Asia Minor (?)....	×	×	×
Gmelin (26)	1808.	W. Germany ...	..	..	×
Roehling (Koch) (50).....	1823–39.	Germany.....	×	..	..
Mérat (40)	1843.	Paris	×	..	..
Lloyd (34)	1844.	W. France	×	..	..
Bertolini (5)	1847.	Italy	..	×	..
Grenier and Godron (27) ..	1848–56.	France.....	..	..	×
Philippe (46)	1859.	Pyrenees	..	×	..
Alefeld (1)	1861.	Austria (?)	×	..	..
Godron (23).....	1861.	Lorraine	×	..	×
Sowerby (53).....	1864.	Britain	×	..	×
Sauzé and Maillard (52)....	1872.	W. France	..	..	×
Koch (Hallier) (32)	1892.	Germany.....	×	..	..
Corbière (18)	1894.	Normandy	..	×	..
Post (47)	1896.	Syria	..	×	×
Rouy (51)	1899.	France.....	..	..	×
Ascherson and Graebner (2)	1910.	Cent. Europe ...	×	×	..
Hegi (30)	1924.	Cent. Europe ...	..	..	×
Borg (11)	1927.	Malta.....	..	×	..
			10	7	9

Seeds taken from green and half-ripe pods are reddish brown in colour (approximately Ridgway, II. 7. *m.*), and seeds which fail to ripen, in pods which dry up prematurely, are also of this colour. It appears, therefore, that as variegated seeds age the light areas approximate in colour to that characteristic of immature and aborted seeds. The descriptions given by Bertolini (5), Post (47), and Borg (11) suggest that the seeds of plants from southerly habitats may, even when properly ripened, bear testas of a similar colour. Presumably the seeds ripen more rapidly in Syria and in Italy than they do, for example, in this country. Delayed ripening may favour the development of more and deeper pigmentation in the testas, and the changes noted in the light areas on stored seeds may be slower changes of a similar kind. These suggestions are provisional, and it is hoped that opportunity may be found to put them to experimental test.

I wish to express my gratitude to the Department of Botany, British Museum, Natural History, to the Herbaria at Kew and the Royal Botanic Gardens, Edinburgh, and to the Botany School, Cambridge, for the free access to specimens and books accorded to me. Professor A. C. Seward, F.R.S., Professor W. H. Weston of Harvard, and Professor E. Gäumann of Zurich have very kindly supplied me with information which could not be obtained in London.

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CONTRIBUTIONS TO OUR KNOWLEDGE OF BRITISH ALGAE.—III., IV.*

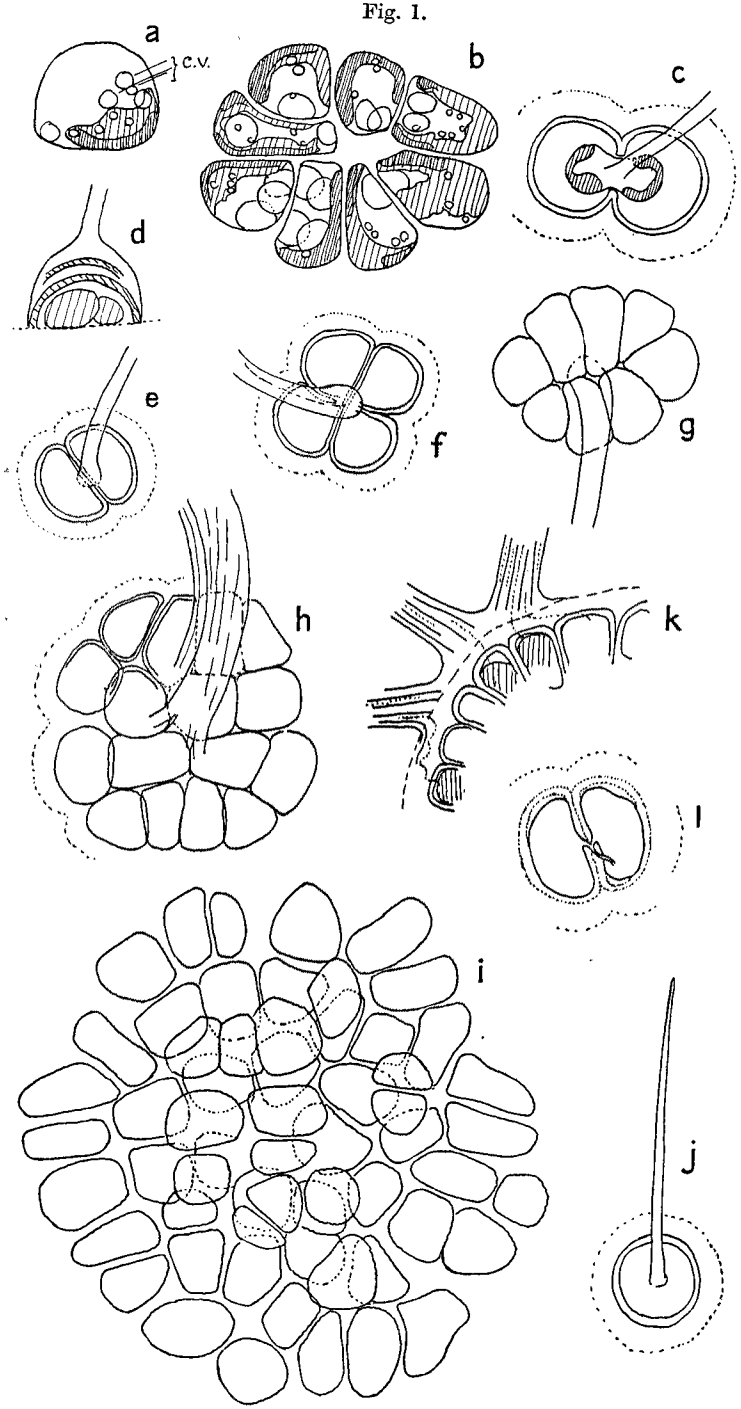
By M. B. Godward, B.Sc.

III. The Genus *Naegeliella* in Britain. (Figs. 1, 2.)

The alga forming the subject of the present communication was first found in January of 1932 in two stagnant ponds near Loughton on the outskirts of Epping Forest. It occurred

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Fig. 1.



EXPLANATION OF FIG. 1.

Naegeliella britannica, sp. nov. *a*, single cell, night-condition (*c.v.*, contractile vacuoles); *b*, young colony, showing cell-contents; *c*, dividing cell; *d*, side view of two-celled colony; *e*, *f*, *g*, *h*, 2-celled, 4-celled, 8-celled, and 16-celled colonies respectively, with bases of hairs; *i*, old colony with cells in two layers in the centre; *j*, single cell with hair; *k*, colony in optical section, showing protoplasmic threads; *l*, 2-celled colony, showing forking protoplasmic thread. *a*, × 1200; *b–d*, × 900; *e–i*, × 850; *j*, *l*, × 900; *k*, × 800.

frequently on glass slides that had been placed in these ponds for the purpose of examining the epiphytic growth. Subsequently it was also found occasionally upon *Nitella* and frequently upon the leaves of *Oenanthe fluviatilis*. The epiphytes *Mischococcus* and *Apiocystis*, which are mentioned as occurring together with *Naegeliella* and *Phaeothamnion* by Correns * and Scherffel †, were also present in this case. *Naegeliella* is a very rare alga, which, since its first description by Correns *, who found it near Tübingen in Württemberg, has only once been recorded, namely by Scherffel † from the neighbourhood of Iglós (Hungary). It is, however, highly probable that Correns's and Scherffel's forms belong to distinct species. *Naegeliella* is regarded by Scherffel (*loc. cit.* p. 354) and Pascher ‡ as a palmelloid member of the Chrysophyceae and placed in a special family, Naegeliellaceae of Chrysocapsales. The majority of the observations detailed below were made on the fresh material within a few hours of its being taken out of the pond.

The colonies consist of few to many cells, the number ranging approximately between one and fifty. The cells, which are commonly elongated in one direction, are usually grouped to form a flat one-layered circular disc, firmly attached to the substratum (fig. 1, *h*); in larger colonies, however, the disc becomes two cells deep in the central portion (fig. 1, *i*).

The whole colony is enveloped in a covering of mucilage (figs. 1, *e*, *f*, *h*; 2, *a*, *c*), which appears to be of rather fluid consistency and which follows the contours of the cells beneath. One or more of the peculiar branched hairs (fig. 2) to be described below emerge from the outer surface of the colony. These hairs are often very inconspicuous until they have been stained and may readily be overlooked. Those on older colonies attain to great complexity and are of enormous length (fig. 2, *a*, *e*).

The individual cells have the following structure. There is usually a single parietal chromatophore, showing the typical golden-brown colour of Chrysophyceae and generally V-shaped

* Correns, C., "Ueber eine neue braune Süsswasseralge, *Naegeliella flagellifera*, nov. gen. et spec.," Ber. Deutsch. Bot. Ges. x. 629 (1892).

† Scherffel, A., "Beitrag zur Kenntnis der Chrysomonadineen.—II.," Archiv f. Protistenkunde, lvii. 347 (1927).

‡ Pascher, A., "Die braune Algenreihe der Chrysophyceen," Archiv f. Protistenkunde, lii. 559 (1925).

as seen from the surface (fig. 1, *a*, *b*)*; sometimes two such chromatophores are found in cells which are dividing (fig. 1, *c*). The cells always contain a number of large rounded whitish lumps (*cf.* fig. 1, *b*), which disappear overnight and presumably consist of leucosin. In addition, there were numerous shining spherical globules which have the appearance of fat globules, although staining with Sharlach R was indecisive. In the living cells 2–4 contractile vacuoles (fig. 1, *a*) could always be distinguished. These were confined to no special part of the protoplast. No stigma could be detected. Staining with hæmatoxylin or chlor-zinc-iodide revealed a rounded body in the centre of the cell, which was presumably the nucleus.

The cells are devoid of a wall, although the individual protoplasts are surrounded by an envelope of denser mucilage (fig. 1, *c*, *e*, *f*)†, which did not stain with chlor-zinc-iodide or ruthenium red. Beyond the individual mucilage investments lies the envelope of less dense mucilage which is of considerable extent, and forms a common envelope to all the cells of the colony (figs. 1, *e*, *f*, *h*; 2, *a*). After staining with methylene-blue or iodine-green followed by dilute potash, a slight stratification was visible in this peripheral mucilage-envelope (fig. 1, *d*), but a marked stratification, like that described by Scherffel (*loc. cit.* p. 348, t. xv. figs. 37, 44), was never seen in fresh plants, although observed in material that had been grown for two months in a culture-vessel in the laboratory (fig. 2, *e*).

The colonies arise by successive division of the cells. Until late stages all the divisions take place perpendicular to the substratum. In the early stages of development there is often a certain regularity in the segmentation. Eight-celled stages commonly show four central and four peripheral (fig. 1, *g*), sixteen-celled stages four central and twelve peripheral cells (fig. 1, *h*), but the arrangement of the cells is often more irregular. As enlargement proceeds the cells appear to divide simultaneously, and in the larger colonies (figs. 1, *i*; 2, *c*) they are often conspicuously grouped in pairs. Division in a plane parallel to the substratum takes place only in the centre and only in older colonies (fig. 1, *i*). The mucilage-envelopes of the individual protoplasts appear always to be in contact along their whole extent (figs. 1, *h*; 2, *a*), except at the margin of the colonies. In this respect the present form differs from that described by Scherffel (*loc. cit.* p. 348), where pairs of cells are stated to be connected only by the overlying mucilage.

The earliest stage of development that has been observed was that of a single round cell, already bearing a long hair (fig. 1, *j*). When stained with methylene-blue (or other stains) the hair appears as a simple hollow tube of mucilage tapering to a point.

* *Cf.* Scherffel, *loc. cit.* p. 347.
† *Ibid.* p. 348.

No clear indication of the sheath described by Correns (*loc. cit.* p. 633) was here obtained. A stage of division of the single cell is shown in fig. 1, *c*. Two-celled colonies invariably possess only one hair, arising from the line of separation of the two cells (fig. 1, *e*). The second division is at right-angles to the first, a single hair often arising from the centre of a group of four cells, as shown in fig. 1, *f*. From this stage onwards there is little constancy in the number and position of the hairs. While a colony of fifty cells may exceptionally have only one massive central hair (*cf.* fig. 2, *a*), a four-celled colony may already exhibit two. Colonies with about twenty cells usually bear from five to ten hairs, which are of diverse sizes and occupy different positions with reference to the underlying cells.

In the species described by Correns (*loc. cit.* p. 632) as *Naegeliella flagellifera* the basal part of the older hairs consists, in transverse section, of a composite aggregate of hollow tubes of mucilage, the innermost of which lie side by side, while the outermost are arranged concentrically around the inner ones. When the hair is viewed from the side, each of the inner tubes is seen to take its origin between two cells of the colony. When these inner tubes are followed upwards, they are found successively to emerge as branches from the outermost tubes. These branches, which may themselves comprise a number of mucilage-tubes, trail out for long distances into the water, and their inner components may emerge as branches from the outer ones at higher points in just the same way, the successive branches becoming thinner and thinner. In this way the older colonies of Correns's form bear elaborate and irregularly branched hairs. He was of the opinion that these arose by the protrusion of hollow mucilage-hairs from most of the cells, the hairs formed from the daughter-cells always growing into that of the parent, but at a higher level breaking out from it as a branch. The outermost sheath of all is quite short, since the first mucilage-hair formed never grows to any great length. Correns was unable to establish the presence of any protoplasm in these hairs (cf. *loc. cit.* p. 633).

The form, described by Scherffel as *Naegeliella natans*, likewise bears mucilage-hairs. These are simple structures, which are usually, but not always, branched. They are traversed by delicate protoplasmic threads emerging from the protoplast of the cell bearing the hair. When the latter is unbranched it contains a single protoplasmic thread, whilst when branched there are a number of these threads arising each from one cell and occupying the main axis of the hair; usually the number of protoplasmic threads is equal to the number of branches, and one thread ultimately passes into each branch (*cf.* fig. 2, *g*). The protoplasmic threads themselves are never branched, but the hairs sometimes bear short branches that are devoid of the

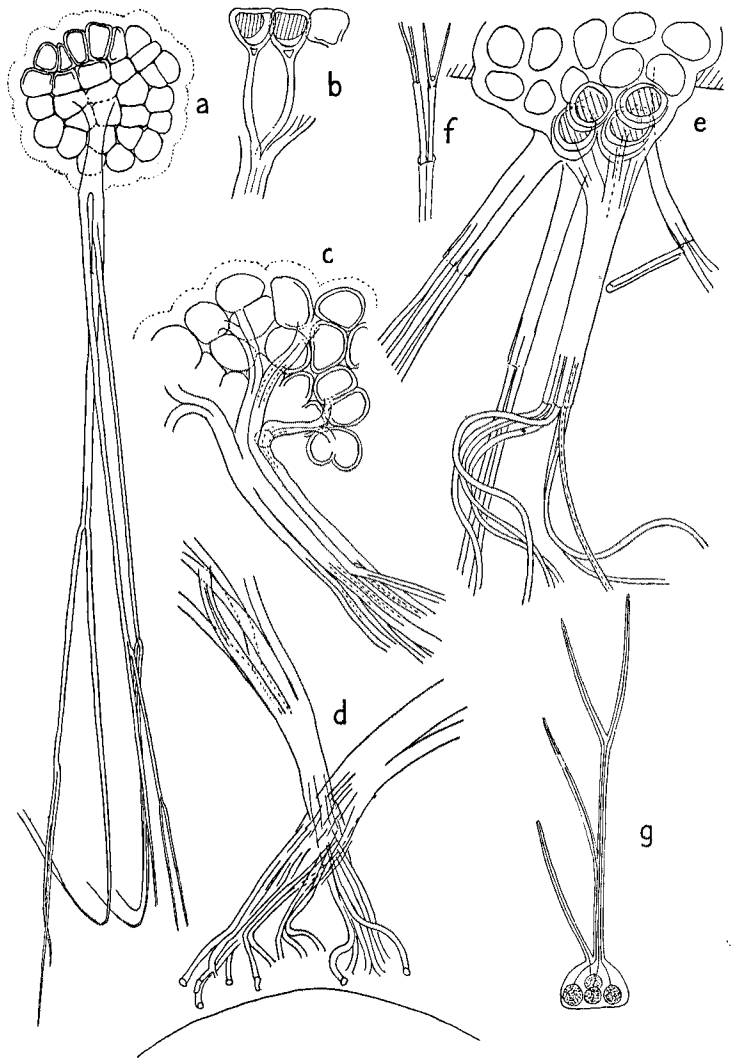


Fig. 2.—*Naegeliella britannica*, sp. nov. *a*, young colony bearing a single long forked hair; *b*, portion of disc showing relation between basal parts of the hair and the cells; *c*, the same, showing protoplasmic threads; *d*, detached hairs showing separation of mucilage-tubes at the base; *e*, colony grown in laboratory culture showing origin of branches of hairs; *f*, tip of one such hair; *g*, structure of hair of *Naegeliella natans* (after Scherffel). *a*, × 360; *b*, *c*, × 550; *d*, × about 500; *e*, × 720; *f*, × 600.

central thread. In many cases these elaborate hairs are borne on a cone-shaped mass of stratified mucilage surmounting the cells from which the hair arises. As Scherffel (*loc. cit.* p. 353) points out, these hairs, except in their peculiar branched character, bear a close resemblance to the pseudocilia of Tetrasporaceae.

In the investigation of the hairs of the British alga the staining methods used by Scherffel (*i. e.*, methylene-blue, or iodine-green followed by dilute potash) were employed. The elucidation of the structure of the hairs is rendered especially difficult owing to the fact that the various parts show a marked spiral twist in many cases. Young hairs of narrow width and no considerable length consist of a hollow tube of mucilage. Such hairs taper to a point, and in unicellular individuals (fig. 1, *j*) arise from the outer mucilage-covering above the centre of the cell. The cells at the margins of older discs sometimes bear similar simple hairs, while the more massive ones always arise from the inner parts of the disc.

Much more massive hairs (*cf.* fig. 2) than those figured by Scherffel were encountered. Such massive hairs branch abundantly and rather irregularly, while sometimes showing conspicuous forking in their upper portion (fig. 2, *a*); the branches become progressively thinner. Towards the base of the hair the main axis likewise divides into a number of units (fig. 2, *c*, *d*), which diverge somewhat and are attached to the disc at points corresponding to the line of separation of two cells (*cf.* fig. 2, *c*). The structure of these hairs is, on the whole, consistent with the interpretation that they are aggregations of simple hairs which become progressively separated above and below into smaller and smaller aggregates and finally into simple tubes. At their upper ends they taper to a fine point (fig. 2, *a*), while at their base they enter the disc at a point between two of the cells (fig. 2, *c*). It has not, however, always been possible to find agreement between the number of ultimate branches above and the number of diverging units observed at the base. Often there seem to be fewer above than below, which would indicate a certain amount of fusion or non-separation of the tubes in passing upwards. Sometimes, too, the tubes appear to branch towards their upper extremities, but this has been less frequently observed. Only indefinite traces of a common sheath have been noticed at points of branching in fresh material, although plants that had been grown in the laboratory for two months showed it clearly (fig. 2, *e*, *f*); such cases agree substantially with the description given by Correns (*loc. cit.*).

After treatment with iodine-green and dilute potash (less clearly after staining with iodine in potassium iodide solution) delicate threads broken into short lengths, presumably as a result of the swelling produced by the potash, have nearly always been observed throughout most of the length of the hairs (fig. 2, *c*–*e*);

they appear just like the protoplasmic threads figured and described by Scherffel (*loc. cit.* p. 349). In the broader parts of the hairs there are a number of such threads, while in the ultimate branches, as well as in young hairs, only a single one can be discerned. The origin of such protoplasmic threads from the protoplasts of cells of the disc has been seen clearly only in a few cases, but it has sometimes been possible to trace them upwards into the hair (*cf.* fig. 1, *k*). In most of these cases it seemed as though the protoplasmic threads arising from two adjacent cells almost immediately fused before passing upwards (fig. 1, *l*). This may be correlated with the fact that each ultimate branch at the base of the hair appeared to terminate at a point midway between two cells, and that in the growth of the colony all the cells divide simultaneously. The units constituting the ultimate branches at the base of the hair appear to pass through the outer mucilage-envelope of the colony and to be in connection with the denser mucilage-envelopes of the cells. This was clearly seen only in two cases.

Few observations have been made which would elucidate the development of these hairs, but the following is an attempt to reconstruct the development on the basis of the ascertained facts. In the earliest stage there is a single cell with the two mucilage-envelopes, a hollow mucilage-hair tapering to a point emerging from the top and containing a protoplasmic thread which arises from the protoplast but has only been traced a short distance into the hair. When the cell divides, the protoplasmic thread splits at its lower end into two, one half extending to each daughter-protoplast, while the two-celled colony still retains its simple hair consisting of a single tube (fig. 1, *c*, *e*). On the division of these two cells, two new mucilage-tubes are formed, which appear to grow up side by side within the old hair and either remain enclosed or more rarely become separated as two simple hairs by the disorganisation of the wall of the one first formed. As a general rule it seems that this course of events may be repeated several times, so that a number of tubes become enclosed within that first formed. This explains the presence of several protoplasmic strands within the broad parts of the hair. It appears that the walls of the older tubes become somewhat diffluent, so that their contours are often difficult to recognise. In the wider branches of the hairs, however, a series of more or less longitudinal, straight, or sometimes slightly spiral lines can be discerned (figs. 1, *h*; 2, *d*); these, at the base of the whole structure, can be followed into the walls of the individual units into which the hair separates. It is not clear whether the upper branches of these hairs always actually represent the individual units becoming free above, although the fact that the finer branches contain only a single protoplasmic thread would, by analogy with the form described by Scherffel, indicate

that that is the case. In addition, in cultivated material the edges of the older tubes through which the younger ones emerge as branches have been clearly observed (fig. 2, *e*, *f*).

Empty cells, whose envelope seemed to be torn at the top, were occasionally observed in all parts of the disc. No zoospores clearly belonging to this alga were, however, found.

The British plant differs from that described by Scherffel in the presence of well-marked dense mucilage-investments around each cell, which are always in contact except at the margin of the disc; in the fact that, when a cell has just divided, the protoplasmic threads from each daughter-cell appear as branches of a single one found higher up in the hair; in the fact that within the larger branches of the hairs a number of mucilage-tubes can be more or less clearly recognised, and in the definitely epiphytic nature of the plant (*cf.* Scherffel, *loc. cit.* p. 347). It differs from the plant described by Correns in the presence of protoplasmic threads in the hairs. It is therefore proposed to describe it as a new species, to be named **Naegeliella britannica** with the following diagnosis:—

Familiæ epiphyticæ, discoideæ, e stratu singulo cellularum, sed in parte centrali familiarum vetustarum e cellulis duabus superpositis compositæ; *cellulis* cum integumentis gelatinosis densis præditis, iis cellularum vicinarum præter in parte marginali disci contiguis; *pilis* in familiis juvenalibus e tubo singulo mucoso, in familiis senioribus elaboratis valde ramosis, sæpe furcatis, e tubis mucosis plurimis qui per axem principalem crescunt et basin vel apicem versus progressive sese separant compositis; *filis protoplasmaticis* in utroque tubo singulis, e cytoplasmate cellularum ortis, basin versus furcatis cum cellulis duabus conjunctis.

Dimens.—Cell. 4×9–$10\times15\,\mu$ (smaller in cultivated plants, 3×4–$6\times9\,\mu$). Long. pil. 150–400 μ; diam. ax. princip. pil. ad 10 μ.

IV. On a Form of *Phaeothamnion*. (Fig. 3.)

The only British record of the occurrence of *Phaeothamnion**, a filamentous alga now referred to the Chrysophyceae†, is that of *P. confervicolum* Lagerh. by M'Keever‡ from the Upper Elf Loch, Midlothian. A species of the same genus has been found commonly as an epiphyte in the same two ponds in Epping Forest as harboured *Naegeliella*. In one of these it was very common among the mass of decaying vegetation near the banks, growing chiefly on the older leaves of *Oenanthe fluviatilis* but also on dead submerged leaves from neighbouring trees; from these it spread on to the filaments of a species of *Oedogonium*

* Lagerheim, Bih. K. Sv. Vet.-Akad. Handl. ix. 1884, no. 19.

† Pascher, Archiv f. Protistenk. lii. 1925, 498.

‡ Trans. & Proc. Bot. Soc. Edinburgh, xxiv. 1912, 176; West and Fritsch, Brit. Freshw. Algæ, 1927, 334.

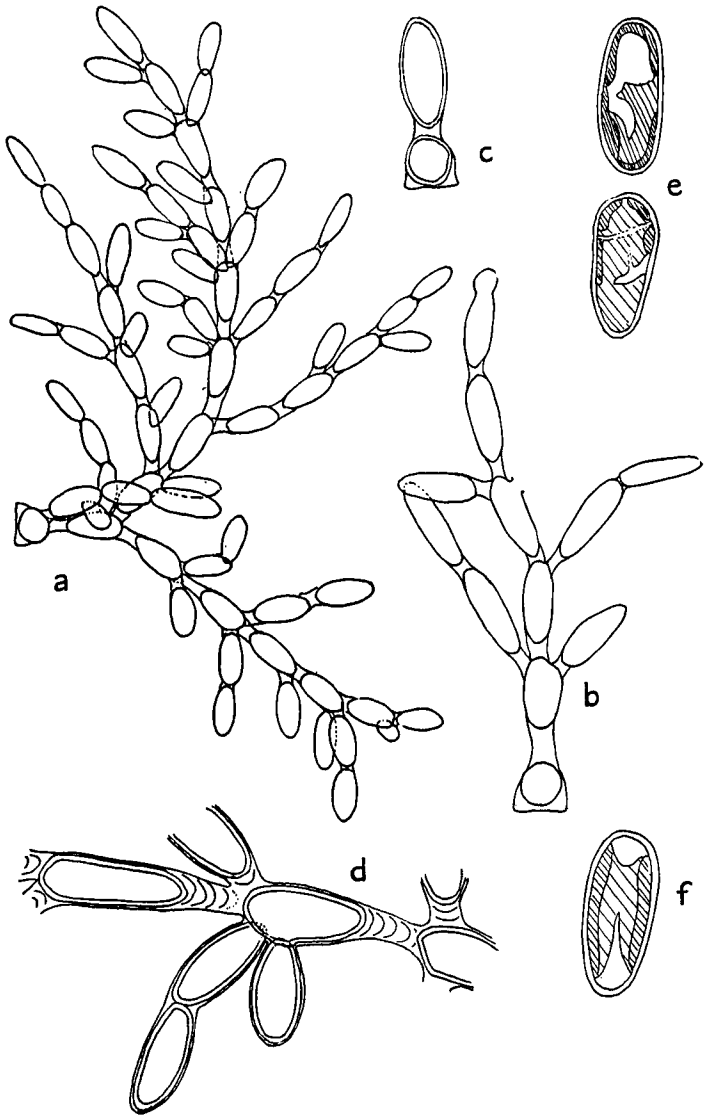


Fig. 3.—*Phaeothamnion confervicolum* Lagerh. var. *britannica*, var. nov. *a*, mature, richly branched plant; *b*, small plant, showing exit-pore of zoospores and dividing cell; *c*, 2-celled plant; *d*, structure of wall; *e*, *f*, cells showing form of chromatophore. *a*, × 620; *b*, × 740; *c*, × 880; *d*, × 1300; *e*, *f*, × 1500.

which was growing on the same substratum. It was first recorded on Nov. 1, 1931, and has persisted undiminished into the month of April.

The plants are relatively large and much branched (fig. 3, *a*). Commonly nearly every cell bears a branch, but many of the latter are short and consist of only one or two cells. Longer branches, which may themselves branch repeatedly, are found in the lower part of older plants. The branches arise from the upper ends of the parent cells. Even the basal cell may bear such branches. The branches in some plants stood off at an acute angle, subvertically (as in Pascher's *P. Borzianum* *), in others they were spreading (cf. *P. confervicolum*); it may be doubted whether this difference is of specific value.

The chromatophore is either a single curved and very much lobed parietal structure or consists of a number of separate pieces (fig. 3, *e*, *f*). It has not been possible to determine exactly which of these two conditions obtains. The colour of the chromatophore varies between golden-brown and greenish, but the former colour was the more usual. Each cell is surrounded by its own membrane, which in older cells is thickened by a small and somewhat mucilaginous cap at either end, but this mucilage-cap is invariably more extensive at the lower end of the cell, where it is usually conspicuously stratified (fig. 3, *d*). As a result of this special method of thickening of the wall the protoplasts of the individual cells are always separated more or less markedly from one another (fig. 3, *a*, *b*, *d*). In addition, there appears to be a thin outer " cuticle " which is continuous over the whole surface of the plant (fig. 3, *d*). All parts of the membrane stain readily with methylene-blue, iodine-green, saffranin, hæmatoxylin, and other stains, but not with chlor-zinc-iodide.

The exit of the zoospores was not observed, but the apertures through which they had emerged were conspicuous. In the terminal cells, the aperture is a little to one side of the tip, whilst in the others it is lateral (fig. 3, *b*) and occupies the same position as that in which a lateral branch is formed.

Young plants, consisting of two cells only, have been observed (fig. 3, *c*). The formation of lateral branches sometimes sets in at an early stage, though commonly an unbranched erect filament of about five cells is first produced. The ultimate product is a much-branched plant of a bushy appearance, about half of whose cells are usually empty, showing apertures through which zoospores have escaped. The remaining cells with contents are often completely isolated by such empty cells.

While the plant described agrees in its essential characters with *P. confervicolum*, its variable habit and the peculiar structure of its cell-wall, which has not previously been figured for *Phaeothamnion*, are points of difference. It is therefore

* Pascher, Archiv f. Protistenk. lii. 1925, 498.

proposed to describe the British form as *P. confervicolum* var. **britannica**, with the following diagnosis :—

Differt a typo membrana cellularum ad apicem et præcipue ad basin incrassata mucosa ; ramis aut divergentibus aut subverticaliter dispositis. Cellulæ 3–6 (plerumque 5) μ lat., 10–20 (plerumque 15) μ long. ; cell. basal. 10 μ lat. 6 μ altit.

The author wishes to express her thanks to Prof. F. E. Fritsch, F.R.S., who has directed the work and assisted in the preparation of the paper for press.

THE IDENTITY OF *HYDROLIRION COREANUM* H. LÉV.

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

The genus *Hydrolirion* H. Lév., referred by its author to the Hydrocharitaceae, was founded upon a single (new) species described by Léveillé (in Fedde, Repert. Sp. Nov. xi. 67 (1912)) in the following words :—

" 920. *Hydrolirion coreanum* Lévl., nov. gen. nov. spec.

" E grege Hydrocharitacearum. Habitu Nanolirion refert. Planta insigniter bulbosa, bulbo tunicato ; pusilla 2–3 cm ; foliis 1–3 cm × 2 mm ; inflorescentia reducta *Blyxae* (*Blyxa bulbosa* Lévl. in herbario). Propter bulbum hanc plantam novo generi adscribimus."

As the basis of the species Léveillé cited material collected by Taquet (n. 3271) in June 1909 in rice-fields at Hannon, in the island of Quelpart, Korea.

By the kindness of Prof. Sir W. Wright Smith, of the Royal Botanic Garden, Edinburgh, I have been able to examine Léveillé's type-material, which, with the rest of his herbarium, is now preserved at Edinburgh. The material consists of a number of sterile young plants of *Sagittaria* L. (Alismataceae), most of them still attached to the winter-tubers which are characteristic of the genus and which caused Léveillé to write " Planta insigniter bulbosa, bulbo tunicato . . . " and found a supposed new genus of Hydrocharitaceae. His "inflorescentia reducta *Blyxae*" is presumably purely imaginary, for the material is quite sterile. It is apparently referable to *S. pygmaea* Miq., a species of which flowering specimens were gathered from rice-fields in Quelpart by U. Faurie (n. 2105 in Herb. Brit. Mus.) in August 1907. The synonymy of this species is now as follows :—

Sagittaria pygmaea Miq. in Ann. Mus. Bot. Lugd.-Batav. ii. 138 (1865).

Sagittaria sagittifolia var. *oligocarpa* M. Mich. in A. & C. DC., Monogr. Phan. iii. 68 (1881).

Sagittaria sagittifolia var. *pygmaea* (Miq.) Makino in Bot. Mag. Tōkyō, xv. 106 (1901), *nomen illegitimum*.

Hydrolirion coreanum H. Lév. in Fedde, Repert. Sp. Nov. xi. 67 (1912).

Blyxa bulbosa H. Lév. *loc. cit.*, *nomen synonymum*.

THE IDENTITY OF *DRIMYS OBLONGA* S. Moore.

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

Drimys oblonga was originally described by S. Moore (in Journ. of Bot. lv. 302 (1917)) in a paper contributing to the phytogeography of Mt. Bellenden Ker, in north-eastern Queensland. The type-specimen, in the British Museum Herbarium, was collected in dense scrub on the summit of the mountain by Miss L. S. Gibbs (n. 6319) in March 1914. Moore's description of the species stated that the sepals were " 4 inter se inæqualibus," the stamens " paucis," and the carpels " solitariis truncatis," and in a note following the description he remarked :—

" The mature flowers seen are but two in number and I have been able thoroughly to examine one only ; this with its few and inconspicuous stamens may be functionally female. Only one carpel was discovered, but additional material may show this to be exceptional.

" Besides the two-edged branches the foliage affords an easy means of distinguishing this species."

This last sentence is very well justified if Miss Gibbs's plant is treated as a species of *Drimys* ; the foliage, and also the flowers, in fact look so unlike those of any other known species of the genus that I was led to dissect an unopened flower-bud from the specimen. The bud proved to have five sepals (the outer two smaller than the inner three), five stamens (all fertile) inserted on a disk, and a syncarpous ovary with a single entire style. Such a structure, in conjunction with the general facies of the specimen, suggested Celastraceae, and a search in that family showed the plant to be identical with *Hypsophila Halleyana* F. Muell., a species which was originally described in 1887 from the highest region of Mt. Bellenden Ker. The synonymy of *H. Halleyana* is therefore now as follows :—

Hypsophila Halleyana F. Muell. in Victorian Naturalist, iii. 168 (1887).

Drimys oblonga S. Moore in Journ. of Bot. lv. 302 (1917).

POTAMOGETON MACVICARII Ar. Benn.

By W. H. Pearsall.

Among an interesting set of Scottish Pondweeds collected by Mr. G. Taylor of the British Museum (Nat. Hist.) during 1932, and recently submitted to me, were several sheets labelled *P. Macvicarii* Ar. Benn. Lochan-na-Creige Duibhe, Argyll, June 26, 1932. This loch was the station from which this hybrid was originally described :—*Potamogeton Macvicarii* mihi (*P. praelongus* × *P. polygonifolius*), a New Hybrid, by Ar. Bennett,

Ann. Scott. Nat. Hist. 106, 1907. This hybrid was never distributed, and had not been seen by Dr. Hagström nor by Graebner, who merely gives the foregoing reference. This is not surprising as the putative parents—*praelongus* and *polygonifolius*—require quite different ecological conditions, and a hybrid between them is inherently improbable. Mr. Taylor's specimens were unmounted, in excellent condition, and therefore easily examined under the microscope. I failed to find any evidence of *P. polygonifolius*, and although the specimens had a superficial resemblance to *P. praelongus* it disappeared upon examination. The plants appeared to me to be *P. alpinus*, and to that species I referred them, although they agreed with Bennett's scanty description of the presumed hybrid (*l. c.*). Subsequently I examined Macvicar's original examples in Bennett's collection in Hb. Mus. Brit. The material (two sheets) is poor, permanently pasted to its mounts, and in my judgment inadequate for the purpose of establishing a new hybrid. It is, however, quite sufficient to prove its identity with Mr. Taylor's more valuable gatherings, and to confirm my opinion that the species is *P. alpinus* Balbis. The following notes apply equally to the original as to the recent gatherings, except where otherwise stated:—

1. No other British species but *alpinus* has the colour of these plants.

2. There are no coriaceous floating leaves, but in deep water *P. alpinus*, more often than not, fails to produce any. On one of the original sheets in Hb. Mus. Brit., however, several of the uppermost leaves—though not coriaceous—possess the distinctive shape of the floating leaves of *P. alpinus*, and would probably have become coriaceous later in the season.

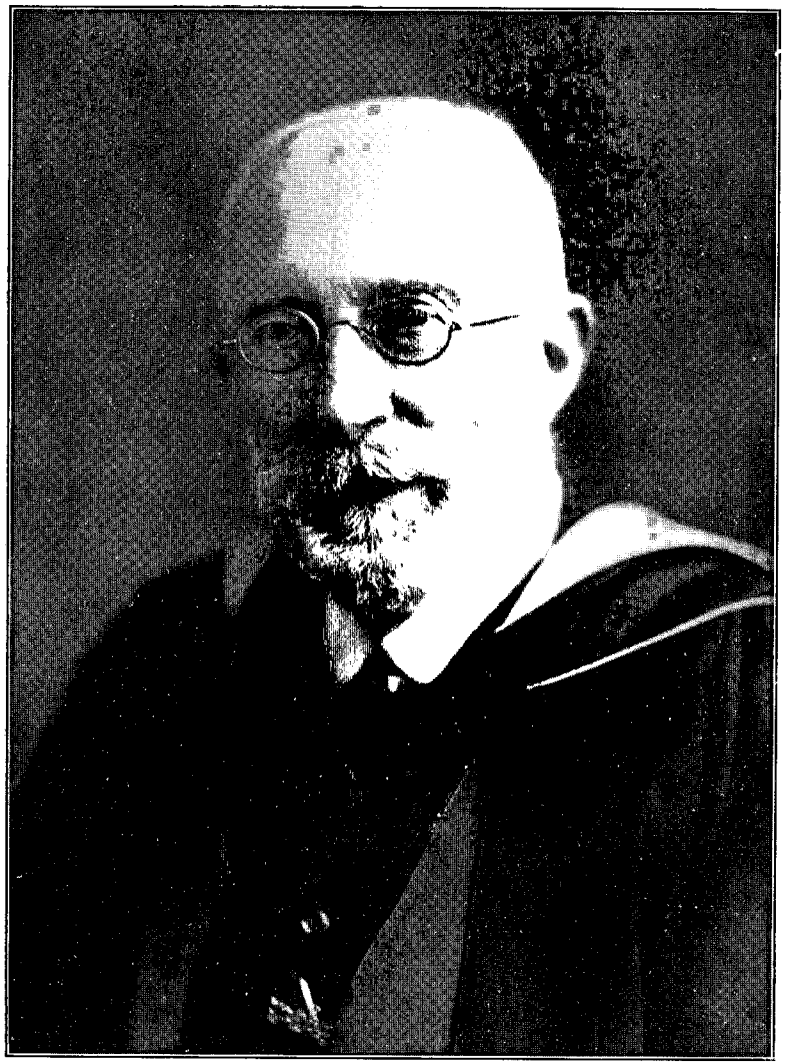
3. The submerged leaves are absolutely devoid of serrulation or of any trace of marginal denticulation, even in the youngest leaves. (This eliminates *lucens*, *perfoliatus*, *gramineus*, *crispus*, or their combinations, almost entirely.)

4. The leaf-apex is in every case conspicuously blunt, broad, and rounded.

5. For leaves of this length and L/B ratio only two species can be admitted—*praelongus* and *alpinus*.

6. Bennett at first named his plants *praelongus*. These plants are not *praelongus* for the following reasons:—(*a*) The leaf-apex is not constantly and conspicuously hooded. (*b*) The midrib of fresh clean leaves is not (as seen from above) light-coloured. (*c*) The leaf-base is not semi-amplexicaul, broad, and rounded. (*d*) There are not a sufficient number of secondary longitudinal veins (*e*) The leaf-colour is not that of *praelongus*.

7. This leaves us with *P. alpinus*:—(*a*) In this species the leaf-apex is frequently hooded, but much less so than in *praelongus*. Some of these leaves have exactly that character. (*b*) These leaves have the three principal veins and eight (eleven) secondary



Yours sincerely
Jas. W. White

mentioned by Bennett (*l. c.*), but that, also, is a character of many forms of *alpinus*! (*c*) The leaves are gradually narrowed below (*alpinus*)—not usually broadest at the base as in *praelongus*. (*d*) The leaves are sub-petiolate or sessile (*alpinus*), not semi-amplexicaul. (*e*) The shape of the leaf is rather that of *alpinus* than of *praelongus*. (*f*) The colour is markedly that of *alpinus*; the leaves of *praelongus* are greener.

8. The venation of the actual apex is very conclusive. Only *praelongus* and *alpinus*—among species—have their two principal lateral veins following the leaf-margin in a parallel curve at the blunt apex and very suddenly turning inward to form an "arch" with the midrib (which often does not quite reach the actual tip). The apex is only now and then slightly split after drying (*alpinus*)—not generally and conspicuously, as is the rule in *praelongus*.

9. Where is the evidence for *P. polygonifolius*? That would be inevitably shown in an acute leaf-apex, a sharply tapering base, and a long petiole—to some or all of the leaves. These characters are absent—*cf.* 4, 7 (*c* & *d*). The nervation, too, is not in the least that of *polygonifolius*, whose nerve-spaces (measured lengthwise, in the direction of the midrib) are narrow, but in the two species concerned are rectangular and long—often 4 or 5 times as long as broad, as are these. The principal lateral nerves of *polygonifolius* curve gradually into the midrib at the leaf-apex, but in the leaves of these Scottish plants—especially the youngest—they meet almost at right angles.

10. No flowers or fruits are present on the original specimens, but on one of Mr. Taylor's plants there is a single immature flowering spike too young to be of diagnostic value.

The cumulative weight of the foregoing evidence seems conclusive that the plant is not a hybrid, but a species, *P. alpinus* Balbis.

OBITUARIES.

James Walter White

(1846–1932).

(With Portrait.)

By the death of Mr. J. W. White, F.L.S., Hon. M.Sc. (Bristol), on October 26, 1932, at the age of 86, Bristol and the West of England loses its leading phanerogamic botanist, and England one of the best of the old type of field-botanists; for White was never happier than when collecting and examining plants in the field, either in the British Isles or on the Continent and adjacent islands. He had been Special Lecturer in Systematic Botany at the University of Bristol, and in 1927 was awarded the Hon. M.Sc. degree. His very fine British and Continental herbaria are bequeathed to that University.

Born in London, August 8, 1846, he went to Dorchester in 1851, and was at school under William Barnes the Dorset poet. At about 14 he was apprenticed for five years to Mr. T. B. Groves, pharmaceutical chemist at Weymouth, where he came under the influence of the late W. B. Barrett the botanist. Thence he went as an assistant at Allen & Hanbury's, where Daniel Hanbury was encouraging and sometimes invited him to his house at Clapham Common. A few years later White started in business himself at Hampton-on-Thames, and on his 25th birthday was married to Miss Mary Naldrett, who, with their seven sons and four daughters, survives him. Mr. and Mrs. White celebrated their Diamond Wedding in 1931.

In 1874 he was invited by a fellow-student at Hanbury's to join him in taking over the important chemist's business at Clifton of Giles and Sons, afterwards well known as Giles, Schacht, and Co. In his student days White had won the Pharmaceutical Society's medal for the best herbarium. Many British and Continental botanists have appreciated his beautifully prepared specimens; and readers of the 'Pharmaceutical Journal' have often enjoyed his racy articles, particularly those descriptive of botanical tours to Spain, the Balearic Isles, etc. These tours were usually in the company of his old friend Cedric Bucknall, and once or twice with David Fry or C. E. Salmon.

White joined the Bristol Naturalists' Society in 1878, and was President 1907–09. He wrote for the Jubilee Report "Fifty Years of Botany in Bristol." Reference is made there to the Botanical Club founded in 1903 by the late G. Brebner. For a number of years this little Club held its informal meetings at White's house in Woodland Road.

It was in the Bristol Nat. Soc. Proc. that his 'Flora of the Bristol Coal-field' originally appeared in six yearly parts from 1881; in 1886 it was published in book-form. In those 'Proceedings' for 1900 a *résumé* of the previous twenty years' work appeared under the title "Bristol Field-botany in 1901."

All this and much other preparation, including numerous short notes and papers in this Journal, culminated in his *magnum opus*, 'The Flora of Bristol,' 1912. In the opinion of not a few this is one of the best works of its kind. A very favourable review by E. S. Marshall appeared in Journ. Bot. 1912, with an additional page by the editor because it "is so admirable an example of how such things should be done." It excels particularly in its admirable introductory matter and the interesting notes under many of the species. We know no British or local 'Flora' which gives habitats (as distinct from localities) so accurately.

Since 1914 copious supplemental notes and records have been published both in this Journal and the Bristol Nat. Soc. Proc. White's last paper on "The Botany of Bristol" was written for the Bristol Meeting of the British Association, 1930, but, owing to there being no 'Handbook' that year, it unfortunately was not published until later in Bristol Nat. Soc. Proc. 1931.

White's cautious nature and broad view, *e. g.*, in the matter of species, were doubtless partly accountable for his having discovered and named but two or three new plants. *Rubus Bucknalli* was described by him in this Journal, 1899, though "detected as a new form by C. Bucknall." *R. Naldretti*, which he found in Sussex, is now placed as a variety of *R. mutabilis*. In Journ. Bot. 19 (1914) in a short note on "Plants of Scilly" he briefly described a new and well-marked variety *atlanticus* of *Juncus maritimus*.

Among some 45 notes and articles he had published in this Journal from 1880 to 1929 one of the most interesting and novel is "Life-History of *Lithospermum purpureo-coeruleum*" (1884, 74). He pointed out important facts, apparently overlooked, about its development and propagation.

White was for many years an active and valued member of the British Exchange Clubs and a contributor to the Herb. Normale, managed at Vienna by Dörfler. He did not join the Watson Club until 1900, when he contributed a great many *Rubi* and other critical plants. On the morning that he died a parcel was found in his study addressed to the Distributor of that Club. From time to time he had been especially interested in Batrachian *Ranunculi*, *Rubus*, *Sorbus*, and *Mentha*, but his knowledge of very many genera was great. White was elected F.L.S. in 1889; he resigned his Fellowship in 1920, but was re-elected in the following year.

He was a prompt and admirable correspondent, and his caligraphy was clear and beautiful almost to the end. He was also a good draftsman, see, for instance, the careful drawing of *Statice Girardiana* illustrating "In Quest of Sea Lavenders" (Pharm. Journ., Feb. 27, 1904). This was after his journey with Bucknall and Salmon to Narbonne, Île Ste Lucie and the Eastern Pyrenees. He was always helpful and kind to other taxonomic botanists, young and old, even if too honest a man to pretend to suffer fools gladly.

Mr. White was buried at Canford Cemetery, after a service at Clifton Parish Church where he had worshipped for many years.

The portrait is from a photo, taken ten years ago, kindly lent by Mr. Dan. White.—H. S. THOMPSON.

RAYMOND NAVEAU.

THE death of Dr. Raymond Naveau at the early age of 43 is a severe loss to the botanical world. He was born in January 1889, and died on the 14th of November last. A native of Antwerp he lived till his death in that city, where he was Director of the Botanical Garden, as well as of the Museum of Natural Sciences.

His special interest was in the Bryophytes, on which he published several papers, notably "Musci Bequaerti" in Bull. Soc. Bot. de Belgique, 1927, a valuable contribution to the bryology of Tropical Africa, based on the collections made by Prof. J. Bequaert in the Belgian Congo and the Ruwenzori district. Of late years, however, official duties prevented his following this up, though much further material remained for publication.

He attended the International Botanical Congress at Cambridge in 1930, and took an active part in, especially, the discussions on Nomenclature.

His genial manner and enthusiastic devotion to plant-life made him a delightful companion, and one who will be greatly missed by his colleagues.—H. N. DIXON.

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

LINEAR-LEAVED NORTH AMERICAN SPECIES OF POTAMOGETON.—Professor Fernald has written an exhaustive monograph (Mem. Amer. Acad. Arts & Sci. xvii. pt. 1 (1932)) of a portion of the generic section *Axillares* Hagstr., comprising twenty-two North American species, which he places in seven subsections. There is an excellent preliminary chapter on diagnostic features in *Potamogeton*, and full descriptions of the species with italicised contrasting characters. The work is profusely illustrated from life-size photographs of herbarium specimens, with enlargements of the leaves, stipules, and fruits. These illustrations appear less attractive than the plates of Fryer & Bennett's 'Potamogetons of the British Isles,' but they will probably be found more useful than those of the British work, which in this group (with one exception) were not drawn by Morgan, and are not comparable with the fine drawings of the broad-leaved species.

The new work will especially interest British botanists in that it deals with four of the eight species treated by Bennett under the section *Chloephylli* Koch. These four plants are now placed in subsection *Pusilli* (Graebn.) Hagstr.; two (*P. Friesii* Rupr. and *P. panormitanus* Biv.) in series *Pusilli Connati* Hagstr., subseries *Panormitani* Fern.; and two (*P. obtusifolius* M. & K. and *P. pusillus* L.) in series *Pusilli Convoluti* Hagstr., subseries *Obtusi* Hagstr. The series are differentiated by the form of the stipules, to which Prof. Fernald attaches much importance, and which seems to have received insufficient attention in this country. In 'Potamogetons of the British Isles' the stipules are not always mentioned in the specific descriptions of this group, and are seldom well shown in the plates. Prof. Fernald identifies the subspecies *lacustris* Pearsall of *P. pusillus* with var. *mucronatus* (Fieber) Graebner. It is noticed that in the present

work the foliage of *P. obtusifolius* is given as fulvous or reddish green in colour, in contrast to the green leaves of *P. pusillus*, a distinction that does not appear to hold good in British specimens, for with us *P. obtusifolius* frequently has deep green foliage.

British botanists will read with regret the severe criticism that Prof. Fernald thinks it necessary to pass on the late Arthur Bennett's work on this genus.—H. W. PUGSLEY.

REVIEWS.

Thomas Johnson, Botanist and Royalist. By H. WALLIS KEW, Past-President, Lincolnshire Naturalists' Union, and H. E. POWELL, Librarian, Royal Society of Medicine. Cr. 8vo, pp. xii, 152, 13 pls., 10 text-figs. Longmans: London, 1932. Price 8*s.* 6*d.*

THOMAS JOHNSON, best known for his revised edition of Gerard's 'Herball,' has suffered from the possession of a popular name and the lack of a reasoned biography. In trying to remedy the latter defect the authors of the present account of his life and work have been hampered by the former difficulty. During all the years of Johnson's practice as a London Apothecary on Snow Hill, another Thomas Johnson, Apothecary, was practising within seven minutes' walk in Friday Street. And in his own parish of St. Sepulcre there were homonyms in the guise of a butcher and a collector of taxes, and nine or more others in London included a barber surgeon, with whom, as with the Thomas Johnson who published tracts in 1630 and with the Apothecary of Friday Street, the botanist has been confused. Further, the Great Fire of London destroyed documents which might have been helpful. The short biographical notice by his contemporary, Thomas Fuller, in the 'Worthies of England' (1662), and personal notes gleaned from the 'Herball' and others of Johnson's writings have supplied material for the delightful and interesting account now available.

Johnson was born, probably at Selby in Yorkshire, early in the seventeenth century. The first certain date is 1620, when, as the records of the Society of Apothecaries show, he was "bound to Mr. Wm. Bell for eight years." In 1626 we gather from his writings that he was travelling in northern England, and evidently giving close attention to the plants, and in August of the same year was in Kent. In 1628 he became a free brother of the Society of Apothecaries.

The authors give a detailed account of Johnson's herborizings in Kent and the neighbourhood of Hampstead, the results of which he published in two pamphlets, in 1629 and 1632. The fact that he was selected to revise Gerard's 'Herball' indicates the

position he had won as a botanist. The work was completed within a twelvemonth, as the publishers wished to anticipate a herbal which John Parkinson was known to have in hand (the 'Theatrum Botanicum' published in 1640). As our authors point out this was a remarkable performance when we bear in mind the size and numerous imperfections of the original edition, and that a different and larger collection of illustrations had to be fitted in and descriptions written for most of the additional ones. The amended 'Herball' (Gerard em.) appeared in 1633, and the story of its production and an appreciation of Johnson's work in enlarging and amending is given in the volume under review.

Another great work, an English translation of Ambrose Parey's works on Surgery was published in 1634. Our authors adduce reasons from internal evidence for regarding the translator, Thomas Johnson, as identical with the botanist. Together these works comprise nearly 3000 pages folio with 3075 text-illustrations, and although the volume on Surgery is only a translation, Johnson must have been a very busy man during these few years.

In 1634, Johnson published his 'Mercurius Botanicus' (a small octavo of 78 pages), a description of a botanical journey in the south and west of England, with a list of the plants observed, and in 1641 his 'Mercurii Botanica pars altera' (37 pages), descriptive of a tour in Wales, with a catalogue which was intended to include those of our native plants which had not been enumerated in the earlier part; together about 900 plants are enumerated, 47 of which are first British records. These constitute, as the authors insist, the first British Flora, an honour unfairly attributed by Pulteney to Dr. How's 'Phytologia' published in 1650.

The journey into Wales was the last of Johnson's herborizing excursions. In 1643 he was among the Royalists who followed the Court to Oxford, where the University bestowed on him the honorary degree of Doctor of Physic. He took an active part, as Lt.-Colonel, in the historic defence of Basing House (the story of which is told in some detail), was shot in the shoulder during a sally on September 14, 1644, and, contracting a fever, died a fortnight after. Thus was cut short in its prime a life full of promise for the development of British floristic botany.

The volume closes with an enumeration of the names of plant genera in which Johnson has been commemorated. With the exception of the Australian genus of Liliaceae, named in his honour by Robert Brown, these are synonyms of previously published names. An excellent reduced photographic reproduction of *Johnsonia lupulina* R. Br. from Ferdinand Bauer's 'Illustrationes Floræ Novæ Hollandicæ,' forms the last plate in the book. The new Rule which rejects homonyms renders *Johnsonia* of Brown invalid, but we may hope that it will figure in the revised list of *nomina conservanda*.—A. B. R.

Flora of the Prairies and Plains of Central North America. By PER AXEL RYDBERG, Ph.D. Roy. 8vo, pp. vii, 969, with 600 text-figs. New York Botanical Garden, 1932.

A MELANCHOLY interest attaches to this work, the epitome of many years of labour devoted to the study of the great Central area of the North American continent. Dr. Rydberg died after some months of ill-health on July 25, 1931. All the manuscript of the main text was in the printer's hands and he had seen the paged proofs of nearly half of the book. A few days before his death he asked his colleague at the New York Botanical Garden, Dr. Marshall Howe, to take over and complete the work. The scope of the book is explained by Dr. Howe in his Preface. Another colleague, Dr. J. H. Barnhart has contributed to the 'Journal of the New York Botanical Garden,' October 1931, an appreciation of Rydberg's work, which is accompanied by a good portrait. From this account we learn something of Rydberg's preparation for his 'Flora' by years of study in the herbarium and by exploration in the field.

The area covered includes the prairies and plains east of the Rocky Mountains, and therefore supplements the author's previous work published in 1917, 'The Flora of the Rocky Mountains and Adjacent Plains,' and comprises an area which has not hitherto been systematically treated. The aim is to supply a complete manual of the Spermatophyta and Pteridophyta of the States of Kansas, Nebraska, Iowa, Minnesota, South and North Dakota, and of southern Manitoba and south-eastern Saskatchewan. There are also included most of the species occurring in the prairie regions of Illinois, Southern Wisconsin, and Northern Missouri, and on the plains of eastern Colorado, eastern Montana, and southern Saskatchewan. A paper in 'Brittonia' (i. 1931), "A short Phytogeography of the Prairies and Great Plains of Central North America" by the author, serves as an Introduction to the taxonomic text of the volume. A posthumous paper in the same journal (Oct. 1931) includes Latin diagnoses of the new species and the one new genus, *Denslovia*, a segregate from *Habenaria* (*H. clavellata* Spreng.), and discussions of changes in nomenclature incidental to conformity with the International Rules.

The flora differs widely in different parts of the area, owing to differences of soil and climate. Central Illinois has a precipitation of about 37 ins., while East Colorado has less than 15; the frost-free season in Saskatchewan is less than three months, that of the plains of Texas nearly seven months. It is almost impossible to give an account of the original vegetation, as it has disappeared under cultivation in about 75 per cent. of the prairie land, and in the uncultivated portion has been altered by over-grazing and the introduction of numerous weeds.

The form and arrangement of the text and the illustration by very small block figures are similar to those of the author's 'Flora of the Rocky Mountains.' Pteridophyta, Gymnosperms, Monocotyledons, and Dicotyledons are treated in succession, following the lines of Engler's 'System,' but with a much larger segregation into families, 168 of which are included in the flowering plants. For instance, the water lilies supply three families Nymphaeaceae, Nelumbonaceae, and Cabombaceae; and Engler's Liliaceae is distributed among seven families. A similar segregation is noticeable in the case of genera and species: *Ionaxalis* and *Xanthoxalis* are separated from *Oxalis*; the old genus *Oenothera*, as recognised by Gray now appears under eleven generic names. Dr. Rydberg is, of course, not the author of all the segregations, but he seems to have adopted them *con amore*. The result is the introduction of many unfamiliar names, for a fair proportion of which Dr. Rydberg is responsible. Some of the new combinations will become invalid by obvious additions that are pending to the list of *nomina conservanda*.—A. B. R.

Flora of Surinam (Dutch Guyana). Edited by Dr. A. PULLE. 8vo, vol. i. (pp. 1–48), vol. ii. (pp. 1–112), vol. iii. (pp. 1–64), vol. iv. (pp. 1–112). Kon. Ver. Koloniaal Instituut te Amsterdam, Meded. no. xxx. Afd. Handels-Museum, no. 11. Amsterdam, 1932. Price Fl. 13.65.

THESE four parts are the first instalments of a descriptive 'Flora of Surinam.' In 1906 Dr. Pulle published 'An Enumeration of the Vascular Plants of Surinam' based on the material available up to that date. Since 1906 extensive collections have been made in the colony by collectors of the Department of Agriculture and of the Forestry Bureau, by Dr. Pulle himself and by Messrs. Gonggrijp, Slahel, and others. The material is all to be found in the Herbarium of the State University of Utrecht.

The Flora deals only with the Phanerogamae, and is planned in four volumes. Vol. i. will include Gymnospermae, Monocotyledonae, and Dicotyledonae-Monochlamydeae; vol. ii. and vol. iii. Dicotyledonae-Dialypetalae; and vol. iv. Dicotyledonae-Sympetalae. Each family will be treated by a specialist, and the families will appear in irregular order as they are ready. The four instalments now issued comprise vol. i. Gnetaceae (by F. Markgraf), Loranthaceae (by K. Krause), Amarantaceae (by A. Scheygrond), Balanophoraceae (by J. Lanjouw), Ulmaceae (by S. J. van Ooststroom); vol. ii. Euphorbiaceae and Rhamnaceae (by J. Lanjouw), Monimiaceae (by H. F. M. Petter); vol. iii. Malvaceae, Bombaceae, Sterculiaceae, Tiliaceae, and Elaeocarpaceae (by H. Uittien); and vol. iv. Apocynaceae (by F. Markgraf), Convolvulaceae (by S. J. van Ooststroom), Loganiaceae (by M. H. van Raalte), and Pedaliaceae (by A. Pulle). As the text runs on in each part with no break between the families it will not be practicable to rearrange the families when the work has been completed. The whole work is estimated to contain about 1500 pages, about one-third of which will be published within the first year. More material is in the press, and the accounts of many other families are in preparation. The text is in English throughout.

Good descriptions are given for each family, genus, and species, and there are keys to the genera and species. Under each species are cited the synonymy, distribution, and the localities of the specimens examined, with collector's name and number of specimen; also vernacular names. The typography is very clear. The plan of the work does not apparently include description of novelties; these are dealt with elsewhere. The Flora should be a welcome addition to our knowledge of the botany of the northern portion of equatorial South America, a systematic treatment of which is much needed. The parts are priced at .65 Dutch Guilders per sheet as published. The price, it is stated, will be raised on completion of the work.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY OF LONDON.—At the General Meeting on January 5, Mr. S. Savage, Assistant Secretary, gave an account, illustrated with lantern-slides, of the various homes of the Society since its foundation in 1788. Lt.-Col. Gage, who is preparing a history of the Society, added some comments. Mr. J. H. Turner read a paper on "The Viability of Seeds": a *résumé* was given of previously published evidence of the retention of viability for a number of years, and a definite example was shown. The Botanical Secretary referred to the well-known long duration of viability of the spores of certain fungi.

AMERICAN ELM DISEASES IN ILLINOIS.—The Illinois State Natural History Survey, Bulletin xx. 1–70, describes "Initial Studies of American Elm Diseases" by Hubert A. Harris. The results show that, in Illinois, the so-called "elm-wilt" represents several different diseases which manifest themselves in a number of forms such as twig-blights, cankers, diebacks, and true wilts. They are widely distributed, and have caused the destruction of thousands of trees in the past few years. The most important disease appears to be due to *Coniothyrium*; other important diseases are caused by *Phoma*, *Sphaeropsis*, *Vermicularia*, and *Verticillium*.

"Botanical Results of the German Central-Asian Expedition, 1927–28" (Mitteil. Bot. Mus. Univers. Zurich, cxliii. 1–76).—Walter Bosshard of Zurich, who accompanied the late Dr. Emil Trinkler and his expedition to the plateau and mountains of Tibet, edits the botanical results of the expedition. A brief general account of the route taken and the country traversed is followed by lists of the species collected, which have been compiled by several workers. That on Algae, by H. Skuja, includes descriptions of several new or critical species, and V. Czurda describes several new species of Zygnemataceae. The short list of lichens by A. Zahlbruckner includes two new species, and I. Theriot describes two new mosses, *Bryhnia* spp. The 300 vascular Cryptogams and Phanerogams collected have been determined by Emil Schmid, whose list includes two new species of *Stellaria*, one of *Arenaria*, and two of *Braya*.

'Hong Kong Naturalist, Supplement.'—The Supplement has been initiated to contain "highly scientific commentaries" which would not be suitable for the ordinary numbers of the Journal. The first number (October 1932) contains an examination by W. A. Setchell of the taxonomy and nomenclature of the parasite *Balania Harlandii* van Tiegh. (*Balanophora Harlandi* Hook. f.) and its relatives. A new genus, *Balaneikon*, is proposed to include two species of *Balanophora* founded by Makino on Japanese specimens. The paper is well illustrated by photographic reproductions of actual specimens. W. R. Ivimey Cook gives a general and systematic account of the parasitic Slime-moulds (Plasmodiophoraceae) with keys to the six genera and short descriptions and figures of the species, "to encourage the search for species in Eastern Asia from where, at present, no species have been recorded."

'Journal of the Indian Botanical Society,' vol. xi. no. 3, contains articles on "The Development of Ovule and Embryo-sac in *Solanum Melongena* L." by P. N. Bhaduri and on "The Development of the Embryo-sac and Fertilisation in Jute (*Corchorus olitorius*)" by I. Banerji. G. P. Majumdar describes the formation of three types of roots, which show hetero-archy in the number of their vascular bundles, from the same node, in the water-plant *Enhydra fluctuans* Lour. B. Sahni records staminal movements in the West Himalayan Composite *Gerbera lanuginosa* comparable to the familiar mechanism in *Centaurea*; and M. J. Narasimhan describes and illustrates five species of Phalloideae from the western ghat region of Mysore.

The Editore xpects to be away on a botanical trip to Jamaica and Bermuda until May. Mr. J. Ramsbottom, Keeper of the Department of Botany, Natural History Museum, has kindly undertaken to see the numbers of the Journal through the press during Dr. Rendle's absence.

THE GENUS *CREPIS* IN GREAT BRITAIN.—II.

By E. Drabble, D.Sc., F.L.S.

In connection with his work on the genus *Crepis* the writer has been asked to give a short account of all the British species and varieties, together with those that are known to have occurred as aliens or established "escapes." It is hoped that the following key and concise descriptions will furnish the required aid.

In examining specimens of *Crepis* it is entirely necessary that ripe fruiting-heads should be seen. The internal surface of the phyllaries, the nature of the receptacle, and the length of the fruits must all be examined for secure diagnosis. These heads should not be pressed with the specimen, but should be allowed to dry in the air, and then be kept in an envelope with the sheet.

Key to the Species.

1.	Fruits not beaked	2.
1.	Fruits beaked	10.
2.	Pappus tawny, stiff, brittle; fruits very definitely truncate above	*C. paludosa.*
2.	Pappus white, silky, not brittle, fruits ±attenuate above	3.
3.	Fruit subtetragonal with 4 deep furrows; receptacle with verrucose papillæ; plant stoloniferous with tubercles	*C. bulbosa.*
3.	Fruits pluristriate, receptacle not verrucose	4.
4.	Capitula few-flowered, involucre with triangular caliculate external scales, 4–5 times shorter than the linear inner ones; stem viscous below	*C. pulchra.*
4.	Capitula many-flowered, involucre and stem not as above	5.
5.	Fruits with 18–20 ribs, capitula few (c. 7), leaves oblong entire, cauline leaves with small round auricles	*C. succisifolia.*
5.	Fruits with 10–12 ribs (rarely 8 or 13); capitula many, corymbose	6.
6.	Cauline leaves with revolute edges; fruits ±long-attenuate above	*C. tectorum.*
6.	Cauline leaves flat, fruits shortly attenuate above	7.
7.	Inner phyllaries downy within	8.
7.	Inner phyllaries glabrous within	9.
8.	Stem roughly hairy, especially below; cauline leaves auricled, terminal lobe of leaf broad	*C. biennis.*
8.	Stem nearly glabrous, leaves not auricled, terminal lobe of leaf long, narrow, and parallel-sided	*C. oporinoides.*
9.	Fruits in winged and strongly fringed alveoli; stem and leaves roughly hairy	*C. nicaeensis.*
9.	Receptacle glabrous, fruits not in winged and fringed alveoli, stem much less hairy, or glabrous; leaves often glabrous, except on the mid-rib below	*C. capillaris.*
10.	Flowers pink	*C. rubra.*
10.	Flowers yellow	11.
11.	Outer scales of involucre short, scarious, broadly ovate, hooded, inner linear bristly	*C. alpina.*

11.	Outer scales of involucre linear, green or with margin only scarious	12.
12.	Peripheral fruits shortly beaked, disc-fruits long-beaked; inner involucral scales at length much hardening and embracing the outer fruits	*C. foetida.*
12.	All fruits long-beaked; outer involucral scales not hardening nor enclosing the outer fruits	13.
13.	Scales of involucre obtuse with scarious margins, not prickly-hispid, receptacle hairy	*C. taraxacifolia.*
13.	Scales of involucre acute, not scarious, prickly-hispid.	*C. setosa.*

CREPIS PALUDOSA (L.) Moench. *Hieracium paludosum* L.

Plates :—Reichb. 'Icones,' xix. t. 102; E. B. 1094.

Perennial, stem up to 2 ft., glabrous, slender, furrowed; lower leaves runcinate or dentate, attenuated to the base, cauline lanceolate acuminate, entire or dentate, amplexicaul, auricled; capitula few, usually 3–7; bracts of peduncles minute subulate with toothed bases; peduncle and involucre with black glandular hairs; phyllaries glabrous within; receptacle glabrous; fruits not beaked, very definitely truncate above, with 6–8 (?10) smooth ribs; pappus stiff, brittle, brownish or reddish white.

CREPIS BULBOSA (L.) Tausch.

Plate :—Reichb. 'Icones,' xix. t. 82. f. 1.

Perennial, stoloniferous, stolons ending in roundish tubers; stem up to c. 15 in., often shorter, naked or with one or two leaves, ±glandular and with black hairs towards the top; leaves chiefly basal, glabrous, oblong-lanceolate, obtuse, ±dentate; capitula 1–4, large; inner involucral scales broadly linear obtuse, narrowly scarious, outer short, all at length reflexed; receptacle verrucose; fruits not beaked, subtetragonal with 4 well-marked ribs.

A native of Southern Europe, N. Africa, and the East. Found in Anglesea by Miss E. M. Massey in 1926 (Rep. B. E. C. 1928, 618).

CREPIS PULCHRA L. *Phaecasium pulchrum* Reichb.

Plate :—Reichb. 'Icones,' xix. t. 80.

Annual; leafy and glandular-viscous below, naked and glabrous above; lower leaves oblong-lanceolate or spathulate, dentate or runcinate, glandular-hairy, stem-leaves sessile, auricled, lanceolate to linear-lanceolate, entire or dentate; capitula few-flowered; involucre glabrous, oblong-cylindrical; outer phyllaries very short, triangular, caliculate, internal 4–5 times longer, linear acute, greatly hardened in fruit; receptacle naked; fruits not beaked, with 10–13 superficial ribs, outer fruits rough, inner smooth; pappus white, soon falling, generally wanting on the outer fruits.

A native of Central and S. Europe, N. Africa, and the East.

CREPIS SUCCISIFOLIA Tausch. *C. hieracioides* W. & K.; *C. mollis* Asch.

Plates :—Reichb. 'Icones,' xix. t. 100. f. 1; E. B. 2210.

Perennial; stem c. 8–20 in., variable in pubescence, usually glabrous or slightly hairy, branched above; leaves glabrous or slightly hairy, lower stalked, oblong-spathulate obtuse, margins entire or minutely dentate, cauline lanceolate acute, sessile with small rounded auricles; capitula few, up to c. 7; peduncles and involucres with glandular hairs; outer phyllaries short adpressed, inner acute, glabrous within; receptacle glabrous, aræolæ not fringed, fruits not beaked, with 18–20 smooth ribs.

Rouy (Fl. Fr. ix. 223) gives two varieties of this plant :—α *mollis* Koch, with stem and leaves "poilues ou rudes," at least in the lower parts: some of our Braemar plants seem to come under this name; and β *nuda* G. & G., entirely glabrous; a continental specimen in Herb. Drabble is of this form, but no entirely glabrous British plants have been seen.

CREPIS TECTORUM L. (*non* Sm., E. B. 1111).

Plate :—Reichb. 'Icones,' xix. t. 91.

Annual; stem c. 1–2 ft., simple or branched; radical leaves oblong-lanceolate entire, dentate or runcinate, cauline sessile, sagittate, linear with revolute margins; capitula small, corymbose; outer phyllaries linear, inner acute with whitish pubescence, ±glandular, hairy within; receptacle almost glabrous, alveoli with finely serrate fringes; fruit not beaked, ±long-attenuate above (more so than in *C. capillaris*), with 10–11 rough ribs, spinulose near the tip.

The following specimens in Herb. Mus. Brit. are the only satisfactory British specimens that the writer has seen :—*C. tectorum* L., nr. Kelso, Roxburgh, Aug. 1874, and July 1875, *A. Brotherston.*

CREPIS BIENNIS L.

Plates :—Reichb. 'Icones,' xix. t. 88; E. B. 149.

Biennial; stem 1–4 ft., ribbed, roughly hairy or hispid, especially below; leaves densely hairy, lower usually runcinate-pinnatifid with broad terminal lobe, occasionally deeply laciniate or more rarely merely deeply dentate, stalked; upper leaves often less deeply divided, rarely entire, sessile, with dentate non-sagittate auricles; capitula large, up to 4 cm., corymbose; peduncles often glandular-hairy; phyllaries broadly linear, outer spreading, internal sub-obtuse ±arachnoid and hairy, occasionally slightly glandular, hairy within, margins scarious; receptacle hairy, with fringed alveoli; fruits not beaked, 5–6 mm., with about 10–13 ribs (occasionally more), rough with short bristles or nearly smooth.

Rouy (Fl. Fr. ix. 230) gives three varieties based on leaf-form :—

α *runcinata* Koch, Syn. ed. 2 (*C. lodomiriensis* Bess., Prim. fl. Gall. 2) with leaves almost regularly runcinate, entire above.

β *bannatica* Rochel (Pl. rar. Bar. f. 61) (var. *lacera* Koch, Syn. ed. 2) with leaves unequally runcinate-pinnatipartite or laciniate.

γ *dentata* Koch, *l. c.*, with leaves elongate linear-oblong, the lower dentate, the upper entire.

CREPIS OPORINOIDES Boissier.

Plate :—Boissier, ' Voyage botanique dans le midi de l'Espagne,' ii. t. 117.

Biennial; stem up to 2 ft. 6 in. or more, deeply striate, nearly glabrous; leaves glabrous or slightly hairy, margins sometimes ciliate, deeply pinnatifid with long, narrow, mucronate, retrorse lateral segments and very long (up to 6 cm.), narrow, (c. 0·5 cm.), parallel-sided terminal segment (basal leaves occasionally less deeply divided or coarsely sinuate-dentate); cauline leaves not auricled; inflorescence-system very open, with long slender peduncles; capitula large, up to 4·5 cm. in diameter; involucre and upper part of peduncle lightly tomentose; outer phyllaries narrow, linear, ±spreading, inner broader, subobtuse, downy within; corolla yellow; receptacle hairy, alveoli strongly fringed; fruit not beaked, 7–8·5 mm. in length, with 10–12 ribs, smooth, or rough above with short bristles.

I am strongly inclined to regard this as a variety of *C. biennis*.

CREPIS NICAEENSIS Balb.

Plate :—Reichb. ' Icones,' xix. t. 89.

Biennial, stem 1–2 ft., grooved, roughly hairy or hispid below, and often throughout; leaves usually densely hairy, lower stalked, deeply dentate or runcinate, cauline sessile with sagittate auricles; inflorescence corymbose, generally rather close, with upright, roughly hairy, somewhat tomentose peduncles; involucre ±tomentose, occasionally glandular; outer phyllaries spreading, inner glabrous within; receptacle with winged and strongly fringed alveoli; fruits not beaked, 3·5–4·25 mm., with c. 10 ribs, smooth except near the top, or rough throughout.

The eglandular plant is var. *eglandulosa* Crépin; Rouy (Fl. Fr. ix. 228) has a var. β *integrifolia* Lamotte, Prodr. plateau centr. 473, with leaves entire or feebly dentate below, and Reichenbach (' Icones,' xix. 44) a var. b. *adenantha*, " multo magis glandulosa, isthmis foliorum profundioribus dentatis. *Crepis adenantha* Visc.! Bot. Zeit. Ergbl. 1836, 53, Dalm. ii. 119 et tab. v. f. 1."

The following specimens in Herb. Mus. Brit. are correctly named :—*C. nicaeensis* Balb., Penters Cross, Cornwall, June 1878, *T. R. Archer Briggs*; Chalk Downs, Reigate, *C.E. Salmon*, July 2, 1909; Pontrilas, Hereford, June 2, 1882, *Augustin Ley*; Inworth, Essex, June 1880, *E. G. Varenne*; Rugby, July 1898, *S.T.Dunn*; Malvern Link, Worcs, June 21, 1886, *R.F.Towndrow*; Yeldersley, Derbys., June 24, 1889 (in W. R. Linton's writing); Harrogate, July 1876, *J. J. Foggitt*; Tweedside, Springhall, June 1874, *A. B.*

The two following sheets in Herb. Mus. Brit. are also *nicaeensis* :—Tretire, Herefordshire, *A. Ley*, June 1878 (as *taraxacifolia*); Barnes Bridge, Aug. 11, 1887, *J. Benbow* (as *taraxacifolia*); also :—Warnham, Sussex, June 1882 (as *biennis*), *E. Straker*, in Herb. Drabble.

CREPIS CAPILLARIS (L.) Wallr. *C. virens* L.; *C. polymorpha* Wallr.; *C. tectorum* Sm. (*non* L.).

Plate :—Reichb. ' Icones,' xix. t. 90.

Annual; stem upright or diffuse, glabrous or slightly hairy below, not deeply striate (more densely hairy and more deeply striate in var. *anglica*); leaves usually glabrous except on the midrib below, lower leaves stalked, very variable, oblong, dentate, runcinate, deeply pinnatifid or laciniate, cauline less deeply divided, sessile, sagittate; involucre glabrous or hairy, sometimes glandular, outer phyllaries linear, adpressed, inner sublinear, glabrous within; receptacle glabrous, without fringed alveoli; fruits not beaked, 2·5–3·25 mm. with c. 8–10 nearly smooth or slightly rough ribs.

Var. *anglica* Druce & Thellung :—Stem tall, 2 ft. or more, robust, hairy below and more deeply grooved; capitula large, involucre with blackish or blackish-green hairs, many or all of them glandular; f. *griseola* Thellung differs only in having copious greyish indumentum on the involucre.

The hairiness of the stem and the glandulosity of the involucre are subject to considerable variation. Excellent examples of *anglica* in Herb. Mus. Brit. are :—

C. virens L., nr. Nairn, v.c. 96, E. Inverness, Aug. 2, 1898, *E. S. Marshall.*

C. capillaris Wallr., Grey Abbey, Co. Down, July 5, 1913, *C. H. Waddell.*

C. capillaris Wallr. v. *agrestis* (W. & K.), nr. Newquay, June 1915, *C. C. Vigurs.*

Many varieties of *C. capillaris* founded on different leaf-forms have been described. The chief of these are (i.) *integrifolia* Coss. & Germ., with entire or only slightly sinuate leaves; (ii.) *dentata* Bisch., with leaves merely dentate (shown as a small plant in Reichb. ' Icones '); (iii.) *vulgaris* Reichb., with leaves very irregularly sinuate-runcinate; (iv.) *runcinata* Bisch., with

runcinate leaves; (v.) *pinnatifida* Willd. (*pectinata* Bisch.), with radical leaves like those of *runcinata* but with cauline leaves pectinate-pinnatipartite, the segments being narrowly linear and approximated and the upper part of the lamina undivided. Two other leaf-forms, perhaps hitherto undescribed, have been grown by the writer:—(vi.) *laciniata*, with leaves divided into very slender segments up to 5 cm. in length by 1·5–2·0 mm. in breadth; and (vii.) *auriculata*, with remarkably large, broad and widely spreading auricles on the cauline leaves. Extreme examples of all these forms look distinct enough, but much more cultural evidence is necessary before their status can be determined.

Var. *diffusa* Wallr. in DC. Prodr. vii. 162, is described as "caule decumbente diffuso, pedicellis filiformibus, foliis inferioribus caulinisque amplexicaulibus lanceolato-linearibus parce dentatis." This is a very common form on dry banks, sand-dunes, and other exposed places. Mr. Wilmott tells me that it is often produced by the attack of rabbits. It still remains to be determined whether there is a genetically distinct variety coming under *diffusa*, but there is strong presumptive evidence that it is a mere state or an ecad.

CREPIS RUBRA L.

Annual; stem with few cauline leaves and one or few capitula; lower leaves runcinate ±deeply divided; phyllaries arachnoid, often hispid on the midrib, nearly glabrous within; receptacle with long hairs; corolla pink; fruits with c. 10 rough ribs, outer shortly beaked, inner long beaked.

A native of Southern Europe.

CREPIS ALPINA L. *Anthochytrium alpinum* Reichb.

Plate:—Reichb. 'Icones,' xix. t. 81.

Annual; stem erect, ±hairy, grooved; lower leaves stalked, lyrate-pinnatifid, with oblong, somewhat dentate terminal lobe; cauline leaves sessile, oblong-lancolate dentate, with sub-cordate clasping base; inflorescence corymbose, outer phyllaries short, scarious, ovate, hooded, glabrous, inner broadly linear, bristly, at length much thickened and hardened and enclosing the outer fruits, with a loose tomentum within, otherwise nearly glabrous; fruits with 15–16 very rough ribs, outer fruits tapering above, inner long beaked.

CREPIS FOETIDA L. *Barkhausia foetida* DC.

Plates:—Reichb. 'Icones,' xix. t. 83; E. B. 406.

Annual or biennial; stem 1–2 ft., upright or diffuse, branched from below, hairy or hispid; leaves runcinate-pinnatifid, the lower stalked, cauline smaller and simpler, sessile, amplexicaul; capitula on very long stalks, nodding in bud; phyllaries hairy or setose and often glandular, generally with a white tomentum, outer linear short, inner broader acute, glabrous within, hardening

and enclosing the outer fruits; receptacle hairy; fruits beaked, with 13–15 (Reichb. figures 17) ribs, rough or bristly, especially above, sometimes nearly smooth below, beaks of the inner more than twice as long as those of the outer fruits.

Rouy, following Bischoff, Beitr. Fl. Deutschl. u. Schweiz, describes three varieties:—

α *vulgaris* Bisch., with pericline whitish, subtomentose, peduncles softly hairy, non-glandular.

β *glandulosa* Bisch., with similar pericline and peduncles but with glandular hairs, sometimes intermixed with blackish "aspérités."

γ *hispida* Bisch., pericline and peduncles hispid with stiff whitish hairs.

Of these there are examples of α and γ in Herb. Drabble.

CREPIS TARAXACIFOLIA Thuill. *Barkhausia taraxacifolia* DC.

Plates:—Reichb. 'Icones,' xix. t. 86. f. 1; E. B. S. 2929.

Biennial; very polymorphic; stem 1–3 ft., hispid, furrowed, usually purple below, branched above or occasionally from the base; leaves hairy, varying much in form, typically lyrate-runcinate with large terminal lobe, sometimes deeply pinnatisect with the divisions again dissected, sometimes merely deeply dentate or almost entire; cauline sessile, auricled; auricles sometimes very large and dissected; peduncles and involucres hairy and with white tomentum, occasionally glandular; outer phyllaries spreading, lanceolate, inner hairy within, receptacle hairy with fringed alveoli; fruits all beaked, 6–7 mm., with about 10 very rough ribs.

The leaf-forms are extremely numerous and cannot be dealt with here, but mention may be made of var. *subindivisa* Druce, a striking form characterized by its entire, almost spathulate leaves, with margins shortly toothed.

CREPIS SETOSA Haller f.

Plate:—E. B. S. 2945.

Annual; stem 1–2 ft. striate, ±hispid; leaves hairy, radical runcinate-dentate or lyrate-runcinate, stalked, cauline dentate or entire, amplexicaul with sagittate auricles; involucre not glandular, prickly with stiff hairs; outer phyllaries linear or subulate (not lanceolate as in Bab. Man. ed. ix.), much spreading, inner contracted in fruit (not hardening as stated in Hooker, Stud. Fl. ed. iii.), hairy within; receptacle glabrous, fruits 4–4·5 mm., beaked, with c. 10 very rough ribs.

It will be noticed in the above descriptions that the colour of the fruits has not been given. Much more work is required before this character can safely be used for diagnosis.

THE DEHISCENCE OF THE SPOROCARP AND GERMINATION OF THE SPORES IN *MARSILIA POLYCARPA* HOOKER & GREVILLE.

By J. T. CUNNINGHAM, M.A., F.L.S., and D. M. REID, F.L.S.

On Jan. 5, 1931, when staying at the Fazenda Camburupý in the island of Marajó, at the mouth of the Amazons, we noticed numbers of curious gelatinous rods lying half submerged in shallow pools of water on the surface of the mud at the margin of the ponds dug out for the cattle to drink. The first rain after about five months of the dry season had fallen on Dec. 27, and it had rained heavily at night several times since then. The gelatinous rods were transparent, 2·2–2·5 cm. in length, and attached at one end to small, black, opaque capsules, from which they had apparently grown. The surface of the capsules was rough. They were almost perfectly spherical, with a diameter of 3 mm. At intervals along the cord were five opaque granules (fig. 1, A). The measurements given were made on specimens preserved in weak alcohol. Under the low power of a microscope, magnified about eight times, they appeared as shown in fig. 1, B. The granules were seen to be the opaque spores contained in hollow capsules attached by short peduncles to the cylindrical rod or cord The cord and peduncles consisted of polygonal transparent cells. The cavity of each capsule contained two oval spores, each with a rounded projection at one end, and in addition a few opaque granules. Some of the spores were kept in small shallow vessels in the house and the stages of germination observed.

The spores were afterwards identified as belonging to *Marsilia polycarpa* Hook. & Grev., and we are indebted for aid in their identification to Dr. Ethel Thomas and to Mr. J. Ramsbottom, and Mr. A. G. H. Alston of the Natural History Museum. The history and synonymy of the species are indicated in the following references :—

M. polycarpa Hook. & Grev. ' Icones Filicum,' ii. pl. 160, 1831 ; A. Braun, Monatsber. Berlin. Akad. 1863, 417, 1870, 722 ; *M. brasiliensis* Martius, Icones Plant. Cryptogam. pl. lxxiii. 1828–34, Flor. Bras. i. pt. 2, fasc. 92, 1884.

A. Braun states (1870, 698) that *M. polycarpa* is the only species of the genus in which the sporocarp is almost spherical as in *Pilularia*. He states that there are three sori on each side, but we observed only five altogether. The number may vary in different specimens, but Braun only examined the unburst sporocarps. He counted 12 to 14 megaspores in a single fruit or sporocarp in six sori; we saw two in each sorus. In Martius (Flor. Bras.) it is stated that there are 12 to 14 megaspores in each sorus, " in singulo soro," but this is obviously a mistake in translating from Braun, 1870, who writes : 12 to 14 macrospores " in einer Frucht."

According to Braun there are five species of *Marsilia* in the continent of South America, two of which, *M. polycarpa* and *M. deflexa*, occur in Brazil. *M. deflexa* has been found in the province of Piauhy, but only *M. polycarpa* in the basin of the

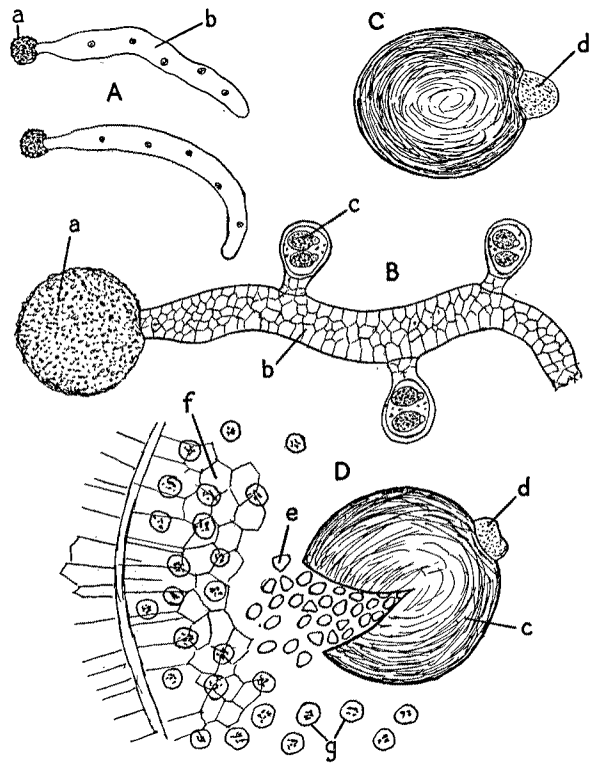


Fig. 1.—A. Sporocarps of *Marsilia polycarpa* after dehiscence. B. Part of one of the same, ×4. C. Single megaspore more highly magnified. D. A single " spore capsule " and megaspore burst by compression.
a, wall of sporocarp; *b*, carrier of mucilaginous cellular tissue; *c*, megaspores; *d*, prothallium; *e*, starch grains; *f*, wall of capsule; *g*, microspores.

Amazons, the locality given being Pará. The species occurs also in Guiana and on the islands of St. Thomas and Cuba in the West Indies. Braun recognises five varieties, two of which occur in Mexico. *M. deflexa* differs from *M. polycarpa* in having much elongated sporocarps with 6 to 8 sori on each

side, and 2 or 3 megaspores in each sorus. *M. salvatrix*, mentioned below, one of the commonest Australian species, has 8 to 10 sori on each side, and 7 or 8 megaspores in each sorus.

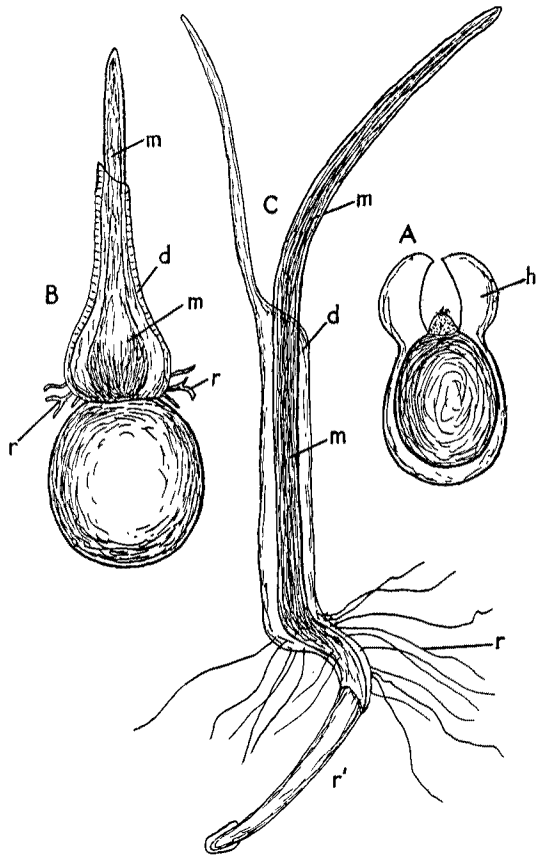


Fig. 2.—A. Spore at earlier stage than fig. 1, C. B. Early embryo. C. Later stage of embryo.
d, prothallium; *h*, episporium; *m*, embryo; *r*, rhizoids; *r'*, primary root.

Fig. 1, C, shows one of the megaspores studied in Marajó more highly magnified. The projection, *d*, is the prothallium, within which the embryo develops from the oospore. The spore is white and opaque, the prothallium is green from the presence of chlorophyll. Fig. 1, D, shows a portion of a sorus containing a spore after compression under a cover-glass, the

spore having been ruptured. Starch grains contained in the spore, and forming the greater part of its bulk, are seen escaping. The mucilaginous tissue of the sorus-wall is seen, and the small spherical bodies containing granules are the microspores.

In the spores shown in fig. 1, C & D, it may be presumed that the wall of the megasporangium, as well as the mucilaginous epispore, has been thrown off and has disappeared. Fig. 2, A, is a drawing of an earlier stage found in some preserved material. The wall of the sporangium is absent, but the spore is enclosed by the mucilaginous non-cellular epispore, which, at the end where the prothallium is situated, is much enlarged to form an open funnel through which the antherozoids pass to fertilise the oosphere.

The dehiscence of the sporocarp (in *M. quadrifolia* L.) was first described by Alexander Braun (in *Flora*, 1839), whose figures showing the mucilaginous carrier with the sori attached in *M. pubescens* were published in the 'Exploration Scientifique d'Algérie,' Botanique, 1849, pl. 38. Hanstein, in 1862, gave a more detailed description with an account of the development of the embryo. This research is remarkable from the fact that it was made up on only six sporocarps sent to Ehrenberg, who communicated Hanstein's paper to the Akademie der Wissenschaften of Berlin (Monatsber. K. Preuss. Akad. 1862), together with a short summary by himself of the chief facts concerning three recent expeditions for the exploration of the interior of Australia, from one of which the specimens were obtained. The advance party of this expedition, including the leaders Burke and Wills, all perished, on the return journey, near Cooper's Creek, lat. 27° 30′ S., with the exception of one man named King, who was rescued in an exhausted condition by a search party. King had for some months lived with some compassionate natives, who shared with him the scanty supplies of food which they obtained by gathering the sporocarps of *Marsilia* from the beds of watercourses. This food they called "nardoo," and it was specimens of these sporocarps which were investigated by Hanstein. Considering that each sporocarp contains a considerable proportion of starch, as well as some protoplasm, it is not more surprising that they should serve as human food, if in sufficient abundance, than that grains of wheat should supply the staple food of civilised man. It is, however, extraordinary that the primitive natives of Australia should have learned to make use of the minute sporocarps of a cryptogam which were specially adapted to survive during the dry season of the Australian desert where little other food was available, and that the rescue of one man of a party of explorers with all their journals should have been due to these sporocarps. The species to which the sporocarps belonged was named by Hanstein

M. salvatrix, as the characters were different from those of any known species, but doubtless the sporocarps of other species are also used as nardoo. Hanstein describes the cellular structure of the carrier and of the wall of the capsule, which he calls the indusium. Botanists are not all agreed that the wall of the capsule is homologous with an indusium. The sorus is properly not the capsule, but the group of sporangia which it contains, and the latter develop from the epidermis. It seems certain that the sorus is sunk within an invagination of the fertile pinnule or outgrowth which gives rise to the sporocarp, and the carrier is the mesophyll of that pinnule. If we regard the relations of the structures after dehiscence, it is obvious that the walls of the capsule are epidermic, and, as they are originally open to the exterior, they resemble closely the sori and open cup-like indusia of Hymenophyllaceae and some Cyathaeaceae among the Filicineae.

Fig. 2, B, shows a stage of development in which the embryo consists of an early stage of the first leaf, with a pyriform swelling at its base which contains the growing-points of the stem and root. Surrounding the embryo is the prothallium, the base of which is throwing out rhizoids. The point of the leaf has broken through the apex of the prothallium. The stage of fig. 2, C, is considerably more advanced. It shows the first root with its root-cap, and the tip of the prothallium has grown out into a long strap-like projection on one side of the first leaf.

The development here described is in its general features typical of the genus *Marsilia*, differing from that of other species only in minor details, namely, the rounded shape of the sporocarp, the small number of spore-capsules, and the small number of megaspores in each capsule. The chief interest of the description and figures is that the dehiscence and spore-germination have not, so far as we have been able to discover, been described before, although it is exactly a hundred years since the species was first defined and named. Hitherto, while the mode of dehiscence of the sporocarp was unknown, it was not certain that the development in this species would so closely conform to that of other species of the genus, because the spherical shape of the sporocarps suggested the possibility that the development might in some respects show an approximation to that of *Pilularia*, or might be in some degree aberrant.

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NOVITATES AFRICANÆ.

(Continued from vol. lxx. 1932, p. 341.)

Leucospermum (§ *Hypophylloidea*) **cereris** R. H. Compton, sp. nov. *Frutex* prostratus. *Caules* teretes, inter ramos ad 9 poll. long., tomento crispato et pilis longis nonnullis tecti. *Folia* numerosa, in caulibus horizontalibus erecta, ovata, ad basim angustata, coriacea, dense persistenteque tomentosa, venis distinctis, apiculo obtuso, præpilata vel interdum tridentata, 8–12 lin. long., 3–5 lin. lat. *Capitula* terminalia solitaria vel 2–3, resupina pedunculata globosa, cum stylis ad 2¼ poll. diam. *Pedunculus* c. 6 lin. long., 2 lin. diam., bracteis paucis latis apiculatis c. 2 lin. long., c. 1½ lin. lat. *Receptaculum* ovatum, c. 3 lin. long. *Bracteæ* steriles appressæ ovatæ apiculatæ, c. 4 lin. long. *Bracteæ florales* late obcuneatæ, 3 lin. long. et lat., in apiculo angusto breviter piloso 1½ lin. long. terminantes, supra glabræ, dorso marginibusque pilis longis sericeis dense tectæ. *Perianthii tubus* 3 lin. long., infundibuliformis, basi glaber, altiore pilosus ; limbo flavo, 5 lin. long., dense piloso ; antheræ 1½ lin. long. *Squamæ hypogynæ* lineares, membranaceæ, 1½ lin. long. *Ovarium* 1¼ lin. long. *Stylus* flavus, 12 lin. long., sulcatus, parte quarta ultima recurvata angustiore. *Stigma* ovoideum, leviter obliquum, obtusum, 1 lin. long.

Hab. The exact locality for this plant is unknown, but is certainly in the Ceres Division, Cape Province. There are three gatherings of it in the Bolus Herbarium, all obtained from wild flower shows, viz., *Bolus Herbarium* no. 16283, exhibited at the Cape Town Wild Flower Show, October 1919 : *Compton* no. 3824, exhibited at Ceres Wild Flower Show, Oct. 3, 1927 : *Compton* no. 3694, exhibited at Ceres Wild Flower Show, Oct. 4, 1930.

A very distinct species, most nearly related to *L. hypophyllum* R. Br., but readily distinguished by the form and clothing of its leaves and by its floral characters.

Leucospermum Catherinae R. H. Compton, sp. nov. (*Proteaceae-Persoonioideae*). *Frutex* erectus. *Caules* rigidi teretes, juventute pubescentes pilosique, glabrescentes. *Folia* erecto-patentia ligulato-elliptica, medio vel supra latissima, basi 2–3 lin. lat., medio 6–8 lin. lat., callis c. 3 terminata, 3½–4½ poll. long., coriacea viridia, juventute breviter puberula, glabrescentes, nervo medio et venis lateralibus præsertim infra basique prominentibus. *Capitulum* solitarium terminale, 4 poll. long. et lat., cum cervice stylisque, cervice distincta unciale, bracteis sterilibus appressis brunneis imbricatis obtecta. *Bracteæ* numerosæ ovatæ acutæ imbricatæ glabrescentes, marginibus ciliolatis. *Perianthii tubus* 4 lin. long., supra minute puberulus, infra glaber, unguibus 3 conjunctis contortis, quarto libero, c. 14 lin. long., flavis laxe sericeo-tomentosis, limbis liberis 4 lin. long., acutis dense sericeo-

tomentosis. *Antheræ* sessiles angustantes, connectivo fusco. *Ovarium* oblongum pubescens, 1¼ lin. long., capillis sericeis circumdatum. *Stylus* robustus quadratus, 3–3½ poll. long., basi 1 lin. diam., glaber nitens viridis gradatim angustans, parte terminali aurantiaca tangentialiter deflexa. *Stigma* 3 lin. long., leviter obliquum, teres sed sulcatum, obtusum purpureum.

Hab. Cape Province ; Ceres Division, exact locality unknown. *Compton* no. 3958, exhibited at the Ceres Wild Flower Show, October 5, 1931. Mrs. C. van der Byl informs me that she had seen the plant growing near The Baths, Modderfontein, Clanwilliam Division.

Most nearly related to *L. grandiflorum* R. Br., from which it differs in the longer, narrower, less hairy, and sooner glabrescent leaves, the glabrescent stems, the larger size of its inflorescences, the neck, the appressed bracts, the less hairy perianth, and the longer and stouter styles. The sterile apical region of the capitulum is conspicuous in the midst of the flowers. The styles are bent laterally at their ends, all of them being directed tangentially in the same sense, giving a wheel-like appearance to the inflorescence in apical view ; the specific name is suggested by this feature.

Nivenia roodebergensis R. H. Compton, sp. nov. (*Proteaceae-Persoonioideae*). *Frutex* c. 3-pedalis. *Caules* rigidi glabri erecti parum ramosi. *Folia* erecta vel patentia, imbricata glauca coriacea dimorpha ; inferiora 2–3-plo trifida, petiolis 5–6 lin. long., linearibus, basi non expansis, lobis ultimis linearibus leviter canaliculatis, apicibus obtusis callosis ; superiora integra late flabellata, petiolis erectis 2–3 lin. long., laminis orbiculatis vel late ovatis, 6–9 lin. long. et lat., reticulate nervatis, nervo medio haud distincto, apice obscuro obtuso calloso, marginibus corneis non crassatis. *Prophylla* reducta et folia transitantia frequentia. *Inflorescentia* terminalis solitaria, ad 1½ poll. long., ad ¾ poll. lat., cylindrica compacta, axe dense lanato, bracteis late obcuneatis, 3 lin. long., 4 lin. lat., rubro-fuscis, juventute puberulis, margine minute ciliato, mox glabrescentibus rigide corneis. *Capitulum* e floribus 2–4 compositum. *Involucri* bracteæ 4, 5–6 lin. long., 2–2½ lin. lat., glabrescentes coriaceæ oblongæ obtusæ concavæ. *Perianthii tubum* 1½ lin. long., sparse villosum, segmentis 5 lin. long., dense villosis, apicibus subcucullatis. *Antheræ* lineato-oblongæ, 1¼ lin. long. *Ovarium* puberulum, basi villosa, stylo glabro, 6 lin. long., stigmate anguste elliptico, 1–1⅓ lin. long. *Fructus* ovoideus, 4 lin. long., 2½ lin. lat.

Hab. Cape Province ; Ladismith Division, Roodeberg, 4800 ft. altitude, November 1, 1931, *Compton* no. 3921.

Similar in vegetative characters to *N. spathulata* R. Br. and *N. Muirii* Phillips & Hutchinson (which are probably synonymous), but the inflorescence is markedly different. The bracts are much broader and are only slightly pubescent when young, rapidly becoming glabrous. The perianths are persistently white-villous, so that the whole inflorescence presents a striking contrast between the bracts and flowers. There are also smaller differences in floral characters. The new species is an interesting addition to the small group of species of *Nivenia* in which the leaves are markedly dimorphic, the lower ones being for the most part finely dissected, while the upper ones are entire and flabellate (some leaves showing an intermediate form) ; this dimorphism not being a phenomenon of juvenilism, but occurring as a regular event on the branches of the mature shrub.

Ornithogalum distans L. Bolus, sp. nov. (*Beryllis*) (*Liliaceae-Scilleae*). *Planta* 25–30 cm. alta, caule ad 3 mm. diam. *Folia* 3, distantia, vaginis per 1·4–2 cm. exsertis, viridi-maculatis vel suprema viridi-nervata, plus minusve setosis, setis patentibus, laminis subdifformibus, infima oblonga vel ovali, obtusa ad 2 cm. longa, 1·1 cm. lata, superioribus linearibus superne attenuatis acutis vel subacutis utrinque pilosis, pilis patentibus minute glandulosis vel supra glabrescentibus, vix carnosis, 4·5–6·5 cm. longis, 0·8–1 cm. latis. *Racemus* 9–20-fl., 8–10 cm. longus vel demum elongatus. *Pedicelli* inferiores ad 2·5 cm. longi. *Bracteæ* e basi ovata longe attenuatæ, tenues, inferne pellucidæ, superne virides, nervis 5 viridibus, 3 ad apicem convergentibus. *Perianthii segmenta* nivea ad 1·6 cm. longa, 6–7 mm. lata, oblongo-ovata vel subobovata, obtusa, exteriora medio viridi-nervata, interiora sæpius concoloria basique breviter unguiculata. *Filamenta* alba inæquilonga, 5–6 mm. longa, longiora basi per 2 mm. dilatata, squama apice biloba ; antheræ luteæ. *Stylus* cum stigmatibus 4 mm. longus. *Ovarium* luteum 4 mm. longum.

Hab. Calvinia Div. ; prope Nieuwoudtville, Oct. 1930, *H. Buhr* (Bolus Herbarium, no. 19945). Flowered in L. Bolus's garden Sept.–Oct. 1931.

Ornithogalum Leipoldtii L. Bolus, sp. nov. (*Cathissa*). *Planta* glabra ad 40 cm. alta. *Folia* ad 6 linearia e parum supra medium attenuata subobtusa ad 13 cm. longa, ad 2·4 cm. lata. *Racemus* dense 13-fl. *Bracteæ* fere ab initio membranaceæ, e basi lata longe acuminatæ, ad 2·2 cm. longæ. *Pedicelli* adscendentes 2·2–1 cm. longi. *Perianthium* niveum, intus haud nitens nec politum, nunquam late apertum, segmentis concavis apice rotundatis, exterioribus ad 1·2 cm., interioribus ad 1·5 cm. latis, pro genere latissimis. *Filamenta* a gynæcio conspicue divergentia, ad 6 mm. longa, exteriora basi leviter ampliata, interiora squama 3 mm. longa apice 2-loba onusta ; antheræ in alabastro 5 mm. longæ pallide luteæ. *Stylus* 4 mm. longus. *Ovarium* atro-viride globose ovale 5 mm. longum, 4 mm. diam.

Hab. Clanwilliam Div.; Oliphant's River Valley, hills near the weir, April 1929, *C. L. Leipoldt* (Bolus Herbarium, no. 19941). Flowered in Mr. Ross Frames's garden October–November 1930, 1931.

Ornithogalum strictum L. Bolus, sp. nov. (*Caruelia*). *Planta* glabra sæpe 56 cm. alta. *Bulbus* 1·7 cm. diam. *Caulis* ad 6 mm. diam. *Folia* 5 adscendentia ad 20 cm. longa, ad 3 cm. lata, vagina caulem spathaceo-includente, ad 12 cm. longa, lamina longe attenuata. *Racemus* strictus 30–40-fl., ob flores erectos demum 25 cm. longus. *Bracteæ* membranaceæ, e basi lata longe cuspidatæ, 1·8–0·8 cm. longæ. *Pedicelli* in genere inter brevissimos, 5–7 mm. vel rarius ad 1 cm. longi. *Perianthii segmenta* nivea concoloria fere æqualia, exteriora obtusa, interiora subacuta, ad 1·8 cm. longa, ad 0·8 cm. lata. *Filamenta* per totum anthesin stricte erecta fere æquilonga gracillima alba ad 9 mm. longa, stigmata leviter superantia, longioribus basi ampliatis, squama 1·5 mm. longa, apice vix bilobulata; antheræ luteæ. *Stylus* cum stigmatibus 4 mm. longus ovario æquans.

Hab. Van Rhynsdorp Div.; Van Rhyn's Pass, Sept. 1931, *P. Ross Frames* (Bolus Herbarium, no. 20072).

Ornithogalum ceresianum Leighton, sp. nov. (*Caruelia*). *Planta* glabra sæpe ad 30 cm. alta vel demum ultra. *Bulbus* globosus, 1·6–2 cm. diam. *Folia* 4 synanthia coriacea subconvoluta linearia, superne gradatim attenuata, acuta 18–25 cm. longa, 1·5–3 cm. lata. *Pedunculus* 18 cm. longus. *Racemus* subpyramidalis multiflorus. *Bracteæ* herbaceæ, superiores membrancco-marginatæ, e basi lata pedicellum amplectente, longe cuspidatæ 3–1·5 cm. longæ ad 1·2 cm. latæ. *Pedicelli* adscendentes, superiores fere patentes, ad 4·2 cm. longi. *Perianthii segmenta* obovato-oblonga abrupte acuminata 2 cm. longa, exteriora 1·1 cm., interiora 1 cm., lata, subviridi-alba, pro parte tertia inferiore viridi-atrata. *Filamenta* basin stigmatum attingentia, a parte superiore ovarii leviter divergentia, omnia basi dilatata, "squama" ad 6 mm. longa apice biloba; antheræ virides 4 mm. longæ, polline subluteo. *Ovarium* cylindricum orbiculare, apice fere truncatum, lobis obtusis, atrate viride nitens demum 8 mm. longum 4 mm. diam. *Stylus* 2 mm. longus, stigmatibus decurrentibus 1 mm. longis.

Hab. Ceres Div.; near Ceres, Nov. 1925, *F. J. Cooke* (National Botanic Gardens, no. $\frac{1756}{25}$). Flowered freely at Kirstenbosch during November 1926–1931.

Neobakeria Visseriae Barnes, sp. nov. (*Liliaceae-Scilleae*). *Bulbus* 1·5 cm. diam., tunicis membranaceis brunneis. *Folia* 2 humistrata, ovato-lanceolata mucronata coriacea, in basin vaginantem 2–4 cm. longam angustata, lamina saturate viridi, supra impresse nervata pustulataque, pustulis fasciculo pilorum crassorum alborum ornatis, infra glabra, 3–7 cm. longa medioque lata.

Pedunculus in vaginis foliorum inclusus gracilis 1–2 cm. longus, 1·25 mm. diam. *Corymbus* quasi in foliis sessilis. *Bracteæ* pro genere maximæ, inferiores 2·5 cm. longæ 5 mm. latæ inferne angustatæ oblanceolatæ acuminatæ tenues membranaceæ obscure ciliolatæ albæ, apice brunneo-virides. *Pedicelli* albi graciles 8–10 mm. longi, vix 1 mm. diam. *Perianthium* album, tubo cylindrico superne haud ampliato gracillimo 1 cm. longo, 1 mm. diam., segmentis subacutis 5 mm. longis, 1 mm. latis. *Filamenta* basi per 1·5 mm. connata, 1–seriata, in fauce tubi inserta, segmenta superantia, circa 6 mm. longa; antheræ atratæ minutæ, 0·75 mm. longæ. *Stylus* cylindricus, stamina haud attingens, stigmate minuto. *Ovarium* pallide viride 3 mm. longum, 1·25 mm. diam.

Hab. Clanwilliam Div.; Lambert's Bay, "on Klip Koppie, about 5 miles from Bay," May 1931, *Miss H. A. Visser* (Bolus Herbarium, no. 19616).

(To be continued.)

OBITUARIES.

Basil Harrington Soulsby

(1864–1933).

Although not a botanist, B. H. Soulsby was for many years associated with botanical and other workers at the British Museum of Natural History in his capacity as Librarian.

Of Northumbrian stock, he was born near Christchurch, New Zealand, November 3, 1864. On the death of his father, the family returned to England, and Basil was educated at Cheltenham College (1877–83) and Corpus Christi College, Oxford (1883–87), graduating B.A. (1887) in the school of Modern History. He next went to the Universities of Tubingen and Gottingen (1888), and after two years as a master at St. Edward's School, Oxford, studied for a year in Paris.

He joined the British Museum as an Assistant in the Department of Printed Books in 1892, becoming, in turn, Superintendent of the Copyright Office, Superintendent of the Map-Room, and Deputy-Superintendent of the great reading-room. In 1909 he was transferred to the Director's office of the Natural History Museum. I first met him on my arrival at the Museum in October 1919, and soon learned that a somewhat gruff exterior concealed a sympathetic nature and a desire to help young and inexperienced colleagues.

In January 1921 he was placed in charge of the General Library, and our official connections were strengthened by our mutual interests in antiquarian lore and literary traditions. Soulsby's visits to Sweden engendered a keen interest in Linnæus and his writings, which caused him to form the most extensive

collection of books on Linnæus, outside Upsala University, supplementing the large collection already at the Museum, mostly at his own expense; these formed the materials for his *magnum opus*, the second edition of the 'Catalogue of the Works of Linnæus,' three times as large as the first edition issued by the Trustees of the British Museum in 1907; fortunately this is all printed except the corrigenda and addenda, and will appear shortly. It has been a pleasure to help in its preparation.

Soulsby's retirement on January 20, 1930, gave leisure for devotion to his special interests. He was keen on everything relating to the business of a librarian—the Hakluyt (of which was at one time secretary), Antiquaries, and Linnean Societies, Library Association, Museums' Association, and Friends of the National Libraries will much regret his loss. He was elected F.L.S. in 1930.

He died at Reading on January 14, 1933, after a short illness.—J. Ardagh.

Henry Ogg Forbes

(1851–1932).

Dr. H. O. Forbes, who died at Selsey on October 27, 1932, was not strictly a botanist, but rather a naturalist-collector. The results of his pioneer botanical work in New Guinea and Malaya have been recorded in this Journal.

He was born on January 30, 1851, and was educated at Aberdeen Grammar School and the Universities of Aberdeen and Edinburgh. He was intended for the medical profession, but the loss of an eye by an accident prevented this, and he turned his attention to exploration.

He travelled in Portugal (1875–77), the East (1878–84), and led expeditions to Mount Owen Stanley in 1885–86 and 1889. His exploration of the Eastern Archipelago, which he has described in his book 'A Naturalist's Wanderings in the Eastern Archipelago' (1885) was, perhaps, from a botanical view-point, his most important work, and one regrets that, apart from the lists at the end of that work and identifications of the *Vacciniaceæ* and Monocotyledons (Journ. Bot. 1886), the bulk of the botanical results of his New Guinea explorations were not published until 1923–24, and of his Malayan in 1924–25 when they appeared as Supplements to this Journal.

He was Director of the Canterbury, N.Z., Museum 1890–93, exploring the Chatham Islands in the latter year, Director of the Liverpool Museums 1894–1911. He visited the Island of Socotra in 1898–99, and also reported on the Guano Islands of the Peruvian Government, 1911–13.

He was elected an A.L.S. in 1879, withdrawing in 1898.—J. Ardagh.

[The delay in publishing the results of the eastern collections was largely due to a misunderstanding between Dr. Forbes and Mr. Carruthers, then Keeper of Botany, and to Forbes's refusal to part with the notes bearing on the specimens, which were indicated in the herbarium by the collector's numbers and a general locality.—A. B. R.]

George Ramage.

We regret to hear of the death of Mr. George Ramage at Rose Hill Estate, Dominica, on January 11. He was a graduate of Edinburgh University, and joined the expedition to Fernando de Noronha under Mr. H. N. Ridley in 1887. After remaining in Brazil for a short time he went to Dominica, where he collected for the West Indian Commission. Later he settled down as a planter in the island, till his death at the age of 68. His name is associated with *Aspilia Ramagei* Ridl. (Compositae).—H. N. R.

SHORT NOTES.

Rocks grooved by Ficus Roots.—In the "Botanical Results of a Trip to the Anambas and Natuna Islands" by Dr. van Steenis (Bull. Jard. Bot. Buitenzorg, iii. vol. xii. 2, 155) is an account, with a photograph, of a grooved rock seen by him on Gunong Ranai in the island Bunguran, Natunas. He writes: "The rock is very smooth and the 20 cm. broad vertical grooves are rounded and originate near the top of the rock" (which is 3 to 4 metres high); "the phenomenon may be observed frequently also in the hilly country, as on the beach in Natuna and Siantan. However, the exposed granite peaks of G. Rania do not show it distinctly. The origin of the grooves must be ascribed to the erosion of water." Similarly, channelled rocks are to be found in the granite mountains of the Malay Peninsula, and the first observer to call attention to them was Dr. J. R. Logan in a paper, "On the Rocks of Pulau Ubin" (an island lying in the Johor Strait), published in Verhandeel. van het Genootsch. van Kunsten en Wetenschappen, xxii. (Batavia, 1846), and reprinted in Miscell. Papers relating to Indochina, ser. 2, i. 23. Such grooved rocks have naturally attracted the attention of geologists rather than botanists, and van Steenis refers to the observations of M. Bauer in Beitr. zur Geologie der Seychellen, Neues Jahrb. für Mineralogie, etc. 1898, 163, Brauner, Bull. Geolog. Soc. Amer. vii. (1896), 255, and Molengraff, Geol. Verkenrungstochten in Central Borneo, 1893, 139, with plates; and Hallier found them in Bukit Ketam (Natuurwochensch. xi. 10). Of these papers I have seen only the last.

Bauer describes the grooves from perpendicular walls of granite, and according to him they may attain a length of 35 metres;

at the top they are not deep and narrow, but towards the base may broaden up to nearly 50 cm. Connections between the different grooves were observed, and he refers to their occurrence in crystalline rocks in Brazil (Brauner).

So here we have this rock-channelling recorded from the Seychelles, Malay Peninsula, Borneo, Natunas, and Brazil.

The explanation is very simple. Where this channelling occurs it will be noticed that the top of the granite mass is broad and rounded, and the grooves (usually in the Malay Peninsula 3 cm. or more deep) are widest at the top of the rock and run more or less straight to the bottom, where they are narrower and shallower. They are caused by the growth of a fig-tree on the summit of the rock, the roots of which run over the face of it to the ground and conduct the heavy rainfall along the sides and between the rock and the root, excavating the channels in which the roots lie. Eventually the tree dies or is felled in forest-clearing, leaving the curiously channelled rock. Naturally these fig-trees, usually found in dense wet jungle, do not occur on exposed peaks of granite. In my first year in Singapore (1889), after reading Logan's paper on the local geology and attempting to follow out his observations, I found in the fern valley of Bukit-Timale not only examples of these rocks bare of vegetation, but alongside of them rocks where the fig-tree (in this case *Ficus polysyce* Ridl. and *F. Miquelii* Hook. fil.) were still growing on the top of the boulders, with the roots in the forming grooves, showing clearly how they were produced. Whether there is also any chemical action produced by the roots on the granite I could not say, but the constant stream of water running along the roots for many years is probably enough to account for the remarkable channelling. The only *Ficus* I see recorded in Baker's 'Flora of the Seychelles' sufficiently large to produce the phenomenon is *F. nautarum* Bak., a tree much in request for boat-building and probably often cut away from the rocks, leaving them bare with the root-grooves conspicuous.—H. N. Ridley.

Carex pauciflora Lightf. in Lake District.—This species was found growing in plenty in a bog near Stonethwaite, Cumberland, in July 1931. This is the first record for the county and for the Lake District. Specimens have been placed in the British Museum Herbarium.—W. R. Philipson.

Artemisia Stelleriana Besser.—I saw a single plant of this *Artemisia* on the shore at Weston Mouth, South Devon, on August 25, 1932. This appears to be a new county record, the plant not having been seen hitherto, I believe, in England, except in Cornwall.—F. Druce.

REVIEWS.

Bibliotheca Botanica. Edited by Prof. Dr. L. Diels. Hefte 104–106. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, 1932.

Heft 104. *Die Arten und Formen der* Veronica-*Sektion* Pseudolysimachia *Kock auf Grund Systematischer und Experimenteller Untersuchungen.* By A. Härle. Pp. vi, 86, 26 pls., 7 figs., and 2 maps. Price 47 R.M.

The section *Pseudolysimachia* is one of the most clearly characterized of the sections of the large genus *Veronica*. The section includes *V. spicata* and such species, well known to British gardens, as *V. longifolia*, *V. spuria*, *V. grandis*, and *V. incana*. The account published under the above title is a painstaking attempt to investigate the taxonomy of the section by herbarium, cultural, and breeding methods. As a preliminary study to more detailed research it is likely to be of great value. It is, however, very unequal in its treatment of the accepted species, some having been investigated in much greater detail than others. From the purely taxonomic standpoint it is to be regretted that clear formal descriptions are not given, that there is no key to the two grades of species, and that the synonymy often remains vague.

Nine main, or group, species are accepted, and minor species, usually termed "Arten," are recognised under several of these. It is rather unfortunate that binominals are used for both the primary and secondary grades. Linnean nomenclature should either be adhered to or definitely refuted in a paper such as this.

In combining cultural and breeding work with herbarium studies the author joins the still limited number of those who are striving in this manner to enlarge the taxonomic outlook. Field-studies, including biometrical analyses of wild populations, do not appear to have been included, and it is also to be regretted that so many of the stock-plants used in the breeding are of botanic garden origin. It would seem, however, from internal evidence, that further research, including cytological investigation, is in progress or is contemplated. In experimental taxonomy, in the broad sense, a tentative taxonomic scheme is usually an essential basis for the preliminary experiments, but such a scheme may have to be subjected to drastic re-arrangement when evidence from experiments and population studies becomes available. Taxonomy is the alpha and omega of such research. We welcome Herr Härle's paper, and trust it will be followed by others on the same interesting and difficult group.

The paper is well illustrated by two distribution-maps, twelve plates (50 photographs) of herbarium and living specimens, and fourteen of leaf-outlines. The photographic reproductions are exceedingly clear and valuable for showing the habits of the species figured. Much more detail could have been shown with advantage in the leaf-drawings. There is, for example, no indication of venation or indumentum.—W. B. TURRILL.

Heft 105. *Pflanzengeographie von Albanien, Ihre Bedeutung für Vegetation und Flora der Mittelmeerländer.* By F. MARKGRAF. Pp. vi, 130, 7 pls. 25 text-figs., and map. Price 56 R.M.

THE kingdom of Albania remains botanically one of the lesser-known parts of the Balkan Peninsula. Apart from the travels of Baldacci, good sets of whose plants are at Kew and the British Museum (Natural History), most of the investigations have been made in the northern Albanian Alps on the borders of Yugoslavia (Montenegro). The extensive journeys of Dr. Markgraf, described in his book 'In Albaniens Bergen' (Stuttgart, 1930), resulted in considerable collections of plants and, equally important, in the recording of data on the vegetation and distribution of many species. In addition to the book just mentioned, Dr. Markgraf has published a number of papers on the taxonomy of Albanian plants, and we now have the volume which is the subject of the present notice.

The general format of the work is excellent, as one expects of papers published in the 'Bibliotheca Botanica.' It is divided into three main parts, dealing respectively with the vegetation, the flora, and the development of the flora. The first, and much the longest, part is based largely on Dr. Markgraf's own observations. The peculiar interest of Albania lies in the meeting within the country of two distinct botanical regions. In the north, at least in the highlands, the Central European vegetation is characteristically represented, with a large number of Alpine species and communities. In the south Mediterranean communities reach even to the tops of the mountains. The essential differences are explained with the aid of diagrams. For the higher zones, Dr. Markgraf makes the southern boundary of the "Wolkenwaldstufe," with the *Fagetum* as the chief constituent, the southern parts of the mountain masses Galičica—Gur i Topit—Mal i Jorranishtit. The "Trockenwalde-Stufe" is acknowledged to be a transitional community, more allied to Mediterranean than to Central European vegetation, a matter requiring further investigation. Nearly all western Albania and also most of the valleys of the Drins and of the Shkumin

are placed in the Macchie-Shibljak belt. One suspects too much generalization in this scheme, and it is also opportune here to criticize the beautifully reproduced coloured map (scale 1 : 400,000) at the end of the paper. A comparison of this map with the map of Dr. Markgraf's routes published in his book (p. 246) will show how much surface which he has not visited is fully plotted for a definite "Stufe" and even for definite communities. Data have no doubt been taken from other authors, but the map, as a whole, gives a misleading impression that our knowledge of the vegetation of Albania is much more complete than it really is.

In dealing with endemism in the Albanian flora the number of "endemics" is swelled to 157 "Sippen" by enlarging the boundaries of Albania, by including taxonomic units below the grade of species, and, especially, by including species which are considered to have their centre or main area of distribution in Albania, but which are not really endemic. Not more than one of the six plants whose distribution is mapped on p. 104 is a true Albanian endemic species.

The richness and diversity of the Albanian flora is indicated by the numerous species-lists (a detailed criticism of which would occupy far too much space) and by the interesting discussion on the "genetic" elements of the Albanian flora. A considerable number of the species and genera found in Albania must certainly be considered of relict nature, as is indicated by the occurrence of the species or genera most closely resembling them in countries far distant from the bounds not only of Albania but of the Balkan Peninsula.—W. B. TURRILL.

Heft 106. *Geographisch-morphologische Studien über* Aster alpinus *L. und verwandte Arten.* By MAX ONNO. 4to, pp. ix, 83, 6 pls., 4 text-figs., and 6 maps. Price 38 R.M.

DR. ONNO presents the results of a systematic study of the forms included in the Section *Alpigeni* Nees of the genus *Aster*. The original species, *A. alpinus* L. is widely spread in the North Temperate zone and the author's main object has been to study its distribution over its area on the basis of the late Prof. Wettstein's geographic-morphological method. Thirty-one pages of the text are devoted to this species, of which three subspecies and eleven forms are recognized. Here, as generally in the volume, full details are given of the localities of the specimens examined, arranged under geographical headings. The remaining thirty species constituting the North American and Asiatic groups have been less intensively studied. The author acknowledges the assistance derived from a number of important European and North American herbaria. The Royal Botanic Gardens at Kew and Edinburgh appear in his list, but two notable

omissions are the British Museum and Paris Herbaria—the invaluable Chinese collections in the latter would have added materially to the information.

Dr. Onno recognises two Subsections, *Homochaeta* Onno (species 1–23) and *Heterochaeta* Benth. & Hook. (de Candolle *pro genere*) (species 24–31), distinguished by a simple or double pappus respectively. These are each subdivided into two series based on the length of the pappus and the presence or absence of a membranous margin on the involucral scales. Subsection I. includes all the American species, *A. alpinus*, and some Asiatic species; Subsection II. is entirely Asiatic. Owing to inadequate spacing it is difficult to follow the various subdivisions in the text.

The author does not adopt the segregation of the genera *Xylorrhiza* Nuttall and *Oreastrum* Greene adopted by some American taxonomists, and this necessitates the forming of a new combination, *A. Gooddingii* for *Xylorrhiza scopulorum* Nelson from the Rocky Mts. of Nevada. It is to be regretted that the term "nova stirps" should be used to indicate new species, three of which are distinguished from China and Thibet. Several Chinese species are included only "e diagnosi" as the originals of the work of Delavay and Franchet have not been examined. A key for the determination of species follows the taxonomic account.

The phylogeny of the groups of species is briefly discussed. A central group Alpini is recognised, from which five smaller groups radiate. Geographical distribution is clearly indicated in six maps. The plates are reduced photographic reproductions of herbarium species selected to illustrate species, subspecies, or varieties, and give merely a general impression of the plant. A list of the relevant literature includes 110 titles.

The Cactus and its Home. By FORREST SHREVE, Desert Laboratory of the Carnegie Institution of Washington, Tucson, Arizona. 8vo, pp. ix, 195, frontisp., and 42 text-figs. Williams & Wilkins Co., Baltimore (Agents: Baillière, Tindall, & Cox, London), Dec. 1931 (received Sept. 1932). Price 16*s*.

IN recent years strong tendencies have directed art toward a "conscious return to the primitive." Gardening has not escaped, and the interest now manifested in Cacti indicates an increasing preference of the strong, rugged, and simple to the graceful and delicate. Such is the author's apology for his little book, which has been prepared with the aim of anwering some of the many questions provoked by familiarity with Cacti, either wild or in cultivation. The arid and semi-arid areas, the

homes of the Cacti, are, moreover, of special interest as the last retreats of unspoiled nature.

The author, who writes from the Desert Laboratory at Tucson, is eminently fitted for his task, and his book will interest the botanist as well as the cactus-grower. The titles of the five chapters—"What the Cactus is," "How the Cactus is built," "What the Cactus is named," "The Cactus in its Home," and "How to cultivate the Cactus"—indicate the scope of the volume. In an easy non-technical style the author describes the general structure and life-history of a Cactus, and gives some account of the great diversity of forms represented by a review of the generally recognised tribes. "The Cactus in its Home" deals briefly with its general distribution, which extends from Alberta to Patagonia, but mainly with the Cactus-regions of the United States, and illustrates the considerable variety of soil and climatic conditions in which Cacti will flourish. Methods of indoor and outdoor cultivation are described and propagation by cuttings and by seed, and the process of grafting. The excellent illustrations, many of which show the plants in their natural habitat, are a notable feature. The typography and general production of the volume are a credit to the publishers, who adopt as their motto the phrase "Sans tache." It is therefore the more to be regretted that their London agents should see fit to disfigure the title-page with a couple of unsightly violet ink impressions from a rubber stamp.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY OF LONDON.—At the General Meeting on January 19, Professor F. E. Fritsch gave an account of a paper by Professor M. O. P. Iyengar, entitled "Contributions to our Knowledge of the Colonial Volvoccales of South India." The paper deals with a large number of different forms, and contains numerous valuable observations. Thus *Eudorina illinoiensis* (Kofoid) Pascher is given greater precision in noting the fact that the four anterior cells of the cœnobium always behave differently from the rest in remaining vegetative. New species of *Eudorina*, *Pleodorina*, and *Volvox* are described; several species of the last previously known only from Africa are recorded for India.

Miss F. Rich read a paper by Miss M. A. Pocock and herself on "Some Observations on *Volvox* in Africa." Numerous excellent lantern-slides illustrated many new facts in the life-histories of the two South African species, especially the mode of development of the zygote.

Mr. A. J. Wilmott explained Mr. A. Eig's paper "On the Synonymy of *Cornucopiae alopecuroides* L." This species, sent to Linnæus by Arduini, was considered to be a variety or monstrosity of *Alopecurus utriculatus* by J. E. Smith, who,

like Linnæus, assumed that the specimen came from Italy. It is now clearly established that the grass is common in Palestine and Syria, and is a well-marked species.

Miss E. D. Brain in her paper, "A Comparative Study of Geotropism in Three Species of *Lupinus*," traced the course of graviperception as measured by presentation time through the life-cycle of *L. albus*, *L. polyphyllus*, and *L. arboreus*. Ontogeny of graviperception has been studied in detail in the seedling of *L. albus* and in the inflorescences of *L. albus* and *L. arboreus*. Specific differences of behaviour are marked in the inflorescence stages, and it is suggested that these may be correlated with specific differences of life-habit.

At the meeting on February 2, Mr. J. Ramsbottom gave a paper on "The Rust of Wheat and Barberry." After an account of the position at the beginning of last century and the "barberry war," references were made to A. Young's circular to agriculturists and Sir Joseph Banks's "Short Account of . . . the Blight, the Mildew, and the Rust." Several letters to Banks from the horticulturist T. A. Knight were read, and attention was called to L. G. Windt's "Der Berberitzenstrauch, ein Feind des Wintergetreides," of which a translation, formerly in Banks's possession, is in the Department of Botany, British Museum.

'WEEDS OF THE PINEAPPLE FIELDS OF THE HAWAIIAN ISLANDS' (University of Hawaii Research Publication, no. 6, Sept. 1932).—A handy and useful guide by Harold St. John and E. Y. Hosaka to the more important weeds of the Pineapple fields. Three ferns (one is our Bracken) and 80 flowering plants are briefly described in non-technical language, and illustrated by full-page line drawings showing the general appearance of the plant and details of flower and fruit. Notes are also included on the duration of the weed, its distribution in the islands and relative abundance, its means of dispersal, importance (*i. e.*, its seriousness as based on observation and experience), and, finally, means of control are suggested. English and Japanese names are also quoted. A key is included for purpose of identification, and there are short general accounts of means of dispersal and of methods of mechanical and chemical control. Many of the weeds are old friends and readily recognisable from the very clear drawings, but the Dandelion is not a good representation of our familiar weed. Perhaps it is a new species!

NOTE TO CONTRIBUTORS.—The Editor begs to remind contributors to the Journal of the following recommendation in the Rules of Nomenclature :—"The metric system only is used in botany for reckoning weights and measures. The foot, inch, line, pound, ounce, etc., should be rigorously excluded from scientific language."

NOTES ON BRITISH EUPHRASIAS.—III.

BY H. W. PUGSLEY, B.A., F.L.S.

(Continued from Journ. Bot. 1922, 5.)

SINCE the publication of my "Revision of the British Euphrasiae" in Journ. Linn. Soc. (Bot.) xlviii. 467 *seq.* (1930) the herbaria of the late A. Bennett and C. E. Salmon have been incorporated with the British Museum Herbarium, and afford a few new vice-county records and other points of interest. I have also been enabled to examine the whole of Col. H. H. Johnston's Orkney Eyebrights (with some from Shetland), comprising nearly 200 sheets, as well as copious material collected in 1931 at Melvich by Mr. G. Taylor and on St. Kilda by Mr. C. P. Petch.

Col. Johnston's collection, which almost entirely consists of good sets of well-dried specimens, suffices to show with some accuracy the composition of the very rich Eyebright-Flora of Orkney. Its predominant feature is the prevalence of purple or violet flowers in place of white—a character noticeable in less degree in Cornwall,—and this suggests that the peculiarity may be due to the Old Red Sandstone soil that is general in both districts. Two species are clearly dominant in Orkney, viz.:—*E. micrantha* and *E. borealis*, and the latter of these is eminently variable. As might be expected, there is no glandular species of the *Hirtellae* group present; and *E. brevipila*, which seems to be scarce, is always eglandular or nearly so, and sometimes not readily separable from *E. borealis*. *E. scotica*, with var. *purpurascens*, is decidedly rare or local, which is not surprising in the case of a species that is more or less a mountain plant on the mainland. *E. frigida* Pugsl. (*E. latifolia*) is wanting, as might be expected, while *E. foulaensis* is fairly common. Of the Series *Nemorosae* the most general species is *E. confusa*, which is frequent and varies from the ordinary white or purple-flowered form of Southern England to the local variety *atro-violacea*; *E. occidentalis* occurs rarely; and rather remarkably the variety *sabulicola* of *E. nemorosa* grows in one spot, where it has perhaps been introduced. *E. curta* appears to be entirely absent, as is also *E. rotundifolia*; and *E. Marshallii* is known in its typical form from one station and from a few others as var. *pygmaea*. Col. Johnston's material indicates that between these species, especially the commoner ones, intermediate strains that are presumably of hybrid origin are prevalent. *E. micrantha* f. *simplex*, *E. Marshallii*, and the rare *E. foulaensis* var. *maritima* grow on Fair Isle, midway between the Orkneys and Shetlands.

Mr. Petch's set of Euphrasias from St. Kilda is naturally of great interest, and comprises the five species *E. micrantha*, *E. foulaensis*, *E. occidentalis*, *E. borealis*, and *E. brevipila*.

Mr. Taylor made a large collection of forms of *E. Marshallii* at Melvich, with abundance of *E. micrantha* f. *simplex* and a little *E. rotundifolia* growing in its vicinity. A few individuals seem to be crosses between the two former, and one or two look like *E. Marshallii* × *rotundifolia*. Plants were also found that have the aspect of *E. Marshallii* × *brevipila* and *E. rotundifolia* × *brevipila*; the former of these has been previously found in the district.

The following experiment seems worthy of record in connexion with the general semi-parasitism of the genus. In the summer of 1929, while in Perthshire, I gathered a few roots of *Hieracia* for cultivation in the garden, and for some days they remained in my vasculum packed with fruiting plants of *Euphrasia brevipila* var. *notata*. On my return home the *Hieracia* were planted in pots, and in the following spring (1930) I was surprised to find three or four seedlings of a *Euphrasia* springing up in one of these pots containing a plant of *Hieracium lingulatum*. Two of those seedlings grew vigorously, although there was no grass in the pot. One was transplanted to the rockery, where it sickened and died, but the other continued vigorous and proved to be *E. brevipila* v. *notata*. It had evidently sprung from a seed that had become attached to the Hawkweed in my vasculum. This plant produced a number of normal flowers, and fruited and seeded freely. When it was withering late in the season I shook out the seeds from the capsules on to the soil of the pot, and in the following spring (1931) thirty-four fresh seedlings appeared. These grew well without any grass until they became overcrowded, when I pulled out the majority. Of the remainder, several flowered, and at the end of the season I again scattered their seeds over the pot-soil to see whether a third generation would germinate. Last spring (1932) over sixty seedlings sprang up and some of these reached the flowering stage. It is thus evident that some Euphrasias can maintain their existence without the help of a host-plant, for there was certainly no connexion between the roots of my seedlings and those of the Hawkweed, which was the only other plant at any time in the pot. Step ('Wayside and Woodland Blossoms,' ii. 60) relates a somewhat similar experience.

The succeeding notes follow the taxonomic arrangement of my Revision.

Subsection CILIATAE.

Series I. LATIFOLIAE.

1. EUPHRASIA MICRANTHA Rchb.—Col. Johnston has a number of sheets of the plant referred by Bucknall to *E. caerulea* Tausch, which is briefly dealt with at page 482 of the 'Revision.' It was first collected by Col. Johnston in 1912 in a damp pasture on Wart Hill, in Hoy, where it has been refound in subsequent

years. Marshall, however, had obtained a similar plant (no. 2401, as *E. curta*) at Stenness, in Mainland, in 1900, and he remarked on his labels that the form was common both in Mainland and in Hoy. A plant closely resembling these specimens (now in Herb. Mus. Brit.) was collected by Townsend in 1881 (as *E. gracilis*) on the moors at Foyers, Invernessshire; and the National Herbarium contains another kindred form found at Bergen, in Norway, in 1900 by L. V. Lester.

All of these examples have the aspect of a coarse *E. micrantha* with large flowers, and it was suggested in the 'Revision' that they might be the result of *E. micrantha* crossing with *E. borealis*. This may well be the case from the geographical distribution of the two species, but the plant in question is much nearer morphologically to *E. micrantha*, and, in view of its uniformity, its occurrence in several places in Orkney and elsewhere, and its apparent permanence in Hoy, it is thought worthy of distinction as a variety of *E. micrantha* Rchb. thus :—

β. **Johnstonii,** var. nov. *E. caerulea* Bucknall, Brit. Euphr. 12 (1917), non Tausch.

Exsicc. Johnston, Wart Hill, Hoy, 1912, ut *E. curta* v. *glabrescens* (typus); Townsend, Foyers, 1881, in Hb. Mus. Brit., ut *E. gracilis*; Marshall, no. 2401, ut *E. curta*; Johnston, nos. 525, 795, 1884, 2075, 2695, and 3490.

Planta e foliorum pare quinto ad septimo florens; caulis simplex vel parce ramosus. *Folia quam in typo majora* (ad 10 mm. longa). Calycis dentes longiusculi, tenuiter acuminati. *Corolla* quam typi *major*, dorso circa 7 mm. longa, ±*lilacina* striis atropurpureis notata; labii superioris lobis retusis, inferioris lobis multo longioribus emarginatis (medio satis lato). Capsula 5–6·5 mm. longa, calycis dentibus sæpius paulo brevior. Aliter ut in typo.

E. caerulea Tausch differs from this plant by its more distinctly æstival habit, with longer internodes and fewer leaves; and also by its short inflorescence. Its leaves are more spreading, broader, and more ovate and setulose; and its corolla is typically of a much deeper violet.

The form *simplex* Pugsl. of *E. micrantha* has been collected in Orkney by Col. Johnston (nos. 3489 etc), but the typical species, sometimes with very small flowers, is much more general.

The following additional vice-counties in Great Britain have been noted for the species :—29, Cambridge: Woolstreet (*Hosking*). 50, Denbigh: Corwen (*Miss Armitage*). 99, Dumbarton: Glen Falloch (*Straher*). 101, Cantire: Carradale (*Geldart*). 102, S. Ebudes: Islay (*Somerville*). 110, Outer Hebrides: N. Harris—f. *simplex* (*Duncan*).

2. EUPHRASIA SCOTICA Wettst.—None of the specimens collected by Col. Johnston in Orkney is quite typical; one

(no. 1907) appears closely to resemble f. *estriata* Pugsl. There are several sheets of var. *purpurascens* Pugsl., but one of those cited in the 'Revision' (no. 1956) is probably *E. micrantha* × *foulaensis* rather than a form of *E. scotica*.

Additional vice-counties for the species are :—46, Cardigan: Pont Erwyd (*Salter*). 66, Durham: Teesdale (*Lousley*). 72, Dumfries: Moffat (*Marshall*). 100, Clyde Is.: Arran (*McKechnie*).

3. EUPHRASIA FRIGIDA Pugsl. (*E. latifolia* Pursh ex Wettst.).—In connexion with the substitution of the new name *E. frigida* Pugsl. in place of the homonym *E. latifolia* Pursh ex Wettst. ('Revision,' page 490), my attention has been drawn to the omission to cite a type. No type was cited because no new group was proposed, and *E. frigida* was merely a new name for the species described by Wettstein, whose account was founded on material which he presumed was identical with Pursh's plant, which came from Labrador. Pursh's plant cannot be traced, and, as more than one *Euphrasia* is now known to grow in Labrador, it appears desirable to typify *E. frigida*, and to select as a type one of the Labrador specimens referred to under *E. latifolia* by Wettstein in his Monograph. The Natural History Museum at Vienna have kindly lent for inspection their material of *E. latifolia* from Labrador, but the only specimen mentioned by Wettstein that is included (coll. Barth) is very immature, and it is therefore thought best to leave *E. frigida* untypified for the present. The other Labrador examples, apparently named *E. latifolia* by Wettstein at a later date, are poor specimens, but seem homogeneous and conspecific with the form generally named *E. latifolia* by recent Scandinavian botanists; and the plant occurring in Scotland is very similar. The chief difference lies in the Labrador material being more uniformly hirsute and having less deeply emarginate capsules. The leaf-cutting of the European forms also tends to be less acute. The Scottish plant that most closely matches that seen from Labrador is "Marshall, no. 2071, Cairngorm" (as *E. foulaensis*), the hirsute nature of which was noted by the collector.

Among some specimens sent for naming by Mr. T. J. Foggitt is a set from Brandon Mt., Co. Kerry, that apparently belongs to this species. The plants were gathered (29. 6. 31) too young to show the characteristic fruit, but there seems little doubt as to their identity. This, if correct, is a new and unsuspected record for Ireland.

Shetland should be deleted from the vice-comital distribution of this species. The exsiccata, Beeby no. 1124, which is labelled "*E. nemorosa*," is more probably a hybrid of *E. micrantha*, perhaps with *E. borealis*.

4. EUPHRASIA FOULAENSIS Towns.—This is well represented in Col. Johnston's collection. The typical plant appears in a few gatherings (*e. g.*, no. 2620), but the majority of the specimens are intermediate between this and the f. *condensata*. The variety *maritima* Pugsl. is absent.

Series II. NEMOROSAE.

6. EUPHRASIA MARSHALLII Pugsl.—In Herb. A. Bennett there is an example of this species labelled "Coast of Aberdeen, Traill. 1890"—a great extension of its geographical range, if correct.

Col. Johnston's own material of his no. 1843, cited in the 'Revision,' is much more robust than the specimens of the set previously seen, and is nearly identical with the Melvich type.

The exsiccata no. 529 has been erroneously shown as the type of var. *pygmaea* Pugsl. instead of Burdon's Scalloway plant (in Herb. Pugsley). Col. Johnston possesses a good series of the plant represented in his no. 529, which was collected at Black Crag, Stromness, Mainland, first in 1912, and subsequently in 1919 (nos. 488 and 529), and in 1922 (nos. 1939 and 2142). Although a few individual plants among these gatherings have the appearance of a large-flowered form of var. *pygmaea*, they are clearly shown by the remaining specimens to be only dwarf examples of a plant much more like typical *E. Marshallii*, from which they differ mainly in their large purplish corollas. Some of the specimens recall *E. borealis* var. *zetlandica* in their leaf-cutting, and this resemblance is especially noticeable among the plants of the year 1922. It therefore seems probable that the large coloured flowers have been derived from a crossing of *E. Marshallii* with *E. borealis* var. *zetlandica*.

Another gathering from Sandwick, Mainland (Johnston, no. 1957), is intermediate between typical *E. Marshallii* and var. *pygmaea*, while one from Birsay (Johnston, no. 2428) is clearly the variety, which was previously found in the same locality by Traill in 1888 (as *E. officinalis*, in Hb. A. Bennett).

7. EUPHRASIA CURTA Fr.—An additional vice-county record is :—62, N.E. Yorks: Goathland (*Miss Roper*).

9. EUPHRASIA OCCIDENTALIS Wettst.—The typical species usually begins to flower in May like its three varieties, and it is evidently the first Eyebright to bloom in this country. The earliest flowers are often produced from the fifth pair of leaves, and owing to the shortness of the lowest internodes these leaves at times form almost a rosette and the branches thus appear quite basal. *E. occidentalis* is probably the commonest species on the sea-cliffs of the south-west of England and of South Wales. The variety *calvescens* Pugsl. was seen in abundance in 1931 on the coast of Dorset and about St. David's, Pembrokeshire.

Additional vice-counties noted are :—46, Cardigan : Ynyslas (*Salter*). 110, Outer Hebrides : St. Kilda (*Petch*). 111, Orkney : Rousay (*Johnston*, no. 1338) ; Swoona—v. *calvescens* (*Johnston*, no. 309).

10. EUPHRASIA NEMOROSA Löhr.—A number of sheets of this species collected in Notts by Prof. Carr belong to var. *collina* Pugsl., which appears to be the prevalent form in the county. Some of the plants have flowers nearly as large as those of *E. Pseudo-Kerneri*.

Col. Johnston collected the variety *sabulicola* Pugsl. in 1920 in an artificial pasture at Stromness, Mainland (no. 820).

Additional vice-counties for the species are :—29, Cambridge ; Chippenham (*Gilmour*). 56, Nottingham : Gotham, etc.—v. *collina* (*Carr*). 61, S.E. Yorks : Bridlington (*Miss Escritt*). 65, N.W. Yorks : Outershaw—v. *collina* ! 111, Orkney : Mainland—v. *sabulicola* (*Johnston*).

11. EUPHRASIA CONFUSA Pugsl.—Col. Johnston has a number of Orkney gatherings of this species from different islands of the group, some resembling the usual f. *albida* of Southern Britain (nos. 407 A, 904, 1391, 1410, 1432, 2014, 2028, 2670, 3453, 4371, and 4444), others with much larger flowers but apparently otherwise identical. These latter seem to merit distinction as a form :—

grandiflora, form. nov.

Exsicc. Johnston, no. 1409, Eynhallow, Orkney, 1921 (typus) ; no. 1910, Birsay, 1922 ; no. 2773, Cava, 1924 ; no. 3323, Papa Westray, 1926 ; no. 4375, Grimbister, 1931.

Corollâ majore (7–8 mm. longâ) labii superioris lobis sæpius retusis reflexis, inferioris medio lobo longissimo a typo differt.

The large corolla of this form may be due to crossing with *E. borealis* or *E. brevipila*, but the specimens show no other indications of hybridity. Other sets in Col. Johnston's collection are clearly intermediate between *E. confusa* and *E. borealis* or *E. brevipila*, and may be presumed to be of hybrid origin.

There are also in the collection specimens of var. *atroviolacea* from several different localities in the islands (nos. 950, 995, 2395, 2399, 2823, 2842, 3103, 3104, 3300, 3368 A, 3485, and 3486), which have been variously named. Some of these are finer examples in better condition than the plants collected at Birsay, the *locus classicus*.

Additional vice-counties for *E. confusa* are :—26, W. Suffolk : Cavenham (*Turrill*). 42, Brecon : Craig Gleisiad (*Barton*). 46, Cardigan : Plinlimmon (*Turrill*). 48, Merioneth : Cader Idris (*Barton*). 62, N.E. Yorks : Rievaulx (*Bickham*). 65, N.W. Yorks : Cautley Fell (*Foggitt*).

12. EUPHRASIA PSEUDO-KERNERI Pugsl.—Additional vice-county records are :—22, Berks : Winter Downs (*Lousley*). 24, Bucks : Risborough (*G. C. Druce*). 26, W. Suffolk : Devil's Dyke (*Miss Todd*). 27, E. Norfolk : Thornage (*Alston*).

Series III. BREVIPILAE.

13. EUPHRASIA BOREALIS Towns.—The majority of Col. Johnston's specimens belong to the variety *zetlandica* Pugsl., but var. *speciosa* Pugsl. and some intermediate forms are also included. The typical species appears to be scarcer than these varieties.

The variety *atropurpurea* Pearsall in Johnston's 'Additions to the Flora of Shetland,' iv. 2 (1929), as represented by its type (Johnston, no. 334, Fetlar, Shetland, 1929), is a compact form, with the calyx and capsules of var. *zetlandica*, but the teeth of the floral leaves more obtuse and so more like those of the typical form. The flowers are of an unusually deep purple for a large-flowered Eyebright, and may owe their colour to crossing with *E. foulaensis*.

14. EUPHRASIA BREVIPILA Burnat & Gremli.—Additional vice-counties are :—29, Cambridge : Chippenham (*Bennett*). 44, Carmarthen (*Barker*). 52, Anglesea : Aberffraw (*Foggitt*). 66, Durham : Teesdale (*Lousley*).

Series IV. HIRTELLAE.

15. EUPHRASIA ROSTKOVIANA Hayne.—An additional record for this species (v. *obscura* Pugsl.) is :—44, Carmarthen (*Barker*).

18. EUPHRASIA ANGLICA Pugsl.—In Herb. C. E. Salmon there is a fine set of *E. anglica*×*Pseudo-Kerneri*, collected near Friday Street, in Surrey, in Sept. 1899. The plants are clearly intermediate between the two species, having the flexuous habit and glandular clothing of *E. anglica* with the neat foliage of *E. Pseudo-Kerneri*, combined with the large flowers of the latter coloured as in the former. The specimens recall Standen's Piltdown Common plant, mentioned on p. 529 of the 'Revision.'

Additional vice-counties noted for *E. anglica* are :—56, Nottingham : Thoresby (*Carr*). 57, Derby : Chee Dale (*H. Fisher*).

19. EUPHRASIA HIRTELLA Jord.—The plant collected by C. E. Salmon near the Lawers Burn, Loch Tay, Perthshire, as *E. Rostkoviana*, which is referred to at p. 531 of the 'Revision' under *E. hirtella*, appears from the better material in his own herbarium to differ from the *E. hirtella* v. *polyadena* which I collected near Killin. Its strict, almost unbranched habit and numerous narrow leaves are very characteristic, and I now think that it is of hybrid origin between *E. brevipila* v. *notata* and *E. micrantha*, both of which are abundant in the station where it was found.

Subsection ANGUSTIFOLIAE.

20. EUPHRASIA SALISBURGENSIS Funck.—In the recently published 'Comital Flora of the British Isles' (p. 221) this species is recorded for South Devon. I have seen the specimens forming the basis of this record, which were collected at Slapton. The gathering consists of thirteen well-preserved plants, which, though young, obviously belong to the Series *Nemorosae* and appear to be drawn-up examples of *E. confusa* Pugsl. (f. *albida*). The presence of stiff marginal hairs on the capsules, which are clearly visible on the specimens, should have prevented confusion with the species of the Subsection *Angustifoliae*.

BRITISH POLYGONA, SECTION *PERSICARIA*.

By C. E. Britton.

THE British species of *Polygonum* included in the section *Persicaria* Meisner comprise *amphibium*, *lapathifolium*, *nodosum*, *Persicaria*, *Hydropiper*, *mite*, and *minus*. Together they form a very natural group, the most divergent species being *P. amphibium*, owing to its perennial duration and usual aquatic habitat, whilst the remaining species are of annual duration, and are plants of watery places and of waste or cultivated ground.

The hydrophilous species, *P. Hydropiper*, *P. mite*, and *P. minus*, are not remarkable for variability, but the species—*P. lapathifolium*, *P. nodosum*, and *P. Persicaria*—that are more often seen in waste and cultivated places are indeed polymorphous, and, in consequence, have frequently received attention from collectors, as may be seen in past reports of the Exchange Clubs.

The varying forms presented within the limits of the species are by some botanists regarded as chiefly induced by the influence of the environment. To the writer, however, it seems probable that, at least in *P. nodosum* and in *P. lapathifolium*, forms occur that have more claim to notice, as they appear to be genetic in origin. Such are *P. nodosum* vars. *ovatum* and *erectum*, and *P. lapathifolium* vars. *genuinum* and *tomentosum*, and these probably do not exhaust the list of forms which appear to breed true. Hybridity is a not infrequent feature of the group and has been put forward by some botanists as one explanation of the variability encountered. Several hybrid combinations are known and, no doubt, others await identification, particularly in the *Persicaria–nodosum–lapathifolium* series.

In the following account of the species, synonymy has been reduced to a minimum, and figures cited only where necessary. The writer is under obligations to the officials of the Department of Botany, British Museum (Nat. Hist.), for placing at his service herbarium material and literature, and is also similarly indebted to Mr. W. R. Sherrin of the South London Botanical Institute. To Mr. W. C. Barton thanks are due for literary aid.

It is intended to place in the British Museum Herbarium examples of the exsiccata mentioned.

POLYGONUM AMPHIBIUM L. Sp. Pl. 361. Perennial. Rootstock elongated, branched, stems simple or branched; ochreæ elongated truncate, ciliate or not, leaves petioled, lamina oblong or oblong-lanceolate, rounded or slightly cordate at base; peduncle sulcate, hairy or glabrous, eglandular, more rarely glandular; racemes terminal, rarely also axillary; flowers dicœcious-polygamous, rarely bisexual, rose-red, perianth eglandular; stamens five, exserted, style bifid; fruits oval, compressed shining, included.

Var. *natans* Moench, Enum. pl. Hass. 28 (1777); E. B. t. 436. Stem glabrous, submerged, upper leaves floating, long-petioled, glabrous; racemes borne above the surface of the water.—Ponds, lakes, etc. An ornamental plant.

Var. *terrestre* Leers, Fl. Herb. 99 (1775); E. B. ed. iii. t. 1241. Stems erect or ascending, pubescent; lamina elongated, narrower and more elongated than in the preceding, at times narrowly oblong-lanceolate, acuminate, shortly-petioled, subcordate, or attenuate at base, hispidulous-strigose, ochreæ pubescent; raceme narrow, peduncle clothed with stiff appressed or spreading hairs, or glandular-hairy—Way-sides, ditches, waste ground. Seldom flowering.

These two varieties represent the most frequent aspects of the species, and the characters exhibited are probably the direct outcome of the influence of the environment.

Related to var. *natans* is var. *decumbens* Klett. & Richt. Fl. Lips. 351 (1830) (v. *coenosum* Koch, Syn. i. 617 (1837)) with stems ascending, prostrate and rooting at the base; leaves usually lanceolate, shortly petioled, appressed hispid, as are also the shortly ciliated ochreæ.—On the muddy borders of ponds etc.

Var. *maritimum* Dethard. Comp. fl. Megol. 33 (1828), marked by the widely protrate stems and narrow undulate hispid leaves.—Sandy places by the sea; has not yet been noticed in Britain, but probably occurs.

Var. *glandulosum* Schönh. Flora, 349 (1832), has the stems, ochreæ and leaf-surfaces clothed with spreading glandular hairs.—In Britain known only for Denbigh, Lincoln, and Hants.

P. PERSICARIA L. Sp. Pl. 361. Stem erect, ascending, decumbent, or prostrate, more or less swollen above the nodes; ochreæ close, surface with appressed hairs, marginal cilia stout elongated; leaves petioled, oval-elliptic or lanceolate, acute or

acuminate, usually blotched, surfaces with scattered hairs, the lower leaves often arachnoid or tomentose beneath ; peduncles glabrous or with appressed hairs, racemes oblong-obtuse, ±dense ; perianth red, pink, or whitish, glabrous or with inconspicuous glands, styles bifid ; fruits black, shining, lenticular orbicular or ovate, or trigonous.

Var. *agreste* Meisner, DC. Prodr. xiv. 168 (1856). Stem short (15–45 cm.), erect or ascending, branches few ; leaves 2·5–5 cm., glabrous ; racemes usually solitary, terminal and axillary, oblong, obtuse ; flowers generally pale.—Dry cultivated fields.

Var. *elatum* G. G. Fl. Fr. iii. 48 (1855) (var. *elatius* Meisn. *l. c.*). Stem erect (30–90 cm.), little branched ; leaves 10–15 cm., glabrous ; racemes paniculately arranged, elongated (2·5–3·75 cm.), slender, attenuate at the apex.—Damp fertile situations.

Var. *ruderale* Meisn. *l. c.* Stem prostrate, branched from the base, branches spreading ; leaves small, lanceolate or linear (2·5–3·75 cm.) often pubescent on both surfaces ; racemes solitary or subracemose, oval, or oblong, obtuse (1·25–2·5 cm.), often interrupted at the base ; flowers generally pinkish.—Dry barren and stony situations.

The preceding descriptions are translations of those given by Meisner. So far as native plants are concerned, it is only exceptionally that plants are met with that fully display the characters of Meisner's varieties. Plants labelled var. *elatum* frequently do not show the slender racemes that should characterise that variety, and in the case of the low-growing var. *ruderale*, the leaves, although smaller than in the other vars., are usually furnished with scattered strigose hairs only. The forma *angustifolium* K. Beckhaus, Fl. Westf. 773 (1893), is described as having narrow lanceolate leaves attenuate at each extremity, and is alluded to by Ascherson and Graebner as a very peculiar and characteristic form. What appears to be this forma occurs near Mortlake, Surrey, C. E. Britton, no. 3902.

Var. *prostratum* Bréb. Fl. Norm. ed. iv. 271 (1869). Stems prostrate ; leaves lanceolate, blotched with black on upper surface, tomentose beneath ; racemes short.—By ponds etc.

P. LAPATHIFOLIUM L. Sp. Pl. 360. Stem usually erect, slightly branched, 30–60 cm., seldom prostrate and much-branched, green or purplish, spotted or not, glandular or glabrous, nodes often enlarged ; leaves petioled, lamina oblong-lanceolate, rhomboid-lanceolate or ovate, attenuate at base and apex, usually broadest at about ⅓ from base, blotched or not above, glandular beneath, the lower leaves often arachnoid or felted ; petiole, edge of lamina, and nerves with short appressed acute hairs ; ochreæ close, glabrous, glandular or arachnoid, truncate, not or only shortly ciliated ; peduncle and inner leaves of perianth

±glandular-warted, bracts glandular ; racemes oblong-cylindrical, erect or slightly drooping ; flowers greenish white, pinkish, or dingy red ; perianth in fruit with principal veins elevated, forking, branches recurved (anchor-like) ; fruits usually roundish, lenticular, biconcave, smooth, shining, dark brown, obtusely beaked, and mucronate, 3×2·5 mm.

It is very seldom indeed that amongst the abundantly produced flattened fruits, a few fruits are to be found of a triangular form. When such occur they are characterised by being deeply trilobed, with compressed obtuse lobes, and possess three styles. This occasional dimorphism of the fruits appears to be little known to modern authors, although it was described long ago by W. Curtis in the 'Flora Londinensis,' and the fruits figured on t. 24 of that fine work.

Very variable, and capable of being divided into a number of easily recognisable forms.

Var. *genuinum* Gren. & Godr. Fl. Fr. iii. 47 (1855). (*P. pallidum* With. Bot. Arr. Br. Pl. ed. 3, ii. 381 (1796) ; E. B. t. 1382.) Racemes short, compact, greenish, fruits large, subrotund, somewhat broader than long ; leaves oval-lanceolate or lanceolate, usually blotched.—A common form of cultivated fields.

Exsicc. C. E. Britton, no. 3707, Rept. B. E. C. 1930, 522.

Var. *angustifolium* Peterm. Fl. Lips. 292 (1838) ; Beck in Reichenbach's 'Icones,' xxiv. t. 215 (var. *lanceolatum* Beck, *l. c.*, non *P. lapathifolium* L. var. *lanceolatum* A. Br. Flora, vii. 362 (1824), the description of which indicates var. *genuinum*).—Stem erect, slightly branched, or prostrate and with many spreading branches ; leaves narrowly lanceolate or oblong-lanceolate, usually broadest at the middle or somewhat below the middle.—Not common.

Var. *ruderale* Schuster, Mitt. Bayr. Bot. Ges. ii. 50 (1907). Decumbent, branches divaricate, green, purple-spotted or wholly purple ; lamina of lower leaves elliptical-lanceolate or broadly lanceolate-acuminate, marked with a darker blotch ; racemes oblong or sometimes elongated, flexuose, and less stout than in preceding vars. ; perianths greenish red, dingy red, or vinous ; fruits usually smaller than in var. *genuinum* and covered by perianth segments.—A plant of way-sides, field-borders, and waste places.

Recalls at times *P. nodosum* Pers. when the racemes are slender and flexuous, but distinguished by its greater glandular development and roundish fruit. Occurs in herbaria labelled *P. maculatum* Trim. & Dyer etc.

Exsicc. C. E. Britton, nos. 3854, 3869.

Var. *tomentosum* Beck, Fl. v. N. Ö. i. 323 (1890). (*P. Persicaria* * *tomentosum* Schrank, Baier. Fl. i. 669 (1789) ; *P. nodosum* Pers. f. *salicifolium* Moss in Camb. Brit. Fl. ii. 117 (1914) ; Beck in Reichenb. Icon. t. 217, figs. 1–3.) Stem ascending or erect ;

leaves elongated lanceolate, all, or at least the lower and middle leaves, closely tomentose or arachnoid below and also on the upper surfaces; perianth greenish white, more rarely purple.—In localities where water has stagnated, or in fallow and cultivated fields.

Exsicc. C. E. Britton, no. 3533, Rept. B. E. C. 1929, 238; no. 3663, Rept. B. E. C. 1930, 522.

Var. *punctatum* Gremli, Excursfl. Schw. ed. 5, 367 (1885). Leaves not marked with deeper blotches, the lower surfaces and perianths furnished with numerous yellowish glands.—Cultivated fields.

The characters given are those of Gremli. German authors attribute additional features, such as racemes closer together, only 1–4, very shortly stalked, and never distinctly paniculate. Flowers dingy white to green.

P. NODOSUM Pers. Syn. i. 440 (1805). *P. maculatum* Auctt. Angl.; *P. petecticale* Druce, Fl. Bucks. 287 (1926); *P. pensylvanicum* var. *petecticale* Stokes in With. Nat. Arr. Br. Pl. i. 412 (1787). Stem erect, taller than in *P. lapathifolium*, or prostrate and decumbent, usually purplish and spotted; nodes distinctly swollen, the lowest at times buried in the soil and rooting; ochreæ loose, shortly fringed or eciliate; leaves petioled, laminæ, the lower ovate, the upper lanceolate, attenuate at each end, undulate, glandular beneath; racemes paniculate, slender, acute, or obtuse, erect or drooping; peduncle and perianth glabrous or with few glands; fruit compressed, biconcave, orbicular-ovate, obtusely beaked and mucronate, covered by the strongly veined perianth.

All forms of this may be known from *P. lapathifolium* by the fruits being smaller on the whole, less roundish, with a more ovate outline, and by the smaller glands of the peduncles and perianth which are also less numerous and at times almost absent. Other characters alleged to separate *P. nodosum* and *P. lapathifolium* are not reliable.

As in *P. lapathifolium*, there are several well-marked forms.

Var. *incrassatum* Rouy, Fl. Fr. xii. 100 (1910); Beck in Reichenb. Ic. t. 216, figs. 1 & 2. Stem branched, divaricate, much swollen above the nodes; leaves broad, shortly acuminate, racemes clustered, ±divergent; lower leaves ovate-elliptical, succeeding leaves elliptical-lanceolate, uppermost lanceolate; racemes elongated, slender.

f. **stenophyllum,** forma nov. Differt a varietate:—Foliis oblongo-lanceolatis vel lineari-lanceolatis ±parallelo-marginatis. Leaves oblong-lanceolate to linear-lanceolate, more or less parallel-sided.—Surrey; C. E. Britton, nos. 3852, 3861, 3899.

Var. *ovatum* A. Braun in Flora, vii. 363 (1824). *P. lapathifolium* L. var. *ovatum* Neibreich, Fl. v. N. O. i. 297 (1859); *P. lapathifolium*, α. *typicum*, 2. *ovatum* Beck, *l. c.*

The description given by Beck agrees very well with Surrey plants, and is here quoted: "Nodes cylindrical or somewhat thickened, leaves orbicular-ovate or lanceolate, usually abruptly narrowed towards the base, broadest below the middle, the lowest leaves almost obtuse; racemes usually elongated-cylindrical; perianth usually pink."

Surrey: exsicc. C. E. Britton, no. 3655, Rept. B. E. C. 1930, 523.

Var. *erectum* Rouy. *P. lapathifolium* L. Race *P. nodosum* Pers. β. *erectum* Rouy, Fl. Fr. xii. 100 (1910). Ic. fig. 318, Butcher & Strudwick, Further Ill. Br. Pls. 300 (1930) (as *Polygonum petecticale* Stokes). "Stem erect, nodes little swollen, leaves lanceolate, elongated attenuate acuminate; racemes sub-erect, not clustered and fasciculate" (Rouy, *l. c.*). A not uncommon form, and well represented in public herbaria. Surrey examples distributed by the writer, no. 3650, Rept. B. E. C. 1930, 523.

Var. **inundatum,** var. nov. Caulis adscendens simplex vel parum ramosus, vel ramis multis patulis prostratus vel decumbens, nodis ±tumidis. Folia parva lanceolata (4–6×1 cm.) subtus pilis sparsis vel lanato-tomentosa. Inflorescentia tenuis; flores subrubentes; fructus parvus inclusus, ovatus rostratus. Stem ascending, pink, spotted, simple or with few branches, or prostrate or decumbent with many spreading branches, nodes more or less swollen; leaves lanceolate, 4–6×1 cm., blotched above or not, strigose or arachnoid or tomentose beneath; racemes slender, flowers pinkish, fruits small (2·0×1·5 mm.), oval, beaked, included.

This plant is often seen in abundance on the sandy margins of ponds, situations that are usually flooded in winter or in wet summers (as in 1931). I cannot trace a distinctive name under *P. nodosum* Pers. It is true that narrow-leaved prostrate forms of *P. lapathifolium* are known, but the descriptions of these do not indicate that they belong to *P. nodosum* Pers.

Exsicc. Esher, Westend, Surrey. C. E. Britton, no. 3598, Rept. B. E. C. 1930, 523.

Var. **Brittingeri,** comb. nov. *P. Brittingeri* Opiz. Naturalient: 74 (1824); *P. lapathifolium* L. var. *Brittingeri* Beck, *l. c.*; *P. lapathifolium* L. β. *danubiale* Kern. (as sp.), Fiek, Fl. Schles. 382 (1881); Beck in Reichenb. Ic. t. 217, figs. 4 & 5.

The following is a transcript of the original description: "*Polygonum floribus* hexandris, semidyginis, stigmatibus reflexis; *foliis* ovatis, subtus cano-pubescentibus; *petiolis* scabris; *floribus* paniculatis; *pedunculis* laevibus; *seminibus* utrinque

impressis. Differt a *P. lapathifolium* L. pedunculis laevibus non scabris; foliis subtus cano-pubescentibus; a *P. incano* Schmidt: foliis ovatis; floribus paniculatis rubris; a *P. Persicaria* L.: foliis ovatis, subtus cano-pubescentibus." With this description may be compared the amplified account given by Beck, *l. c.*: "Stem prostrate, ascending, or almost erect, copiously branched, nodes not or only slightly enlarged, ochreae usually arachnoid. Leaves short, elliptical or ovate-orbicular, often almost orbicular, usually acute, or the lowest sub-obtuse, gradually or abruptly narrowed into the petiole, green above, and white or grey beneath, arachnoid-felted, except the upper leaves, the lower usually also arachnoid on the upper surfaces. A bright red, brown, or almost black marking usually present on the upper surfaces of the leaves."

I have hesitated whether to accord specific rank to this form. Continental botanists who mention it place it with *P. lapathifolium* as a var., and, this, no doubt, is its correct position when *P. nodesum* Pers. is placed in the same category, but if we regard the latter as a species, then *Brittingeri* is best placed as a var. of this.

Var. *Brittingeri* appears to be a rare plant in western Europe, and the name has not previously been applied to any British plant, so far as I am aware. It is however, included here on the evidence afforded by examples of two gatherings contained in the herbarium of the South London Botanical Institute. Both specimens exhibit the habit, leaves, and inflorescence of var. *Brittingeri*, and, one at least, is in close agreement with the figure cited. The plants were gathered by G. Nicholson at Kew, Surrey, and by A. Bennett near Sandwich, E. Kent.

P. lapathifolium × *Persicaria*. Stem tall, erect, branched, ochreæ with appressed hairs and numerous sessile glands on the surface, marginal cilia from ·5 mm. to 1 mm. in length; leaves lanceolate, often blotched. Peduncles glabrous or with scattered sessile and pedicelled glands; racemes oblong or cylindrical, erect, crowded as in *P. lapathifolium* or less crowded as in *P. Persicaria*, perianth rosy, or green and vinous, glandular, especially below; fruits compressed, orbicular-ovate, convex and gibbous at the base on one side, plane or concave on the other, or fruits trigonous; perianth in fruit with prominent elevated veins.

Varies in aspect from *P. lapathifolium* to *P. Persicaria*. Known from the former by the reduced glandular clothing of the peduncles and perianths, and by the convex and trigonous fruits, and known from *P. Persicaria* by the glandular peduncles and perianths, the broader fruits, the more prominently veined fruiting perianths, and the shorter ciliated ochreæ.

Probably not infrequent, but overlooked. Surrey: Wisley, and between New Malden and Surbiton, etc.

Exsicc. C. E. Britton, no. 3706, Rept. B. E. C. 1930, 522.

P. HYDROPIPER L. Sp. Pl. 361. Stem ascending or suberect, rooting at the lower nodes, 30–60 cm., branched, often swollen above the nodes; ochreæ inflated, glabrous or glabrescent, marginal cilia elongated, the floral ochreæ ciliate or eciliate; lamina shortly petioled or subsessile, oblong-lanceolate, narrowed at each end, undulate, asperous at the margin, occasionally blotched. Racemes lax, elongated, subfiliform, interrupted curved or erect; perianth usually 4-partite, but occasionally 3-partite, greenish or reddish, glandular, transparently dotted, stamens 6, styles 2–3, fruits trigonous or lenticular, tubercular, matt, 2·5–3 × 2·0 mm. An acrid property is present in all parts of the plant.

In Britain varies only within narrow limits, the most notable form being var. *densiflorum* A. Br. in Flora, vii. 356 (1824): racemes shorter, stouter, almost cylindrical, dense-flowered, pedicels longer; stem stouter, much branched, leaves broader. Surrey: Brox, exsicc. C. E. Britton, no. 2988; Rept. B. E. C. 1926, 275.

P. Hydropiper appears more readily to form hybrid combinations than any other species of the genus, and the following have been noted in Britain:—

1. *P. Hydropiper* × *minus*. Distinguished from *P. Hydropiper* by reason of the leaves suddenly attenuate at the base, by the slightly hairy ochreæ with longer cilia, and by the flowers being mostly 5-merous. Known from *P. minus* by the more robust habit, by the leaves abruptly narrowed at the base, and by the slightly glandular outer perianth segments.—Berkshire, Worcestershire.

2. *P. Hydropiper* × *mite*. To be recognised from *P. Hydropiper* by the shortly hairy ochreæ with longer marginal cilia, and by the usually 5-merous weakly glandular perianth, and known from *P. mite* by the characters of the less hairy and shorter-ciliated glandular ochreæ.

3. *P. Hydropiper* × *nodosum*. Known from the first-named species by the ochreæ not (or only lightly) ciliate, lax, peduncles glandular, racemes compact, perianth almost eglandular, leaves eglandular beneath, dotted, blotched above.—Cambs, Hunts.

4. *P. Hydropiper* × *Persicaria*. Leaves sessile blotched, ochreæ with cilia elongated as in *P. Persicaria* and intermixed with shorter cilia characteristic of *P. Hydropiper*, racemes elongated, lax, peduncle eglandular, perianth prominently nerved, faintly glandular. Closely resembles *P. mite* Schr., but distinguished from that by the less shining fruits, the racemes less interrupted, the flowers closer together.—Surrey, Berks, Oxon, etc.

P. MITE Schrank, Fl. Baier. i. 668 (1789). *P. laxiflorum* Weihe in Flora, ix. 746 (1826). Stem erect from a decumbent rooting base, 30–60 cm., often much branched; ochreæ lax,

hairs appressed, eglandular, strongly fringed. Lamina lanceolate subacute, slightly undulate, ciliate, eglandular. Raceme erect filiform, interrupted, perianth usually 5-partite, eglandular, white or pink, faintly nerved, fruit black, shining, compressed, ovate acute, plano-convex or trigonous, as long as the perianth. Acrid properties absent.

Hybridises with *P. Hydropiper* and with *P. minus* (see under those species) and with *P. Persicaria*.

P. mite×*Persicaria*. Stem usually erect, branched; ochreæ appressed, pubescent, cilia elongated; lamina lanceolate or oblong-lanceolate, base cuneate, apex acute, surface with scattered hairs, faintly blotched; peduncles eglandular, racemes numerous, erect, narrowly cylindrical, not interrupted; perianth rather large, pink, eglandular.—Berks, Oxon.

P. MINUS Huds. Fl. Angl. i. 148 (1762). Stem slender, prostrate, ascending, or erect, much branched from the base; ochreæ appressed, eglandular, hairs appressed, cilia elongated, lamina subsessile, lanceolate-linear or linear, rounded below and narrowed from base to apex, eglandular; racemes erect, subfiliform or narrowly cylindrical, more or less interrupted below; perianth usually 5-partite, glandular at the base, stamens usually 5, styles 2–3 connected below, fruit ovate, acute, plano-convex or trigonous, shining, 2×1·5 mm.

Var. *commune* A. Br. Flora, vii. 359 (1824); Ic. Camb. Brit. Fl. ii. t. 129.—Stem medium, usually branched from the base, leaves mostly sublinear, racemes short, almost uninterrupted at the base.

The more usual form of the species.

Var. *latifolium* A. Br. Flora, vii. 359 (1824); *P. minus* var. *elatum* Moss, Camb. Brit. Fl. ii. 121 (1914); Ic. Camb. Brit. Fl. ii. t. 128.

Stem stouter than in the preceding var., usually ascending, branched above; leaves lanceolate, broadest towards the base; racemes slender, elongated.

P. minus×*mite*. Stem erect or ascending, ochreæ with appressed hairs, cilia elongated; leaves scarcely narrowed at the base, resembling those of *P. minus*, but broader; racemes drooping, flowers red or bright pink, bracts ciliate, fruit small, produced.—Berks, Oxon.

P. minus × *Persicaria*. Stem ascending with spreading branches, ochreæ closely appressed, hairs appressed, cilia elongated; lamina usually blotched, linear-lanceolate, acute, subglabrous, abruptly narrowed at the base. Racemes erect, very slender, usually numerous, cylindrical, interrupted at the base; perianth usually large, purple, red, or white; stamens 6, styles 2–3. Usually sterile.—Sussex, Hants, Berks, Oxon.

NOTES FROM THE UNIVERSITY HERBARIUM, CAMBRIDGE.

ON *ILEX PERADO* AIT. AND *NOTELAEA EXCELSA*.

BY T. G. TUTIN.

IN 1768 Banks and Solander collected two species of *Ilex* in Madeira when accompanying Captain Cook on his first voyage round the world. These were both described by Solander (MS. in Banksian Herbarium), and one, *Ilex Perado*, was published by Aiton in 'Hortus Kewensis,' i. 169, 1789. The other, *Ilex Azvinho*, was overlooked until it was published by Lowe in his 'Flora of Madeira,' ii. 12, 1872, and it has since been shown (Loesener, Mon. Aquif. in Nov. Act. Abhandl. Leop. deuts. Akad. Naturf. 135, 1901) to be synonymous with *Ilex canariensis* Poir., which is an earlier name.

Lamarck (Encycl. 146, 1801) applied the name *I. maderensis* to *I. Perado* Ait. and Meerbeck (Pl. Sel. Ic. Pict. tab. 4) had described it as *I. crassifolia* in 1798. *Ilex Perado* was also recorded from the Azores in Seubert's 'Flora Azorica,' 46.

Webb and Berthelot described a species from the Canaries under the name of *Ilex platyphylla* (Hist. Nat. Iles Canar. ii. 135). Loesener (*loc. cit.* 244) reduced this to *Ilex Perado* Ait., of which he describes the following four varieties based on the size and shape of the leaves:—

I. Perado var. a. *platyphylla* (Webb & Berth.) Loesener. Canaries and Madeira.

Var. b. *maderensis* (Lam.) Loesener. Madeira and Teneriffe.

Var. c. *azorica* Loesener. Azores.

Var. d. *iberica* Loesener. Spain and Portugal.

An examination of the flower and fruit characters of a large number of specimens shows that there are constant differences between the plants from the different groups of islands, and enables a better grouping to be made than that proposed by Loesener.

As the differences are slight and the plants from the different localities apparently related to one another, it is proposed to describe the following three subspecies:—

Ilex Perado subsp. *Perado* from Madeira.

I. Perado subsp. *platyphylla* from the Canaries.

I. Perado subsp. *azorica* from the Azores.

Loesener's var. *iberica* is poorly represented in herbaria, and requires further investigation.

Ilex Perado subsp. nov. **Perado.**

I. Perado Ait. Hort. Kew. i. 169 (1789).

I. crassifolia Meerb. Pl. Sel. Ic. pict. tab. 4 (1789).

I. maderensis Lam. Dict. iii. 146 (1801).

I. Perado var. β *maderensis* (Lam.) Loesener, *loc. cit.* 246 (1901), ex parte.

I. Perado var. α *platyphylla* (Webb & Berth.) Loesener, *loc. cit.*, ex parte.

Folia sæpissime 6·75–13 cm. longa, 2·5–7·5 cm. lata, apice mucronata, coriacea, nervis prominentibus, margine undulato plus minusve spinoso, basi cuneata. *Petioli* lati plus minusve alati glabri supra canaliculati sæpe 2·5 cm. longi. *Pedunculi* uni- rarius bi- vel tri-flori, pedicellis glabris circa 0·9 cm. longis. *Lobi calycis* margine minute denticulati, dorso glabri. *Fructus* maturi circa 0·9 cm. diametro.

Hab. in Insula Madera.

subsp. nov. **platyphylla.**

I. platyphylla Webb & Berth. Hist. Nat. Iles Canar. ii. 135.

I. Perado var. α *platyphylla* Loesener, *loc. cit.* 246, ex parte.

I. Perado var. β *maderensis* (Lam.) Loesener, *loc. cit.*, ex parte.

Folia sæpissime 10–15 cm. longa, 5–10·5 cm. lata, apice spinosa, minus coriacea quam in subsp. *Perado*, nervis prominentioribus, margine undulato sæpe spinoso, basi cuneata. *Petioli* latiores quam in subsp. *Perado*, vix alati pubescentes supra canaliculati 0·5–1 cm. longi. *Pedunculi* puberuli uni- rarius bi- vel tri-flori circa 0·9 cm. longi. *Lobi calcycis* margine evidenter ciliolati dorso pubescentes. *Fructus* maturi circa 1·2 cm. diametro.

Hab. in Insulis Canariis.

subsp. nov. **azorica**.

I. Perado var. *azorica* Loesener, *loc. cit.* 247.

I. Perado Seubert, Flora Azorica, 46.

Folia crassissima et coriacissima 2·6–4·2 cm. longa, 2·5–3·2 cm. lata, rotundata, apice sæpissime non mucronata, basi cordata, margine rarissime spinoso sæpissime integro in plantis maturis, nervis non prominentibus. *Petioli* graciles non alati vix canaliculati circa 0·25 cm. longi. *Pedunculi* circa 0·5 cm. longi puberuli sæpissime uniflori. *Lobi calycis* margine breviter ciliolati dorso glabri. *Fructus* maturi circa 0·7 cm. diametro.

Hab. in Insulis Azoricis.

Notelaea excelsa was first described from Madeira as *Olea excelsa* by Aiton (Hort. Kew. i. 14), and was subsequently recorded from the Canaries by Webb and Berthelot, who transferred it to the genus *Notelaea*. A plant believed to be identical with this was recorded from the Azores by Seubert (Fl. Azorica, 35) under the name of *Picconia excelsa* DC.

On examination the Azores plant proves to be constantly different from the one occurring in Madeira and the Canaries, and it is proposed to describe it as *Notelaea azorica*.

Notelaea azorica, sp. nov.

N. excelsae (Ait.) Webb & Berth. affinis a qua differt statura fruticis vel arboris parvæ; foliis minoribus (3–5 cm. longis et 1·0–2·5 cm. latis) obovatis obtusis, subtus costa prominente, nervis inconspicuis; floribus parvis, sepalis longe mucronatis, stigmate profunde bifido; fructu maturo circa 1·3 cm. longo.

Hab. in Insulis Azoricis.

Typus in Herb. Univ. Cant. São Jorge. Leg. E. F. Warburg et T. G. Tutin, 1929.

Notelaea excelsa (Ait.) Webb & Berth. is a lofty tree with leaves 7–10 cm. long and 2·5–4·5 cm. broad, ovate, acute, and strongly veined. The sepals are small and semi-orbicular, and the stigma entire or slightly emarginate. The ripe fruit is about 2 cm. long.

Hab. Madeira and the Canaries.

My thanks are due to Mr. A. J. Wilmott for help with the nomenclature of *Ilex Perado*.

OBITUARIES.

Sir Daniel Morris.

With the death of Sir Daniel Morris, K.C.M.G., on February 9, 1933, in his 89th year, we mourn the passing from us of a botanist and an administrator who devoted his energy and administrative abilities to the service of the Empire.

In his Presidential Address to Section K of the British Association at Bournemouth (1919) at the close of the War, Sir Daniel very fittingly devoted his remarks to the importance of botanical research and its practical application—work which he so ably carried out during the time that he held the post of Imperial Commissioner for Agriculture in the West Indies. His Address may be considered a summary of the aspects of botany, for which, with his valued practical experience, he did so much.

His first introduction to tropical botany was under Dr. Thwaites in the Royal Botanic Gardens, Peradeniya, and on his promotion to the Directorship of the Public Gardens and Plantations, Jamaica, in 1879, he started his long connection with the West Indian Islands, which was so fruitful of valuable results. After seven years' service in Jamaica he was appointed Assistant Director at Kew, where for twelve years his knowledge of the Tropics was fully utilised. During his time at Kew he was sent on a special mission to the West Indies in connection with the development of economic plant industries, and later was appointed Expert Adviser to the West India Royal Commission. It was in consequence of the valuable services he rendered to the Royal Commission that he was appointed Imperial Com-

missioner for Agriculture. In recognition of his services he received the honour of the C.M.G. in 1893 and the K.C.M.G. in 1903.

He published numerous papers, mainly concerning botanical or horticultural matters. His introduction of the Sea Island Cotton and his work in connection with sugar-cane hybridisation and the cultivation of limes, *Cacao*, and other tropical products have been of permanent value to the West Indian Islands.

On his retirement, Sir Daniel Morris took an active interest in the work of the Bournemouth Natural Science Society, and did much to stimulate local interest in the natural sciences.

While he was at Kew he acted as Treasurer to the Royal Horticultural Society from 1888 to 1891, and received the honour of the V.M.H. from the Society.

The success of his work in his many spheres of activity was due to his power of organisation and to his ability both as a writer and a speaker, based on sound knowledge and critical observation.—A. W. Hill.

Charles Alfred Barber.

Dr. Charles Alfred Barber, who died on February 23, 1933, at the age of 72, is best known for his work on sugar-cane, though in his early years, after leaving Cambridge, he contributed several papers of purely botanical interest to the 'Annals of Botany' and later published, in the 'Botanical Memoirs' of the Department of Agriculture in India, a series of important papers on root parasitism, dealing with the haustoria of *Santalum album*, *Olax scandens*, and *Cansjera Rheedii*, and with the interrelations between the host and parasite.

Dr. Barber's first introduction to the tropics was his appointment, in 1891, to the post of Superintendent of the Botanical and Agricultural Department in the Leeward Islands. His duties were multifarious, varying from the study of tick-borne diseases in cattle, geology, entomology, and plant pathology to agriculture. It was here that his interest in the sugar-cane was first aroused, and he was instrumental in founding a sugar-cane station in St. Kitts, where he collected a large number of cane varieties and, in collaboration with (Sir) Francis Watts, designed a series of manurial experiments with this crop.

He left Antigua in 1895, and was for a short period Professor of Botany at Coopers Hill. In 1898 he was appointed Government Botanist in the Madras Presidency, and did much useful work on the Madras Flora. Later he investigated various problems connected with forestal and agricultural plants and their diseases—notably the "red rot" disease of sugar-cane, which threatened to destroy the sugar industry of the Godavari district.

The excellent work he carried out in the improvement of the cane cultivation in that area led to his selection by the

Government of India, in 1912, to fill the newly-made post of Sugar-cane Expert. This appointment gave full scope to his genius. It enabled him to travel throughout India and to study the different types of Indian canes in the field. His "Studies in Indian Sugar-cane," published in five of the 'Botanical Memoirs' of the Agricultural Department of India are classical. His classification of these into five groups, based on morphological characters alone, has recently been fully confirmed by the cytological work of Bremer in Java, and speaks highly of his capacity as a critical and accurate observer. With this work as a basis, he was able to set about the breeding of quick-maturing canes to suit the short growing season of Northern India. By crossing various N. Indian canes with *Saccharum spontaneum*, seedlings were obtained which gave rise to new varieties, many of which, after extensive trials in N. India, have now entirely replaced the varieties which were previously grown, and have increased greatly the quantity of sugar produced.

In 1918 Dr. Barber received the honour of Companion of the Indian Empire.

Since his retirement from India in 1919 until shortly before his last illness, Dr. Barber held the post of Lecturer in Tropical Agriculture at Cambridge. His interest in sugar-cane was maintained till his health failed, and his reviews on recent sugar-cane research have been an important feature in the 'International Sugar Journal.'—H. C. Sampson.

SHORT NOTES.

The English Name of Spartina Townsendii.—May I, as one of the discoverers of this grass in the early 'seventies of last century, and joint sponsor for its Latin name, enter a decided protest against the misnomer "rice-grass" as its English name? With one exception, all the British floras of standing within my reach, which give English names, including those of Withering, Sir J. E. Smith, Sir W. J. Hooker, Bromfield, Macreight, etc., agree in calling the members of the genus *Spartina* "cord-grass." The exception is S. F. Gray's 'Natural Arrangement of British Plants,' where it is styled "sea-grass." The earliest use of the name "rice-grass" that I have found is in a paper of 1913 by Dr. Stapf, entitled "Townsend's Grass or Rice Grass," which appeared in the 'Proceedings of the Bournemouth Science Society.' In the body of the paper the author discredits the name as inappropriate, and it appears that the latter arose from a silly tale current among the villagers that the plant had originated from a ship laden with rice having been wrecked in the neighbourhood of Lymington! Many botanists probably think that English names for plants do not much matter, provided that we are clear about the Latin ones, but, I submit that, after all, established English plant-names are a part, though a very

small one, of our patrimony, and should not therefore be lightly set aside, especially on such very ridiculous grounds. If the name "rice-grass" were in the least appropriate, perhaps it would not so much matter, but the plant does not resemble rice, and belongs to a different tribe of the Gramineae. The newspapers, with the characteristic wrongheadedness of the journalist, have seized with avidity on the name "rice-grass," and are broadcasting it all over the Empire.—JAMES GROVES.

DOES JUNCUS TRIFIDUS OCCUR IN IRELAND?—This high Alpine Rush has been more than once recorded as a native of Ireland. Thus Wade in his 'Plantæ Rariores,' 1804, records it as growing "in the marshy ground at the foot of Mangerton Mountain, Killarney, and on many of the boggy mountains in Cunnemara" (Wade, Gallovid); both records may, however, be safely dismissed as errors of identification.

The only modern record for this Alpine Rush in Ireland occurs in the 'Journal of Botany,' 1910, 227, where Messrs. Thompson and Elliott state that they found one small patch on the summit of Carrantnohill, Reeks, Co. Kerry, in July of that year. This record has been repeated by Mr. A. Wilson in his important and very useful paper on "The Altitudinal Range of British Plants," 1931, 102 (supplement to the 'North-Western Naturalist').

Unfortunately, neither Mr. Thompson nor Mr. Elliott was aware at the time of the extreme interest to Irish botanists of their discovery, and no specimens are available. Carrantnohill has been examined by many botanists, including Mr. H. C. Hart, whose detailed report on this range appeared in the 'Proceedings of the Royal Irish Academy,' 1882. The present writer, too, has visited this summit several times, but neither he nor Mr. Hart, nor any previous botanist, has been fortunate enough to detect this Rush. In the British Isles, *Juncus trifidus* is known to occur only on the higher mountains of Scotland, a gap of fully four degrees of longitude separating Carrantnohill from its nearest Scottish station. While Irish botanists would most gladly welcome this addition to their Alpine flora, it is better to await actual specimens from this summit before doing so.

The present writer has referred more fully to this record of Messrs. Thompson and Elliott in his 'Flora of Kerry,' 1916, 290, as well as on p. 21 to their record of *Cardamine amara* for South Kerry, which also must await actual specimens; this latter plant is unknown outside Ulster as a native of Ireland.—R. W. SCULLY.

STUDIES OF FLOWERING IN HETEROSTYLED AND ALLIED SPECIES: Part I. PRIMULACEAE (Publication of the Hartley Botanical Laboratories of the University of Liverpool, no. 8, 1932. By James Stirling, B.Sc., F.L.S.).—This developmental study is based on measurements both of fresh material and

of prepared sections of flowers of various species of heterostyled Primulas (*P. sinensis, malacoides, vulgaris,* and *veris*) and of the monomorphic *Primula mollis*. One object of the investigation was to ascertain the stage of development at which the dimorphic condition of the flowers first made its appearance. It is shown by the measurements that heterostylic differences only become evident after the petal has attained a stature of 4 mm. and the tube part of the petal a size of about 1·3 mm. This applies to all dimorphic species of *Primula* examined. At approximately the same stage in the development of the monomorphic *Primula mollis*, namely, when the petal has reached about 4 mm. there is a change in the rate of development of the pistil and also in the "insertion" of the stamens, *i. e.*, the region of the corolla-tube below the insertion of the stamens. When compared with the heterostyled Primulas, the rate of growth of the "insertion" of *Primula mollis* stands between the rates of the long- and the short-styled forms respectively. Measurements of the development of the flowers of *Hottonia* are also given, and they show a similar commencement of divergence of growth when the petals have reached a length of about 4 mm.

There is therefore a unity in the early stages of the development of the flowers of the Primulaceae whether they be monomorphic or dimorphic—at all events, so far as the species examined are concerned.

In *Primula vulgaris*, when the divergence into long-styled and short-styled flowers takes place, it is noticeable that the development continues at the same relative rate (shown by a straight line in the graph), while the corresponding organs of the short-styled flower show an alteration in the rate of growth, the "insertion" of the stamens growing more rapidly than the tube as a whole and the style less rapidly.

The author concluded from this fact that the ancestral monomorphic flowers of *Primula* resembled the long-styled form of *Primula vulgaris*, and that the short-styled forms were developed by a retardation of the elongation of the style and increased intercalary growth of the region of the tube below the insertion of the stamens. Since in *Primula mollis* there is as stated also a change in the rate of growth of pistil and insertion at a petal size of about 4 mm., the author assumes that this monomorphic species shows incipient heterostyly. The author also advances the view that the tube part of the corolla in this Family is receptacular in nature. He does not, however, fully discuss this point, leaving it for further consideration at a later date.

He also deals with the genetics of heterostyly, and his views are generally in agreement with those put forward by Dr. Ubisch, that an inhibition factor connected with the short-styled form

prevents the long-styled forms arising from " legitimate " cross-pollination, thus explaining the dominance of the short-styled forms. A further conclusion from this developmental investigation is that any advantage to the plant as a consequence of its becoming heterostyled is merely capricious and not purposed. One cannot but feel that valuable and interesting as are the exact measurements of floral development described in this memoir, they are a somewhat slender foundation on which to base such far-reaching morphological, genetic, and anti-teleological conclusions.—F. E. Weiss.

Alderney Plants.—In August last we had three weeks botanising in Alderney, one of the least known of the Channel Islands, which seems to have been little visited by English botanists during recent years. Practically no plants from this island are to be found in the National Herbaria at Kew or South Kensington, and one of the main objects of the trip was to remedy this omission. During our stay we saw and collected over 250 of the 503 species recorded from Alderney by Marquand in his admirable ' Flora of the Channel Islands,' published in 1900. We were successful in finding many of the more interesting species in the localities he mentions, including a number peculiar to the island, although we arrived too late in the season for some of the special rarities such as : *Helianthemum guttatum*, *Ornithopus ebracteatus*, *Ononis reclinata*, and *Bupleurum opacum*.

It was interesting to notice how little the flora of this island has changed during the last thirty years, most of the species still existing in the localities where Marquand found them. For instance, there is still the small patch of *Geranium sanguineum* about a yard square at the lower end of the Longy Road, where Marquand saw it in 1899.

We were able to make a few additions to the existing records in the ' Flora,' and these are appended :—

Sagina nodosa (L.) Meyer.—Grassy slopes on Longy Common, sparingly. Found in Alderney sixty years ago by Babington, who records it in ' Flora Sarniensis,' but without definite locality. Marquand was unable to find this plant.

Malva moschata L.—Two plants found on the Blaye in the centre of the Island. Very rare.

Hippuris vulgaris L.—Sparingly in a marsh at Mannez Quarry. We also found it in the spot mentioned by Marquand on Longy Common. These are the only two known stations in the Channel Islands.

Aethusa Cynapium L.—A single plant occurring with other weeds of cultivation on the Blaye. Not previously noted for Alderney, though recorded for Jersey, Guernsey, and Sark.

Tanacetum vulgare L.—Roadside near Mannez Cottages. Possibly a garden escape.

Marrubium vulgare L.—A plant or two by a cottage in Clanque Bay. It was noted by Babington at the neighbouring Platte Saline.

Limonium lychnidifolium var. *corymbosum* (Boiss.) C. E. Salmon.—We had no difficulty in finding this at the spot where Andrews discovered it, at the east end of the island, in 1900 (see Journ. Bot. xxxviii. 483 (1900) ; xxxix 193 (1901). It grows in the fissures of the sandstone or gritstone, which replaces the usual diorite at the north-eastern end of the Island, its associates being : *L. binervosum*, *Juncus maritimus*, *Glaux maritima*, *Crambe maritima*, and *Armeria maritima*.

The bright red margins of the inner bracts noted by Andrews were very conspicuous. The plant seems to have increased considerably since it was first found. Apparently there were only about a dozen plants in Marquand's time, but we counted at least 60. This very distinct sea-lavender grows in many places on the west coast of France and has since been found in Jersey in an almost inaccessible spot, but is not known to occur anywhere else in the Channel Islands.

Limonium binervosum (G. E. Sm.) C. E. Salmon.—Two or three plants in Cachelière Quarry.

Ulmus nitens Moench.—A row of elms in Reuter's Valley appear to belong to this species.

Carex leporina L.—A single tuft in a marshy place in Mannez Quarry. Not recorded from Alderney in Marquand's ' Flora.'

Agrostis nigra With.—Plentiful in one spot on the Blaye.—A. Bruce Jackson and A. K. Jackson.

Artemisia Stelleriana Besser (p. 76).—In connection with Mr. Druce's note it may be of interest to place on record that I collected this species in September 1900 on the sand-spit of Hengistbury Head, Hants, where it appeared quite naturalised. I am not aware whether it still exists there.—H. W. Pugsley.

Orchis hircina (L.) Crantz.—A specimen of this rare orchid, found by Mr. J. A. Sharpe near Glynde, Sussex, in July 1932, has been presented to the British Museum Herbarium.—A. J. W.

Rumex rupestris Le Gall.—The " crescent-shaped communities " mentioned in the interesting note on the occurrence of this plant in the Kenfig dunes of Glamorgan are evidently characteristic. Near Perranporth in West Cornwall similar colonies occur in two or three damp hollows among the dunes. Each colony is normally a dense crescent-shaped thicket following the landward shore-line of what in the winter is a considerable pool.

Where the plant is found on the actual sea-shore my experience is that it usually occurs either singly or in small groups just above the tide-line. Such small groups occur far away from sand-dunes, as in several small bays and coves on the south coast of Cornwall.—F. Rilstone.

REVIEWS.

Moss Flora of North America North of Mexico. By A. J. GROUT, Ph.D. Vol. III. pt. 3. 8vo, pp. 115–178, pls. 30–44. Published by the Author: Newfane, Vermont, U.S.A., 1932. Price $2·50.

VOLUME III. of this work has so far been concerned with an account of the family Hypnaceae, which is divided into nine subfamilies; three of these (principally Brachythecieae) were dealt with in Part 1; the Amblystegieae occupied the whole of Part 2; and now in Part 3 come the remaining subfamilies—Hylocomieae, Hypneae, Stereophylleae, Plagiothecieae, Entodonteae. The beginning of the next family, Leskeaceae, is also included, one genus (*Thuidium*) being represented. In all, there are descriptions of 22 genera, 95 species, and a number of varieties in the present part.

Great pains have clearly been taken to render the flora suitable to the requirements of the moss student. Keys to the genera and species are provided; the essential characters in the descriptions are italicised; many of the species are figured in the plates; references to other illustrations and to exsiccati are quoted, the type-locality of each species is indicated, and critical notes are appended. Several of the figures are from original drawings, and the rest are usually from standard works. It might be suggested that there is a tendency to multiply genera, but that does not necessarily add to the difficulties of the student, for he can by means of a key be guided as easily to a well-defined genus as to a section of a larger and more comprehensive genus.—A. G.

Les Roses d'Europe de l'Herbier Crépin. Par G. A. BOULENGER. 2 vols., 8vo, pp. xvii, 400, ii, 537, 55 woodcuts. Goemaere: Brussels, 1924, 1932. [Reprinted from the 'Bulletin du Jardin Botanique de l'Etat, Bruxelles,' vols. x & xii.]

THE second volume of this work has now been completed, the first having been published in 1925. It covers the Roses of Great Britain, France, Belgium, Holland, Switzerland, and Germany, and represents a vast amount of work on the part of the author during the twelve years of his curatorship of the Crépin Herbarium, and for some years previous to his appointment.

The author considers that Crépin's general arrangement is the best to follow, as other modern authors have done, though he adopts some original ideas in the details. The arrangement adopted by Almquist, and used in Scandinavia, is rightly condemned as unscientific. That was based largely upon the form and coloration of the leaflets, and the form and direction of their

teeth. In Mr. Boulenger's opinion, shared by most modern rhodologists, the very large number of species created in former years is totally inadmissible; in many cases these were obviously based upon single bushes. At the same time he considers that each species should be described in great detail, an arrangement which entirely defeats its object, since the leading characters of each are lost in the superabundance of detail.

The author considers that the disposition of the prickles, number of leaflets, form of stipules, presence or absence of bracts on the peduncles, or lateral pinnæ on the sepals, and the direction of the sepals after flowering, on which great importance has been laid in the past, are really of secondary value. On the other hand, he lays stress on the number of teeth in each leaflet, surely of very minor interest, but involving an immense amount of work in counting many hundreds of examples to obtain an average for his descriptions. Stress is also laid on the characters afforded by the disc, especially in its diameter and that of the stylar orifice, and in the thickness of the disc itself, which seems to bear a relation to the erection or reflexion of the sepals. The diameter of the stylar orifice in *R. villosa* and *R. Sherardi* is about half that in *R. tomentosa*, which gives a more useful character for segregating the two former than the greater erection and persistence of the sepals, which may be considerable in *R. tomentosa*.

The subdivision is as follows (only British species are cited in this review):—

Section I. EGLANTERIAE.

Group A. Pimpinellifolii–Suavifoliæ.

1. *R. pimpinellifolia*; 2. *R. rubiginosa*; 3. *R. agrestis*; 4. *R. micrantha*.

Group B. Alpinae–Vestitae.

5. *R. villosa*; 6. *R. Sherardi*; 7. *R. tomentosa*.

Group C. Cinnamomeae–Caninae.

8. *R. dumalis*; 9. *R. canina*; 10. *R. Pouzini*.

Section II. SYNSTYLAE.

11. *R. arvensis*.

Followed by all the hybrids.

The reasons for including *R. pimpinellifolia* in the Pimpinellifolii–Suavifoliæ are not very clear, though the author says in his preface that it has a different arrangement of its chromosomes from that of the other species in the Group. This is the only place where I can find any mention of chromosomes.

Comparatively few varieties are recognized—for example, *R. canina* has only 11,—the author relying upon long descriptions and a vast amount of synonymy for distinguishing the few he upholds. An easier course is to rely upon a few characters, such as shape and size of fruit and leaflets, clothing of styles, etc.

R. dumalis replaces *R. Afzeliana* and *R. coriifolia* and their varieties, a course upon which comment has already been made in my ' Revise of the British Roses.'

The description of each species is inordinately long, every possible alternative feature of each organ being given, and there is also a vast number of footnotes, mostly citing stations of specimens which present the alternative features given in the descriptions. These footnotes usually much exceed the main text in length. Thus, the description of *R. micrantha* occupies thirteen pages, but five-sixths of this consists of footnotes. The important features are not italicised, and thus become obscured under a mass of detail.

Though a dichotomous key is deprecated in the Introduction, a long one is provided, but it deals with the species only, the descriptions of all the varieties and hybrids having to be read before one can be identified. In so far as the species are concerned, the key to some extent counterbalances the defect of the unwieldy descriptions.

There are many excellent woodcuts showing enlarged figures of the various parts, but these seem to have been selected rather to show what a great range of variation exists than to help in recognising the species. Thus there are 20 illustrations of the styles of *R. canina* and 16 more of *R. stylosa* which is included with it. These cover a very great degree of form and clothing.

It is doubtful whether the immense amount of research involved has been repaid by a clear exposition of the characters of the species and varieties.—A. H. Wolley-Dod.

BOOK-NOTES, NEWS, etc.

Linnean Society of London.—At the General Meeting on February 16, Professor Sir William Wright Smith gave the Hooker Lecture, taking as his subject " Taxonomy and Cytology." For the most part he dealt with the classification of *Primula* and showed how cytological investigations at times give considerable help to taxonomists in enabling them to come to a decision, whereas occasionally cytological results are at variance with what appear to be taxonomic certainties. The lecture was illustrated by a series of lantern-slides, which made clear the references to various species.

Royal Society.—We are pleased to learn that Professor E. J. Salisbury, Quain Professor of Botany in the University of London, has been recommended by the Council for admission to the Fellowship of the Society.

A PRELIMINARY NOTE ON THE DISTRIBUTION OF MARINE DIATOMS DURING THE TERTIARY PERIOD.

By N. Ingram Hendey.

It is apparent from a study of the literature that the geographical distribution of diatoms in geological time has not been understood, and many erroneous ideas have arisen from inaccurate observation. Many of the early workers were obsessed with the idea that diatoms were very old geologically, and could be found in Palæozoic rocks.

Dana (1) thought that the Hornstone in the corniferous limestone (early Devonian), around York Town, in the United States, was derived from siliceous sponge-spicules and diatoms. Ehrenberg (2) claimed that the presence of diatoms could be detected in Silurian deposits, while Edwards (3) claims to have found them in Triassic grit from New Jersey. Castracane (4) was one of the first to announce the presence of diatoms in coal, and D. Vitto Zanon (5) in 1928 reported diatoms in coal from Newcastle (Permian) and in a Carboniferous schist. Pantocsek (6) held that the deposit of Kusnetzk in Saratov in south-east Russia was Triassic, while Cleve (7), partly agreeing with Pantocsek, thought that this was the oldest diatom-bearing layer.

Recent work, however, by Julius Pia (8, 9) discredits the early work, and confirms the belief that diatoms were most prolific during the Tertiary age; so that any statement about the presence of diatoms before the Cretaceous period must be regarded with suspicion. It has been always difficult to appreciate the presence of diatoms in Mesozoic or pre-Mesozoic formations, because of the scantiness of the evidence and the fact that the emergence of diatoms in geological time should be precise, because of their abundance and indestructibility.

When considering a fossil deposit it is necessary to determine whether it is primary or secondary—that is, whether it has remained undisturbed and uncontaminated by adjacent deposits; or whether it has resulted from one or more primary formations becoming disintegrated by denudation or movement and re-deposited and consolidated by water or other pressure. A secondary deposit would contain the diatoms present in the primary rocks before disintegration, together with those species contemporary with the reformation.

According to Pia (8) the fossil deposits of marine diatoms were laid down during the Cainozoic or Tertiary formation, and he gives the following chronological arrangement of

strata illustrating the position in time of the chief marine deposits:—

Period.	*Deposit.*
Paleocene	Kusnetzk, Russia.
Paleocene	Ananino, Russia.
Lower Eocene	Jutland.
Eocene	Barbadoes.
Oligocene	Oamaru, New Zealand.
Lower Miocene	Nagy Curtos, Hungary.
Miocene	Santa Monica, California.
Upper Miocene	Richmond, Maryland, U.S.A.
Upper Miocene	Yedo and Senda, Japan.
Upper Pliocene	Villefranche, France.

It will be seen from the table that the Kusnetzk deposit is the oldest diatom deposit in the world, and was laid down in the period that immediately followed the Cretaceous—that is, the Paleocene—at the dawn of the Eocene. A period of great activity and prolificacy is indicated from the Oligocene throughout the Miocene, while the deposit in the south of France during the Pliocene indicates some local change.

The geographical distribution of diatoms has always presented many difficulties, and is closely related to the disposition of land- and water-masses on the globe. Much mystery has been caused by the discovery of similar forms in the Hungarian and New Zealand deposits, and in the Maryland and Japanese deposits. These deposits are widely separated, yet the peculiar facts are unquestionable.

To understand this distribution of species it is necessary to have an idea of the probable land and water disposition during the period in which the deposits were laid down. Many theories have been suggested to explain the changes, or effects of the changes, between land and water areas during geological time, chief among which are the "contraction theory" and its derivatives. The "contraction theory" of Lyell (10) was strongly advocated by Dana and Suess (11), and even to-day receives support, although modified to the theory of "tetrahedral collapse" of Green (12). This theory demands the limitless alternation of the raising of the sea-floor above water-level, and the lowering of the land-areas beneath the sea-level, so that the existing continents are the result of a complex series of movements of elevation and depression. This theory has to call to its aid the "land-bridge" theory in order to elucidate the distribution of terrestrial organisms.

The above theories have several serious objections, and although ingenious manipulation makes them more plausible with regard to the fact of land-distribution of plants and animals, they do not explain satisfactorily the transport of marine organisms like diatoms over thousands of miles of sea.

The majority of marine diatoms belong to the Centricae

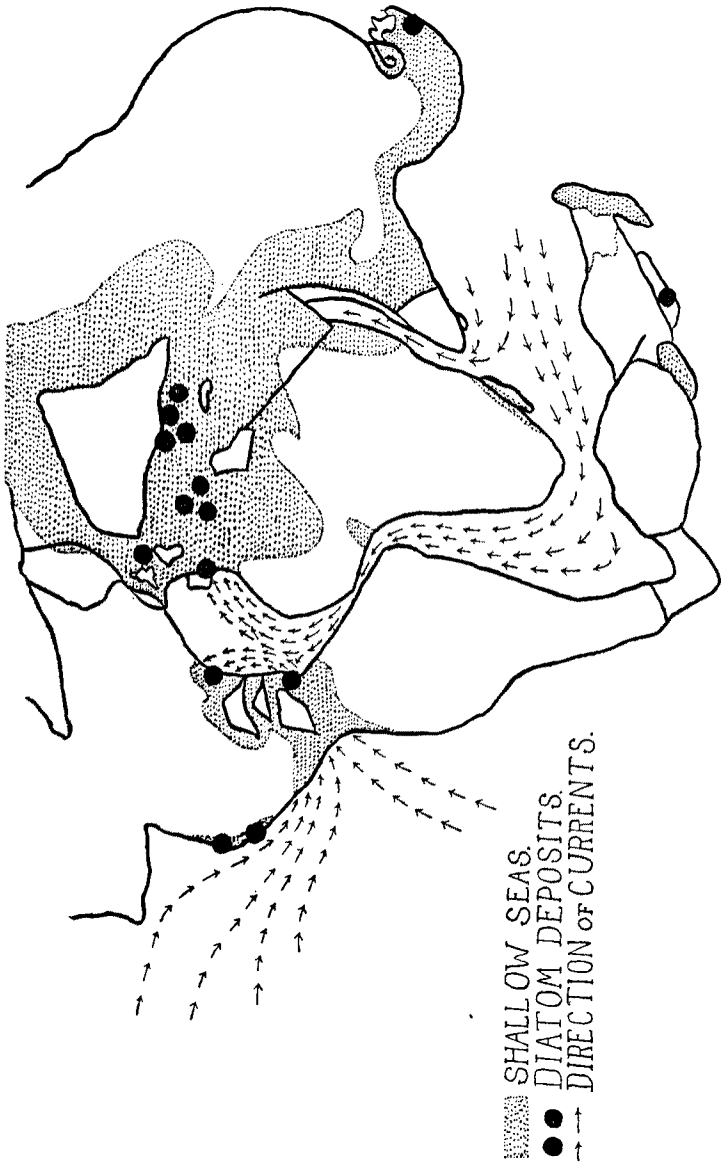
and have no power of locomotion, so that they are entirely at the mercy of ocean currents. The distribution of marine diatoms demands movements of land-areas that would cause currents capable of transporting organisms from the great southern ocean of Tertiary times and depositing them in Central Europe, and depositing Japanese forms on the eastern sea-board of the United States and Californian forms in the south of Spain.

A theory which fulfils these requirements, and at the same time other claims made upon it, is Wegener's 'Theory of the Origin of Oceans and Continents' (13). The Wegenerian theory is one of land-mass displacement, and its fundamental principle is that the land-mass surfaces or continents have remained in outline much as they are found to-day, the chief difference being in their relative positions.

The map on p. 114 illustrates Wegener's ideas of the land and water disposition of the earth during the Tertiary period. The theory assumes that in pre-Carboniferous times the "land-mass" concentration was complete—that is, all the land-surfaces now known were fused together into one continent, a considerable portion of which was lying beneath a very shallow sea. Lines of weakness developed in this land-mass and eventually fissures developed. The splitting commenced in the earliest Jurassic period when the "land-mass" now known as Australia became separated from India and Africa. By the passage of time the rifts became wider and a gradual "land-mass" movement or continental swing arose.

The North Pole acted as a pivot, and the "land-masses" moved to the westward; the centrifugal forces of the rotation of the earth in conjunction with the tendency of the "land-masses" to move towards the equatorial zone is thought to be the cause of the drift from the poles. The rift between the west coast of Africa and the east coast of South America became greater, and during the Cretaceous period the separation became complete. Towards the end of this period the coast of India became separated from the east coast of Africa and Madagascar. These two rifts, one on either side of Africa, were the forerunners of the sea-areas now known as the Atlantic and Indian Oceans. This "land-mass" dispersion is more easily understood when the eccentricity of the poles during the Tertiary period is postulated.

In order to understand these "land-mass" movements it is necessary to know something of the nature of the "land-mass" in relation to the floor of the ocean. The rocks of the "land-mass" consist chiefly of acid plutonic rocks and gneiss, and are as a whole of comparatively low density, being composed of silica, alumina, and alkalis; to these Wegener applies the term "sial." The ocean beds are composed of basic rocks of magnesia, iron, and lime: these rocks underlie the continents and constitute a lower band of the earth's substance. Wegener uses the term "sima" to describe them. The rocks of the



Map of the world during Tertiary era, after A. Wegener.

" sima," though solid, are viscous, and show a flow in the same way as Burgundy pitch, which although quite hard will " flow " uniformly, and given time will occupy a space of any shape. Wegener's theory assumes that the continental " land-masses " of " sial " move through the more dense and viscous " sima."

Referring to the map, let the effect of the " land-mass " swing be studied with relation to marine diatom distribution. The western swing of the South American continent, with the consequent widening of the rift between it and the West African coast, would set up currents from the south, and in effect would draw large volumes of water from the neighbourhood of New Zealand and Australia. Similarly, China and Japan, drawing the Indian Peninsula with them, would widen the rift between India and the east coast of Africa and would draw vast quantities of water from the south. This water would flow around Africa upon the east and west, and it is reasonable to suppose that this northward-moving current would carry with it organisms from the southern ocean in the vicinity of New Zealand. The current flowing up the western coast of Africa would, by virtue of the direction of the coast-lines, swerve north-eastwards and flow over the low-lying country now known as Central Europe, which was then covered by a shallow sea. It is therefore reasonable to expect that diatoms found in Tertiary deposits in New Zealand will be represented in the Central-European deposits of the same geological formation. Reference to the stratigraphical table show the Oamaru deposit in New Zealand to be older than that of Hungary, so that the diatoms travelled from New Zealand to Hungary, and not from Hungary to New Zealand.

In considering the current of water which flowed from the south up the east side of Africa, it is interesting to notice that the extreme eastern corner of Africa, in the neighbourhood of Kenya, is a continental shelf, covered by a low sea (dotted area on the map). This shelf would act as a trap or nucleus for any organisms that might be deposited by the northward-moving current, and, once such a deposit had commenced to accumulate, it would, by virtue of its position, accumulate rapidly. It is interesting to note that some 200 miles north-west of Mombasa there lies the greatest diatom deposit in the British Empire. In this area it is estimated that one deposit covers nearly 116,000 acres, and is computed to contain 62,000 tons of diatomaceous earth.

The deposit is a remarkably pure one, and, apart from an occasional *Cocconeis*, it consists entirely of *Stephanodiscus astraea*. This deposit is almost identical with that found in the Rotorua district of New Zealand. The Rotorua deposit in the Ngongataha Valley is a pure earth consisting of *Stephanodiscus nova-zelandicus* entirely. These two species of *Stephanodiscus*

are practically identical, and they may have had a common origin. The sea, from which the organisms found in New Zealand were deposited, was drawn towards the African coast by the westward swing of the " land-masses," and here upon the Kenya shelf deposited organisms.

The formulæ relating the strength of ocean currents to the transport of material are of some interest here, but in the absence of definite information of physical conditions in Tertiary times they have no definite application ; similarly, calculations of rate of fall and accumulation of diatoms in Tertiary water are vitiated by the absence of physical constants, but provide an interesting speculation.

The further effects of the westward swing of the American " land-mass " now need to be considered with reference to the distribution of species living in the Pacific Ocean. Certain species found in the fossil deposits in Japan are also found in Maryland on the eastern sea-board of the United States, the most characteristic of these being *Triceratium multifrons*. *Triceratium tabellarium* is found in the Galapagos Islands on the western side of America, and also in Barbados upon the eastern side.

Can the Wegenerian displacement theory satisfactorily explain these facts ? It can. The western movement of the American " land-mass " results in a gradual diminution in the distance between the west coast of America and the east coast of China and Japan, so that large volumes of water would be displaced, and the displacement, although slow, would be very definite and considerable. The North Pole was then situated somewhere in the neighbourhood of the Aleutian Islands off the coast of Alaska, so it is feasible to suggest that the direction of the ocean currents would be as indicated in the map, and that large volumes of water would move down the coast of California from the neighbourhood of Japan and sweep over the low-lying neck of land joining North and South America, which was then covered by a shallow sea.

Experiments with models gave water currents moving in the required direction after movement of the " land-masses."

This current of water moving from the pole to the equator would be greatly increased in volume by a general draining of water from the middle area of the Pacific Ocean towards the Pacific coast of South America ; in order to make this clear it is necessary to consider briefly certain geophysical phenomena, which present themselves when a mass of " sial " moves through the viscous " sima."

The progression of the " sial " blocks through the " sima " causes a folding to take place upon the anterior margin of the "sial." This folding or mountain-making takes place above and below the sea-level, and, since the greater portion of the

continental block is submerged in the " sima," the folding will take place to a greater degree in a downward direction. To preserve lithospheric equilibrium, the theory of isostasy provides that, although the " sial " is of a certain thickness throughout the greater part of the " land-mass," it is considerably thickened under mountain ranges, and conversely much attentuated or even entirely absent under the oceans. Thereby equilibrium is maintained throughout the earth's crust. The folding of the " sial " or " land-masses," particularly upon the under side, has the effect of forcing down the " sima " of the ocean bed in the neighbourhood to a great depth. This drop in the " sima " level is accentuated by the fact that when the " sima " is so pushed down large portions of the constituent rocks upon the under side melt and are carried away, causing more and more " sima " to be drawn down. In this manner an ocean "deep " is formed along the margin of the progressing " land-mass." This deepening of the ocean bed will cause a draining of water from an adjacent area not so affected.

It will be readily realised that the westward progression of the American continent and the consequent folding, whereby the Andes were thrown up, would also bring about a deepening in the ocean bed right along the American coast. The filling up of this deepened coastal area with waters from a more distant point would have the effect of drawing mid-Pacific organisms towards the American coast. These currents of water, together with those caused by the actual westward movement of the " land-mass " and polar eccentricity, provide an explanation of the presence of diatoms from Japan and California in deposits east of the United States.

The map illustrates how the currents flowing over the low-lying southern part of the United States are turned back north-westward by the current of water coming up between the coasts of Africa and Brazil from the south ; these currents would therefore overflow the eastern sea-board states of America. By this means it is possible to explain the presence of *Triceratium multifrons* (*Triceratium Kainii* ?) both in the deposits in Japan and New Jersey. At the point of confluence a certain amount of intermingling of species would take place, certain species from the southern ocean would be carried to the westward, and so one or two species from New Zealand would be found in Barbadoes.

Similarly, certain species passing over the Panama into the North Atlantic would be caught in the current of water from the south moving north-east and would be deposited in Europe.

The following table is an analysis of the genus *Coscinodiscus* as found in the Moron and Californian deposits. It will be seen that more than 60 per cent. of the species that occur in California are also found in the south of Spain. Other genera when analysed

show a great similarity also; over 90 per cent. of the genera that occur in California are also found in the Moron district:—

List of Species of Coscinodiscus *found in the Moron and Californian Deposits.*

Moron.	California.
C. apiculatus.	*C. apiculatus.*
C. asteromphalus.	*C. argus.*
C. centralis.	*C. asteromphalus.*
C. crassus.	*C. centralis.*
C. cribrosus.	*C. cribrosus.*
C. curvatulus.	*C. curvatulus.*
C. fimbriatus.	*C. decrescens.*
C. gigas.	*C. diorana.*
C. hetroporus.	*C. elegans.*
C. lineatus.	*C. fimbriatus.*
C. marginatus.	*C. gigas.*
C. nobilis.	*C. hetroporus.*
C. obversus.	*C. lineatus.*
C. obscurus.	*C. marginatus.*
C. oculis-Iridis.	*C. micans.*
C. radiatus.	*C. oculis-Iridis.*
C. ——.	*C. omphalanthus.*
C. scintillans.	*C. radiatus.*
C. subtilis.	*C. robustus.*
C. ——.	*C. scintillans.*
C. ——.	*C. subtilis.*
C. ——.	*C. symmetricus.*

The appearance of these diatoms in two localities so widely separated has always been regarded as one of the greatest mysteries of diatom distribution, but the Wegenerian "land-mass" displacement theory immediately provides a rational solution to it.

It is hoped later to provide a more detailed account of some of the complexities of diatom distribution.

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THE WINTERACEAE OF NEW ZEALAND.

BY J. E. DANDY, M.A., F.L.S.

THE family Winteraceae (by many authors treated as a subdivision of Magnoliaceae) is represented in New Zealand by an endemic group of plants which comprises three species. These were dealt with by Cheeseman (Man. Fl. New Zeal. 29–30 (1906); *op. cit.* ed. 2, 455–456 (1925)) as members of the genus *Drimys* J. R. & G. Forst., under the names *D. axillaris* J. R. & G. Forst., *D. colorata* Raoul, and *D. Traversii* Kirk. His conception of *Drimys* was the broad one adopted by Bentham and Hooker (Gen. Pl. i. 17–18 (1862)) and by Prantl (in Engl. & Prantl, Nat. Pflanzenfam. iii, 2, 19 (1889)). In their 'Genera Plantarum' Bentham and Hooker regarded the Winteraceae as forming a tribe (Wintereae) of Magnoliaceae, with two genera, *Illicium* L. and *Drimys*. Prantl, in 'Die natürlichen Pflanzenfamilien,' also treated the group as a tribe (Illicieae) of Magnoliaceae, including in it the genera *Illicium* and *Drimys* together with *Zygogynum* Baill., which had been described in 1867. The plants which at that time were referred to the genera *Drimys* and *Zygogynum* were subsequently separated by Harms (in Ber. Deutsch. Bot. Gesellsch. xv. 358 (1897)) as a subfamily Drimyoideae of Magnoliaceae, and this subfamily can retain its status and name unaltered under Winteraceae.

At the beginning of the present century Van Tieghem published an account of the Winteraceae subfam. Drimyoideae (which he regarded as a family "Drimytacées") in a paper entitled "Sur les Dicotylédones du Groupe des Homoxylées" (in Journ. de Bot. xiv. 259–297, 330–361 (1900)). In this work Van Tieghem divided the "Drimytacées" into six genera; he took a narrow view of *Drimys*, recognized *Zygogynum*, and added the genera *Wintera* Forst. f. ex Tiegh., *Bubbia* Tiegh., *Belliolum* Tiegh., and *Exospermum* Tiegh. All of these were maintained by Hutchinson in his account of the Winteraceae, "The Family Winteraceae" (in Kew Bull. 1921, 185–191), which included a key to the genera. As restricted by Van Tieghem and Hutchinson the genus *Drimys* differs from the other five genera mentioned in that the outer whorl of the perianth at first completely envelops the rest of the flower-bud, at anthesis splitting longitudinally into its constituent tepals and finally being deciduous; in the remaining genera the outer whorl is much shorter than the rest of the flower-bud and thus does not envelop it, and, moreover, is persistent. Among these latter five genera *Wintera* is distinguished by having the inflorescences axillary (or sometimes axillary *and* terminal) instead of all terminal as in the other four. *Wintera* is, in fact, a valid genus, which comprises the three New Zealand species of Win-

teraceae. The name *Wintera*, however, cannot stand for this genus under International Rules, for reasons explained in the following paragraph.

Drimys was founded by the Forsters (Charact. Gen. Pl. 83, t. 42 (1776)) on two species, *D. Winteri* J. R. & G. Forst. (from South America) and *D. axillaris* (from New Zealand), both of which were defined and figured without either being designated as type of the genus. *D. Winteri* has, however, been generally regarded as the type-species of *Drimys*, and should be accepted as such, since it more closely accords with the Forsters' generic diagnosis*. In 1781 a third species, *D. granadensis* L. f. (from South America), was added by the younger Linnæus (Suppl. Pl. 269). Three years later Murray (in L. Syst. Veg. ed. 14, 507 (1784)) unnecessarily proposed the name *Wintera* Murr. to take the place of *Drimys* †, and under it listed two species, namely, *W. aromatica* Murr. (including *D. Winteri*) and *W. granadensis* Murr. (based on *D. granadensis*). For some reason he altogether omitted to mention *D. axillaris*. The latter name was, however, transferred to *Wintera* two years later by G. Forster (Florul. Ins. Austr. Prodr. 42 (1786)). When in 1900 Van Tieghem (*tom. cit.* 277) separated the New Zealand forms as a genus distinct from *Drimys* he adopted the name *Wintera* for them, attributing it (unjustifiably) to Forster (*loc. cit.*) with *W. axillaris* Forst. f. (*D. axillaris*) as type-species. Obviously, the name *Wintera* Forst. f. ex Tiegh. cannot be retained. Van Tieghem (*loc. cit.*) rightly regarded *Wintera* Murr. as a synonym of *Drimys*, but Murray's name was validly published and a later homonym of it is therefore illegitimate. To replace *Wintera* Forst. f. ex Tiegh. the new name *Pseudowintera* is proposed below.

In his account of the genus *Wintera* Van Tieghem (*tom. cit.* 290–293) recognized four species. Two of these, *W. axillaris* and *W. colorata* Tiegh. (based on *Drimys colorata*), had previously been described by other authors; the remaining two, *W. monogyna* Tiegh. and *W. terminalis* Tiegh., were proposed by him as new species. He subdivided the genus into two sections: *Euwintera* ‡ Tiegh. ("à inflorescence à la fois terminale et axillaire"), based on the single species *W. terminalis*, and *Pleurowintera* Tiegh. ("à inflorescence exclusivement axillaire"), comprising the other three species. *W. terminalis*, however, appears to be nothing more than a form of *W. axillaris*, so that Van Tieghem's sections can scarcely be maintained. His other new species, *W. monogyna*, is referable *ex descriptione* to *D. Traversii*, described some years earlier.

The revised nomenclature of the endemic New Zealand genus of Winteraceae and of its three species is therefore as follows:—

PSEUDOWINTERA Dandy, nom. nov. pro *Wintera* Forst. f. ex Tiegh.

Drimys J. R. & G. Forst. Charact. Gen. Pl. 83, t. 42 (1776) pro parte.

Drimys sect. *Eudrimys* ("*Eudrymis*") DC. Prodr. i. 78 (1824).

Wintera Forst. f. ex Tiegh. in Journ. de Bot. xiv. 277 in obs., 290 (1900)—non *Wintera* Murr. (1784).

Wintera sect. *Euwintera* Tiegh. *tom. cit.* 291 in obs. (1900).

Wintera sect. *Pleurowintera* Tiegh. *loc. cit.* (1900).

Type-species: *Pseudowintera axillaris* (J. R. & G. Forst.) Dandy (*Wintera axillaris* Forst. f.).

1. **Pseudowintera axillaris** (J. R. & G. Forst.) Dandy, comb. nov.

Drimys axillaris J. R. & G. Forst. Charact. Gen. Pl. 84, t. 42 fig. *a–l* (1776).—Raoul, Choix Pl. Nouv.-Zél. 47 (1846).—Hook. f. Bot. Antarct. Voy. ii. 1, 12 (1852) pro parte; Handb. New Zeal. Fl. 10 (1864) pro parte.—Kirk, For. Fl. New Zeal. 1 (excl. var.), t. 1 (1889); Stud. Fl. New Zeal. 22 (excl. var.) (1899).—Cheesem. Man. Fl. New Zeal. 29 (1906); *op. cit.* ed. 2, 456 (1925).

Wintera axillaris Forst. f. Florul. Ins. Austr. Prodr. 42 (1786).

Wintera terminalis Tiegh. in Journ. de Bot. xiv. 291 in obs. (1900).

2. **Pseudowintera colorata** (Raoul) Dandy, comb. nov.

Drimys colorata Raoul in Ann. Sci. Nat. sér. 3, Bot. ii. 121 (1844)*; Choix Pl. Nouv.-Zél. 24, 47, t. 23 (1846).—Cheesem. Man. Fl. New Zeal. 30 (1906); *op. cit.* ed. 2, 456 (1925).

Drimys axillaris var. *colorata* Kirk, For. Fl. New Zeal. 2, t. 2 (1889); Stud. Fl. New Zeal. 22 (1899).

Wintera colorata Tiegh. in Journ. de Bot. xiv. 290 in obs. (1900).

J. D. Hooker (Bot. Antarct. Voy. ii. 1, 12 (1852); Handb. New Zeal. Fl. 10 (1864)) included this species under *D. axillaris* [*P. axillaris*].

* The diagnosis begins as follows: "CAL. *Perianthium*, inferum, monophyllum, integrum, dehiscens." *D. Winteri* (having a dehiscent outer perianth-whorl) agrees with this, but *D. axillaris* does not. Both species conform with the rest of the diagnosis.

† In an explanatory footnote Murray (*loc. cit.*) observed: "*Genus hocce, nobilitatum cortice Winterano, malui praefixo nomine* [i. e. *Wintera*] *insignire, quam Drimydis, quo posteriori quidem et in Supplemento comparet. Concinnius quoque dici putavi Winteram, quam Winteranam.*"

‡ In forming sectional epithets Van Tieghem apparently used the prefix *Eu-* not necessarily to denote the section containing the type-species of a genus, but to indicate the section which he considered basal from a phylogenetic point of view.

* This is the original place of publication of *D. colorata*; in the 'Index Kewensis' (i. 799 (1893)) the name was attributed to "Raoul, Choix Pl. N. Zél. 24 [1846]."

3. **Pseudowintera Traversii** (Buch.) Dandy, comb. nov.

Hymenanthera Traversii Buch. in Trans. & Proc. New Zeal. Inst. xv. 339, t. 28 fig. 1 (1883).

Drimys Traversii Kirk in Trans. & Proc. New Zeal. Inst. xxx. 379 (1898).—Cheesem. Man. Fl. New Zeal. 30 (1906); *op. cit.* ed. 2, 456 (1925); Illustr. New Zeal. Fl. i. t. 8 (1914).

Wintera monogyna Tiegh. in Journ. de Bot. xiv. 291 in obs. (1900).

NOVITATES AFRICANÆ.

(Concluded from p. 73.)

Gethyllis Herrei L. Bolus (*Amaryllidaceae-Amarylleae*). *Bulbus* 4·5 cm. longus, 3·5 cm. diam. *Vaginæ basales* 2, maculis lineisque saturate purpureis notatæ, superne in craterem marginibus involutis ampliatæ. *Folia* 20–30 laxe spiraliter torta anguste linearia glabra, ad per 8 cm. ultra vaginam superiorem exserta, 2–3 mm. lata. *Perianthii tubus* floris marcidi in fructu persistentis 7 cm. longus, in flore normali 4 mm. diam.; segmenta obtusa apiculataque vel abrupte acuta, alba, 3 cm. longa, exteriora 1·2 cm., interiora 1 cm. lata. *Stamina* numerosa, filamentis brevissimis, antheris siccis ad 1·6 cm. longis. *Stylus* usque ad 7 mm. exsertus, stigmate parvo. *Fructus* clavatus luteus, "vittis 2 sanguineis percursus," in sicco 8 cm. longus, planatus ad 2·1 cm. diam., odore ingrato.

Hab. Namaqualand; Richtersveld, Kambroekop, Sept. 1929, *H. Herre* (Stellenbosch University Gardens, no. 3542). Flowered at Stellenbosch Feb. 1930, in fruit May 1931.

Morea Barnardii L. Bolus (*Iridaceae-Moreae*). *Planta* glabra 15–26 cm. alta. *Cormus* 1·5 cm. diam., tunicis extimis e fibris crassis compositis. *Caulis* gracilis ad 1·5 mm. diam., nodis incrassatis. *Vaginæ basales* ad 3·5 cm. longæ. *Folium productum* 1, parum supra basin positum, anguste lineare, ob margines involutos quasi terete, ad 49 cm. longum sine vagina 1 cm., ad 2 mm. lata; folia caulina reducta 2–3, 4–3·5 cm. longa cum vagina 1–2 cm. *Cymæ* 2–3, 3-fl., pedunculis 4·5–7·5 cm. longis. *Spathæ valva* exterior 2–3 cm., interior 3·5–4·3 cm. longa. *Perianthii segmenta* exteriora pallide rosea, nervis maculaque parva in genu saturatioribus, ad 2·3 cm. longa cum ungue 7 mm., lamina fere orbiculari ad 1·5 cm. lata, interiora nulla. *Filamenta* ad 9 mm. longa, basi per 1·5 mm. coalita; antheræ 4 mm. longæ, stigma parum superantes. *Stylus* ad 2 mm. longus, rami cum cristis ad 7 mm. longis et 3 mm. latis, ad 1·5 cm. longi. *Stigma* bifidum; ovarium 8 mm. longum.

Hab. Caledon Div., Shaw's Mountain, between Caledon and Hermanus, Oct. 1929, *T. T. Barnard* (Bolus Herbarium, no. 20067). Flowered in Dr. Barnard's garden September to October 1930, 1931. Allied to *M. tripetala* Ker, but the flower looks less angular and more compact because the sepals and style-branches diverge much the less. The latter curve inwards so that half the anther may be seen from above, and the crests are shorter and broader than they are in *M. tripetala*. No trace of petals has been observed in a number of flowers examined.

Morea bipartita L. Bolus. *Planta* gracilis glabra sæpius ad 25 cm. alta. *Cormus* globosus, 1·2 cm. diam., in collum 1·2 cm. longum terminans, tunicis e segmentis fibrosis crebre pinnato-nervatis atratis vel intimis brunneis compositis. *Vagina basalis* membranacea sæpe 4–5 cm. longa. *Folia* producta 2 conduplicata 25 cm. longa vel rarius ad 45 cm., sine vagina 1·5–2·5 cm. longa, ad 3 mm. lata, in plantis minoribus quasi setacea vix 1 mm. diam., 3–5 cm. supra cormum posita, internodio semi-exserto 2–4 cm. longo; caulina reducta 1–3 vaginiformia 1–3 cymas gerentia. *Cymæ* graciles 4-fl., pedunculo ad 2 cm. longo. *Spathæ valvæ* exteriores mox marcidæ submembranaceæque 1·9–2·2 cm. longæ, interiores superne membranaceæ 3–4 cm. longæ. *Perianthium* lilacinum; sepala 2·5–2·8 cm. longa, breviora ad 9 mm., longiora ad 7 mm. lata, lamina obtusa inferne leviter angustata, basi nota ovali lutea albo-cincta ornata, genu aureo minute brunneo-maculato, ungue inferne pallido, fossa nectarifera lutea; petala sæpius concoloria 2·1–2·4 cm. longa, lamina oblonga vel lineari-oblonga abrupte acuta apiculata 6 mm. lata, ungue 7 mm. longo. *Filamenta* 5–6 mm. longa per 3–4 mm. coalita; antheræ cyaneæ ante dehiscentes 5 mm. longæ, stigma parum superantes, polline pallidissime cyaneo. *Stylus* 3–4 mm. longus; rami cyanei, ad 6 mm. longi sine cristis oblique lineari-lanceolatis, acuminatis, ad 1 cm. longis. *Stigma* bipartitum, 1·5 mm. latum. *Ovarium* terete 5–8 mm. longum, 1·5–2 mm. diam.

Hab. Riversdale Div., Riversdale Karroo, on the road to Adam's Kraal, Sept. 1931, *Emily Ferguson* (Bolus Herbarium, no. 20068).

Ferraria Framesii L. Bolus (*Iridaceae-Moreae*). *Planta* 15 cm. alta. *Folia* basalia 4 adscendentia vel falcate recurvata ad 12·5 cm. longa, parte vaginante 1–4 cm. longa, 0·7–1·1 cm. lata, caulina 6 prope apicem leviter angustata obtusa vel subacuta, marginibus demum cartilagineo-crenulatis, nervis demum conspicuis, 9–3·5 cm. longa, ad 1·6 cm. lata. *Inflorescentia* copiose ramosa, ramis primarius 6, 4–5 cymas gerentibus, cymis sæpius 2-fl.; spathæ valvæ obtusæ, exterior 2·5–3·5 cm., interior sæpius 5 cm. longa. *Bracteæ* sæpe 4 cm. longæ. *Pedicellus* 3 cm. longus. *Perianthii segmenta* ad 3·8 cm. longa, exteriora ad 1 cm., interiora ad 7 mm. lata, cyanea immaculata supra medium saturata, marginibus viridi-cyanea, externe viridi-vittata, ungue pallide cyanea 1·3 cm. longo; "tubum" 8 mm. diam. cristis styli omnino tectum. *Filamenta* cyanea ad 1·2 cm. longa fere ad apicem coalita, parte libera antheram æquante. *Antheræ*

ultra ramos styli haud exsertæ rubicunde purpuræ vix ad 2 mm. longæ, lobis divaricatis, polline aurantiaco. *Rami styli* cum cristis multifidis, 5 mm. longis, 7 mm. latis, rubro-purpurei; stigma minutum. *Ovarium* cum rostro ad 1 cm. longo ad 2·3 cm. longum.

Hab. Clanwilliam Div.; hill about 6 miles south of Clanwilliam, *P. Ross Frames* (Bolus Herbarium, no. 19928). Flowered in Mr. Ross Frames's garden throughout October and more than half of November 1931.

Watsonia Desmidtii L. Bolus (*Euwatsonia*) (*Iridaceae-Ixieae*). A *W. Galpinii* L. Bolus bracteis obtusis vel infima subacuta, ad 1 cm. longis, bracteolis parum ultra, perianthis longiore, tubo segmentis angustioribus duplo longiore, præcipue differt.

Planta 1 m. alta. *Cormi tunici* tenues. *Caulis* ad 6 mm. diam., internodiis 2 superioribus exsertis. *Folia* 7 viridia, marginibus haud incrassatis, nervo medio leviter prominente nervis intermediis inconspicuis, basalia 3, ad 84 cm. longa ad 2·2 cm. lata, caulina 60–7 cm. longa, vaginis clausis 5·5 cm., 10 cm., 7·5 cm., 3 cm., longis, arte amplectentibus. *Spica terminalis* ad 36-fl., ramis 4- ad 7-fl. *Bracteæ* 1–0·7 cm. longæ, internodos æquantes vel parum superantes; bracteolæ 1·1–0·8 cm. longæ. *Perianthium* pallide roseum 4·7 cm. longum tubo 3·2 cm. longo, apice 5–6 mm. diam., parte cylindrica partem filiformem paullo superante; segmenta obtusa, exteriora 5 mm., interiora 7 mm. lata. *Stamina* arcuata apicem segmenti attingentia; antheris 8 mm. longis. *Stigmata* 6 subexserta. *Ovarium* 4 mm. longum.

Hab. George Div.; Wilderness, in the shallow part of the Touw River, Dec. 1930, *R. A. H. Flugge-de Smidt* (Bolus Herbarium no. 20071).

Gladiolus Emiliae L. Bolus (*Iridaceae-Ixieae*). *Planta* glabra, ad 50 cm. alta. *Cormus* lateraliter subcompressus ad 2·5 cm. diam., tunicis tenuibus, in segmentis gracillimis derumpentibus. *Caulis* teres ad 2 mm. diam. *Folia* producta per anthesin nulla; vaginæ basales rubicundæ immaculatæ ad 5 cm. longæ; folia caulina 2, 3·5–5·5 cm. longa, parte vaginæ clausa ad 4 cm. longa, lamina nulla vel subnulla. *Spica* laxa ad 19 cm. longa; flores ad 7, suaveolentes secundi fere erecti vel demum tubo apicem versus subgenuflexo. *Bracteæ* obtusæ, 2·5–1·5 cm. longæ, bracteolis eas æquantibus vel parum superantibus obtusis fere ad apicem coalitis. *Perianthium* luteo-brunneum rubre brunneo-maculatum sæpius 5–5·8 cm. longum, tubo ad 3·6 cm. longo, parte infundibuliformi 5 mm. longa ad 4 mm. diam., segmentis obtusis, supremo 9 mm., lateralibus 7–6 mm., infimo 5 mm., latis. *Antheræ* cum stylo ultra dimidium segmenti attingentes, ad 6 mm. longæ. *Ovarium* 3 mm. longum.

Hab. Riversdale Div., flats near Riversdale, on a rocky outcrop, April 1931, *Emily Ferguson* (Bolus Herbarium, no. 19608).

Hermas intermedia C. Norman, sp. nov. (*Umbelliferae*). *Herba* perennis circa 40 cm. alta. *Caule* erecto robusto haud ramoso, indumento niveo-villoso vestito. *Folia basalia* congesta petiolo teniusculo dense pubescente usque 19 cm. longo suffulta; *lamina* 8–10 cm. × 5–6 cm., ambitu lanceolata vel ovato-lanceolata obtusa, basi leviter cordata vel rotundata, superne sparse, inferne dense niveo-pubescens, margine subintegra vel undulata, nervis subtus valde prominentibus; *folia caulina* ad bracteas angusto-oblongas vel spathulatas reducta, ±3 cm. longa. *Umbella* terminalis, *radiis* numerosissimis tenuibus erectis glabratis circa 2 cm. longis; pedicellis glabris circa ·5 cm. longis; *involucri phylla* numerosa anguste lanceolata acuta villosa ±1·5 cm. longa; *involucellorum* basi valde longeque attenuata lanceolata villosa ±7 mm. longa. *Flores* (ut videtur omnes fertiles) et *fructus* omnino generis.

Hab. Cape Province; "Fairly frequent in crevices of rock faces facing S., south side of crest of Riebeek Kastel, Malmesbury Division," Feb. 1932, *N. S. Pillans*, no. 6646 (type in Herb. Mus. Brit.): same locality, Jan. 1928, *N. S. Pillans*, no. 6061.

Apparently intermediate between *H. gigantea* and *H. Pillansii*. It is a much smaller plant than the former in all its parts, but approaches it in the outline of the leaves, while their cordate bases suggest *H. Pillansii*. The latter character is, however, variable. The indumentum of leaves and petioles—not of the stem—is shorter and less dense than in either species.

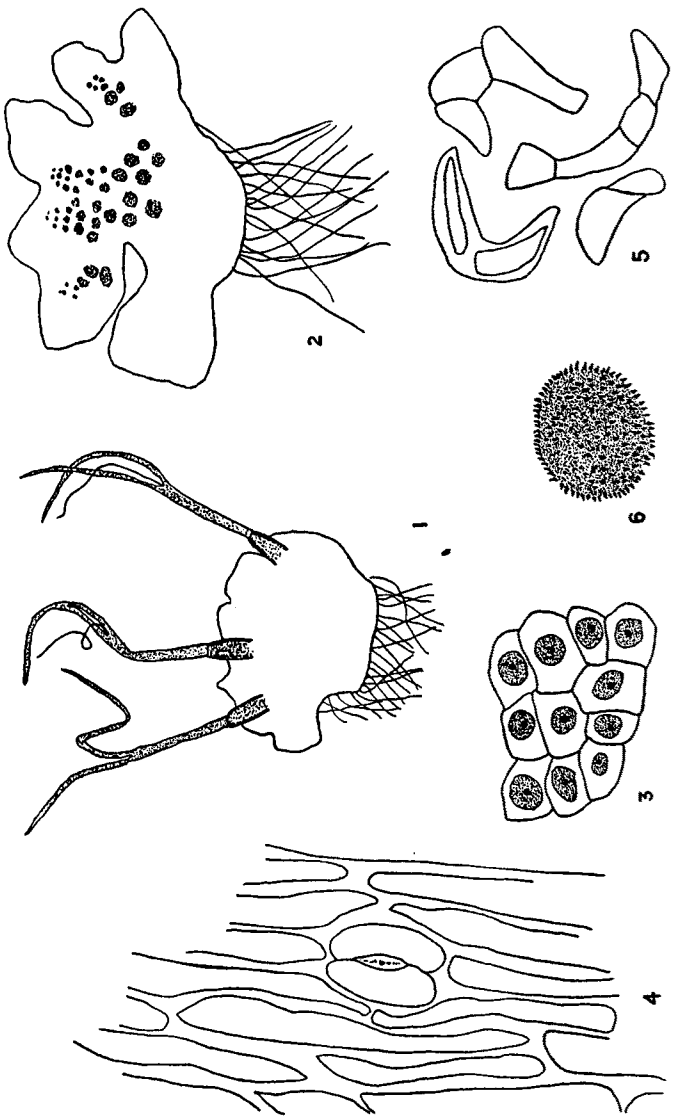
I am indebted to Mr. Pillans for the excellent material recently received and also presented when I visited Cape Town in 1928.

A NEW *ANTHOCEROS* FROM BURMA.

By L. P. Khanna, University College, Rangoon.

The material for this paper was obtained from Maymyo in the Northern Shan States, Burma. The plant, which grows in green patches, black when dry, was found growing in a moist locality near Laughing Water.

Anthoceros Parkinsonii, sp. nov. *Herba* dicœcia. *Plantæ femininæ* 5–14 mm. diametro, in medio leviter depressæ, margine undulato. Cellulæ epidermidis 20–81 μ × 14–54 μ, quæque chloroplasto singulo magno disciforme præbite. *Thallus* in sectione transversa usque ad 8–14 cellulas altus, ad marginem 1–3 cellulas; costa media distincta deest. *Rhizoidei* sæpius granulosi. *Involucrum* 1·65–2·8 mm. latum, ad apicem paulo angustius. *Capsula* 13·0–30·0 mm. longa, ·28–·45 mm. lata, atro-fusca. *Stomata* 44–55 μ longa × 30–45 μ lata. *Spori* 41–52, flavo-brunnei spinulosi, spinulis rectis. *Pseudo-elateres*



1. Female plant. 2. Male plant. 3. Epidermal cells. 4. Stomata. 5. Elaters. 6. Spore. All much enlarged.

diversiformes 40–110 μ longi × 13–22 μ lati sæpius 2–4 cellulares nonnumquam 1 aut 5 cellulares atro-brunnei. *Plantæ musculinæ* 7–11 mm. diametro, cryptis antheridialibus plurimis; quoque antheridia 12–20 gerente.

The possession of the yellow-brown spores and the absence of mucilage-chambers from the involucre separates the present plant from *A. erectus* Kashyap (1915). The dicœcious habit and the number of antheridia in the antheridial cavities distinguishes it from *A. Longii* Stephani (1916). The habit, size, and other characters distinguish it from the other species of the genus.

RUBUS LATIFOLIUS Bab. AND *R. LAETUS* Wm. Watson.

By Wm. Watson.

In this Journal last year (p. 108) some criticism appeared of my communication in 1930 (p. 183), which had for its object to disentangle the two very distinct brambles which had until then been, and still continued in the issue of the Journal for October of the same year to be, confused under the single name of *Rubus latifolius*. Certain defects were alleged in my definition of those two species, and an attempt was made to reject the name *R. laetus* which I had adopted in place of the homonym *R. latifolius* Focke.

Amongst other things it was stated that the stem of *R. latifolius* Bab. ought to have been described as "very stout," not as "slender." Weihe and Nees state of nearly every bramble they describe that the stem measures up to half an inch thick, and that is also my usual experience. Kuntze ('Reform,' 119) broadly agrees. To justify the term "very stout," therefore, a stem should be at least 15 mm. thick, but I have seen no stem of *R. latifolius* exceeding 7 mm. in thickness.

The leaves of *R. latifolius* were given by me as shortly hairy (not felted) beneath, and green beneath on the panicle. Babington has "... foliolis utrinque pilosis ... subtus nunquam tomentosis." Rogers in his 'Essay' has "Leaflets ... thin, hairy on both sides," and Focke in Rep. B. E. C. 1893 has "the leaves of the typical plant are green beneath." According to Messrs. Barton and Riddelsdell, however, the leaves are very thickly felted, and on the panicle are white beneath. It will be noted that my description, besides being in accordance with the specimen which I quoted, is in agreement with the descriptions of Babington, Rogers, and Focke, the first two of whom were acquainted with the plant in a living state. Further specimens of *R. latifolius* collected at Acharn last summer have the leaves shortly hairy beneath, not felted.

Admittedly White's Perth specimen has a large panicle and white felted leaves, but it differs therein and in other respects from Babington's type; and the conclusion that ought to be drawn surely is not that my description and the descriptions of my predecessors are incorrect, but that the Perth plant cannot be *R. latifolius*. Turning to White's 'Flora of Perthshire' one discovers that Babington only suggested the name *R. latifolius* with doubt, and that White himself regarded the identification as uncertain. "*R. latifolius* Bab. (?) but the teeth are more nearly simple than in my specimen from Acharn or that from Cramond. I do not think it can be *macrophyllus*. A most interesting plant."—BAB. White adds that the plant grew in the island below the Linn of Campsie and that he failed to find it again. Another specimen (which I have not seen) was gathered by White in the same island, and was thus reported on by Babington, "Closely approaches *R. sepicola* L. & M. which may be the same as my var. *conjungens*. At first sight it much resembles *R. latifolius*."

Messrs. Barton and Riddelsdell think it should have been stated that the topmost branch of the panicle of *R. latifolius* was sometimes nearly patent. Babington, who studied the plant growing at Cramond and Acharn, says that the branches are "ascending not spreading." One panicle in Herb. Bab. certainly has the topmost branch nearly patent, but it has been forced into that position in the pressing of the specimen. With that exception, the branches of panicles in Herb. Bab. are ascending, as in the authentic specimen which I took as the type and in the new specimens (now in Herb. Mus. Brit.) which were obtained from Acharn last year.

Coming now to the Welsh plant, fault is found with my description of the panicle of *R. laetus*. I described the form of panicle to be seen on a well-developed bush, as it is only on such a plant that the specific characters come to full expression and that specimens for the herbarium are to be sought (see the 'Handbook'). To record in a summary of distinguishing characters that young or stunted bushes have the panicles reduced to racemes seems to me useless, since it is not a specific character, but is a condition to be found at times in all brambles. I grant that the descriptions in the 'Handbook' sometimes refer to such reduced panicles—as, for instance, the descriptions of *R. longithyrsiger*, *R. hirtus* var. *rotundifolius*, and *R. tereticaulis*,—but it does not help in the slightest to distinguish one bramble from another. Species are to be defined by the characters in which they differ, not by those in which they resemble one another. When Messrs. Barton and Riddelsdell saw a narrow-panicled bush growing beside a broad-panicled bush of *R. laetus* they were looking merely at a young plant growing beside an older and stronger one. A narrow simple panicle is the only kind of

panicle which the 'Handbook' allows to *R. laetus*, but the broad and spreading panicle which I described is the normal and characteristic form for the species, and alone requires notice in a diagnosis of the species. Incidentally the following comment *à propos* of this species is attributed to Mr. Riddelsdell in a paper read by Mr. Rilstone before the Royal Institution of Cornwall in 1926. "Cornish plants have panicles very compound as in strong bushes in N. Wales."

I regret to see that it is desired to keep *R. laetus* in the group *Subrhamnifolii*. I indicated a position beside *R. gratus* in the *Silvatici*. The 'Handbook' says the stem is "soon nearly prostrate and thus abnormal in this group," that the sepals "go off altogether from the suberect type," and that "the broad reddish bracts and stipules are marked features." The first two characters, which take the plant out of the *Subrhamnifolii*, are just those which, with the third character, mark *R. gratus* and its allies in the *Silvatici*.

In Rep. B. E. C. 1893 Rogers asks whether a specimen of "*R. latifolius* Bab." found by Griffith does not belong to the *Silvatici*; and Focke is quoted as saying "Near our German *R. silvaticus*," a position which, in fact, he gave the Welsh *R. latifolius* in his last Monograph.

Another point is instructive. The 'Handbook' describes the stamens of *R. latifolius* as far exceeding the styles. This is not correct either for *R. latifolius* Bab. or for *R. laetus*. The error perhaps arose through the confusion of *R. laetus* with *R. gratus* and *R. mollissimus*, both of which have very long stamens. Thus the Bucks "*R. latifolius*," so named by Focke and Rogers, is *R. gratus*; and the Siliwen "*R. mollissimus*" (Rep. B. E. C. 1896), for the naming of which Rogers says he was responsible, is *R. laetus*. On the other hand, specimens of *R. laetus* have been mistaken for *R. gratus* (Bangor, coll. Druce, det. Focke) and for *R. villicaulis* (Bethesda, coll. Linton, det. Rogers, 1903, in Hb. Mus. Brit.). Is it fanciful to regard these misidentifications by our greatest specialists at the group as corroborative of the real affinities of *R. laetus*? One does not see it mistaken by them for any member of the *Subrhamnifolii*.

It will be observed that I keep the name *R. laetus*. Sudre quotes only "Progel hb. p.p.," no description, for the name *laetus*, which he applies as a var. of *R. miostylus* in the group of *R. tereticaulis*. The fact is, Progel did not publish a description of *R. laetus*. As a rule, when publishing a new species (e. g., *R. cerchoviensis* immediately before *R. laetus*) he gave a full description on the usual lines, beginning with the stem, following on with each part of the plant, and finishing with the carpels, and then pointed out the differences from one or two other Bavarian species. In the case of *R. laetus*, however, the description proper is wanting. The name follows, *without*

a number but with " ad int.," straight on after *R. cerchoviensis*, which has a serial number as an accepted and undoubted member of the Waldmünchen flora. Then some differences from *R. cerchoviensis* are pointed out. Four of these are of the " less or more " character, the rest are very ordinary and wholly insufficient to constitute a description of the species, " prickles not com pressed, leaflets green beneath, terminal leaflet not cordate, flowering branch shortly hairy, panicle thyrsoid, and branches shortly peduncled." In such a critical group these few words, omitting all mention of the armature and the flowers, are far from enough to define a species. They would be applicable probably to 100 different plants. Two only of the characters are retained by Sudre in supplying a fresh diagnosis, *as a var.*, and one character is contradicted by him. So incomplete is Progel's treatment that he himself placed another different plant, *R. curtiglandulosus* Sudre, in his herbarium under the name of *R. laetus*.

I accordingly regard *R. laetus* Progel as invalid, because not provided with a description. A numbered specimen is quoted, but that, of course, is not an allowable substitute for a description. I imagine he was not ready to describe the plant, not having sufficiently studied it, and intended to return to the matter another day. This he never did, although he published a supplement to his list a few years later.

R. laetus is not taken up as a species in either of the monographs of the Bavarian Rubi by Ade and Sudre. No other specimen than the original one found by Progel " am Plattenberg " seems to be known.

RUBUS OPACUS SUBSP. *NOBILISSIMUS*, NOV.

By Wm. Watson.

A TALL pink-flowered bramble which grows on Abrook Common and other commons between Ditton and Church Cobham in Surrey has often caught the eye of botanists and been sent in to the Exchange Clubs for determination and distribution. In the new Surrey Flora the various determinations are all impartially recorded, the plant receiving a triple record as *Rubus opacus*, *R. holerythros*, and *R. nitidus*. In the last case there is the qualification, "A form with pink petals but otherwise most characteristic." The remark is not very comprehensible as *R. nitidus has* pink petals.

This Surrey bramble is identical with the *R. opacus* from Shapwick, Som., which was issued as no. 78 of the ' Set of British Rubi,' and also with a bramble similarly named from West Moors, Dorset. Both these plants were originally pronounced by Focke to be exactly *R. opacus* Focke. Murray, however,

in his ' Flora of Somerset ' very justly pointed out that the German plant was described as having white flowers, whilst the Shapwick plant had pink flowers. Focke then modified his determination, and in a paper on the distribution of certain brambles in Western Europe he stated that he had seen forms very similar to *R. opacus* Focke in England, but none exactly like it. In his monograph of the brambles of Central Europe (1902) he again stated that English forms appeared not essentially different from this plant.

Sudre thought that the Shapwick bramble in the ' Set of British Rubi ' was not *R. opacus*, but a form of the group of *R. nitidus*, and he published it in his ' Rubi Europæ ' as *R. nitidus* var. *anglicanus*. The colour of the petals not being shown on the ticket, he trusted to the ' Handbook ' description, which says (incorrectly) that the petals are white. He does not show how the new variety is to be distinguished from *R. opacus*, except implicitly by placing *R. opacus* as a subspecies under *R. plicatus*. This does not help much, as the affinities of *R. opacus* are not obviously with *R. plicatus* rather than with *R. nitidus*. Focke, as a matter of fact, placed his plant under each of these species, and also grouped it with *R. affinis*. Gaeke mentions it under *R. sulcatus*.

There has been equal uncertainty as to the relationship of the Shapwick bramble. In the ' Handbook ' it stands under *R. nitidus*, in accordance with Focke's opinion at the time the ' Handbook ' was published (1900). A specimen collected by Townsend at Stuckton, S. Hants, in 1879, was, however, named *R. plicatus*, and White states that the Shapwick bramble was known as *R. plicatus* until 1891. Rogers said that he at one time took it for *R. sulcatus*. He again named an Aberdare specimen *R. sulcatus* in 1905.

The German and the English plants cannot, in my opinion, be placed—as Focke finally placed them—close to *R. plicatus*. The greyish felted sepals, the cup-shaped flowers, and the connivent stamens must exclude them from the *Suberecti* proper (to which *R. plicatus* belongs); although the suberect subsimple stem, the creeping and suckering habit, the early leaf-fall, and the habitat on peat require a position in the *Semi-Suberecti* with *R. nitidus* etc.

I have seen no English plant identical with the German specimens issued by G. Braun as nos. 43 and 190 in Herb. Rub. germ. under the name of *R. plicatus* f. *opaca* Focke, or answering to the full descriptions given by Focke and Braun. Before I saw these authentic specimens it appeared probable that a white-flowered plant which E. F. Linton obtained (1890) at Kinson, Dorset, and Focke named *R. opacus*, did in fact represent that species. Linton's specimen, now in Herb. Mus. Brit., has one flower prepared to exhibit the receptacle, which

is pilose. This character Focke formerly relied on to distinguish *R. opacus* from the nearly related *R. Bertramii*, the type-plant of which had glabrous receptacles. The Kinson specimen, however, in spite of the pilose receptacles, is undoubtedly *R. Bertramii*. I have myself met with *R. Bertramii* with pilose receptacles in W. Sussex and W. Kent. The type-plant of *R. Bertramii* was also androdynamous, but individuals with short stamens occur in England and Wales, as well as in N.W. Germany. The variability does not end here: the carpels, glabrous in the type, may be pilose, and the anthers may be glabrous or pilose in different groups of individuals, without accompanying differences outside the flowers. Such instability is, in my experience, very unusual in *Rubus*.

RUBUS OPACUS subsp. **nobilissimus,** nov. *Radix* repens, propagulifera. *Turio* suberectus subsimplex, biennis, autumno ineunte mox defoliatus, obtusangulus, etiam ad basin sulcatus, parce pilosus, aculeis sparsis e basi lata falcatis cum aculeolis rarissimis armatus. *Folia* digitato-quinata; petioli longi, aculeis paucis instructi, supra evidenter canaliculati, stipulæ glanduliferæ; foliolum terminale ovato-oblongum acuminatum; foliola inæqualiter serrato-denticulata. *Ramus fertilis* angulatus subglaber, infra paniculam solum aculeis magnis curvatis instructus. Inflorescentiæ sursum angustatæ ad basin foliferæ ramuli ascendentes longe pedunculati, superiores 3–1-flori. *Pedicelli* vix armati. *Petala* obovata, incurvata, rosea. *Filamenta* sæpe roseola stylos multo superantia; antheræ (semper ?) pilosæ. *Sepala* canescentia, interdum albo-marginata, post anthesin patentia. *Carpella* pilosissima. *Fructus* nunc mediocres, nunc majusculi, sapidi.

Type-specimen, Hb. W. Watson, collected at Abrook Common, Surrey, August 2, 1930.

A stately luxuriant plant, growing on peat in wet places. *Stem* tall, erect or high-arching, unbranched, not rooting, green in shade, becoming purplish crimson and opaque in the sun, obtuse-angled, sides furrowed down to the base (shallowly below, more deeply above), thinly hairy throughout and furnished with many subsessile glands and occasional stout pricklets; spreading by a thick twisted horizontal root, which creeps just below the surface of the ground and sends up suckers at intervals. *Prickles* very few, large and long, strong-based and falcate. *Leaves* digitate, rather crowded on the stem, yellowish green and strigose above, greyish-white felted and softly pubescent chiefly on the prominent veins beneath; leaflets becoming plicate and convex, finely serrate to serrate-denticulate, the principal teeth sometimes larger and patent. *Terminal leaflet* ovate-cordate, gradually acuminate to oval or oval-oblong and acuminate-cuspidate, the base entire or somewhat cordate. Intermediate leaflets unusually long and widely spreading,

the base cordate to entire. Basal leaflets with stalks 3–5 mm. long. *Petiole* long, furrowed above, and like the petiolules armed with few (often grouped) strong-based hooked prickles; stipules glandular.

Flowering branch angled, flexuous, subglabrous throughout, usually furnished with a few large-based, hooked or falcate prickles below the panicle, and some 3–5nate leaves, the terminal leaflets of which are obovate or oval and often cuneate and sharply serrate. *Panicle* subracemose to compound, with long slender ascending many-flowered branches below and 3–1-flowered branches above. Pedicels long, clothed with ascending hairs and subsessile glands, almost or quite unarmed. Bracteoles fringed with subsessile glands. Terminal flower-stalk about 1 cm. *Flowers* small or moderate. Petals incurved, crumpled, oval or obovate, tapered into a long claw, apex often notched, rose-pink. Stamens white or pinkish, much longer than the yellowish to pinkish styles. Anthers pilose. Sepals felted and woolly all over (sometimes green rather than grey, and then with a very distinct edge of white felt), broadly ovate acute or more pointed and ending in a linear tip, patent in flower and after, loosely reflexed from the ripe fruit. Young carpels pilose. Receptacle pilose. Fruit somewhat roundish oval, sometimes rather small, generally large and well-flavoured.

Attention to the form and toothing of the leaves will distinguish this plant from *R. plicatus* and *R. sulcatus*. The form of the stem-prickles and armature of the panicle will distinguish *R. nitidus* and *R. affinis*. *R. rhombifolius* bears a closer resemblance, but may be distinguished by its flat petioles, its stem not furrowed in the lower part, and its larger flowers with more conspicuous stamens and bright rose-pink filaments and styles.

R. opacus Focke differs as follows:—*Stem* sharp-angled, the sides flat or seldom furrowed, glabrous except at the tip, which bears a few simple hairs. *Prickles* nearly patent, declining or falcate, usually slightly hooked at the point. *Leaves* a deep opaque green above, usually rather grey beneath when young, later green or yellowish brown and soft with shining hairs; unequally serrate. Petiole flat above, armed like the petiolules with rather many hooked prickles. *Pedicels* furnished with a few strong falcate prickles, bracteoles eglandular. *Calyx* green and hairy, rarely greyish green and felted. *Flowers* white, rather large. Stamens unequal, the longer only slightly exceeding the green styles. Carpels bearing a few long hairs or glabrous. *Fruit* often in great part abortive, consisting of a few drupels.

R. nobilissimus occurs in the following vice-counties:—Surrey (Abrook etc.); S. Hants (Romsey and Stuckton); Dorset (West Moors); N. Som. (Shapwick, Burtle Moor, etc.); Westmorland and Lake Lancashire (Gt. Langdale and Little Langdale); Glam. (Werfa Wood, Aberdare).

A small bramble armed with very slender and quite straight prickles, and occurring in S. Devon, E. and W. Cornwall, and in Ireland, has been distinguished by Focke as *R. opacus* f. *minor*. In the 'Handbook' and records supplementary to the 'Handbook' it is merged with other plants under the name *R. opacus* Focke. Babington thought it was to be referred to *R. fissus*. It is quite distinct from the Shapwick bramble and is not merely a small form of it. Its true place is, I believe, beside *R. Salteri* Bab. in the *Silvatici*.

The 'Handbook' records *R. opacus* Focke doubtfully for East Sutherland, and invites confirmation. A specimen in Hb. Mus. Brit. collected by Marshall 18. vii. 1890 in East Sutherland and marked "*R. opacus* Focke?" is *R. plicatus*. The 'Handbook' also records *R. opacus*, but without doubt, from East Kent, probably on the strength of a plant found by Marshall on bushy ground near Preston, E. Kent, 2. vii. 1890, now preserved in Herb. Mus. Brit. and marked "*R. opacus* teste Focke." As the specimen has flat petioles, prickles like *R. affinis*, and white flowers, it is evidently not *R. opacus* subsp. *nobilissimus*. The material is hardly good enough for a confident determination.

A SECOND NOTE ON *OENANTHE* IN TROPICAL AFRICA.

By C. Norman, F.L.S.

In the *Journal of Botany*, 1932, p. 139, an account was given of the genus *Oenanthe* in Tropical Africa, and the conclusion was reached that it was represented to date by three species, viz.:—

1. *Oenanthe Mildbraedii* Wolff.
2. *O. Uhligii* (Wolff) Norman.
3. *O. procumbens* (Wolff) Norman.

Unfortunately, at the time, I was unaware of the identity of Chiovenda's genus *Stephanorossia*. This was described in 1911 (Journ. Bot. Ital. ix. 65), and with it the species *S. palustris* founded on *Chiovenda* 981 collected in Eritræa at Amhara Semien.

In 1913 J. J. Clark added a second species, *S. Elliotii* (Kew Bull. 1913, 77), founded on *Scott Elliot* 7791 from Ruwenzori. This I also overlooked. Recently Dr. Negri of Florence has kindly sent me specimens of Chiovenda's species (including the type), so that the identity of his genus can now be ascertained. I have also seen *S. Elliotii* at Kew.

I must confess that I am unable to see that *Stephanorossia* Chiov. differs in any way from *Oenanthe* Linn., as understood by, I believe, all recent writers. This involves a change of name of one of the species cited above (no. 2) and an addition to the synonymy of another (no. 3), for *S. palustris* Chiov. is identical

with *Oenanthe Uhligii* (Wolff) Norman and *S. Elliotii* with *Oenanthe procumbens* (Wolff) Norman (for the latter, see citations Journ. Bot. (1932), p. 140).

The synonymy of species 2 and 3 will now run as follows :—

No. 2. *Oenanthe palustris* (Chiov.) Norman, comb. nov.
Stephanorossia palustris Chiov., Journ. Bot. Ital. ix. 65 (1911).
Peucedanum Uhligii Wolff, Engler's Jahrb. xlviii. 271 (1912).
Oenanthe Uhligii (Wolff) Norman, Journ. Bot. (1932), 140.

No. 3. *Oenanthe procumbens* (Wolff) Norman, Journ. Bot. (1932), 140.
Volkensiella procumbens Wolff, Engler's Jahrb. xlviii. 265 (1912).
Stephanorossia Elliotii J. J. Clark, Kew Bull. (1913), 77.
Oenanthe ruwenzoriensis Norman, Plant. Bequaert. iv. fasc. ii. 303 (1927).

SOUTH-EASTERN UNION OF SCIENTIFIC SOCIETIES.

Flora of Sussex.

A new 'Flora of Sussex' has been in course of preparation for several years past, having been initiated by the Botanical Section of the South-Eastern Union of Scientific Societies at the Hastings Congress in 1927. It will contain much more detailed information than Arnold's 'Flora,' all the stations in which have been carried forward and very many added. It is hoped that the completed 'Flora' will bear favourable comparison with those of the neighbouring counties. The number of species already known considerably exceeds those in the Floras of Surrey and Kent, and many new records have been established.

Thus *Himantoglossum hircinum*, the Lizard Orchis, has been found in seven or eight places in the county, and is now seen nearly every year. Among other rarities *Thalictrum minus*, *Chrysosplenium alternifolium*, *Eryngium campestre*, *Doronicum plantagineum*, *Cnicus eriophorus*, *Arnoseris minimus*, *Lobelia urens*, *Pinguicula vulgaris*, *Ajuga Chamaepitys*, *Cephalanthera rubra*, *Epipactis leptochila*, *Sisyrinchium angustifolium*, *Colchicum autumnale* (in a new station) have all been added to the Sussex list, and many new stations have been recorded for species already known. Old stations have been verified, and the disappearance of a few species has been recorded.

The work is now approaching completion, only a few lists remaining to be sent in. Although reports can be embodied up to the end of the present year, it is sincerely hoped that all long lists be sent to the editor as soon as possible, so as to allow

time for any apparently necessary corrections to be made this year. After Christmas no additions can be embodied in the main text, since it will take some months to write up the 'Flora' for printing, and it is hoped that it may be published before the end of 1934.

Notes may be sent to the Editor, Lt.-Col. A. H. Wolley-Dod, Berkeley Cottage, Mayfield, or the Hon. Secretary, F. O. Whitaker, 51 Grosvenor Avenue, Carshalton, Surrey.

OBITUARY.

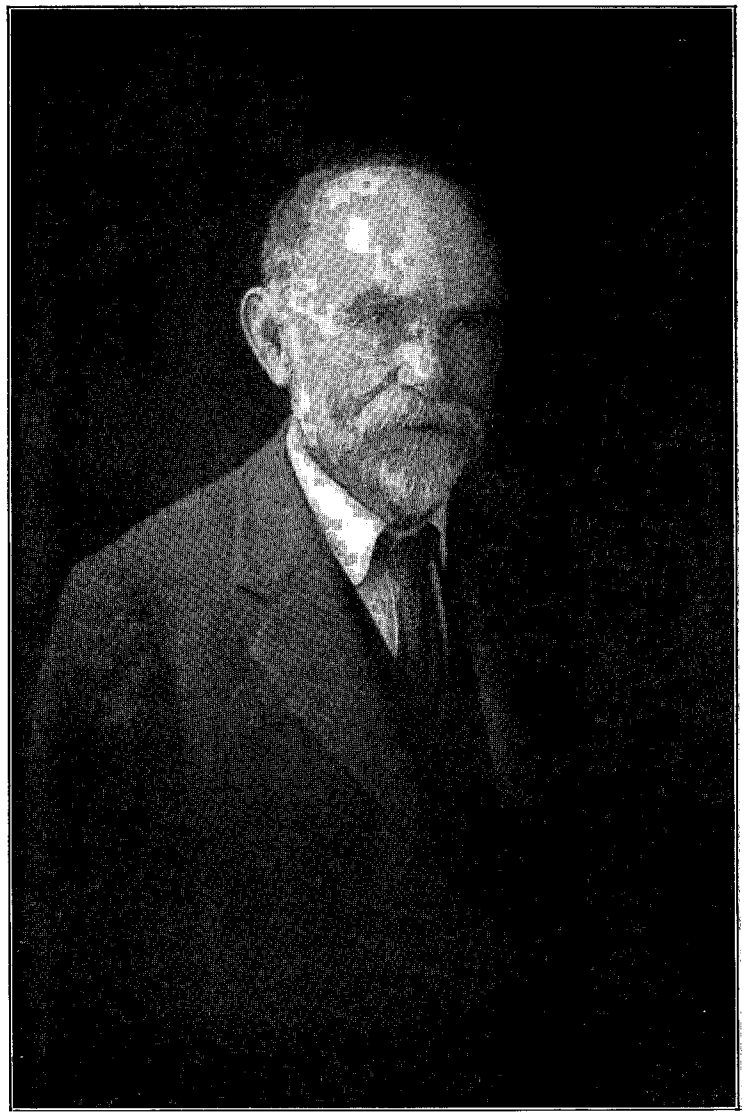
James Groves (1858–1933).

(With Portrait.)

It is with some reluctance and the feeling that there are others better qualified for the task that I have undertaken to write a brief account of the late James Groves, by whose death on 20th March last, after a short illness, we lose one of the most distinguished British systematic botanists, and one of the very few who has become a recognized authority on an important group of plants.

James Groves was born in London on 19th January, 1858, being three years younger than his brother Henry, who died in 1912. The family removed to Godalming in 1863, and the two boys began their education at the local Grammar School, where they received their earliest training in Natural History from the headmaster. In 1869, owing to the death of their father, they returned to London, and in 1872 James entered the office of the Army and Navy Stores. The brothers' interest in nature, however, suffered no check from the changed circumstances, and in 1874 they joined the South London Microscopical and Natural History Club, and made the acquaintance of Hewett Cottrell Watson, B. Daydon Jackson, Mr. T. B. Blow (who happily is still with us), and other well-known botanists. In his memoir of his brother (Journ. Bot. li. p. 73 (1913)), Mr. Groves gives an interesting account of their early endeavours and of their joint botanical work. They began to study the Charophytes in 1877, and three years later published their first important work in this Journal, a "Revision of the British Characeae." In 1881 they described as a new species, *Spartina Townsendii*, the grass that has since widely spread and become of considerable economic importance.

In the succeeding years the brothers Groves continued their study of the British Flora, but specialized more on water-plants, and particularly the Charophytes, of which they distributed two fascicles of the British species in 1892 and 1900. In the latter of these Canon Bullock-Webster participated. A series



JAMES GROVES.

of their papers on the British Characeae appeared in this Journal at various dates during this period, and in 1901 they described the very distinct hybrid *Ranunculus Hiltonii*. In 1904 the ninth edition of Babington's 'Manual' was published, edited by H. and J. Groves. The book was brought up to date so far as was possible under the limitations imposed by Mrs. Babington, but, as was remarked by a reviewer at the time, a completely new flora, written entirely by the editors, might have been preferable. The nomenclature of our flowering plants, however, was thoroughly revised, and the soundness of the brothers' views, though not always in accord with the present rules, is well shown in their paper on the use of Linnean specific names (Journ. Linn. Soc., Bot. xxxv. 1902). In 1909 another new British plant, *Luzula pallescens*, was described in this Journal, and in 1911 the brothers contributed an important account of the West Indian Characeae to Urban's "Symbolae Antillanae."

The year 1912 was a sad one for James Groves, for it was darkened by the illness and death of his brother, who had been the inseparable collaborateur in all his botanical work. His interest henceforward became centred on the Charophytes. In 1915 he described (Journ. Bot. liii. 41) a new *Nitella* (*N. Dixonii*) from the south of Portugal, and the following year he was working with Clement Reid on the fossil Characeae of the Purbeck Beds, of which a preliminary report, including a description of the fossil genus *Clavator*, is contained in the contemporary 'Proceedings of the Royal Society.' In 1918 he retired from the Army and Navy Stores, where he had become an Assistant Secretary, and left his house at Clapham to reside at Yarmouth, I.W. Here he lived until his removal in 1923 to Freshwater, which remained his home until the end.

An interesting paper from his pen appeared in this Journal in 1920 (p. 50), in which he added to the roll of British botanists the well-known water-colour artist, Cornelius Varley, who read a paper on *Chara vulgaris* before the Microscopical Society in 1845. This year (1920) was notable for the publication of vol. i. of 'The British Charophyta,' written in conjunction with Canon Bullock-Webster and printed for the Ray Society. The volume deals with the morphology of the group, and treats in detail of the section *Nitelleae*, of which fourteen species are described, with complete distribution, synonymy, and lists of exsiccata. The twenty accompanying plates, mostly the work of Miss Mary Groves, are of the peculiar excellence that distinguishes the figures of all the Groves' papers. Another important article, written with Clement Reid, on the "Charophyta of the Lower Headon Beds of Hordle Cliffs," was published in the 'Quarterly Journal of the Geological Society,' lxxvii. pt. 2, in November 1921; the systematic account of the fossil remains deals with twelve species of *Tolypella* and *Chara*, ten of which are considered

new. Two further fascicles of 'British and Irish Charophyta' were issued in 1924 (with Canon Bullock-Webster); and in the same year appeared vol. ii. of 'The British Charophyta,' dealing with the section *Chareae* (eighteen species), and including an account of the geological history of the whole group by Groves. Like the first volume, this is beautifully illustrated with twenty-five plates; and the two volumes form one of the most complete Monographs ever written of any group of British plants.

After the publication of this Monograph of the British species Groves' attention was chiefly directed to the Charophytes of extra-European countries. Resulting publications are "Notes on Indian Charophyta" (Journ. Linn. Soc., Bot. 1924), "On some Indian Charophyta" (with G. O. Allen—Journ. Bot. 1927), "Charophyta from Madagascar," based on a collection made by Mr. Blow (Journ. Linn. Soc., Bot. 1928), and "New African Charophyta" (with E. L. Stephens—Trans. Roy. Soc. South Africa, vol. xiii.). His last paper on his favourite group is "On the Antheridium of *Chara zeylanica*" (Journ. Bot. lxix. 97 (1931)); and at the time of his death he was engaged on the compilation of a world-wide conspectus of the whole family.

James Groves was a born naturalist, like his brother Henry—interested in many forms of animal and vegetable life. In his early days he worked hard, with little leisure, to acquire a competent knowledge of British plants, and in his more mature years he produced a succession of original papers on a particularly difficult group, on which he came to be a universally recognized authority. His work is characterized by a uniform care and thoroughness that are seldom equalled in the writings of his contemporaries. And his fascicles of Characeae, and indeed his herbarium specimens in general, are models of intelligent selection and proper preparation. My own acquaintance with him began in 1902, when he visited me to discuss my reasons for practically deleting *Fumaria muralis* from the British list in a recent paper in this Journal. I was able to satisfy him, and from that date we were always the best of friends, although from my ignorance of the Charophytes, I had less contact with him in recent years than I would have wished. He always appeared of a retiring disposition and shunned all notoriety; but he possessed an insight into plant-life and a well-balanced judgment, which were equalled by very few of his fellow-botanists and on all occasions rendered his opinion valuable. Many of his friends will sadly miss his gracious smile and his quiet sallies of wit or humour.

Groves joined the Linnean Society in 1885, and served on the Council for 1914–18, during part of which period he was a Vice-President. After his removal to the Isle of Wight he co-operated in founding the I.W. Natural History and Archæological Society, and took a prominent part, as a Conservative,

in local politics. He was a trustee of the South London Botanical Institute and a Honorary Member of the Watson Botanical Exchange Club.

The sympathy of all British botanists will go forth to Mrs. Groves, his widow, and to his sister, Miss M. Groves, in their grievous loss.—H. W. Pugsley.

SHORT NOTES.

Centaurium compressum in Dorset.—In connection with experimental work on the genus *Centaurium* (*Erythraea*) I am investigating the factors controlling the distribution of *C. compressum* (Hayne) Druce, (*C. vulgare* Rafn.), and *C. umbellatum* Gilib. in Britain. As a means of testing certain theories regarding these factors I have planted eleven rosettes of *C. compressum* from the Lancashire Coast among the sand-dunes of Studland Bay, Dorset. I am recording the fact here so that any botanist finding them may know their origin and will, it is hoped, leave them undisturbed.—J. S. L. Gilmour.

Diatoms (Recent and Fossil) of the Tay District (Journ. Linn. Soc., Botany, lxix. (no. 328), 27 Jan., 1933).—Mr. F. W. Mills has kindly pointed out that *Navicula peregrina* v. *producta*, var. nov. (p. 252), is a name already occupied—viz., W. West, "Clare Island Survey," Proc. Roy. Irish Acad. xxxi. pt. 16, p. 16 (32), pl. ii. fig. 22. I therefore propose to name the variety *Navicula peregrina* v. *intermedia*, var. nov.—David McCall.

REVIEWS.

Manual of Bryology. Edited by Fr. Verdoorn. Roy. 8vo, pp. ix, 486, with 129 text-figs. Martinus Nijhoff: The Hague, 1932. Price 20 Gld.

The industrious editor of the 'Annales Bryologici' has produced in this volume what is practically a general text-book of Bryology. He has had the help of fifteen collaborators, who have contributed chapters on the phases of the subject in which they are specially interested.

Bryology, like other branches of botany, suffers from lack of co-ordination among its workers: those occupied in general research sometimes have very little knowledge of the plants with which they deal and the value of their work is lessened by this narrowness of outlook. The taxonomists, on the other hand, do not pay enough attention to general botanical research on the

group ; hence the ill-founded opinions and erroneous conclusions in many otherwise sound taxonomic papers. The present 'Manual' is an attempt to meet some of these difficulties.

The scope of the book will be best judged by an epitome of its contents, which are distributed through sixteen chapters. Morphology and Anatomy of *Musci* and *Hepaticae* are treated successively by R. van der Wijk and H. Buch ; the latter also supplies a chapter on Experimental Morphology. Then follow Germination of the Spores and the Protonema-stage by G. Chaland, Association with other Organisms by G. Nicolas, Cytology by J. Motte, Karyologie by K. Hoefer, Physiology by A. J. M. Garjeanne, Genetics by F. von Wettstein, Geography by Th. Herzog, Quaternary Distribution and Moss Societies by H. Gams, Ecology by P. W. Richards, Classification of Mosses and of Hepatics by H. N. Dixon and Fr. Verdoorn respectively, and Phylogeny by W. Zimmermann. Six of the chapters are in English, the remainder in German or French.

A useful feature is the historical review with which each contributor opens his subject. The citation of literature has been governed by the availability or otherwise of easily accessible bibliographies. In the Systematic Treatment of the Mosses Mr. Dixon does not go beyond description of orders and suborders, with an indication of the contained families. That of the Hepaticæ includes the families, with an indication of the genera. There are separate Indexes of Plant-names and Authors respectively.

The book, which is clearly printed and admirably produced, forms a valuable addition to general botanical literature.

The East Anglian Flora. By E. J. Salisbury, D.Sc., F.L.S. Reprinted from the 'Transactions of the Norfolk and Norwich Naturalists' Society,' xiii. pt. iii. 1931–32, pp. 191–263, 3 text-figs., & 106 maps. To be obtained from Dr. S. H. Long, 31 Surrey St., Norwich. Price 5*s*.

It is all to the good that a wider publicity should be given to Prof. Salisbury's valuable presidential address to the Norfolk and Norwich Naturalists' Society in April of last year, and Botanists outside the membership of the Society will welcome the opportunity of obtaining a copy. The address, described as 'A Study in Comparative Plant Geography,' contains matters of general interest to British botanists, which are discussed partly in an introductory section and partly arise incidentally in the portion dealing specifically with the East Anglian flora.

The occurrence of a species in an area may be an accident of dispersal rather than an indication of especial fitness for the

area. "Information of this character," says the author, "can, for most plants, be acquired only by the deliberate introduction of wild species beyond their existing range." The objection which some students of geographical distribution have to such introductions "cannot be defended on scientific grounds, though it is of course essential that such introductions should be properly recorded." Would that Prof. Salisbury were with me enjoying the sunshine of Bermuda in the early days of March. He could then observe the effect of the deliberate introduction of wild species from the West Indies and elsewhere, duly recorded, which have completely altered the character of the vegetation over large areas. The deliberate introduction of a new factor into the problem of geographical distribution may perhaps be defended on scientific grounds, but it is not to be encouraged.

In discussing the position of rare species, the need for more data as to the type and phase of succession of the Communities in which they occur is emphasized. Species associated with artificial habitats may have found a refuge owing to the restriction or obliteration of their former natural habitats. The hedgerows of the south-east of England may in future be the sole stations for species characteristic of the woodland marginal flora. The view is advanced that the degree of abundance of a species towards the climatic limit of its range varies directly with the stage of succession to which it belongs.

A sketch of the recent geological history of East Anglia is given, and the author regards it as highly improbable that any considerable proportion of the flora survived from preglacial or interglacial times.

The greater part of the Address is occupied by a critical enumeration of the various components of the East Anglian flora, eight in number—the Northern, the Southern, the Oceanic, the Continental, the Western Central, the Eudemic, Recent Immigrants, and the Generally Distributed. The distribution of the more important species is illustrated by sketch-maps.

In conclusion, a concise summary suggests generalisations which appear to be justified from the data furnished. A. B. R.

BOOK-NOTES, NEWS, etc.

Linnean Society of London.—At a general meeting on March 2, Miss D. de Winton gave a demonstration of leaf and bract forms of *Primula sinensis* and their inheritance. Six distinct types of leaf are known, all of which have mutated by loss from the original, and act as good Mendelian recessives, breed true, and give a mono-hybrid segregation in F_1 on being

crossed to the normal. Another Mendelian factor greatly increases the size of the bract, whose shape then closely follows that of the leaf; the factor is a Mendelian recessive to the normal.

Dr. E. C. M. Ernest read a paper on the water relations of plant-cells. It was shown that suction pressure rather than osmotic pressure is the determining factor in water exchange of the plant-cell, and that its value depends largely on the properties of the cell-wall. The method of measuring suction pressure was described and emphasis laid on the necessity for avoiding the section method in plant-cell physiology.

At a general meeting on March 16, Professor E. J. Salisbury opened a discussion on mortality among young plants and animals. He instanced examples of seedling mortality in monocarpic species of up to 99 per cent. The survivors, almost without exception, attained the flowering stage and produced viable seed: the seed from the most depauperate individuals was as viable and gave as high a percentage variation as those saved from the largest individuals. There was hence no evidence of selection in the later stages of development. The very high mortality of plants is practically confined to the seedling stages. If selection takes place when the morphological characters are so little differentiated that species of the same genus are often well nigh indistinguishable, the morphological characters of the adult may perhaps be the necessary concomitants of the characters upon which natural selection operates, and are only indirectly selected themselves. The actual characters which determine mortality or survival may be entirely physiological, though linked it may well be, with the morphological and other attributes of the adult condition.

On the botanical side Dr. R. A. Fisher held that such an inference could only be drawn from the facts adduced by arbitrarily confining the action of natural selection to a differential death-rate and by defining death in a sense appropriate to the higher animals but not so appropriate to plants, namely, as the elimination of the whole organism. Further, it was not enough to show that all produced some viable seed, as it was necessary, if selection were to be excluded, that all should produce equal quantities of equally good seed.

Professor Weiss called attention to the work on mortality of seedlings carried out at Aberystwyth, where in several grasses self-fertilized plants produced a large number of albino seedlings, and further that two lethal factors have been discovered in plants of normal colour.

Mr. J. Ramsbottom stressed the fact that when mortality of seedlings was considered it was necessary to try to ascertain the cause of death. It appears that though this was sometimes due to parasitic disease, and sometimes to constitution, it was usually the result of starvation.



CELOSIA MOHNSONIAE KOENIG.

Original specimen with author's inscription in British Museum Herbarium.

JOHN GERARD KOENIG.

BY A. B. RENDLE.

(PLATE 601.)

JOHN GERARD KOENIG was a native of the Government of Courland on the Baltic, where he was born about the year 1728. He was a pupil of Linnæus, who dedicated to him the genus *Koenigia* *, which his pupil had found in Iceland in 1765. There are at the Linnean Society, in the Linnean correspondence, a number of letters from Koenig to his old master—they date from 1763 to 1782—the earlier ones are written from Copenhagen, the later from Tranquebar. In the 'Mantissa' (1767) Linnæus describes a number of species from Koenig's Iceland collection.

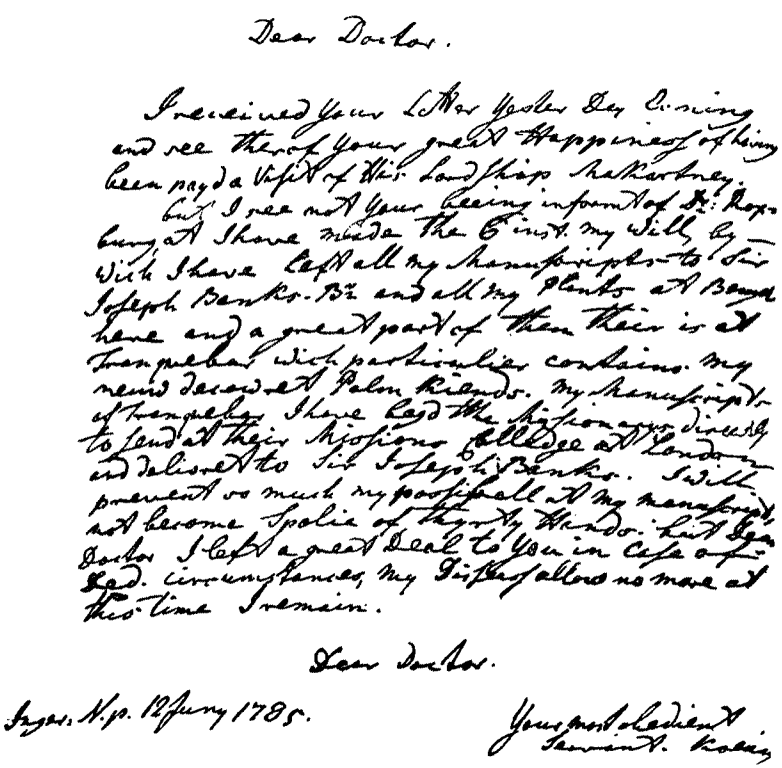
In 1768 Koenig went to India in the Danish service as Surgeon and Naturalist at Tranquebar. In 1774 he entered the service of the Nawab of Arcot, and in July 1778 was appointed Naturalist in the Madras establishment of the Honourable East India Company, to which he was attached during the remainder of his life.

In the Department of Botany, British Museum, are a number of his letters to his friend, Dr. Patrick Russell, then residing at Vizagapatam. The letters, which range from October 25, 1783, to June 12, 1785—a fortnight before his death,—describe, in what Koenig calls his "bad German English," his travels and natural history and medical observations. In the later letters he refers to the symptoms of the disease (dysentery) to which he succumbed at Jagrenathporum on June 26, 1785. The last letter, a short one, is to inform Russell that he had made his will on the 6th inst., leaving all his manuscripts and plants to Sir Joseph Banks. By the kindness of the present Keeper of Botany, Mr. Ramsbottom, I am able to reproduce a photograph of this letter (see p. 144), and also of a sheet from Koenig's herbarium (Plate 601).

In the transcript of the Banks Correspondence, in the Department of Botany, there is a long letter from Patrick Russell from Vizagapatam, dated July 9, 1785, informing Sir Joseph of Koenig's death—"which in respect to the natural history of this country I regard as an irreparable loss,"—of the bequest, and of his own arrangements for sending the plants and manuscripts to England. The original of the portion of this letter relating to Koenig has been incorporated with Koenig's MSS. (vol. 3, pp. 251, 2). The preface to Roxburgh's 'Plants of the Coast of Coromandel,' written by Patrick Russell, gives an appreciative account of Koenig's botanical work in India. Russell also appends an indication of the contents of the MSS. and a list of Koenig's few publications.

* Koenigia islandica L. Mant. 35 (1767) [Polygonaceae]. Habitat in Islandia detecta 1765 a Jo. Ger. König qui Islandiam adiit Historiam naturalem ejus descripturus.—The specimen is in the Linnean Herbarium.

As the account of Koenig's collections in the 'History of the Collections contained in the Natural History Departments of the British Museum' is very terse and incomplete—under Botany we read (i. p. 160) merely "Sent Indian plants to Banks, 1776; herbarium and MSS. bequeathed to Banks,"—it may be useful to give a brief account of the material available at the Museum and to indicate its value to workers on the botany of India and Ceylon.



Letter from J. G. Koenig to Patrick Russell, June 12, 1785.

The MSS. are contained in twenty-one volumes, varying in size from folio to duodecimo. Volumes 1–19 are successively numbered 'Koenigii Manuscr.,' and are in the original bindings as they were arranged, evidently by Dryander, Banks's librarian, who has annotated them, and was presumably responsible for the preparation of the "Index Manuscr. Koenigii"—a list of the subjects treated, followed by a list (incomplete) of genera and species, arranged on the Linnean System, with references to volume and page of the MSS. Koenig's publications are a very

inadequate criterion of his industry and the extent of his botanical work. A list of the items in Dryander's subject-index will indicate the extent and variety of the information contained in the MSS. The notes relating to an individual item are sometimes distributed in more than one volume, owing to the different sizes of the paper used by Koenig.

Index of Subjects, with reference to volume and pages of the MSS.

(I have retained the original Arabic style for the volume-numbers. Since writing this account the volumes have been rebound and numbered in Roman characters.)

Journal at Tanjore, Apr. 6–8, 1775. 10, pp. 129–154.
Journey from Waendeluhr, Aug. 14, 1777. 7, pp. 165–179.
Voyage to Siam, Aug. 8, 1778–Feb. 21, 1779. 2, pp. 1–180.
Notes from Feb. 21 to Apr. 30. 13, pp. 43–65.
May 1 to Sept. 25. 3, pp. 1–57.
Sept. 28 to Dec. 12. 2, pp. 103–206.
[Sept. 7 to Dec. 4. 18, pp. 1–80.]*
Notes from Dec. 15–30, at Quedar. 15, pp. 227–244. [See also 8, p. 81.]
[Chirotonetum itineris siamensis. 18, pp. 105–176.]
Voyage from Madras to Trinquemalle, Apr. 15 to May 9, 1780. 12, pp. 1–62.
May 9–11. 14, pp. 147–161.
Voyage to Ceylon, Jan. 7 to March 22, 1781. 12, pp. 65–114.
March 30 to Apr. 11. 12, pp. 119–148.
Apr. 20 to May 5. 15, pp. 103–133.
Letter to Sir Joseph Banks, 1784. 1, pp. 157–164.
Letters to Dr. Solander, 1774–1782. 3, pp. 177–249; 1, pp. 149–156.
Descriptiones plantarum Indicarum, Fasciculus 1 (1769–71). 5, pp. 227–269.
Descriptiones plantarum Tranqueb., Fasciculus 2 (1770–73). 4, pp. 77–116.
Descriptiones plantarum, Decas 1. 4, pp. 119–121.
Descriptions of Plants sent in 1774. 4, pp. 171–185.
Descriptiones plantarum 1775. 8, pp. 125–152.
Plantæ siccæ pro anno 1776. 13, pp. 257–273.
Descriptiones plantarum pro a. 1776 & 77. A. 7, pp. 1–82.
Definitiones plantarum 1777. B. mense August–Nov. 1, pp. 1–84.
Herbarium pro a. 1777. Nomenclator Herbarii Januario. 13, pp. 301–322.
Malacca, 1779. Lit. A. 9, pp. 257–316.
Plantæ Itineris Siamensis. 3, pp. 59–113 (1779). Lit. C. 13, pp. 1–42.
Descriptiones plantarum et Animalium in itinere Siam, 1779, mense Januarii. Lit. D. 4, pp. 1–54.
Definitiones plantarum novarum. Malacca, 1779 [including an autograph Index]. 19, pp. 131–294.
Descriptiones plantarum Zeylanicarum Columboensium 1781. Lit. A. 10, pp. 157–213.
Descriptiones plantarum Zeylanicarum 1781. Lit. B. 17 (the whole volume).
Descriptiones plantarum 1783. 16, pp. 1–93.
Plantæ Orixenses descriptæ 1784. 1, pp. 208–251.
The last descriptions of plants are in 19, pp. 1–130, as p. 119 is dated Vizagapatnam, April 24, 1785.
Palmæ mihi obviæ in India Orientali. 9, p. 218.
List of Palms sent to Sir Joseph Banks. 9, pp. 229–231.
Monandrarum descriptiones. 11, pp. 87–159; 6, pp. 125–144.
Epidendrorum descriptiones. 11, pp. 161–196 & 211–240.

* Items in [ ] are my additions.

Contortae. 11, pp. 25–28, 69–86, 197–209.
Annotationes in graminoideis. 8, pp. 101–113.
Descriptiones graminum Indiæ Orientalis. 5, pp. 165–174.
Chloris graminum et graminoideum. 5, pp. 175–211.
Gramina, 1784. 1, pp. 253–263.
Eatable fruits in Malacca. 15, pp. 171–177.
Flora Indica ? (probably what is quoted in 19, 29, under the name of Catalogus herbarii). 5, pp. 1–141.
The first four classes of a Flora Indica ?, containing a great number of additional plants. 6, pp. 25–63.
Neither of these take in the plants of Malacca or Siam.
Nomenclator Floræ Coromandelianæ (alphabetical). 10, pp. 41–101.
Copied by himself under the name of
Catalogus alphabeticus plantarum Coromandeliarum, 1780. 1, pp. 299–331. This copy ends in P.
Chloris Orixensis, 1783 & 84. 16, pp. 95–163.
Chloris Zeylanica, 1781. 15, pp. 39–91.
A list of Zeylon plants beginning in Tetrandria and ending in Polygamia. 4, pp. 161–170.
Chloris Malaccensis. 15, pp. 137–169. Copied in 2, pp. 207–266.
Chloris Siam. 11, pp. 241–291.
Plants seen in the journey from Bankok to Iuthia [Ayuthia, the former Capital of Siam]. 13, pp. 83–123.
Rottboell's 'Descriptiones plantarum rariorum,' with Notes by Koenig. 9, pp. 155–186.
Rottboell's pamphlet on the Contortae, with Notes by Koenig. 11, pp. 1–67.
Plants in the 'Hortus Malabaricus' discovered by Koenig. 5, pp. 147–159.
Observations on the 'Hortus Malabaricus.' 8, pp. 90–93 & pp. 114–122; 10, pp. 114–118; 12, pp. 262–263.
Observations on Rumphii 'Herbarium Amboinense.' 10, pp. 109–114.
Observations on Burmanni 'Flora Indica,' 1777. 9, pp. 201–206; 8, p. 123.
Hermanni 'Museum zeylanicum,' with Notes by Koenig. 9, pp. 1–71.
Index of the Cingalese names in this book. *Ib.* pp. 73–85.
Another index of these Cingalese names, with references to 'Flora Zeylanica,' and botanical names. 7, pp. 85–160.
Nomina plantarum Tamulica e spoliis herbarii bibliothecæ missionis Tranquebarensis in catalogum reducta a J. G. Koenig, 1771. 3, pp. 137–158. In 13, pp. 159–202, is a copy with additions.
An index of Tamul names of plants with a kind of explanation in Danish, by one who was no Botanist. 4, pp. 151–158.
Lexicon pharmaceuticum Latino-Tamulicum et Lusitano-Tamulicum, nominibus classicis auctum a J. G. Koenig, 1775. 8, pp. 157–187.
Medicinal plants of Zeylon. 1, pp. 265–278, and 3, pp. 131–132.
Medicina malabarica. 4, pp. 59–73.
["Miscellanea, 1782." 18, pp. 177–259.]*

A translation of the 'Voyage to Siam,' comprising the Journal and Notes from Aug. 8, 1778, to Dec. 30, 1779, was published in the 'Journal of the Straits Branch of the Royal Asiatic Society' in 1894 (January, pp. 58–201; October, pp. 57–133), under the title "Journal of a Voyage from India to Siam and Malacca in 1779." The translation was a work of some difficulty, as the journal was written in "a mixture of antiquated German and Danish in a very bad handwriting." It has not been well edited and contains numerous misspellings of scientific names.

* Beneath the title Koenig has written "His ego . . . & alter tulit honores"—a pathetic prevision of the lack of recognition of his work.

Descriptions of the plants and animals observed and collected on this journey occur in several of the volumes of MSS. The "Definitiones plantarum novarum, Malacca, 1779," a small separately paged MS. of 160 pages has been bound up with vol. 19 (12mo); the other portion of the volume consists of very full, apparently final, descriptions of a large number of new genera and species, apparently written in the last two years of his life. That of *Dolichos prostrata*, pp. 26–28, is headed "Lager-Naikpo, 7, Jan. 1784" with the note "antea in Tranquebar 1783 descr."—presumably a reference to a short diagnosis in vol. 6, p. 15.

The letters to Solander, which range from 1774–1782, are written in German, the writing is cramped and not easy to read; that to Banks is in English, in which Koenig was less proficient. These letters were subsequently incorporated with the MSS. The descriptive matter is mainly in Latin, in which Koenig wrote fluently. The character of the notes and descriptions varies from rough notes and preliminary diagnoses to very elaborate final descriptions; and there is naturally some repetition.

Bound up with the MSS. are annotated copies of Hermann's 'Museum Zeylanicum' and Rottboell's 'Descriptiones plantarum rariorum' and 'Botanikens Udstrakte Nytte.' There are also notes on the 'Hortus Malabaricus' and Burmann's 'Flora Indica.'

For the translation of the following letter to Solander (MSS. 1, pp. 149–156) I am indebted to Miss F. L. Stephens. The letter illustrates the close relations between Koenig and the Banksian Herbarium :—

"Madras, January 24th, 1774.

"Most noble and learned Professor!

"In the previous Autumn I took the liberty to send your noble self a letter; now I write again, and according to promise send a small collection of this year's seeds, together with some plants, which on the journey between Tranquebar and Madras appeared to me to be remarkable; others I have collected during my personal visit in the region of the small and great S^{t}. Thomas mountains, together with those collected in and around the fine garden of M^{r}. Andreas Koch, and, according to the state of my knowledge, they are described as well as possible, and from this account the particulars have been picked out and included with the plants. I feel sure that some of these will be new; with others there will doubtless be mistakes, for which I beg your pardon, as I have no book other than the System of Mr. Archiater von Linné; only quite recently have I had opportunity to run through the Hortum Malabar., for these plants, however, I can put it to little use; these plants have not come up to my expectations, partly due to my terrible journey, and partly due to the short time I have had; I have been here scarcely a month so they have not turned out to the best advantage.

The Professor will however have the graciousness to regard them as firstlings, for I will certainly be able to send beautiful and better examples.

"I have taken the liberty, according to my slight means, this time to perpetuate the worthy memory of the happy arrival of our excellent Lady Ann Mohnsen* by a beautiful plant apparently new to our science: this Indian plant I found just at the time the above mentioned lady arrived in India: in that I desire it to be so I leave it for the approval of the Professor and Mr. Archiater von Linné.

"A second plant I have dedicated to Doctor Boswall [*sic*], who as first physician to the Nabob has been a great forwarder and supporter of my search, who at the same time encourages Botanical work here very strongly, and who moreover knows the moorish as well as the tamil names of the plants. From him I got the Hortum Malab.: through this small act I have wished to show my obligation, and if it is possible I beg at the same time the approval of the Professor.

"I have risked leaving the Danish Service in the hope of enjoying a better fate under the English; nothing that can be achieved by work and good will will be left undone by me; here especially the approval of the Professor and Mr. Banks is desired and for this I offer my most beseeching prayers, and to gain this will be my chief effort; after this I wish very much to know in which branch of Natural History the greatest interest lies; in this I will take the greatest trouble to give the highest possible satisfaction, and will include for each the necessary descriptions as in the plants; I also wish incidentally that I could have some reminders from your noble self which would evaluate my observations!

"The languages English, French, Latin and Swedish are all the same to me, only the preparation prevents me from writing in any other language than German.

. . . . . .

"Yesterday I received some new plants, these were, a *Corchorus* which appears to me to be new, an *Indigofera*, which I first regarded as a *Hedysarum prostratum*, more exactly examined it was found to be three-leaved, with acute four-angled pods; a beautiful Diandria with dark blue blossoms resembling *Scutellaria* ——; the leaves were like a *Mentha*, and sweet smelling; as these are still in fruit they cannot be included, but a beautiful Triandrist I have put in with a preliminary description; I only doubt if it has a Corollam superam. It is noteworthy that these

* Lady Anne Monson. *Illecebrum Monsoniae* Linn. fil. Suppl. Pl. 161 (1781) was described from a specimen sent by Koenig, now in Herb. Linn. Described independently by Retzius, Obs. ii. 13 (1781), as *Celosia Monsonia*. See note below; and for a notice of Lady Anne Monson see J. Britten, Journ. Bot. 1918, 147.

lovely yellow blossoms, after they have withered grow into a tubum . . ., the spiral is twisted up, the limbus is then rolled up in a ball; it seems to me to be a new genus. Finally I beg to be commended to Mr. Banks; I have no other right to this honour than what the mutual possession of an interest in natural history offers me; if I could have the good fortune to be of service to you I should be very happy. May I recall to your noble self our old acquaintanceship. To me, to gain your approval will always be of the greatest importance. I am, with the most indebted esteem

" for your noble self,
" Your most dutiful servant,
" JOHANN GERHARD KÖNIG."

Note.—Koenig, writing here in German, adopts a consistent signature. His letter to Banks is signed John Gerard Koenig, and the same form appears in his letters to Russell, in which, however, the variants Jan, Gerhard, and König also appear. I have not found the form Kønig, which was used by the late Mr. B. B. Woodward, in the 'Catalogue of the Libraries at the Natural History Museum.'

The letter to Banks, dated six months before Koenig's death, covers seven pages of foolscap. The large round-hand and errors in the spelling of plant-names suggest that it was copied by a clerk; it is signed by Koenig. The extracts from this letter which follow give an insight into Koenig's work and his relations with Banks. Errors in spelling have not been reproduced:—

" Dear Sir

"I received your kind and very agreeable by the Barrington Indiaman and was much enjoyed over its contents. I am very anxious to get the book from you, which has the great Value to be an Edition of your own hand and wherefor every body of the learned World has been so desirous.

"I shall not omit to communicate you my discoveries in the History of Nature, especially of the Plants, and I shall only look upon every discovery as a true one when confirmed by you. For I am likewise in want of books and Consultation here. Uncertain Memory and Imagination gives us men often occasion to faults.

" Concerning the Tree which bears the Gummi Gutto and which you would be so kind to add to the Transactions of the Society for which I kindly thank, being certainly the Tree of the renomated Gumm. in the Materia Medica, I am the more sorry that the given description is so very short. But I have since these two Years past an extensive description ready under my

Manuscripts at Tranquebar, by which I have at the same time the description of the Cambogia Gummi gutta Linnae and the certain Supposition of more Species of this Genus and a Chimick examination of the Gum of this Tree in which is a remarkable difference from the real Gummi Gutt. Which I promise to send you as soon as I come to my papers.*

"With this Opportunity I send you from Bengal packed in a Box the following conserved in Spirits . . . [a list follows].

"In a Sack I have lay'd the following Seeds, Dionthera Malabar., Phisalis Somnifera.

"Lagerstroemia flos reginae a New Species. [See note at end of letter.]

"The Young Cap^{n} Cullen at Midnapore was so much pleased with this flower when I first showed it him, with its particular beauty of the separate blossoms, partly of its majestick appearance with its Pyramide erect. Paniculis above the Top of the Tree.

"We dedicated it for this appearance to the remembrance of our present reigning gracious and most excellent Queen Charlotte, her Royal Majesty, who is so rich of high gifts & Virtue which makes her so much Superior to any of her Sex. The knight of Linnae has it in his Fl. Zeylanica No. 533, under the Name of Murthu Ghas, & Rheed. Hort. Malab. part 4. pag. 45. table 20–21, has two but indifferent tables of them. At Siam I first met with this as a large Tree the bark of which is smooth as by the Gujawes Tree, the Crown extends itself almost round, the wood is white and very hard. Rottens not very easily, and very much used at Siam, especially where it has great weights to bear. I met with it at Ceylon in the Valleys between Madrne [Matara ?] and the Adams mount.

"On my Journey lately from Sammellcotte to Bengal I found it in quantity in the Maratta provinces, in the Valleys there, and fine and agreeable Trees of them in blossom about the Size of a Cherry tree, and afterwards by an old fort at Midnapore. If it is likewise agreeable to you to adopt to it the Synonymous name, you'll complete our wishes, except any thing contrary to the rules should be found in it.

"Then I would rather beg to exclude it. The Seeds are quite fresh gathered. My Definitive of it is Arborea foliis oblongis venis striatis coriaceis. Panicula Pyramidali, Calycibus sulcatis.

"There are different sorts of Plants used here for Hemp . . .

. . . . . .

"The Seeds of the Herba Spiralis Rumphii follow hereby. She likes wet ground; likewise Allughas a Linnae; this is a species of Lanquas Rhetzii, has rose coloured blossom, very seldom two Anthera, the Seeds are a little Aromatic, very sharp.

* Koenig's account was sent by Banks to Dr. J. A. Murray who embodied it in a paper entitled "Commentatio de arboribus Gummi guttæ fundentibus" &c. published in Commentationes Soc. Reg. Sci. Gottingensis, ix. 169–186, 1789.

"Linnae's Classification of this Plant is very undetermining. I shall endeavour to let you know my Idea about them.

"Ambroma. I look upon mine as a second Species of M^{r}. Jacquin's, who has given so good a description of his according to the approbation of Linnae. A description of mine follows hereby. I have Dedicated it to the remembrance of Edward Wheler Esqr. as a much esteemed Man and a great friend of our Science; more of which with a fine drawing of it, I hope to communicate you with the first.*

. . . . . .

"A New kind of the Diadelphia Class.; the Calyx has four uneven leaves, the Corolla is as in the Hedysaris, the Stamina

[† "Smithia Sensitiva Hort. Kew.," inserted by Dryander between the lines.]

are in two equal parts, divided into 5 at each side, otherwise as the Class. The following Legumin is likewise parted, that each Seed has his own roughly Legumin, these are 5–7 with flat sides approximated to each other of orbicular figure and hang on the continuing Styles which runs over them in sharp corners (! zik zak !) thin thread like.

"The leaves are sensible. I have described it all very particular.

"The fruits of the Mangifera pinnata follow hereby packed in Sand. M^{r}. Linnae has wronged me therein that he calls it on my Name a Mangifera ‡ which it is not, and which I have often wrote him, since these ten Years past.

"Habenastrum Rumphii is a Diospyros: I believe I sent you some examples of it several times pasted on paper to England. Rumphii figure is bad, for the Tree bears a fine, full of leaves and large Crown, like the Mangoes.

"I have, to distinguish it from another fruit of the same kind, which is eat at Siam, call'd it glutinifera §. At Ceylon the Book-

* *Abroma Wheleri* Retz. Obs. Bot. v. 27 (1789) described from a specimen sent by Koenig.

† The species is described and figured in Aiton's Hort. Kew. ii. 496, tab. 13 (1789). The type from Koenig in Herb. Banks is written up by him "Genus novum Classis diadelphiarum a Linne," with a Latin diagnosis. A very full description is given of this "Genus nov. Diadelphiar." in MSS. 19, pp. 55–58.

‡ *Mangifera pinnata* Linn. f. Suppl. 156 (1781): "Suasu Observatoris acutissimi D. König, qui plantam vivam examinavit & etiam vidit fructum mihi ignotum, ad hoc genus refero." Koenig's specimen in Herb. Banks bears a note "Mangifera" followed by a short description. There are several long descriptions in the MSS. under the name *Mangifera pinnata*. It would appear that Koenig had himself suggested the name, but later regarded it as a species of *Spondias*. In the latest volume of his descriptions (1784) (19, p. 79) he writes *Mangifera pinnata* mihi *Spondias* spec. The species was named *Spondias Mangifera* by Willdenow (Sp. Pl. ii. 751, 1799).

§ A specimen in Herb. Banks from Ceylon is written up by Koenig "*Diospyros glutinifera* ☿. Foliis lineari-oblongis &c. *Habenastrum* Rumph: Herb. Amboin. f. 3."

binders make use of the juice of the fruits because it is never eaten by the Worms and in the rainy Season never opens. In Bengall the greatest use is made of it for excepting the aforesaid Tippo Saib has ordered all Cartridges to be covered & gloued with this juice to keep the powder from all moisture. The on the Ganges Used Vessells are covered with this Juice to preserve them from the Worms & rotting of the Wood. The Nets of the fishers are painted with it as well at Ceylon as here either brown or black to preserve them.

" Old Linnen which is easily given to breaking inbibed with this Juice, stands for the first Merchant and has the appearance to be as strong as new.

" In the Medicine it is of great use . . .

" This Tree is planted at the side of Waters and in Woods, the Wood is reddish at the outside and black at the inside, according to common descriptions I have got it is the Ebenae Wood of the Mauritius, but not so heavy hard and fine from texture as the true one.

. . . . . .

" I conclude this Letter with a heartly wish that the Seeds may come soon, fresh and well to your hands.

" Against Linnae's Supplement I have with great reason a great deal to say which I shall take the Liberty to communicate you in my next.

. . . . . .

" To Professor Schreiber* at Erlangen I send a Collection of India Grasses because he excels particular in this way, for to publish the newest of them.

" Recommending myself to your friendship I have the honour to be

" Your
" Active Friend
" and most obedient Servant
(signed) " JOHN GERARD KOENIG."

" Calcutta the 8th
" December 1784.
" To
" Sir Jos: Banks Esqr.
" London."

Note.—The name *Lagerstroemia Flos-Reginae* was published in 1789 by Retzius (Obs. Bot. v. 25), who thus renames his *Lagerstroemia β. major* (Obs. Bot. i. 20, 1779), received by Bladh from Java. In 1789 Retzius had presumably a specimen from

* Prof. J. C. D. von Schreber (1739–1810), editor of 'Der Naturforscher' (Halle), published (vol. xxiii. pp. 201–212, 1788) under the title 'Botanische Bemerkungen aus Briefen des . . . Herrn D. Joh. Gerh. König an den Herausgeber' a number of notes, mainly on grasses, dated Calcutta, 21 Aug. 1784, 10 Jan. 1785, and 16 Feb. 1785.

Koenig, as he adopts his name and says : " Crescit in sylvis Calcuttæ König." But although he quotes Linn. Flor. Zeyl. and Burmann Zeyl., he does not include Ceylon as a habitat. In his original description Retzius is doubtful as to the rank to be assigned to the two forms of *Lagerstroemia*—he writes :—

61. LAGERSTROEMIA. Aut hujus binæ sunt species, vel saltem maximæ varietates.

α. *minor*, Chinensis [with diagnosis].

β. *major*, Javanensis [with diagnosis].

'Index Kewensis' quotes both these names as species (of Retzius). If the specific rank is recognised, the combination *L. major* takes precedence of *L. flos-reginae*.

There are two specimens of this species from Koenig in Herb. Banks, one from India and the other from Ceylon, but they are written up by Koenig *Lagerstroemia arborea* and presumably antedate his letter to Banks. The name appears in the MSS. 5, 72 and 9, 125. The genus is not included in Dr. Fischer's list of Retzius's specimens from Herb. Lund (see below).

A number of " Lists of Plants," originally kept separate, have been subsequently bound up in two volumes. These lists, dating from 1773 to 1785 are mainly of specimens sent to European botanists ; the exact date of sending and the name of the person to whom they were entrusted or of the captain of the vessel in which they were transhipped is sometimes indicated. Some are rough lists, others are more carefully written and include short descriptions of new genera and species or similar notes. Among the recipients is Dr. Daniel Solander : for example, " Missus seminum ad Angliam mense July, Anno 1777, pro Dr. Solander & Boswel " ; " Herbarium für Hr. Dr. Solander . . . April 1782." In the same year, October 20, a packet is sent from Tranquebar to Copenhagen for Dr. Retzius in Lund, the plants in which evidently supplied material for the ' Observationes ' no. iv. ; many of the names are accompanied with botanical descriptions.

(To be continued.)

THE NAMES OF SOME SOUTH AFRICAN PLANTS.

BY J. E. DANDY AND G. TAYLOR.

IN a recent paper entitled " Contributions to the Flora of the Knysna and Neighbouring Divisions " (in Trans. R. Soc. S. Afr. xxi. 75–102 (1932)) H. G. Fourcade has published a preliminary treatment of species which are to be included in a list of the flowering plants found in the divisions of George, Knysna, Humansdorp, and Uniondale, in the Cape Province of South Africa. Many of the species dealt with are described as new, but in addition the author sets out synonymy of previously

known species for which he either makes new names or combinations or restores well-established names in place of combinations proposed during recent years. In his own words (p. 75), "I have added the name changes in my list that have been rendered necessary by the international rules of botanical nomenclature. In testing the numerous new combinations that have already been made by others since the publication of the Flora Capensis, I found a number of illegitimate changes which I have taken the opportunity to rectify." The synonymy given is, however, frequently incomplete, and in some cases consideration of the full synonymy shows that the changes proposed are by no means necessary. It is extremely undesirable that non-valid names should be adopted in an important floristic list, and we therefore recapitulate, under the names which appear to be valid according to the International Rules, the relevant synonymy of some of the species dealt with. The order of the families and species follows Fourcade's paper.

MONOCOTYLEDONES.

CYPERACEAE.

Ficinia secunda (Vahl) Kunth, Enum. Pl. ii. 262 (1837).
[*Schoenus bulbosus* (non L.) Thunb. Prodr. Pl. Cap. 16 (1794); Fl. Cap. i. 356 (1811).] *
Schoenus secundus Vahl, Enum. Pl. ii. 215 (1806).
Schoenus dispar Spreng. Neue Entdeck. iii. 8 (1822).
Ficinia dispar (Spreng.) Fourcade in Trans. R. Soc. S. Afr. xxi. 76 (1932).

Ficinia filiformis (Lam.) Schrad. in Comment. Soc. R. Sci. Gotting. Recent. vii. Cl. Phys. 146 (1832); Anal. Fl. Cap. 46 (1832).
Schoenus filiformis Lam. in Tab. Encycl. & Méth., Bot. i. 135 (1791).
Scirpus marginatus Thunb. Prodr. Pl. Cap. 17 (1794).
Ficinia marginata (Thunb.) Fourcade, *loc. cit.*

Scirpus striatus (Nees) Fourcade, *loc. cit.*
Eleogiton striatus Nees in Linnaea [ix. 291 (1835), *nomen nudum*] x. 165 (1836).
Scirpus capillifolius Parl. Fl. Ital. ii. 83 (1852).

IRIDACEAE.

Hesperantha angusta (Jacq.) Ker-Gawl. in Konig & Sims, Ann. Bot. i. 225 (1804).
Ixia linearis Jacq. Collect. iv. 183 (1790)—non *I. linearis* L. f. (1781).

* Misapplications, in addition to *nomina nuda* and *nomina synonyma* (*i. e.*, names published as synonyms), are cited in square brackets, since they have no nomenclatural status.

Ixia angusta Jacq. Icon. Pl. Rarior. ii. 7 (1794); Willd. in L. Sp. Pl., ed. 4, i. 1, 202 (1798).
Hesperantha linearis (Jacq.) Fourcade, *tom. cit.* 77.

MUSACEAE.

Strelitzia alba (L. f.) Skeels in U.S. Dep. Agric., Bur. Pl. Indust. Bull. 248, 57 (1912); Druce in Bot. Soc. & Exch. Club Brit. Is. iv. 649 (1917).
Heliconia alba L. f. Suppl. Pl. 157 (1781).
Strelitzia augusta Thunb. Nova Gen. Pl. 113 (1792); Fl. Cap., ed. Schult. 216 (1823).

ORCHIDACEAE.

Pterygodium catholicum (L.) Sw. in K. Vetensk. Acad. Handl. xxi. 218 ("*catholica*") (1800).
Ophrys catholica L. Pl. Rarior. Afr. 27 (1760).
Ophrys alaris L. f. Suppl. Pl. 404 (1781).
Arethusa alaris (L. f.) Thunb. Prodr. Pl. Cap. 3 (1794).
Pterygodium alare (L. f.) Dur. & Schinz, Consp. Fl. Afr. v. 116 (1892), pro parte; Druce in Bot. Soc. & Exch. Club Brit. Is. iv. 642 (1917).

DICOTYLEDONES.

ANACARDIACEAE.

Laurophyllus capensis Thunb. Nova Gen. Pl. 104 (1792); Prodr. Pl. Cap. 31 (1794).
Botryceras capense (Thunb.) Druce in Bot. Soc. & Exch. Club Brit. Is. iv. 610 ("*capensis*") (1917).

APOCYNACEAE.

Carissa bispinosa (L.) Desf. [Tab. Éc. Bot. 78 (1804), *nomen nudum*].
Arduina bispinosa L. Mant. Pl. 52 (1767).
Lycium cordatum Mill. Gard. Dict., ed. 8 (1768).
Carissa Arduina Lam. in Encycl. Méth., Bot. i. 555 (1785).
Carissa cordata (Mill.) Fourcade, *tom. cit.* 82.

ASCLEPIADACEAE.

Tylophora cordata (Thunb.) Druce in Bot. Soc. & Exch. Club Brit. Is. iv. 651 (1917); Fourcade, *loc. cit.*
Apocynum cordatum Thunb. Prodr. Pl. Cap. 47 (1794)—non *A. cordatum* Mill. (1768).
Astephanus? cordatus (Thunb.) R. Br. ex Schult. in L. Syst. Veg., ed. nova, vi. 123 (1820).*
Tylophora syringaefolia E. Mey. Comment. Pl. Afr. Australior. i. 198 (1837).

* This combination was not made by R. Brown in Mem. Werner. Nat. Hist. Soc. i. 54 (1811), as indicated by the 'Index Kewensis' (i. 1, 218 (1893)).

COMPOSITAE.

Berkheya carduoides (Less.) Hutch. apud Fourcade, *tom. cit.* 86 ("*carduodes*").

Stobaea decurrens Thunb. Prodr. Pl. Cap. 141 (1794); Fl. Cap., ed. Schult. 621 (1823)—non *Berkheya decurrens* Willd. (1804)*.

Stephanocoma carduoides Less. Synops. Gen. Composit. 56 (1832).

Berkheya petiolata (DC.) Schönl. in Bot. Surv. S. Afr. Mem. 1, 108 (1919); Hutch. apud Fourcade, *loc. cit.*

Stobaea petiolata DC. Prodr. vi. 520 (1837).

Gazania linearis (Thunb.) Druce in Bot. Soc. & Exch. Club Brit. Is. iv. 624 (1917).

Gorteria linearis Thunb. Prodr. Pl. Cap. 162 (1794); Fl. Cap., ed. Schult. 697 (1823).

Gazania subulata R. Br. apud Ait. f. in Ait. Hort. Kew., ed. 2, v. 140 (1813).

Helichrysum orbiculare (Thunb.) Druce in Bot. Soc. & Exch. Club Brit. Is. iv. 626 (1917).

Gnaphalium serpyllifolium Berg. Descr. Pl. Cap. Bon. Spei, 250 (1767).

Gnaphalium orbiculare Thunb. Prodr. Pl. Cap. 152 (1794); Fl. Cap., ed. Schult. 659 (1823).

Helichrysum serpyllifolium (Berg.) Less. Synops. Gen. Composit. 277 (1832)—non *H. serpyllifolium* Pers. (1807).

Hirpicium echinulatum Cass. in Bull. Sci. Soc. Philom. Par. 1820, 27 (1820).

[*Oedera alienata* (non *O. aliena* L. f.) Thunb. Prodr. Pl. Cap. 169 (1794); Fl. Cap., ed. Schult. 725 (1823).] †

Hirpicium alienatum Druce in Bot. Soc. & Exch. Club Brit. Is. iv. 628 (1917).

Peyrousea calycina (L. f.) DC. Prodr. vi. 77 (1837).

Cotula umbellata L. f. Suppl. Pl. 378 (1781).

Osmites calycina L. f. *op. cit.* 380.

Peyrousea umbellata (L. f.) Fourcade, *tom. cit.* 87.

CUCURBITACEAE.

Kedrostis nana (Lam.) Cogn. in A. & C. DC. Monogr. Phan. iii. 637 (1881).

* Willdenow's combination was based on *Rohria decurrens* Thunb.

† *O. alienata* was not published by Thunberg as the name of a new species, for in his 'Flora Capensis' he attributed it to "*Linn.* Syst. Veg. per *Gmelin* p. 1279. Suppl. p. 390." Obviously Thunberg was identifying his material with the known species *O. aliena* L. f. Suppl. Pl. 390 (1781), though he misspelt the epithet as *alienata*. *O. aliena* is now referred to the genus *Heterolepis* Cass. as *H. aliena* (L. f.) Druce.

[*Sicyos angulata* (non L.) Berg. Descr. Pl. Cap. Bon. Spei, 352 (1767).]*

Bryonia nana Lam. in Encycl. Méth., Bot. i. 497 (1785).

Bryonia triloba Thunb. Prodr. Pl. Cap. 13 ("*tribola*") (1794); Fl. Cap., ed. Schult. 34 (1823)—non *B. triloba* Lour. (1790).

Cyrtonema trilobum (Thunb.) Schrad. in Eckl. & Zeyh. Enum. Pl. Afr. Austr. 276 ("*triloba*") (1836).

Coniandra Thunbergii Sond. in Harv. & Sond. Fl. Cap. ii. 484 (1862).

Kedrostis angulata Fourcade, *tom. cit.* 91.

PROTEACEAE.

Leucospermum ellipticum (Thunb.) R. Br. in Trans. Linn. Soc. Lond. x. 98 (1810), saltem quoad syn. Thunb.†

Protea elliptica Thunb. Dissert. Bot. Protea, 22 (1781).

Leucadendron phyllanthifolium Knight, Cult. Pl. Prot. 55 (1809).

Leucospermum attenuatum R. Br. *tom. cit.* 96 (1810).

Leucospermum phyllanthifolium (Knight) Fourcade, *tom. cit.* 97.

SAPINDACEAE.

Allophylus decipiens (Arn.) Radlk. in Engl. & Prantl, Nat. Pflanzenfam. iii. 5, 313 ("*dicipiens*") (1895).

Rhus spicata Thunb. Fl. Cap. ii. 217 ("*spicatum*") (1818).

[*Rhus decipiens* E. Mey. ex Drège, Cat. Pl. Exsicc. Afr. Australior. 26 (1839), *nomen nudum*; Zwei Pflanzengeogr. Docum. 216 (1843), *nomen nudum*—non *R. decipiens* Wight & Arn. (1834).]

Schmidelia undulata (Jacq.) C. Presl in Abhandl. K. Böhm. Gesellsch. Wissensch., Folge 5, iii. 471 (1844), pro parte.‡

Schmidelia decipiens [C. Presl, *loc. cit.*, *nomen nudum*] Arn. ex Sond. in Harv. & Sond. Fl. Cap. i. 239 (1859–60).§

Schmidelia spicata (Thunb.) Druce in Bot. Soc. & Exch. Club Brit. Is. iv. 645 (1917).

Allophylus spicatus (Thunb.) Fourcade, *tom. cit.* 100—non *A. spicatus* Radlk. (1895).

* Bergius misidentified the Cape plant with the American *S. angulata* L.

† R. Brown's combination *L. ellipticum* was based on *Protea elliptica* Thunb., but he misapplied it to another species for which the name *L. ellipticum* was retained by Phillips and Stapf in Dyer, Fl. Cap. v. 1, 620 (1912) and which should be called *L. medium*, as follows:—

Leucospermum medium R. Br. in Trans. Linn. Soc. Lond. x. 97 (1810).

Protea formosa Andr. Bot. Repos. i. t. 17 (1798)—non *Leucospermum formosum* Loud. (1829).

Leucospermum ellipticum (Thunb.) R. Br. *tom. cit.* 98, pro parte.

‡ This combination was based on *Rhus undulata* Jacq. (Anacardiaceæ). See following footnote.

§ The names *S. decipiens* and *S. undulata* were not published by Arnott in Hook. Journ. Bot. iii. 152–153 (1840), as has sometimes been supposed.

STERCULIACEAE.

Hermannia lacera Fourcade, *tom. cit.* 101.

Mahernia scabra Eckl. & Zeyh. Enum. Pl. Afr. Austr. 50 (1834).

[*Mahernia lacera* E. Mey. ex Drège, Cat. Pl. Exsicc. Afr. Australior. 17 (1838), *nomen nudum* ; Zwei Pflanzengeogr. Docum. 200 (1843), *nomen nudum* ; Harv. in Harv. & Sond. Fl. Cap. i. 214 (1859–60), *nomen synonymum.*]

Hermannia scabra (Eckl. & Zeyh.) Hochr. in Annu. Conserv. & Jard. Bot. Genève, xi–xii. 3 (1907)—non *H. scabra* Cav. (1788).

NEW VICE-COUNTY RECORDS FOR SPHAGNA, MOSTLY NORTH COUNTRY.

BY A. THOMPSON.

Sphagnum fimbriatum Wils. var. *robustum* Braithw. ; ditch, Ecclesall Wood, Sheffield ; v.c. 63.

S. pulchrum Warnst. ; drying-up pool, Widdy Bank ; v.c. 66.

S. recurvum P. de Beauv. var. *robustum* Breidler ; moorland bog near Hazelhead ; v.c. 63.

Var. *majus* Ångstr. ; Exe Cleave ; v.c. 5.

S. fallax von Klinggr. var. *plumosum* Warnst. ; submerged in pool near Hazelhead, v.c. 63 ; and almost submerged in pool, Cracoe Fell, v.c. 64.

Var. *Roellii* Schlieph. ; moor near Hazelhead ; v.c. 63.

Var. *robustum* Warnst. ; Ringinglow, near Sheffield ; v.c. 57.

Var. *Schulzii* Warnst. ; Slippery Stones ; v.c. 63.

S. cuspidatum Ehrh. var. *falcatum* Russ. ; peaty ground, Helvellyn, v.c. 70 ; and among rushes, Curbar Moor, v.c. 57.

Var. *submersum* Schimp., Exe Cleave, v.c. 5 ; and wet places among heather, Thorne Waste, v.c. 63.

Var. *plumulosum* Schimp. ; drying up pool, Widdy Bank ; v.c. 66.

S. molluscum Bruch ; Exe Cleave ; v.c. 5.

S. obesum Warnst. var. *plumosum* Warnst. ; only heads on surface, muddy pool, Lustleigh Cleave ; v.c. 3.

Var. *luxurians* Warnst. ; submerged, ditch, Totley Moss ; v.c. 57.

Var. *sanguineum* Warnst. ; floating, pool, Tarn Hows ; v.c. 69.

Var. *hemi-isophyllum* Warnst. ; submerged, pool, Coniston Old Man ; v.c. 69.

Var. *mastigocladum* Warnst. ; submerged, pool, Loughrigg ; v.c. 69.

S. subsecundum Warnst. var. *robustum* Warnst. ; all but heads submerged, pool, Scandale ; v.c. 69.

S. inundatum Warnst. var. *eurycladum* (Warnst.) Sherrin ; marshy ground near Haytor Rocks, v.c. 3 ; marsh, Loughrigg, v.c. 69 ; marsh, foot of Ben Lawers, v.c. 88 ; Exe Cleave, v.c. 5.

Var. *lancifolium* Warnst. ; marsh, Tam Hows ; v.c. 69.

Var. *diversifolium* Warnst. ; almost submerged, marsh, Tarn Hows ; v.c. 69.

S auriculatum Schimp., near var. *submersum* Warnst. ; in trickling water, near Derwent Dams ; v.c. 63.

S. aquatile Warnst. var. *intortum* Warnst. ; Exe Cleave ; v.c. 5.

Var. *remotum* Warnst. ; marsh, Lustleigh Cleave, v.c. 3 ; wet bank, Cupola, Hathersage, v.c. 57.

S. crassicladum Warnst. var. *magnifolium* Warnst. ; edge of lake, Tarn Hows ; v.c. 69.

Var. *diversifolium* Warnst. ; Exe Cleave ; v.c. 5.

S. papillosum Lindb. var. *sublaeve* Limpr. ; boggy ground, Slippery Stones ; v.c. 63.

My naming of these Sphagna has been very kindly corrected by Mr. W. R. Sherrin. The plants from Exe Cleave, Somersetshire, were collected jointly by Mr. Sherrin and myself.

Vice-county numbers :—3, S. Devon ; 5, S. Somerset ; 57, Derbyshire ; 63, S.W. Yorks ; 64, Mid-West Yorks ; 66, Durham ; 69, Westmorland and N. Lancs ; 70, Cumberland ; 88, Mid-Perth.

AN ADDITION TO THE BRECKLAND FLORA : *VERONICA PRAECOX* ALL.

BY A. J. WILMOTT.

SPECIMENS of this *Veronica* have been collected by Mr. J. E. Lousley in a fallow field near Barton Mills, associated with other species characteristic of the Breckland Flora. They were collected on April 16 this year, in the company of A. W. Graveson, and some were sent on to me scarcely dry, as the collector was unable to identify them with any known British species.

As he then remarked, it strongly recalls *V. triphyllos* L. in its rather large bright blue flowers with white centre, but the leaves are less deeply divided. Other differences lie in the stiffer spicate inflorescence and the broad bracts like small foliage leaves, although the deep teeth are fewer in the upper bracts and may disappear in the upmost which are then " elliptic-oblong."

The leaves are more deeply toothed than in *V. arvensis* L., but less deeply cut than in *V. verna* L. The lowest leaves are less deeply cut than the mid-stem leaves, which are sub-triangularly ovate with a slightly cordate base, about as broad near the base as they are long, with three to four deep teeth each side extending about or more than one-third of the way to the midrib. The teeth of the upper leaves are a little deeper. But from these two species it differs in having pedicels considerably longer than the calyx, a shallowly emarginate capsule with only a right-angled sinus, a longish style (reddish) about one-third the length of the capsule and projecting far above its top. These are all characters recalling *V. triphyllos*, to which it is most closely allied. According to Rouy (Fl. Fr. xi. 48 & 51, 1909) these two species have the seeds (which are not yet ripe in the specimens sent) " pelviform (convex on the dorsal face and cupuliform on the other face)," and not " flat on one face or biconvex " as in *V. arvensis* and *V. verna*.

For the rest, the plant is erect, either unbranched or with rather divergent ascending branches. Pubescence on the stem of crisped sub-appressed hairs with some longer patent (arrect) pilae, with a few long glandular hairs increasing in number above. Leaves beneath mostly deep red, with numerous longish hairs, fewer above, margin ciliate, calyx similar but with numerous glands. Pedicels longer than the calyx and about equalling the bracts. Sepals slightly unequal, about as long as the capsule and a little shorter than the corolla. Capsule slightly longer than broad, somewhat inflated with numerous glandular short hairs.

It is astonishing that an additional species of *Veronica* should now be discovered in an area so thoroughly examined by generations of botanists searching for *V. verna* and *V. triphyllos*, both of which species often demand considerable hunting before they are found. Can it be a recent immigrant ? On the other hand, how could it arrive ?

Its geographical distribution affords no reason for doubting its being indigenous here, for it occurs " in the whole of France (rare in the Mediterranean region)," Belgium, Holland, Germany (especially west and south), Austria, Hungary, Transylvania, Rumania, and southern Russia, and extends in the south to Spain, Sicily (mountains), and Greece. It occurs in the Rhine Valley, and could therefore be included as one of the Breckland species supposed by some to be relics from the time when the northern reaches of the Rhine flowed over part of East Anglia. Before we can judge properly we must await further knowledge of its British distribution.

Note.—I hear from Mr. Lousley that it has been found in a second station about two miles from the first by Mrs. Sandwith and others, with characteristic Breckland species including *V. triphyllos*.—A. J. W.

REINTRODUCTIONS.

By J. Ramsbottom.

Periodically there have been suggestions that our British countryside might be enriched by the planting of aliens. Occasionally botanists have been unwise enough to countenance this procedure, to which references may be found in previous volumes of this Journal.

The modern spread from the north country of " rambling "—with the reintroduction from America of the old verb " to hike "—has provided material for journalists from whose extravagances it is obvious that the hiker needs to be protected as much as from those of the outfitter. In commenting on the benefits of tramping the countryside, newspaper and magazine articles often lay stress on the opportunities that arise for gathering wild plants. This is totally different from botanising or herborizing, which, if encouraged, would add greatly to the pleasure of present hikes and the walks taken when age begins to tell. The danger is that youths and maidens may get the idea that the complete hiker should add a huge bundle of wild flowers to the characteristic equipment and thus may cause damage to even the most prolific species by trampling down the foliage, if in no other way.

Announcements about the protection of wild flowers have been broadcast recently and an attractive poster has been displayed all over the country. Probably as a result of this, advice to hikers is altering in tone. The ' Daily Mirror ' on April 29 ends a suggestion to hikers to add interest to their walks by making a botanical collection with the advice, " as a little thank-offering plant something else." The ' Daily Sketch ' on May 8 goes further. In some doggerel headed " The Fragrant Minute. Hikers ! Please take note," Wilhelmina Stitch ends . . . " Must confess that I am smitten with an idea gay and new. ' Hikers ! make a brighter Britain, taking flower seeds out with you.' Varied seeds where'er you're going, sow a pinch first here, then there—Nature will attend their growing—Britain will look passing fair."

Such sloppy sentiment and ignorance are ludicrous. It is most unlikely that those for whose improvement these things purport to be written will be generally stimulated into action, but odd, earnest adolescents and older people may succumb to the appeal to try to brighten this our England in the time of world trouble.

I suppose every botanist who has given it a thought is convinced of the foolishness of indiscriminately scattering seed—even if the seeds don't grow. What is open to argument is whether there is any botanical justification for introducing species into areas for experimental purposes.

Professor E. J. Salisbury in a recent Presidential Address to the Norfolk and Norwich Naturalists puts the view as follows :—

" . . . the occurrence of a species in a particular part of England, and not in another, may be an accident of dispersal rather than an indication of especial fitness for the area in occupation. Furthermore, the absence of one species may be of equal significance to the presence of another, provided we can be sure that for both species there have been equal opportunities for invasion and establishment. Information of this character can for most plants, however, be acquired only by the deliberate introduction of wild species beyond their existing range. The strong objection which some students of geographical distribution have to such introductions, whilst it may have some sentimental justification, cannot be defended on scientific grounds, though it is of course essential that such introductions should be properly recorded.

"Experimentation of this character can alone afford us definite data as to the capacity of species to exist beyond their present limits, and may also yield information as to whether the limiting factors are climatic, edaphic, or biotic."

On the other hand many botanists are entirely opposed to this view. Once such an " experiment " has been made, conditions have been altered and, as these are in no way under control, the attempt to find out what is the result so far as the introduced species is concerned may have disastrous effects on other species which may be rare and specialised, thus interfering unduly with the scientific study of geographical distribution. Comparison may be made with the boy who takes his first watch to pieces to see how it works. A further objection is that there is no logical reason on this line of argument against introducing alien plants which on some hypothesis or other might have been expected to occur in this country, or which we know from geological evidence did occur. If there is no logical limit to the kind of introduction nor to the area, we may have " experiments " with results analogous to those obtained by early settlers overseas. An analogous problem is that of the reintroduction of a species in a habitat from which it has disappeared. The Plant Conservation Board (which includes representatives of all the principal institutions and societies interested in the British Flora) considered the matter at a meeting in December last and passed the following resolution : " The Board see no scientific objection whatever to re-establishments, in the same or similar habitat, provided they are placed on record," it being understood that where possible the stock should be the same as, or similar to, the original stock. It was decided that the records should be sent to the Department of Botany, British Museum, with the hope that they will be noted in this Journal.

NOTES FROM THE BRITISH MUSEUM HERBARIUM.

Combretum tenuifolium Exell, sp. nov. *Frutex* scandens, ramulis fulvo-tomentellis. *Folia* opposita petiolata, petiolo 10–12 mm. longo fulvo-tomentello, lamina chartacea oblongo-elliptica vel obovato-oblonga, 14–20 × 5–9·5 cm., supra minute papillosa costa media puberula excepta glabra subtus lepidota sed lepidibus brunneis fere inconspicuis, apice abrupte acuminata subcaudata basi obtusa vel rotundata, costa media supra insculpta subtus prominente, costis lateralibus utrinque 16–18 supra conspicuis sed vix prominentibus subtus prominulis. *Flores* albi tetrameri in spicas congestas 2–3 cm. longas paniculatim dispositas conferti, paniculis terminalibus et axillaribus. *Receptaculum* inferius subglobosum, circa ·7 × ·6 mm., pubescens, superius campanulatus, 2–2·8 × 1·8–2 mm., sparse puberulum vel fere glabrum. *Discus* tenuis glaber, ·9 mm. diam., margine vix libero. *Lobi calycis* late deltoidei brevissimi. *Petala* transverse elliptica, 1·5 × ·8–1 mm., breviter unguiculata glabra. *Stamina* 8 exserta glabra, filamentis 3·5–4 mm. longis. *Stylus* filiformis exsertus glaber 4 mm. longus. [Fructus ignotus.]

Hab. Belgian Congo : Angodia, Uele-Itimbiri, fl. May 1931, *J. Lebrun* 2904 (holotype in Herb. Mus. Congo, Tervueren ; Herb. Brit. Mus.) ; Angodia, Uele-Itimbiri, fl. June 1931, *J. Lebrun* 3039 (Herb. Mus. Congo, Tervueren ; Herb. Brit. Mus.).

" Forêt secondaire ; liane ; racèmes denses ; fl. blanches (no. 2904). Forêt au bord de l'Uélé ; grande liane ; infl. fortement ramifiées, formées de racèmes denses ; fl. blanches (no. 3039)."

This species is nearest to *C. insulare* Engl. & Diels, from Fernando Po, which it resembles in having unusually thin leaves (for the genus) at the time of flowering. In *C. insulare*, however, the lower receptacle differs in being black and viscid in the dried specimens and the flowers are only half the size of those in the new species.—A. W. E.

Combretum Luxenii Exell, sp. nov. *Frutex* scandens, ramulis primo glanduloso-hispidulis demum glabrescentibus. *Folia* opposita petiolata, petiolo supra sulcato, 2–2·5 cm. longo, glanduloso-hispidulo, lamina elliptica vel late elliptica, ad 16 × 8 cm., basi acuta vel obtusa, supra fere glabra subtus ad nervos glanduloso-hispidula, costis lateralibus utrinque 6–8 subtus prominulis. *Flores* tetrameri rubri breviter pedicellati, pedicello 1–1·5 mm. longo, in paniculas axillares vel terminales dispositi. *Bracteæ* lanceolatæ glanduloso-hispidulæ, 5–7 mm. longæ, mox deciduæ. *Receptaculum* inferius fusiforme, 5 mm. longum, albo-sericeum et glanduloso-hispidulum, superius infundibuliforme basin versus subglobosum infra medium paullo constrictum, ad 10 × 5 mm., dense vel subdense glanduloso-hispidulum. *Lobi calycis* filiformes vel anguste triangulares,

ad 5 mm. longi. *Discus* campanulatus, 2×2·5 mm., margine pilosus ceteroque glabrum. *Petala* ovata vel late oblongo-elliptica rubra, 3·5×2·2 mm., glabra. *Stamina* biserialia breviter exserta, antheris rubris, filamentis 8–9 mm. longis. *Stylus* filiformis longe exsertus, 22 mm. longus, glaber. [Fructus ignotus.]

Hab. BELGIAN CONGO: Banza Territory, Mupanga Village, fl. May, 1931, *Luxen* 54 (holotype in Herb. Mus. Congo, Tervueren; Herb. Brit. Mus.). Native name "*Lukondambo.*"

This species is best placed in Sect. *Conniventes* Engl. & Diels, though it has also an evident relationship with certain species in Sect. *Grandiflorae* Engl. & Diels, the species of which are pentamerous. It can be distinguished from all other species in Sect. *Conniventes* by the much larger flowers, though resembling *C. Haullevilleanum* De Wild. in its glandular indumentum and *C. Lecardii* Engl. & Diels in the swollen base of the upper receptacle. As regards species in Sect. *Grandiflorae*, from all of which it can be separated by the tetramerous flowers, it resembles *C. grandiflorum* G. Don in general appearance, though the latter has much larger petals; its indumentum closely resembles that of *C. hispidum* Laws.; while its elongated calyx-lobes are reminiscent of *C. dolichopetalum* Engl. & Diels. The genus *Combretum* cannot readily be divided into clear-cut sections and it is evident that *C. Luxenii* could be equally well regarded as an exceptionally large-flowered member of Sect. *Conniventes* or as an aberrant tetramerous member of Sect. *Grandiflorae*.—A. W. E.

Anisopappus abercornensis G. Tayl., sp. nov. (Compositae). *Herba* annua, erecta, ramosa, altitudinis usque ad c. 34 cm. attingens, fere omnino puberula. *Folia* alterna, manifeste graciliterque petiolata (petiolo usque ad c. 1·2 cm. longo); lamina bipinnatifida (segmentis plus minusve linearibus apice obtusis), ambitu triangularis, usque ad c. 2 cm. longa et basi 2 cm. lata, utrinque pellucido-glandulosa. *Capitula* ramulos axillares terminantia, longe graciliterque pedunculata (pedunculo usque ad c. 6·5 cm. longo). *Involucrum* late cupuliforme. *Receptaculi* paleæ concavæ, ambitu oblanceolato-oblongæ, dorso valde carinatæ carina in mucronem producta, apice subfimbriatæ, c. 3·5 mm. longæ. *Ligulæ* oblongæ, c. 4 mm. longæ et 1·5 mm. latæ, apice 2-dentatæ dentibus emarginatis. *Disci* flosculi c. 3 mm. longi, apice aliquantulum glandulosi. *Antheræ* basi manifeste caudiculatæ. *Styli* rami complanati, apice obtusi. *Acheniorum* pappus ex aristis 4–5 et squamis oblongis quadratisve apice laciniatis constructus.

Hab. NORTHERN RHODESIA. Tanganyika Distr.: Abercorn, under big trees on sandy soil over rocks, at an altitude of about 1500 m., April 1932, *Miss A. H. Gamwell* 38 *a* (type in Herb. Brit. Mus.).

In referring this species to *Anisopappus* I have accepted the opinion expressed by Humbert (Mém. Soc. Linn. Normand. xxv. 240 *et seq.* (1923)) that the genera *Anisopappus* Hook. & Arn., *Epallage* DC., *Sphacophyllum* Benth., *Astephania* Oliv., and *Temnolepis* Bak. should be regarded as congeneric. It appears, however, that the aggregate genus thus constituted should bear the name *Anisopappus* Hook. & Arn. (Bot. Beech. Voy. 196 (1836)*) and not *Epallage* DC. (Prodr. vi. 3 (1837)), the name adopted by Humbert. In this account of the Compositae of Madagascar Humbert has noted that in the genus *Epallage*, among the Tropical African and Madagascar species, "il est possible d'établir une double série parallèle d'espèces homologues dans les deux contrées," and this statement is further borne out by the new species *A. abercornensis*. The only apparent difference between it and its Madagascar "homologue," *A. anemonifolius* (DC.) G. Tayl.†, is in the size of the capitula, which are very much smaller in the Tropical African species. *A. Rogersii* G. Tayl.‡, the other species from Rhodesia, differs from *A. abercornensis* in having many more heads and leaves which are ovate with lobed or toothed margins.—G. T.

Crossandra sulphurea G. Tayl., sp. nov. (Acanthaceae). *Herba* perennis, ex rhizomate subterraneo lignoso horizontali ramos erectos scapiformes floriferos emittens, nonnusquam indumento cinereo vestita; rami floriferi dense sericei, usque ad c. 7·5 cm. longi (inflorescentia terminali inclusa). *Folia* ad ramorum bases conferta; lamina plus minusve oblanceolata, basi attenuata in petiolum manifestum sensim decurrens, apice obtusa, margine integra vel leviter undulata, usque ad c. 17 cm. lata, chartacea, utrinque hispidula. *Flores* in spicas strobiliformes conferti. *Bracteæ* infimæ aliquot steriles inter se distantes, reliquæ fertiles dense imbricatæ; steriles infimæ concavæ, ambitu lanceolatæ, c. 1·7 cm. longæ et 0·5 cm. latæ, extus dense sericeæ, intus saltem ad basin apicemque villosæ; steriles superæ 3-fidæ, c. 2 cm. longæ et 1·2 cm. latæ, villosæ, lobis lanceolatis subæqualibus apice breviter spinescentibus c. 1 cm. longis et basi 0·3 cm. latis; fertiles 5-fidæ, c. 2·2 cm. longæ et parte latissima 2·3 cm. latæ, utrinque villosæ, lobis 3 medianis lanceolatis subæqualibus apice breviter spinescentibus c. 1·5 cm. longis et 0·4 cm. latis, lobis 2 lateralibus anguste lanceolatis usque ad c. 1 cm. longis et basi fere 0·2 cm. latis. *Bracteolæ* lineares, c. 1·7 cm. longæ et 0·1 cm. latæ, praesertim in margine costaque dense villosæ. *Calycis* segmenta lanceolata, apice subuliformia, margine dense villosa, posticum bifidum c. 1·9 cm. longum et 0·3 cm. latum, antica c. 1·5 cm. longa et 0·2 cm. lata,

* This date is given by B. D. Jackson in Journ. Bot. xxxi. 298 (1893).

† **Anisopappus anemonifolius** (DC.) G. Tayl., comb. nov. *Epallage anemonifolia* DC. Prodr. vi. 4 (1837).

‡ **Anisopappus Rogersii** G. Tayl., nom. nov. *Epallage africana* S. Moore in Journ. Bot. lv. 123 (1917)—non *A. africanus* Oliv. & Hiern.

lateralia c. 1·1 cm. longa et 0·15 cm. lata. *Corollæ* tubus subcylindricus, apicem versus leviter constrictus, c. 1·7 cm. longus, extus minute pubescens ; limbus flabelliformis, c. 2·4 cm. longus et parte latissima 2·7 cm. latus, supra dense glanduloso-puberulus, infra parce pubescens. *Ovarium* compressum, ambitu oblongo-ellipticum, c. 0·35 cm. longum.

Hab. NORTHERN RHODESIA. Tanganyika Distr. : Abercorn, with yellow flowers on poor soil in open bush, mostly on the sides of hills, at an altitude of about 1460 m. and upwards, 20 July, 1931, *Miss A. H. Gamwell* 56 (type in Herb. Brit. Mus.).

The affinity of *C. sulphurea* appears to be with *C. subacaulis* C. B. Clarke, but the structure of the bracts (which are all entire and obovate-oblong in *C. subacaulis*) serves to separate the two species and, further, in *C. sulphurea* the horizontal rhizome and the dense sericeous tomentum on the peduncles are distinctive features.—G. T.

Tinnea caudata G. Tayl., sp. nov. (Labiatae). *Suffrutex* ramosus, altitudinis usque ad c. 1 m. attingens ; rami obscure tetragoni vel trigoni, primum dense breviterque cinereo-pubescentes glanduliferique, deinde glabrescentes, internodis ut videtur usque ad c. 5 cm. longis. *Folia* opposita vel ternata, distincte petiolata (petiolo hispidulo c. 0·4–0·6 cm. longo) ; lamina lanceolata, basi plerumque cuneata sed aliquando rotundata, apice longe gracillimeque caudata (cauda usque ad c. 0·7 cm. longa), margine integra, usque ad c. 5·3 cm. longa et 1·5 cm. lata, utrinque rubro-glanduloso-punctata, supra primum præsertim in costa hispidula mox glabrescens, subtus in costa nervisque hispidula pilis subpersistentibus. *Flores* pedicellati (pedicello per anthesin c. 0·3 cm. longo), in bractearum axillis singillatim dispositi. *Bracteæ* breviter petiolatæ, late ovatæ vel suborbiculares vel oblatæ, basi rotundatæ, apice longe gracillimeque caudatæ (cauda filiformi usque ad c. 1·2 cm. longa), indumento foliis similes. *Bracteolæ* subulatæ, c. 0·9 cm. longæ. *Calycis* labia inter se libra vel leviter cohærentia, per anthesin subæqualia, subquadrata, c. 1 cm. longa et 0·9 cm. lata, extus dense pubescentia, apice plus minusve truncata vel late rotundata, in fructu accrescentia scariosa usque ad c. 2 cm. longa et 1·5 cm. lata. *Corolla* pallide rosea vel purpurea, extus parce pubescens dense glandulifera ; tubus c. 0·8 cm. longus et ore (in sicco) 0·8 cm. latus ; labium posticum latissime ovatum, apice emarginatum, c. 0·5 cm. longum et basi 0·8 cm. latum ; labium anticum 3-lobatum, fere 1 cm. longum et basi c. 1·2 cm. latum, lobo medio multo maximo subquadrato apice emarginato c. 0·5 cm. longo et 1 cm. lato. *Staminum* filamenta applanata, parte inferiore intus villosa cohærentia, postica c. 1·1 cm. longa, antica c. 0·9 cm. longa. *Stylus* integer, c. 1 cm. longus, basin versus applanatus, apice acuta angulo recto deflexa.

Hab. NORTHERN RHODESIA. Tanganyika Distr. : Abercorn, bushy plant about 1 m. in height with pink or purple flowers, on river bank at an altitude of about 1000 m., April 1932, *Miss A. H. Gamwell* 113 (type in Herb. Brit. Mus.).

T. caudata is closely related to *T. apiculata* Robyns & Lebrun, a species occurring in the same area, from which it differs principally in the possession of very much longer caudiform appendages to the leaves and bracts. The bracts of *T. caudata* are also larger and their pubescence is much less dense than in *T. apiculata*.—G. T.

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

TAXONOMICAL REMARKS ON JUNCUS ALPINUS Villars AND SOME RELATED SPECIES.—Dr. Bertil Lindquist (Botaniska Notiser. 1932, Häfte 5, pp. 313 *sq.*, and Report Bot. Soc. & Exch. Club, B.I. 1932, pp. 769 *sq.*) discusses at length *Juncus anceps* Laharpe, *J. atricapillus* Drejer, *J. alpinus* Villars, *J. fusco-ater* Schreber, *J. nodulosus* Wahlenberg, *J. Marshallii* Pugsley, and *J. alpestris* Hartman. The first two he groups together as a species, *J. anceps*, distinguished from the remainder chiefly by its larger anthers. The succeeding plants are treated as five distinct types, which are placed as varieties under *J. alpinus*. It is these latter plants that are most interesting to British botanists.

The treatment of these forms as five types seems to accord with their natural affinities, but the reduction of all of them to the rank of varieites of *J. alpinus* Vill. may well be questioned. *J. fusco-ater* is closely allied to *J. alpinus*, and has frequently been placed under it as a variety, but *J. nodulosus*, to which *J. Marshallii* and probably *J. alpestris* are related, is very much more distinct and has an entirely different geographical distribution. Dr. Lindquist does not appear familiar with the *J. alpinus* of the Alps, where it is a common and relatively uniform species, always with very dark inflorescence and capsules. Lindman, in the last edition of his flora, excluded this plant from the Swedish list, and no Scandinavian specimens have been seen in any British herbarium. Dr. Lindquist remarks that hybrids of *J. nodulosus* and *J. fusco-ater*, morphologically inseparable from *J. alpinus*, occur in Sweden, and, this being so, it seems desirable closely to scrutinise any plants of this kind before admitting their identity with Villars's species. Two Scandinavian gatherings, cited by Dr. Lindquist under *J. alpinus*, that have lately been examined, are clearly different from the alpine plant, and have the aspect of the above-mentioned hybrid ; and while the Widdybank specimen is correctly figured by him as *J. alpinus*, the Stockholm plant depicted certainly looks like a different form.

The peculiar character of irregularly pedicelled flowers distinguishes *J. nodulosus* Wahlb. from *J. alpinus* so obviously that it is difficult to understand why the two plants were ever associated; and, indeed, the reduction of *J. alpinus* to a variety of *J. lampocarpus* Ehrh. might seem more natural. The difference in the geographical distribution of the two plants is also of importance; *J. nodulosus* is a sub-arctic plant, which is nearly circumpolar, and is apparently unknown in Central Europe; *J. alpinus* is a characteristic species of the Alps, and, like a few other alpines of Central Europe, occurs very rarely in Great Britian.

J. Marshallii Pugsl. is shown by its inflorescence to be related to *J. nodulosus*, and Dr. Lindquist identifies with it forms from Northern Scandinavia (mainly Norway) and from Iceland, although it could not be matched at Oslo. This identification is confirmed by an unmistakable Norwegian example (*J. Groves*, Kundshoe, Dovrefjeld, 1889) now in Herb. Mus. Brit., and apparently also by his figure of an Iceland plant, which, so far as can be seen, differs from the Loch Ussie type only by its rather larger flowers. In this respect it approaches Fernald's Newfoundland plant (no. 27780) referred to *J. Marshallii*, but this Dr. Lindquist identifies with *J. nodulosus*. The occurrence of *J. Marshallii* in Scandinavia and in Iceland is of interest as tending to connect its Scottish and Newfoundland stations. Buchanan-White's Blair Athol plant, which Dr. Lindquist identifies, albeit with some doubt, with *J. nodulosus*, still appears to me to be a weak form of *J. Marshallii* with a condensed inflorescence.

J. alpestris Hartm., the most northerly plant of the group, is considered by Dr. Lindquist to be less characteristic than the other types, and in some degree it seems to be a reduced form intermediate between *J. nodulosus* and *J. lampocarpus*.

It is not unlikely that *J. nodulosus* and even *J. alpestris* may yet be found in Scotland, for hitherto British botanists have had very hazy ideas on the group, and both plants may have easily been passed over.

Dr. Lindquist has apparently overlooked the paper in Journ. Bot. 1930, pp. 368–370, which is the earliest notice of *J. alpinus* in Teesdale, and its first authentic record for England.—H. W. P.

SHORT NOTES.

May-Lily in Ken Wood.—The occurrence of the May-Lily (*Maianthemum bifolium*) in Ken Wood has been well known for over 150 years (see 'Flora of Middlesex,' p. 177). When the wood was opened to the public one of the footpaths made unfortunately ran over the site of the plant, which disappeared. This, I believe, has been known to many London botanists,

and in October 1932 Mr. H. T. White of Hendon suggested to the Director of the Royal Botanic Gardens, Kew, that it should be replanted near its original site.

The matter was discussed by the Wild Plant Conservation Board which agreed to sponsor the re-introduction and to leave the procuring and planting of the stock in the hands of Kew. Permission for the re-introduction was obtained from the London County Council, thanks to the kind offices of Sir William Lawrence, Bart. Mr. F. W. Parker, Second Officer of the Parks Department, took a personal interest in the matter, specially visiting Ken Wood for the purpose of choosing suitable sites in areas to which the public has not access.

It was considered desirable to obtain a stock of the plant from a British source, if possible, and, after several enquiries, Mr. Clarence Elliott, of Stevenage, very kindly presented Kew with a number of rhizomes which had been taken from the Scarborough locality and planted in a Yorkshire garden. On Tuesday, February 14, Mr. F. W. Parker and myself planted these rhizomes in two carefully chosen sites in Ken Wood, one near the old locality and one at the opposite end of the park. It will be interesting to see whether this attractive woodland plant will re-establish itself and increase its area now that the factor of human interference has, as far as possible, been removed.—J. S. L. Gilmour.

Australian Acacias in Ceylon.—In the *Journal of Botany*, 1932, pp. 256–258, Mr. T. Petch, made some very interesting comments in regard to the flowering of Australian Acacias in Ceylon; in this connection it is perhaps worth observing that about twelve or fourteen years ago the following species were planted on a fairly large plantation scale by the Ceylon Forestry Department:—

Acacia melanoxylon:
At Pattipola and Kandapola (6000–6300 ft.).

A. dealbata:
At Bandarawela (4000 ft.) and Ohiya (5500 ft.).

A. pycnantha at Pattipola:

A. longifolia was also introduced at Pattipola, Ohiya, and Haputale (4900 ft.) as an ornamental tree.

These stations receive their rain at different times of the year, thus: Pattipola is a South-West Monsoon station (Spring and Summer Rains); Bandarawela, Haputale, and Ohiya are North-East Monsoon stations (Autumn and Winter Rains); while Kandapola receives a limited quantity of both North-East and South-West rains.

It would be interesting to know whether these plantation-grown Acacias have altered their seasonal flowering, etc., both as

compared with Australia and as between North-East and South-West Monsoon stations in Ceylon.

There used to be, and may be still, a small (10 acres) plantation of old (30–35 years old in 1920) *Acacia melanoxylon* between Kandapola and Iron Bridge (about three miles East of Nuwara Eliya); these trees fruited regularly though not in great quantity during the years 1919–1921, and I believe did so in most years; the seed was collected in October or November.—J. R. AINSLIE, B.Sc.

REVIEWS.

Plant Sociology, the Study of Plant Communities. By Dr. J. BRAUN-BLANQUET. Translated by GEORGE D. FULLER and HENRY S. CONARD. 8vo, pp. xviii, 439, 180 text-figs. McGraw-Hill Publishing Co.: London, 1932. Price 27*s*.

BY translating Dr. Braun-Blanquet's 'Pflanzensoziologie' Messrs. Fuller and Conard have rendered useful service to English-speaking ecologists and students of plant geography. The author, who is director of the Geobotanical Institute of Montpellier, has had a wide experience of plants in the field, in the study of which he has been actively engaged for thirty years or more, especially in Switzerland, France, and Germany, and has written extensively on the study of plant communities.

The study of plant sociology is still young; many debatable points arise in consequence, and many of the conclusions need to be tested by further research and experience. The growth of this study, which has enlisted many workers both in Europe and America, has been rapid, and already a vast literature has grown up dealing with the many aspects of the subject. Dr. Braun-Blanquet has hazarded the task of testing and arranging this material with the view of putting the subject on a firm basis as a new branch of science. The result is a comprehensive survey of the scope, aims, and limits of plant sociology, and a handbook which will be helpful to those studying vegetation.

The author's view is that every plant community is a social unit. Every natural aggregation of plants is the product of definite conditions, past and present, and can exist only when these conditions are fulfilled. The definite objective of plant sociology is to catalogue and describe the plant communities of the earth, to discover their causal explanation, to study their development and geographic distribution, and to arrange them according to a natural classification.

The subject is divided into six sections: the basis of social life among plants; the organisation of plant communities; synecology or community economics; syngenetics; synchorology; and, finally, systematics of phytosociology.

It is obvious that in any attempt to cover so wide a field and deal with so vast a literature, much condensation is necessary, and only a selection of the available material can be made, but the author has endeavoured to indicate the more important results of workers in Europe and America. In the present volume, however, the translators have taken the opportunity, with the approval of the author, of producing a revised and enlarged edition, and included further results of American investigators. There are many helpful diagrams, charts, transects, and quadrats illustrating methods and results of study in the field, and the 180 illustrations include many excellent vegetation photographs.

The work serves well to show the extent and variety of investigations into ecological problems, and the rapid progress that has been made in recent years. It is clear, however, that some of the methods and deductions will need modification as a result of wider application and experience before satisfactory conclusions can be drawn. The author has developed an elaborate system of classification of plant communities, and, as an example of the practical applications of the principles he has laid down, concludes with a table of the communities of Higher plants of Bas Languedoc, classified on the basis of their sociological progression.—T. W. WOODHEAD.

Rabenhorst's Kryptogamen-Flora von Deutschland, Oesterreich und der Schweiz: Bd. x. Abt. 3. *Dinoflagellata* by J. SCHILLER: Lief. 2 & 3. 8vo, pp. 257–617. Akadem. Verlagsges., Leipzig, 1932–33.

THE two instalments of Schiller's Dinoflagellata under review, which complete the first part of the treatment of this group, are devoted to the naked forms (Gymnodiniales). These are classified, largely in correspondence with Lindemann's treatment in the 'Natürliche Pflanzenfamilien,' into the families Pronoctilucaceae, Gymnodiniaceae, Polykrikaceae, Noctilucaceae, Warnowiaceae, and Blastodiniaceae. The last of these is, however, not included in the present volume and is apparently to be dealt with at a later stage, although the reason for its separation from its allies is not altogether apparent. As in the first instalment of this volume, the general treatment and the plentiful and clear illustrations leave nothing to be desired. It is, however, unfortunate that the author did not see his way to give keys to the species of such large genera as *Amphidinium*, *Gymnodinium*, and *Cochlodinium*, which for the most part are not even divided into sections. This will materially lessen the value of the work to those attempting to use it. Unfortunately, too, although the third instalment completes a volume and is provided with an index, there is no enumeration of literature, and one will

presumably have to wait until the second volume is complete before the numerous references briefly cited under the various species can be consulted in full.

Schiller follows Pascher in dividing the Dinoflagellata into Desmokontae and Dinophyceae. In my opinion, however, the latter name would be by far the most suitable designation for the whole group, with Desmokontae and Dinokontae as subdivisions. Much of the matter in these instalments is based on the large monograph of the naked Dinoflagellates by Kofvid and Swezy, and many of the illustrations come from the same source.—F. E. FRITSCH.

Handwörterbuch der Pflanzennamen und ihre Erklärungen. By ROBERT ZANDER. Second Edition. 12mo, pp. 468, 1932. Reichsverband des deutschen Gartenbaues e. V.: Berlin, 1932.

THE second edition of this handy little reference-book combines the matter of the original edition of 1927 and the Supplement of 1928. These were noticed in this Journal for 1928, p. 311.

The book is of special use to nurserymen and other growers of plants who wish to call their plants by their generally accepted names; and it should serve to lessen the confusion prevalent in horticulture from a lack of appreciation of synonymy. Since the appearance of the first edition, horticulturists in Congress at Vienna, London, and Paris have made concerted efforts to remedy this confusion and to bring horticultural nomenclature into line with botanical. Dr. Zander has been much interested in these efforts, and his 'Handwörterbuch' will be of service to those interested in the attainment of a uniform system of nomenclature.

Commercial Timbers of India. By R. S. PEARSON and H. P. BROWN. Vol. I. pp. xliv, 548; Vol. II. pp. ix, 549–1150, 320 pls. Govt. of India, Central Publication Branch: Calcutta, 1932. Price £5.

THE late J. S. Gamble's 'Manual of Indian Timbers,' for many years the standard authority on the subject, was last revised in 1902. The need of a more up-to-date reference-book embodying information on the distribution and available supplies of Indian Timbers, their technical properties and uses, led to the inception of the present work in 1924. At that time, Mr. Pearson was in charge of the Economic Branch of the Forest Research Institute at Dehra Dun, Dr. Brown being temporarily attached to the Institute for the purpose of investigating the anatomical structure of the more important Indian timbers. Mr. Pearson's part of the project has been to bring together the results of technical investigations carried out at Dehra Dun and elsewhere, a task which his unique knowledge

and experience rendered him exceptionally well fitted to undertake, while Dr. Brown is responsible for the detailed descriptions of the wood structure and the excellent photomicrographs which accompany them. The species to be dealt with were selected from a careful consideration of their importance in India, regard being paid both to the quality of the timber and to the supplies available. It is of interest to note that there exist in the forests of India some 2500 species of trees and an approximately equal number of woody shrubs. The proportion of commercially important timbers in tropical forests is indicated by the number of species included in the present work, namely 320. Of nearly one half of this number it is stated that considerable quantities are available for which there is at present little or no demand.

The subject-matter is arranged in botanical sequence following Bentham and Hooker's classification and preceding each family is a brief account of its chief botanical characteristics, including the anatomical features of the woods. The introduction includes a good account of the forests of India, and discusses the effect of topographic and climatic conditions and geological formation on their area and distribution. The information on the uses and qualities of the various timbers has been restricted to such facts as have a direct bearing on their present or prospective uses, and should go far towards fulfilling the object of the book, which is to encourage the use of many Indian timbers of unquestionable beauty and merit. Apart from the utilitarian aspects of the subject, the book will be found of value as a work of reference for students of economic botany and plant anatomy.—B. J. RENDLE.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY OF LONDON.—At the meeting on April 6 a paper by Mrs. M. R. Levyns on "A Revision of *Lobostemon*," a South African genus closely allied to *Echium*, was read. Twenty-eight species are recognized, several of the previously so-called species having proved to be hybrids or habitat forms.

Prof. W. H. Longley followed with a lecture on "Evolution in the Light of Incidental Records of Taxonomy." The records specified are dates when currently accepted species of organisms were named, those when specimens of each were first collected, and what is set down anywhere regarding their range: the number of species in each genus is also included.

Dr. E. S. Semmens then described the hydrolysis of starch by the action of polarized light.

On April 27 Professor E. B. Poulton analysed a manuscript by Searles Valentine Wood, Junr., written shortly before the publication of the 'Origin of Species,' which brought forward several convincing arguments in favour of organic evolution.

Dr. E. J. Collins and Mr. K. Mather gave an account of the genus *Crocus* and its cytology. The complex evolution of the various chromosome complements explains the unsatisfactory taxonomy of the genus.

Mr. E. M. Marsden-Jones described the pollination of *Ranunculus Ficaria* and the differences between bulbil- and non-bulbil producing plants.

On May 11 Sir Daniel Hall gave an account of the scarlet tulip of the near East, *Tulipa oculus-solis*.

Miss E. R. Saunders summarised her study on *Veronica* from the view-point of certain floral characters.

Dr. Elmer Drew Merrill, Director of the New York Botanic Garden, Dr. Erwin Bauer, Director of the Kaiser Wilhelm Institute of Plant breeding, Münchenberg-i.-Mark, and Prof. Adolf Pascher, German University, Prague, were elected Foreign Members.

At the Anniversary Meeting on May 24, the President, Prof. F. E. Weiss, F.R.S., presented the Linnean Gold Medal to Prof. Robert Chodat, F.M.L.S., of the University of Geneva. The President referred to Prof. Chodat's versatility, as illustrated by his taxonomic work on the Polygalaceae, his ecological study of the vegetation of Paraguay and of the Iberian peninsula, his elaboration of methods of obtaining pure cultures of Algae and his book on the polymorphism of the group, his studies of the organisms of fermentation and of the Palæozoic Pteropsida, and his admirable 'Principes de Botanique.'. Unfortunately, owing to ill-health, Prof. Chodat was unable to be present, and the Medal was received by the Swiss Minister, who thanked the Society on his behalf.

The President then gave his Address on "Variegated Foliage," which was illustrated by a series of lantern-slides.

Professor Weiss, Mr. Francis Druce, and Mr. John Ramsbottom were re-elected respectively President, Treasurer, and Botanical Secretary; and Mr. H. A. Hyde, Dr. Margery Knight, and the Hon. Henry D. McLaren replaced Prof. T. G. Hill, Mr. G. W. E. Loder, and Prof. J. R. Matthews on the Council.

After the meeting a number of the Fellows and their friends dined together at the Trocadero Restaurant.

In the 'Irish Book Lover' for March–April 1933 (xxi. 37–40), Mr. J. Ardagh has written a supplement to N. Colgan's "The Shamrock in Literature" noticed in this Journal in 1897 (p. 159).

Royal Society.—Friedrich August Ferdinand Christian Went, Professor of Botany in the University of Utrecht and Director of the Botanic Garden, has been elected a Foreign Member.

The Editor returns thanks to Mr. Ramsbottom for kind assistance in producing the numbers of the Journal during his own absence abroad.

JOHN GERARD KOENIG.

By A. B. Rendle.

(Continued from p. 153.)

There is no record of the number of specimens contained in Koenig's herbarium at the time of its passing into Banks's possession. The number must run into thousands. In a letter to Patrick Russell, Dec. 4, 1783, he writes :—"My Flora Orixensis runs up to 1000 species; I have got several new genera and species in the botanical way." Descriptions of these are found in vol. 1 of the MSS., "Plantæ Orixenses descriptæ, 1784" (pp. 208–251). The specimens are now incorporated with the general collection in the British Museum Herbarium.

The plants were sometimes mounted on thin folio sheets, but more often on larger stiffer sheets similar to those in use in Banks's herbarium—a standard of size still followed in the British Museum Herbarium. The sheets are labelled on the back in the top left-hand corner "Ind. Orient. Koenig" (or similarly), generally by Dryander, who succeeded Solander as librarian to Banks in 1782. In many cases a species-name with a diagnosis and note of locality was written by Koenig on the back of the sheet (see Plate 601).

As already mentioned, Koenig sent plants from time to time to various European botanists during his life. Notes and lists of these are found intercalated among his manuscripts. Thus in vol. 13, p. 243, a note "Enumeratio & descriptiones Plantarum, Seminum, Lapidarum cum nonnullis ex regno animali transmissa ad europæam annis 1776 & 77" is followed by a number of lists with descriptive notes. One of these lists (p. 257) of 100 specimens, dated 1776, seems to be the origin of a list of species in Herb. Mus. Brit. in Solander's writing headed "Koenig 1776." The corresponding herbarium sheets are noted in Solander's hand "India orientalis: Coromandel *J. G. Koenig*, 1776."

Koenig also sent many specimens to the elder and younger Linnæus, descriptions of which are published respectively in the 'Mantissa,' pt. ii. (1771), and the 'Supplementum,' 1781. The specimens are in the Linnean Herbarium. A numbered list, with descriptions, of the specimens sent from India by Koenig to the elder Linnæus and described in the 'Mantissa' has recently been found by Mr. Savage among Sir James Edward Smith's effects at the Linnean Society. The specimens in the Linnean Herbarium are indicated by corresponding numbers which thus serve to connect them with Koenig.

The failure of Banks to publish accounts of the rich collections in his herbarium is well known. The careful descriptions drawn up by Solander and his successor Dryander, two experienced

and industrious botanists, trained by Linnæus, are preserved in the British Museum Herbarium. If the rich harvest gathered by Banks and Solander in their World voyage with Captain Cook remained unpublished, it is not a matter for surprise that Koenig's extensive Indian collections suffered in the same way. Koenig had, however, sent many specimens to Retzius at Lund, and descriptions of these appeared in Retzius's 'Observationes' (1779–1791).

In a recent number of the 'Kew Bulletin' (1932, no. 2), Dr. C. E. Fischer has recorded the results of his examination of 346 specimens attributed to Koenig in the Lund herbarium, and has correlated these with the descriptions of Koenig's plants published by Retzius. I have not seen any of the Lund specimens, but from Dr. Fischer's remarks the association with Koenig is less intimate than is afforded by the evidently much fuller and frequently annotated material in the British Museum Herbarium. For instance, of *Holmskioldia sanguinea* Retz. Dr. Fischer states (p. 64) that the specimen in the Lund herbarium, written up "*Holmskioldia*," is "presumably the type of the description in Retz. Obs. vi. 31, but there is nothing to connect it with Koenig." In Herb. Banks there are two sheets from Koenig. The first bears on the back, in the usual left-hand corner, the indication (in Dryander's hand) 'Bengal. culta. König,' and is written up '*H. sanguinea* Retz.' On the back of the sheet is a long description, in the same clerical hand that transcribed Koenig's letter to Banks, diagnosing the plant as a new genus, and stating that it was brought from the valleys of the highest mountain peaks of Boutan "cura propria" of the Governor-General of Bengal, Warren Hastings, and is now flourishing spontaneously in his garden. The following is the text of the description :—

"Genus novum Classis XIV didynamia, ordinis Angiospermia, Calyce indiviso. Character essentialis—Calyx perianthium inferum indivisum campanulatum magnum membranaceum persistens Coloratum (Coccineum punctis aureo-luteis minimis conspersum). Corolla subringens, tubo compresso. Limbo marginibus revolutis. Calyce parum longior concolor. Stamina inaequalia approximata Corolla vix longiora. Frutex Spectabilis floribus axillaribus numerosis vividissime Coccineis, viroreque foliorum intermixtis distinctissimus; Ex vallis summorum jugorum montium Boutanensium Cura propria Excellentissimi Domini Warren Hastings Gubernatoris Generalis totius regni Bengalensis allatus, nunc in suo hortu plantis exoticis ditissimo sponte vigens, Spectatores alliciens."

Koenig gives a very full description of the plant in the MSS. vol. 19, pp. 73–77, under the heading "Hast. augustiss. gloriosa." Above the description Dryander has written "*Holmskioldia sanguinea* Retz. obs. 6, p. 31." A second sheet in Herb. Banks, bearing the note "Bengal, Koenig, 1785," is written up by Dryander *Hastingsia augusta* (Mscr.) *Holmskioldia sanguinea*.

The name was subsequently published by J. E. Smith in Rees 'Encyclopædia' (1819) as *Hastingia*, "so named by the late John Gerard Koenig in honour of his patron, the celebrated governor Warren Hastings." "The design proved abortive," the genus "being published by Retzius under the uncouth name *Holmskioldia*."

At the end of his communciation Dr. Fischer gives a list of thirty-three species mentioned by Retzius, but not found in the collection from Lund. I thought it might be useful to see how far these were represented at the Museum, and the following notes are the result, and at the same time indicate the extent and nature of the information that may be gathered from the specimens and manuscript. The notes are numbered to correspond with the numbers in Dr. Fischer's list of omissions.

1. MENISPERMUM COCCULUS L., Retz. Obs. vi. 34 (1791). Retzius states that Koenig has sent him a specimen named *Menispermum hirsutum*, which agrees excellently with Plukenet's figure, 'Mantissa,' 345. This figure was referred by Linnæus (Sp. Pl. ed. 2, 1468) to *M. Cocculus*. Retzius cannot understand how Koenig should have been ignorant of a plant so common in India, and suggests that there is some confusion, adding: "Dubia haec solvant autoptae."

There are two good sheets of specimens in Herb. Banks from Koenig, one of which bears the note in Koenig's hand :—

"Menispermum hirsutum. Foliis lanceolato-ovatis villosis a Linné Spec. pl. pag. 1469 [*sic*] [Ed. 2]; habitat in nemorosis inter frutices scandens. Planta medicinalis per totam indiam præsertim in morbis infantum."

The specimens represent, as Koenig indicates, *M. hirsutum* L., now known as *Cocculus hirsutus* Diels (*C. villosus* DC.). Plukenet's figure, t. 345, fig. 7 (not fig. 2 as erroneously cited by Linnæus) was not quoted under *M. Cocculus* in Spec. Plant. ed. 1. It represents a different species, *Pachygone ovata* Miers: there is a specimen in Herb. Plukenet in Herb. Sloane. *Menispermum Cocculus* L., now known as *Anamirta Cocculus* Wight & Arn., is distinct from both the above.

It is of interest to note that in his MSS., vol. 18, pp. 94–96, Koenig gives a full description of the species headed :—"Observ. in Menispermo ~~hirsuto~~ [*sic*] myosotide" with the locality "habitat ad latera pedesque & summitates montium Waendeluhrensium frequens." I find no specimen with this note in the herbarium.

M. hirsutum and *M. myosotoides* were both described by Linnæus from Plukenet's figures; corresponding specimens exist in Plukenet's herbarium in Herb. Sloane, and both represent the same species, *Cocculus hirsutus* Diels.

2. CAPPARIS HORRIDA Linn. f. Retz. Obs. v. 4 (1789) merely states "e Coromandel, non vero e Ceylono misit b. Koenig."

C. horrida Linn. f. is a *nomen dubium*. It was described by the younger Linné (Suppl. 264, 1781) on a specimen from Ceylon from Koenig. There is, however, no specimen of it in the herbaria at the Linnean Society. In Herb. Banks a specimen from Koenig is written up *Capparis horrida* Koenig, and bears the following note in Koenig's hand :—

"Capparis horrida. Folia lanceolato-oblonga, subavenia. Floribus axillaribus solitariis. Pomis globosis acutis, scruposis. habitat locis aridis, dumosis prope Tanschauhr [Tanjore] frequens, aliis locis rarior. Folia sunt caduca inde spinæ horridæ pungent."

This specimen is the type of *C. stylosa* DC. Prodr. i. 246 (1824) characterised by *patent* stipular thorns, narrow leaves, and *solitary* axillary flowers. It comes, as De Candolle states, from Coromandel, not Ceylon. On the same sheet, in Herb. Banks, is the specimen from Mysore, Buchanan, on which de Candolle founded his var. *β velutina*. There is no specimen of Koenig's from Ceylon in Herb. Banks. What was the specimen sent to the younger Linné, on which he founded his *C. horrida* ?

The leaves of *C. horrida* Linn. f. are described as "ovate-lanceolate" and the peduncles as "binate." S. T. Dunn in Kew Bull. 1916, 62, suggests that the younger Linné was redescribing *C. zeylanica* Linn. (Sp. Pl. ed. 2, 720, 1763), the type of which was in Hermann's herbarium, and, therefore, presumably unknown to him. But *C. zeylanica* is a climbing shrub, while *C. horrida* is "arbor rigida." Nor does "ovate-lanceolate" suggest the leaves of *C. zeylanica*. De Candolle (Prodr. i. 246) regarded *C. horrida* Linn. f. as distinct, with *ovate leaves* and 2–4 *supra-axillary pedicels*. He cites "Coromandel and Ceylon in Herb. Banks," but there is no evidence as to what specimens he saw. If the plant sent by Koenig from Ceylon to Linné was conspecific with the one named *C. horrida* from Coromandel in his own herbarium, then *C. horrida* is an earlier name for de Candolle's *C. stylosa*. In view, however, of possible differences of opinion as to the identity of *C. horrida* and the absence of any definite type, it would seem best to reject it as a *nomen dubium*. A specimen from Wight in Herb. Mus. Brit. represents *C. stylosa* DC. ; this is figured as "*C. divaricata* Lam." in Wight, Icon. 889. Lamarck knew neither flowers nor fruit of his species (Encyc. Meth. i. 606, 1785), but de Candolle, who saw the plant in Herb. Jussieu, puts it among his doubtful species (Prodr. 252) : it has *hooked* and not the *patent* stipular thorns characteristic of *C. stylosa* DC.

3. MANGIFERA PINNATA Linn. f., Retz. Obs. v. 4. (See above, p. 151.)

4. AESCHYNOMENE CANNABINA Retz. Obs. v. 26. "Dedit honor. König, qui *cannabinam* vocavit, quia hujus in modum tractata, Cannabis speciem praebet." Described by Koenig, MSS. 5, p. 101. No specimen from Koenig has been found in Herb. Banks.

5. ZINNIA BIDENS Retz. Obs. v. 28. No specimen from Koenig found in Herb. Banks.

6. DIOSPYROS EBENASTER Retz. Obs. v. 31, presumably a synonym of the following species.

7. DIOSPYROS EBENUM Koenig (1776), Retz. *l. c.*

A specimen in Herb. Banks, "Coromandel J. G. Koenig," bears no writing of Koenig's, but is written by up Banks *Diospyros Ebenum*. There are several descriptions of this species in the MSS. under *Melanoxylon* and *Ebenum*; in vol. 10, pp. 119–122, is a very full description of *Diospyros Ebenum*, to which Dryander adds the note "Published in 'Physiographiska Sälskapets Handlingar,' Del. 1, St. 3, pag. 177–180."

8. MYRTUS LAURINUS Retz. Obs. iv. 26 (1786). "E Zeylona misit amic. Koenig." The specimen from "Zeylon König" in Herb. Banks bears Koenig's note written on the back of the sheet, "Laurus serrata, Burm. Thes. Zeyl. pag. 139. Tab. 62. habitatus nemorosis."

The specimen is *Symplocos spicata* Roxb.

In the MSS. 17, 'Descriptiones Plantarum Zeylanicarum,' p. 20, there is a full description (dated 5 Mar. 1781) of *Laurus serrata* Burm. Zeyl. Above the name, Koenig has written, presumably at a later date, "*Myrtus*." The name *Myrtus serratus* Koenig appears, quoted in synonymy, in Steudel, Nomencl. ed. 1, 321.

9. VINCA PARVIFLORA Retz. Obs. ii. 14 (1781). "E Tranquebaria misit indefessus König."

A sheet bearing two specimens in Herb. Banks, written up by Banks and labelled "Ind. Or. Koenig," bears the note by Koenig :—"Vinca parviflora" followed by a brief diagnosis, a reference to Rheed. Malab., and the locality—"habitat in agris siccioribus intra segetes."

The species has been referred to *Vinca pusilla* Murray.

10. CYNANCHUM CORDIFOLIUM Retz. Obs. ii. 15.

No specimen from Koenig found in Herb. Banks. There is a description in the Manuscript, *Cynanchum cordifolium* ?, 5, p. 29.

11. PERIPLOCA EMETICA Retz. Obs. ii. 14 (1781). A specimen in Herb. Banks labelled "India orientalis. J. G. Koenig, 1777," is *Secamone emetica* R. Br.

12. STRYCHNOS COLUBRINA L., Retz. Obs. ii. 12. A specimen "Ind. or. König" has been referred doubtfully by A. W. Hill to *S. Benthami* C. B. Clarke.

S. TETANKOTTA Retz. *l. c.* (see Fischer in Kew Bull. 1932, 60). A specimen from "Koenig, Ceylon," bears no notes, but is written up by Banks, "*Strychnos Tettan Cotta* Koen. MS. 4to, clearing nut." There are several descriptions of this in different volumes of the MSS. It is referred by Dryander to *S. potatorum* Linn. f.

13. JUSTICIA PARVIFLORA Retz. Obs. v. 9. "E Calcutta misit *honor.* Koenig." A specimen in Herb. Banks bears on the back of the sheet in Koenig's hand :—

"Justitia parviflora sp. nova. Caule diffuso ramosissimo. Spicis terminalibus axillaribusque sessilibus secundis obtusis planiusculis folio brevioribus; bracteis diphyllis marginatis ciliatis. habitat ad margines hortorum prope Calcuttam satis frequens alibi rarissima planta & distinctissima sui generis cum floribus suis minimis magisque coloratis cœruleis."

There is also a short description in Koenig MSS. 5, p. 1. The specimen is written up by Dryander in Herb. Banks *Justicia pectinata* L. C. B. Clarke has assigned it to his *Rungia parviflora* Nees var. *pectinata* in Hook. f. Fl. Brit. Ind. iv. 550.

14. ACHYRANTHES ECHINATA Retz. Obs. ii. 12. "Num nova species, an varietas tantum *Achyranthes lappaceae*? Unicam plantam invenit Cl. Koenig prope montem Apuhr; sed exemplum ejusdem plantae ex Horto tam Vindobonensi, quam Upsaliensi, habeo. Differt a nominata *Achyranthes Lappacea* Linn."

A sheet bearing three separate pieces in Herb. Banks from Koenig, "Coromandel 1774," bears a ticket in Koenig's hand, "Achyranthes. Caule herbaceo patulo . . . habitat intra frutices abscondita, ad montem maximum St. Thomæ," transcribed from his MS. (vol. 8, p. 79). It is written up by Solander "*Achyranthes lappacea singularis* var. in Literis ad D^m. Jacquin." A similar specimen from Jacquin is written up "*Achyranthes lappacea* varietas." The specimens are *Pupalia lappacea* Juss. Mt. St. Thomas is ten miles south-west of Madras.

15. CELOSIA POLYGONOIDES Retz. Obs. ii. 12. "E Tranquebar misit Cl. König." A specimen from Koenig, "Coromandel in ruderatis," in Herb. Banks is written up by Solander "*Achyranthes 3gyna.*" Koenig MSS. 5, p. 26, describes "*Achyranthes 3gyna?*" "habitat in ruderatis intra fissuras rupium montis St. Thomæ." No specimen of Koenig's stated to come from Tranquebar has been found in Herb. Banks.

16. CELOSIA MARGARITACEA L., Retz. Obs. iii. 27 (1782). Retzius refers to a specimen sent by Koenig from Tranquebar under this name. Koenig MSS. 1, p. 243, and 7, p. 45, has a description which he queries '*Celosia margaritacea,*' "habitat in agris oryzazeis, inter Cynosuro Corocan prope momblon inveni."

I have found no specimen thus named in Herb. Banks, but a specimen of *C. cristata* L. labelled merely "Ind. Orient. Koenig," may perhaps be the original of the description.

17. CELOSIA COMOSA Retz. Obs. vi. 26 (1791). No specimen from Koenig thus named can be traced in Herb. Banks, and I have found no mention of the name in the MSS. There is a specimen of *C. argentea* L. labelled "Coromandel 1774 J. G. Koenig." A ticket in Koenig's hand with the specimen reads "*Celosia argentea* habitat in agris oryzazeis prope Cuda. Floret mense Decembr."

18. CELOSIA BACCATA Retz. Obs. v. 23. "Comm. cel. König"—no locality given.

There are two full sheets in Herb. Banks from Koenig, one bearing on the back the following note by him :—

"Celosia baccifera species nova [Retz. Obs. 5, p. 23. n. 55, added in Dryander's hand].

"Caule flaccido lævi ramosissimo; Foliis alternis ovatis subdentatis. Spicis terminalibus axillaribusque raris; Floribus trigynis. habitat in ruderatis & intra sepes hortorum prope Calcutta satis frequens, alibi nunquam observavi."

The second sheet is labelled "Bengal, Koenig, 1785."

The plant is *Deeringia baccata* Moq. (*D. celosioides* R. Br.).

Koenig's description occurs as above (the words after *hortorum* are omitted) as no. 2 in a list of plants, the contents of a packet, sent from Calcutta, January 13, 1785. The list is headed "Eingeklebte Krauter welcher als Proben fertig machte von einem Horto Sicco," and includes 32 numbers, among which are new genera and species with descriptions.

This heading explains the presence in Herb. Banks of sheets from Koenig with his own writing on the back.

19. CELOSIA MONSONIA Retz. ii. 13. Retzius states that fruit, necessary to determine the genus with certainty, is wanting in his specimen, which he received from Koenig. He cites no locality.

There are two full sheets from Koenig in Herb. Banks. On the back of one (see Plate 601) Koenig has written "*Celosia Mohnsoniae* sp. n. habitat in aridis sterilioribus prope Samalcotta copiose ad Madrastam minus frequens."

The second sheet is labelled (not in Koenig's hand) "Coromandel 1774, J. G. Koenig. Peritschalli Weretti pundu" [in the

Solander MSS. "Tamulis" is added], and is written up by Solander *Celosia Monsoniae* MS. In Koenig MSS. 19, pp. 7 & 8, is a full description of *Celosia Mohnsoniae* "habitat in aridis arenosis," but with no further locality. The species is *Aerva Monsonia* Mart.

A specimen sent by Koenig to the younger Linnæus was described as *Illecebrum Monsoniae* (Suppl. Pl. 161, 1781). Unfortunately the incorrect form *Monsonia*, initiated by Retzius, has been perpetuated by subsequent workers.

20. NEPENTHES DISTILLATORIA Linn., Retz. Obs. v. 7. No specimen from Koenig found in Herb. Banks. Retzius merely says: "Est planta dioica monente Cl. Koenig." Koenig MSS. 10, p. 185, has a description of the male and female flowers.

21. CYPERUS LUZULAE Friis Rottb. Descr. et ic. p. 23. no. 27; Retz. Obs. iv. 11 (1786). Retzius undoubtedly applied this name to a specimen from Koenig. He adds the note "A *Scirpo Luzulae* Ill. a Linné diversissimus, nisi erronea sit Ill. Viri descriptio. Cyperus enim Rottböllii, quem benevolentia Cl. König possideo, sine ullo dubio Cyperus est. Variat multum quoad involucri numerum, vidi enim foliis tantum tribus instructum."

Rottboell gave no specific name, merely a descriptive phrase:—*Cyperus umbella simplicissima* &c. Desc. Pl. Rar. Icon. Ill. 23 (1772); Desc. et Icon. Pl. 23, tab. xiii. fig. 2 (1773). His species was based on a dried specimen from the Amsterdam Botanic Garden, and his figure represents the widespread tropical American species known as *Cyperus Luzulae*. There is no evidence that he had a plant from Koenig; the usual indicating letter K is not appended to the diagnosis in his earlier work (p. 23).

The origin of the name is *Scirpus Luzulae* Linn. Syst. Nat. ed. 10, 868 (1760), without locality. In Sp. Pl. ed. 2, 75 (1762), Linnæus adds "Habitat in India," but cites no specimen. The specimen in the Linnean Herbarium is, *fide* C. B. Clarke (Journ. Linn. Soc., Bot. xxx. 313), the same tropical American species; Clarke suggests that by "India" we must understand the West Indies.

Rottboell, however, cites references to Burmann, Fl. Ind. 22 (1768), Plukenet, and Sloane. In this he is following Burmann with some hesitation, for he mentions a small variety from Surinam, the existence of which leads him to accept, "cum dubio tamen," Burmann's authority for referring the Indian species to *Scirpus Luzulae* Linn. The confusion is therefore traceable to Burmann, who under *Scirpus Luzulae* L. cites: "Gramen cyperoides orientale, panicula elegantissima &c.," Pluk. Mant. 97, t. 417, f. 3, from Malabar. No specimen has been traced in Herb. Plukenet (in Herb. Sloane), but the figure evidently represents the Indian species *Cyperus difformis* L. Burmann also cites Sloan. jam. t. 79, fig. 1, but this is a different species.

Willdenow was therefore justified in excluding these references when citing *Cyperus Luzulae* Rottb. in his Sp. Pl. 1, 276 (1798); but he overlooked Retzius's publication (as does also the 'Kew Index,' which quotes *C. Luzulae* Rottl. (*sic*) ex Willd.).

Koenig presumably followed Rottboell and Burmann in determining his plant; there is a very full description in his MSS. (14, p. 120), as *Cyperus luzulae* (p. 131 is dated 11 Nov. 1783). No specimen named *C. Luzulae* by Koenig has been found in Herb. Banks, but there are four sheets of *C. difformis* L. from him under this and other names.

22. SCIRPUS PILOSUS Retz. Obs. vi. 19. A synonym of *Fuirena glomerata* Lam. and *F. ciliaris* Roxb. (*Scirpus ciliaris* Linn. Mant. 182).

There are two specimens in Herb. Banks from Koenig; on one he has written *Scirpus ciliaris*, with the habitat on the back of the sheet, the other, received from Koenig in 1776, is written up by Solander *Scirpus ciliaris* Linn., Koenig MS.

23. SCIRPUS CARIBAEUS Rottb., Retz. Obs. iv. 12. The specimens on which Retzius based his observation were presumably conspecific with two in Herb. Banks from Koenig; one sheet bears Koenig's note "*Scirpus capitatus* a Linné," the other bears a note in Dryander's hand "*Scirpus* forte *caribaeus* Retz. Obs. (not Rottb.)." Both were determined by C. B. Clarke for the 'Flora of British India' as "*Eleocharis capitata* R. Br." There has been some confusion as to the name of this species—the valid name is *E. caribaea* (Rottb.) Blake (in 'Rhodora,' xx. 24, 1918).

24. AEGILOPS MURICATA Retz. Obs. ii. 27 (*Eremochloa muricata* Hack.). No specimen from Koenig found in Herb. Banks.

25. ARISTIDA DEPRESSA Retz. Obs. iv. 22 (*A. adscensionis* L.). No specimen found.

26. ARUNDO BENGALENSIS Retz. Obs. v. 20 (*A. Donax* L.). I have found no specimen named *A. bengalensis* from Koenig, but there is a description in the MSS. 5, p. 197. There are two sheets of *A. Donax* from Koenig: one bears Koenig's label *Arundo bifaria* sp. nov. with diagnosis and habitat, and is presumably a duplicate of the specimen described by Retzius from Koenig (Obs. iv. 21); the second, obviously conspecific, is written up by Koenig "*Arundo nana*," also with description and locality.

27. ANDROPOGON INCURVATUM Retz. Obs. v. 21. A specimen from Koenig is written up by him *Andropogon incurvatum* with a short description and locality. It is *A. caricosus* L. There is also a specimen from Koenig named by him *Andropogon caricosum*.

28. MILIUM RAMOSUM Retz. Obs. vi. 22. A specimen from "Koenig, Ceylon," named by him *Agrostis indica* is *Eriochloa polystachya* H. B. K.

29. PANICUM SETIGERUM Retz. Obs. iv. 15. No specimen found from Koenig.

30. BAMBOS ARUNDINACEA Retz. Obs. v. 24. "Arundo Bambos Auctorum." A specimen in Herb. Banks labelled "Ind. Orient. Koenig" is written up by Dryander *Arundo Bambos*, under which name it figures as no. 4 in the list referred to under *Celosia baccata*. General Munro has determined it as *Bambusa spinosa* Roxb.

31. EMBELIA BURMANNI Retz. Obs. iv. 23. This is a misquotation; Retzius is referring to the genus *Embelia* Burmann, not to a species*, as is evident from the typography and the remark which follows: "De charactere hujus generis essentiali nihil certi pronunciare audeo, non visa specie Burmanniana, fide autem *Opt.* König binae ejusdem sunt Species, scil."

"*Embelia Ribes* foliis obovatis alternis Burm. Fl. Ind. p. 62, t. 23, et *Embelia Grossularia* foliis &c. Hanc e Tranquebaria communicavit *Cel.* König."

Embelia Grossularia Retz. is a synonym of *Salvadora persica* L. There are specimens in Herb. Banks from Koenig (presumably from Ceylon and the Coromandel coast), and in Koenig MSS. I, p. 166, is a full description. The latter is the source of the description by Koenig published as a footnote in Roxburgh's 'Plants of the Coast of Coromandel,' i. 27, under *Salvadora persica* L., of which *E. Grossularia* Retz. is cited as a synonym. Koenig in the MS. cited gives no botanical name, but quotes the native name "Olan chiddy." He seems to have confused the species with *Embelia Ribes* Burm., as there are notes on it in his MS. under this name, and one of the specimens in Herb. Banks was apparently sent thus named, as Dryander has annotated it *Embelia Ribes* Koen. (non Burmann).

Walker Arnott, in his discussion on the species of *Salvadora* (in Proc. Phil. Soc. Glasgow, iii. 160), distinguishes the plant of Koenig, Vahl, Roxburgh, and others as *Salvadora Koenigii*, and the sheets from Koenig in Herb. Banks have been thus written up by J. J. Bennett, apparently before the actual publication of Arnott's paper, as reference to volume and page is not given. Arnott's paper seems to have been overlooked by C. B. Clarke when revising the genus for the 'Flora of British India' (iii. 619), and the combinations proposed by Arnott are also omitted from the 'Index Kewensis.'

* The 'Kew Index' makes the same mistake, as does also Walker Arnott in the paper referred to below.

32. CLAVARIA BIFIDA Retz. Obs. v. 32. In Malacca, Siam habitat. *Cel.* König. No specimen found.

33. FUCUS ZEYLANICUS Retz. Obs. vi. 40. "E mari Ceylanico misit D. König." Mr. G. Tandy informs me that the description suggests a species of *Sargassum*. A. Grunow, 'Additamenta ad cognitionem Sargassorum' in Verhandl. k.-k. zool.-bot. Ges. Wien, lxv. 398 (1915), under *S. cristaefolium* C. Ag., quotes Koenig as sending a specimen from Ceylon, but does not say where the specimen is preserved. No specimen has been traced in Herb. Banks.

The statement that specimens of some of the species have not been found in Herb. Banks does not necessarily indicate their absence. Koenig's specimens were incorporated, either originally or subsequently, with the general herbarium, and, during the century and a half since their arrival, may have been placed under genera or species where we might not now expect to find them. A proportion of them were unnamed or named only tentatively. We gather from Koenig's letters to Russell that he continually deferred the work of arranging his specimens and manuscripts, and he had probably not completed it at the time of his death.

The plants collected on the journey to Siam and Malacca I have not found in Herb. Banks. Koenig's journal contains copious references to plants collected and described; references to his 'Chloris Malaccensis' and 'Chloris Siamensis' indicate that these enumerations were written on his journey. Descriptions were made from living plants, but there are frequent references in the Journal to drying of specimens. His collections appear to have suffered greatly in the heavy rains—thus he writes:—"Nov. 22, 1779. Terrible rains, everything saturated and my collection suffered greatly as everything began to decay." On Nov. 24, "I sent away whatever was dry in my collection by the war frigate 'Sea Horse,' which starts for Madras to-day." Koenig was specially interested in the Scitamineae, and his 'Descriptiones Monandrarum pro annis 1778 et 1779' appended to Retzius's 'Observationes,' pt. iii. (1783), is based on species observed during this journey. A draft of the 'Descriptiones' is in the MSS. II, pp. 87–157, and is followed by a draft of the 'Descriptiones Epidendrorum,' pp. 161–196, 211–240, appended by Retzius to part vi. of his 'Observationes' (1791)*. Retzius states in his preface that he received 'Descriptiones Epidendrorum' from Prof. J. C. D. Schreber of Erlangen, to whom he dedicates this part. (In his letter to Banks, printed above, Koenig mentions sending grasses to Schreber.)

There is no evidence that these descriptions were accompanied by specimens, nor that they were intended for publication. Retzius begins his introductory note to the Descr. Monandr.

* There are also copies in the Linnean library at the Linnean Society.

"Optime Koenig, Descriptiones tuae exactissimae, quae Te inscio publicas facio," and Koenig, writing to Patrick Russell, Sept. 19, 1784, complains that Retzius had published these descriptions contrary to his knowledge and "after a wrong copy." The nomenclature is obviously, in some cases, tentative. The first entry "*Hura Siamensium* Novum genus" affords an example. This has been accepted in botanical literature as a species-name, but Koenig's MS. (11, p. 87) reads: "Siam: Hurâ. Genus novum. Monandria Gynandria." The interpretation is, of course, "the plant named Hurâ by the Siamese is a new genus." Compare also the kinds of Languas (pp. 64–67), and, among the "Descr. Epidend.," *Epidendrum Fl. aeris*? nos. 18 and 23; and *E. Calceolariae* nos. 3 and 22; two distinct species in each case. Hooker (Flor. Brit. Ind. vi. 197) includes the Epidendra as of undetermined affinity, and says, "they are for the most part Peninsular and probably all communicated by Heyne." But dates and indications of locality in the manuscript descriptions, which can be correlated with frequent references in the Journal to collection and description of Epidendra between May 4 and Sept. 14, 1779, show that they were collected by Koenig mainly in Malacca, and in Jung Ceylon and adjoining islands. The last species only, *Serapias Epidendraea*, is Indian.

Koenig's descriptions are lengthy, but data essential to determination are sometimes not given; he occasionally adds rough figures in his MSS. Mr. Ridley has kindly gone through these descriptions and makes the following determinations or suggestions:—

(1) *Epidendrum spathulatum—Aerides suavissimum* Lindl.
(2) *E. variegatum*—doubtful.
(3) *E. Calceolariae*—a *Dendrobium*, probably *D. acerosum* Lindl.
(4) *E. hexandrum—Appendicula Koenigii* Hook. f.
(5) *E. ophrydis—Microstylis congesta* Rchb. f.
(6) *E. Herba simplex minima*? Rumph. *Oberonia Prainiana* King. It cannot be *Dendrobium atropurpureum* as suggested by Rolfe as that has not the flowers in distant whorls.
(7) *E.* ? *Orchideum—Ceratochilus orchideus* Lindl.
(8) *E. pusillum—Sarcochilus Wightii* Hook. f.
(9) *E. complanatum*—probably *Thrixspermum arachnites* Rchb. f.
(10) *E. clavatum*—? *Saccolabium clavatum* Lindl.
(11) *E. subulatum*—doubtful.
(12) *E. nudum—Dendrobium pumilum* Roxb.
(13) *E. tomentosum*—probably *Eria albido-tomentosa* Lindl.
(14) *E. bidentatum—Cleisostoma* sp.
(15) *E. Lycopodioides—Oberonia* sp., probably *O. anceps* Lindl.
(16) *E. longiflorum* and (17) *E. flabellum veneris* are certainly *Cirrhopetala*: (16) being hairy on the flowers is perhaps *C. papillosum* Rolfe, (17) is probably *C. miniatum* Rolfe, but both may be unknown species.

(18) *E. Flos-aeris*?—A *Vanda* with yellow flowers.
(19) *E. plantaginifolium*—perhaps *Acriopsis javanica* Reinwdt.
(20) *E. sessile—Bulbophyllum clandestinum* Lindl.
(21) *E. Liliifolium—Thecostele* or *Acriopsis*.
(22) *E. Calceolariae—Bromheadia palustris* Lindl.
(23) *E. Flos-aeris*?—*Eria albido-tomentosa* Lindl.

EXPLANATION OF PLATE 601.

Photograph of Koenig's specimen of his *Celosia Mohnsoniae*, sp. nov., in the British Museum Herbarium (one-third nat. size). Below a photo of the note in Koenig's hand on the back of the sheet (reduced by one half). The note reads thus:—"Celosia Mohnsoniae sp. n. habitat in aridis sterilioribus prope Samelcotta copiose ad Madrastam minus frequens. Amaranthoides spicatum indicum ramosissimum, Spergulae foliis: spica Alopecuroide incarnata. Plukn. Amalth. pag. 13, Tab. 357, Mant: Tab. 334: f. 4."

CONTRIBUTIONS TO OUR KNOWLEDGE OF BRITISH ALGÆ*.

BY F. E. FRITSCH, F.R.S.

V. A BRITISH SPECIES OF *ECBALLOCYSTIS* (*E. FLUITANS*, SP. NOV.).

THE alga that forms the subject of the present communication was collected in 1924 by the late Mr. C. Turner, F.L.S., of Wilmslow, Cheshire, from a small stream running from the adjacent moorland alongside of a farmyard near Tal-Y-Bont, Merionethshire, in Wales, at an altitude of between 500 and 600 feet and about two miles from the sea. The area lies on Silurian rocks. At the time I exchanged a number of letters with Mr. Turner with reference to the nature and probable taxonomic position of the alga, and he sent me a small quantity of formalin material from which a number of stained preparations were made by Dr. N. Carter. Some little time after the death of her husband, Mrs. Turner very kindly placed his material at my disposal, but unfortunately the tubes that were received did not contain any material of the alga in question. On the other hand, there were innumerable stained mounts of the alga, the majority of which afforded very little information, but on a number of them, and on the slides originally made by Dr. Carter, the following description of the alga is based.

There is much that remains doubtful about the structure and mode of growth of this form, but it is felt that it will be well to call attention to it in the hope that someone may have the good fortune to find it again and be in a position to study it more completely. From the very first I was of the opinion that

* From the Department of Botany, East London College, University of London.

the alga was probably a species of *Ecballocystis* *, but it was not until I had had the opportunity of examining the numerous interesting members of the genus described by Iyengar † that I became fully convinced of the fundamental similarity. Fig. 1 is a reproduction of figures found among Mr. Turner's papers, while figs. 2 & 3 are drawn by myself.

Mr. Turner describes the alga as forming a thin mucous stratum in the shallow water on the bottom of the stream at a depth of about 2 to 3 inches. It is, however, highly probable that the stratum consisted of innumerable colonies attached at one end and trailing out with the current. As to the length of these colonies there is no available information. Under the microscope the colonies appear simple or branched (fig. 1, B) with large numbers of small elongate cells, loosely or compactly aggregated within a more or less tubular mass of apparently rather soft and readily diffluent mucilage. The cells are grouped in one or two or sometimes even three or four longitudinal series, but there is no great regularity about these series, and the arrangement of the cells is often anything but parallel, many of them lying at an angle to others (fig. 1, B ; 3, A). The mucilaginous envelope of the colony, which is mostly not very evident until stained, usually shows a rather irregular outline and at many points is clearly stratified, although the strata exhibit a very uneven course and are often exceedingly difficult to follow up in the longitudinal direction. In many cases successive strata from without inwards are of increasing density, as shown by the depth of staining (fig. 3, F).

The individual cells are elongate, usually three to four times as long as broad, and are most commonly broader at one (the upper) than at the other end (fig. 2, B, D, E). The cells contain a number of parietal chloroplasts, in practically all cases apparently four, grouped generally in two pairs in the upper and lower halves of the cells respectively. These chloroplasts have the form of curved plates. In certain strongly elongate cells the four chloroplasts were, however, found to lie in a linear series and to be larger and more or less of the form of curved bands (fig. 2, C); I suspect that these are cells about to divide and that each daughter-cell will receive two of the chloroplasts, which will then subdivide. I have been unable to recognise a pyrenoid in the chloroplasts, but do not think that the material was adequate to disprove its presence. Nor has it been possible to demonstrate starch in the cells, and the product of photosynthesis must at present remain an open question. No fat could be clearly demonstrated with the usual reagents. A large proportion of the

* Bohlin, K., " Die Algen der ersten Regnell'schen Expedition.—I. Protococcoideen," Bih. K. Sv. Vet.-Akad. Handl. xxiii. Afd. iii. No. 7 (1897).

† " Two little-known Genera of Green Algæ (*Tetrasporidium* and *Ecballocystis*)," Ann. of Bot. xlvi. 191 (1932).

cells are binucleate (*cf.* fig. 2, G), more than half of them in some colonies. The nuclei are spherical and usually placed at about one-third of the length of the cell from either end.

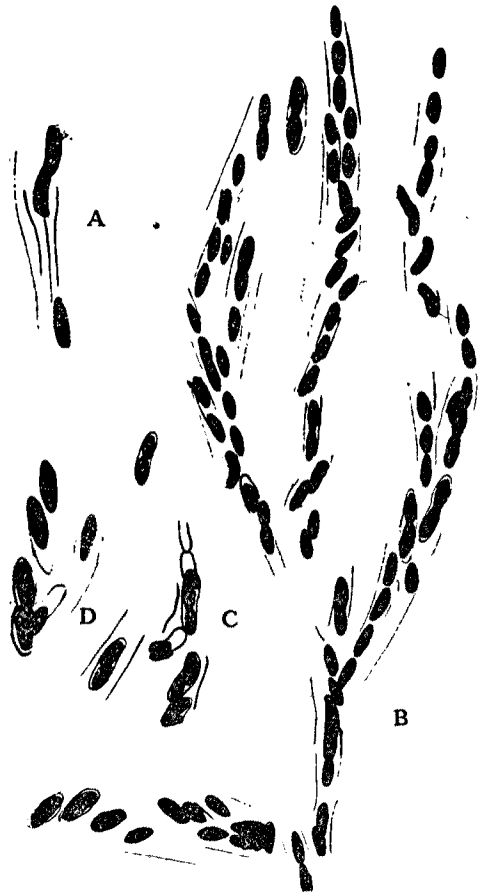


Fig. 1.—*Ecballocystis fluitans*, sp.nov. (from drawings made by Mr. C. Turner*). A, C, D, small portions of colonies, showing dividing cells and escape of the protoplasts from the membranes ; B, a branched colony. (× about 650.)

There can be little doubt that the frequent binucleate character of the cells merely marks an early division of the nucleus antecedent to actual cell-division. In the latter process the protoplast always divides obliquely (fig. 2, A ; 3, A–E), the plane of

* The actual drawings were not received, but there were a number of photographs of groups of drawings, and one of these enlarged is reproduced in fig. 1.

division being usually very much inclined to the transverse one, although in occasional cells the division-plane approaches more nearly to the horizontal (fig. 2, H). Each cell possesses a delicate cell-membrane, usually fitting closely round the protoplast,

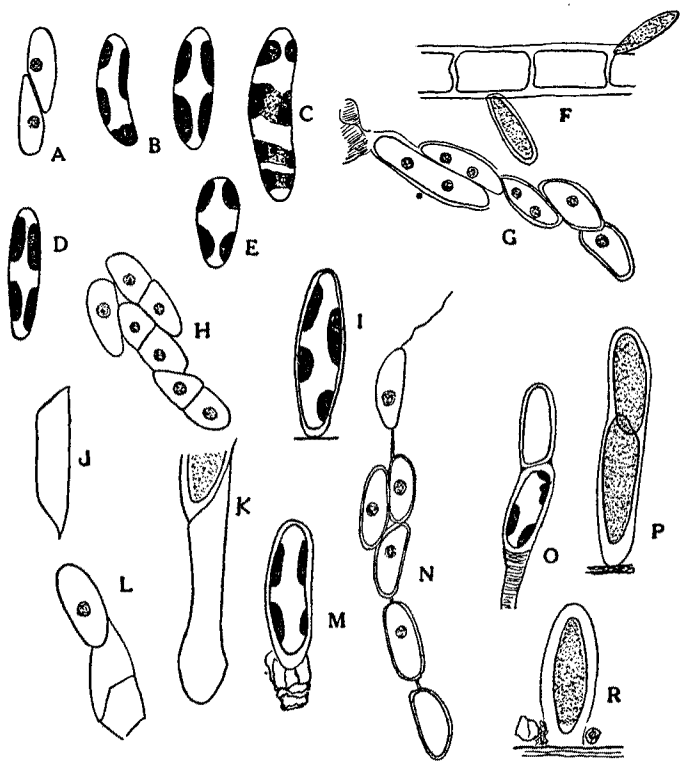


Fig. 2.—*Ecballocystis fluitans*, sp. nov. A, cell just after division; B–E & I, cells showing chloroplasts, in C arranged in a row along the cell; F, attached cells, showing probable process of ejection; G, basal part of an attached colony, with some of the cells binucleate; H, group of cells with almost transverse division; I, M, & R, attached cells showing the slightly thicker membrane at the base; J, K, empty membranes from colonies, in K with a cell at the mouth; L, two cells, the lower empty and with a second empty membrane at its mouth; O & P, two-celled attached colonies, in O with an empty membrane at the base. A, B, D, G, H, J, L, N, O, R, × 1500; C, E, I, K, M, P, × 2000; F, × 1000.

but sometimes more offstanding (fig. 3, B). After division each daughter-cell forms a complete new membrane of its own within the original parent-membrane, and in many cases the two sets of membranes are clearly seen (fig. 3, A, B, D, E). It seems

that quite commonly the two daughter-individuals may thus remain enclosed within the wall of the parent for a considerable length of time. The latter no doubt becomes somewhat mucilaginous, and can evidently undergo considerable stretching as the

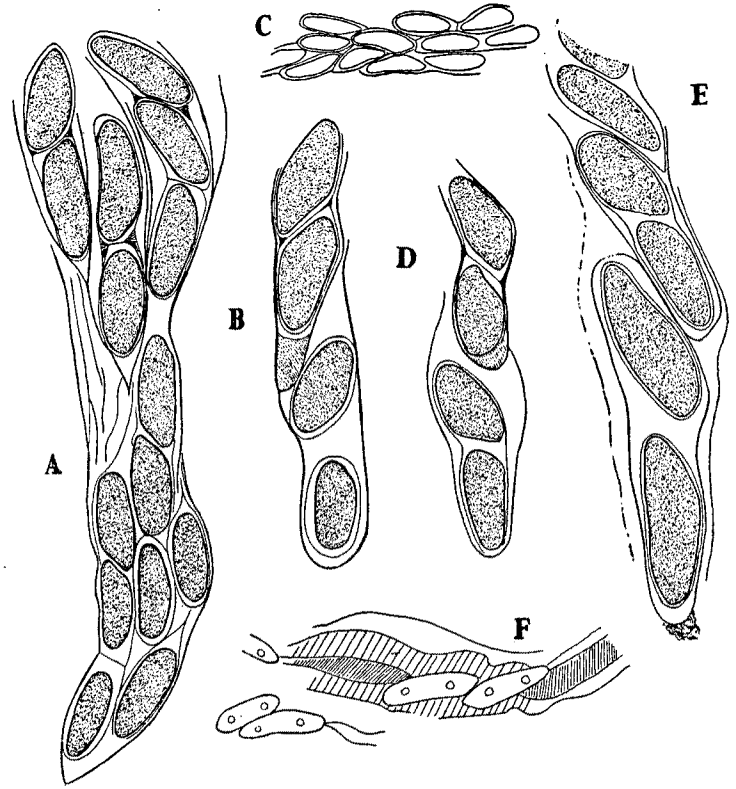


Fig. 3.—*Ecballocystis fluitans*, sp. nov. A, lower part of an older colony to show the general relations of the cells; B & D, parts of larger colonies showing definite *Ecballocystis* structure and attaching pads at the base of the individuals of the upper generation. C, part of an older colony with densely packed cells. E, 6-celled colony with definite *Ecballocystis*-arrangement of the cells; the uppermost individual is only partly shown. F, small part of an older colony, showing stratification of the enveloping mucilage and liberation of cells from their membranes. (C & F, × 1000; the other figs. × 2000.)

new individuals enlarge—moreover, it is not uncommon to find the two daughter-individuals more or less widely separated from each other (fig. 3, E), but still enclosed in the membrane of the parent. It would seem that there is a good deal of variety with respect to the stretching capacities of the parent-membrane,

which certainly, in some cases, becomes ruptured at an early stage of the enlargement of the daughter-individuals. Recently divided cells are always easily recognisable by the obliquity of their approximated ends (figs. 2, 3), and such cells are almost invariably uninucleate. The binucleate condition seems to arise at an earlier or later stage of their growth. In many cases the successive division-planes slope in the same direction, but this is not an invariable rule.

Most of the larger colonies taper to a single cell at one end, and this is invariably the case with the smaller ones. At this end, at which it is believed that the colony was originally attached (*cf.* below), the details of the mode of formation of the colony are often clearly recognisable (*cf.* especially fig. 3, B, D, E). Here one can often find a succession of ruptured parent cell-membranes corresponding to the successive divisions that have taken place. Fig. 3, E, is a complete 6-celled colony in which the uppermost cell is only partially shown. The membrane of the primary cell was only recognisable at certain points as a goblet-shaped mucilaginous envelope surrounding the whole. Within are found the two daughter-generations, the lower having divided once, the upper twice. The membrane of the upper individual of the first generation has ruptured, that of the lower is intact, although it shows clear indications of a probable breaking down at the apex in the near future. The spatial separation of the two individuals of the lower generation is noticeable, and may depend on excretion of intervening mucilage.

Similar stages to this were repeatedly observed at various points within larger colonies (*cf.* the upper part of fig. 3, A). In fig. 3, B & D, the individual of the upper generation shows a prominent basal foot, more marked in fig. 3, B, than in fig. 3, D. This usually conical foot stains much more deeply than the rest of the membrane and appears to correspond to the attaching mucilaginous pads described by the writer* and by Iyengar†. In these cases, therefore, the upper individual of the first division has become attached to the parent-membrane near one of its ruptured edges, and such conical attaching pads were repeatedly seen in some of the individuals of larger colonies, but were by no means always recognisable—for instance, not in the colony shown in fig. 3, E. This may either mean that such definite attaching pads are not developed in all cases or that they are not always equally stainable. It will be noticed that the parent-membrane breaks open obliquely, the plane of the oblique aperture being probably always parallel to the plane of division of the protoplast. It seems that this aperture is produced by gelatinisation of the apical part of the membrane.

* Fritsch, "Contributions to our Knowledge of the Freshwater Algæ of Africa.—2," Ann. S. Afr. Mus. ix. 499 (1918).

† *Loc. cit.* 206 etc.

The method of arrangement of the two daughter-individuals of a division, the one at the base of the parent-membrane and the other at the rim of its ruptured apex, is altogether that typical of *Ecballocystis*, and it would appear that this type of construction is always realised in the young colony. On the other hand, I think there is very little doubt that it does not obtain throughout an older colony. All the daughter-cells appear to be capable of continuous division, although there are indications (*cf.* fig. 3, E) that the upper daughter-individual may (sometimes or usually ?) divide more rapidly than the lower. The fact, however, that in many of the larger colonies nearly all the cells may be binucleate indicates that division continues more or less regularly in all of them. This is an unusual condition for an *Ecballocystis*, and is responsible for the close crowding and irregular arrangement of the cells in many of the larger colonies. In such cases (fig. 3, C) the individual membranes of the cells are not easily distinguishable, but appear merely as a network of fine lines separating the protoplasts (*cf.* also fig. 3, A). Moreover, many of the obliquely disposed pairs of cells are to be found enveloped by the still intact parent-membrane, and I am inclined to think that in such dense colonies the entire parent-membrane sooner or later becomes mucilaginous, and that there is none of the characteristic breaking down of only the upper part of the membrane, such as can be recognised in the more loosely aggregated parts. The close crowding resulting from repeated division of the cells is probably also responsible for the frequent irregular shapes of the latter in such colonies. The cells may be flattened or even slightly concave on one side or slightly attenuated at one or both ends (*cf.* fig. 3, A & C). In many cases the membrane is drawn out to a point at what appears to be the lower end of the cell (fig. 3, A), and these are probably cells whose membrane is or was attached to that of the next older generation. But such attenuated membranes are also occasionally seen at the upper ends of the cells (fig. 3, A, lower part). I am unable to explain such cases except by the hypothesis that the soft mucilaginous membrane has been squeezed into this shape by the pressure of adjacent cells or drawn out by pushing apart of cells. Perhaps this also explains the curious condition shown in fig. 2, N, which was occasionally observed, where the cells were connected to one another by shorter or longer thread-like strands, apparently mucilaginous in nature. Attention may be drawn to the fact that in many of the pairs of cells in older colonies the membranes of the daughter-individuals appear joined together (*cf.* fig. 3, A, B, D), so that a subsequent separation of two such cells might easily lead to a thread-like prolongation of the membrane.

Yet another peculiarity is often to be noted in older colonies. Occasional cells are to be found in which the membrane has broken down apically in the way above described, but in which the proto-

plast or protoplasts have escaped and either lie at the aperture (fig. 2, K; 3, F) or are not to be traced (*cf.* also fig. 1, C, D). Such cases are not very common, but one or more of them are nearly always to be found in a larger colony. When such empty membranes collapse they probably afford the confused series of strata seen on the left-hand side of fig. 3, A.

It has not been possible to establish the mode of origin of the branches. Possibly they arise at points in older colonies where the true *Ecballocystis*-type of daughter-cell formation obtains, which may well lead to a cell-series being developed along a line inclined to that of the main axis. There is a possibility, too, that some of the colonies may have occasional fenestrations, two branches joining together again at a higher level and leaving a more or less oval or elliptical space between them. A case like this was shown in one of the figures received from Mr. Turner (not here reproduced), but in view of the very diffluent nature of the mucilage around the colonies this question cannot be settled by an examination of slides alone. It may merely be a case of two branches overlying one another. Whether the mucilaginous envelope of the colony is formed solely from the gelatinised membranes of successive generations must also remain an open question. There may well be some additional secretion of mucilage from the cells themselves, which, indeed, alone explains the not uncommon spatial separation of the daughter-individuals within the parent-membrane (fig. 3, E).

Another point upon which I am unable to give exact data is whether the polarity of the cells of a colony remains the same throughout. I have seen some cases which seemed to indicate occasional reversal of polarity, but the evidence is unsatisfactory.

A careful examination of the slides disclosed numerous cells of the alga attached to other algæ or to particles of débris. In all cases such cells were attached by the more pointed lower end of the cell (fig. 2, F). In many of them the membrane was clearly discernible, and was commonly, but not always, slightly thicker at the point of attachment (fig. 2, G, M, P, R). Moreover, in the immediate neighbourhood of the point of attachment, particles of fine débris were often observed (*cf.* fig. 2, R), as if there were a local formation of mucilage here serving for attachment. Such a mass of mucilage was clearly seen in the colony figured in fig. 3, E. In a few cases, but not as a general rule, there was a definite basal mucilage-tube (*cf.* fig. 2, O), which may merely be an empty parent cell-membrane, the protoplast having shifted up to the aperture, as in fig. 2, K. Some of the unicellular attached stages were placed obliquely on the substratum (fig. 2, F), as if they were undergoing gradual erection after the manner described by Iyengar (*loc. cit.* 215), but no one-sided secretion of mucilage could be observed.

In no case was division into more than two cells noticed, although Turner in his notes refers to a very occasional division into four. I must confess to being rather doubtful about this. In any case there are no sporangial stages, such as have been observed in other species of *Ecballocystis*, and reproduction would appear to be effected solely by cells detached from the colonies.

It may be well to summarise the colony-development of this form, as it appears from the above considerations. The single cell floated on to a suitable substratum clings there by virtue of its mucilaginous wall, and becomes gradually erected (presumably in the way described by Iyengar) and firmly attached by its more pointed end with the help of a basal mucilage-pad. There follows an oblique division of the protoplast (fig. 2, P) and the secretion of new membranes around the daughter-cells. With their subsequent enlargement the membrane of the parent-cell breaks down apically, and the upper individual becomes fixed to the rim of the oblique aperture. Both cells divide again with the same succession of events, the membrane of the first cell becoming more and more mucilaginous. Division of all the resulting cells continues at more or less equal rates, and thus we get gradually a lengthening mass with the cells distributed in two or more linear series, and the whole enveloped in a mucilage-tube formed from the older membranes, possibly supported by additional secretion of mucilage from the protoplasts. As the colony becomes in this way many-celled and the individuals become more closely compacted, further division is not accompanied by the gelatinisation of only the apical part of the parent membranes, but by a gradual gelatinisation of the whole wall, so that the definite *Ecballocystis*-structure recognisable in the early stages becomes lost in the later ones or is only of occasional occurrence. Where it occurs we have possibly the formation of branches. While I believe that these suggestions represent the correct course of events, they require to be tested on living material.

The stages shown in fig. 3 recall to some extent certain stages of *Ecballocystis Fritschii* Iyengar (*loc. cit.* 200), but the habit of this species is altogether different, owing to the fact that both daughter-cells of a division assume a position at the mouth of the ruptured parent-cell. It is this that leads to the general dendroid habit that is assumed. In the present species, however, the fact that the daughter-cells retain more or less markedly the positions in which they are left after division, and proceed to divide with great frequency, leads to a disposition of the cells in linear series and to their close crowding in the older colonies. The absence of starch, associated with the possible lack of pyrenoids in the chloroplasts, suggests that our alga may not belong to the Chlorophyceae at all. It is not out of the question that forms parallel to *Ecballocystis* may have been developed among the

Heterokontae. This matter can, however, only be conclusively established by an examination of living material.

The following is the Latin diagnosis of the new species :—

Ecballocystis fluitans, sp. nov., familiis microscopicis, simplicibus vel ramosis, probabiliter satis elongatis, basi fluminibus desidiosis affixis; cellulis numerosis parvis elongatis, diam. 3–4plo longioribus, laxe vel dense et sæpe irregulariter in seriebus 1–4 longitudinalibus (sed sæpe cellula singula terminali) aggregatis, tubo mucoso diffluenti interdum irregulariter lamellato inclusis; cellulis oblongis, plerumque uno polo paullo attenuatis, in familiis vetustis sæpe formæ irregularis, chromatophoris parietalibus 4 (sine pyrenoidibus ?) sine amylo, sæpe binucleatis; divisione cellularum obliqua, cellulis filialibus juvenalibus uninucleatis et membrana propria præditis; membrana matricali probabiliter sæpe æqualiter deliquescenti, sed in partibus basalibus familiarum juvenalium et interdum alio loco familiarum seniorum in apicem oblique dehiscenti, cellulis filialibus una supra alteram affixis, superiore plerumque in ostio; divisione cellularum filialium verisimiliter plus minus constanter. Diam. cell., 3–3·5 μ; long. cell., 9–18 μ; diam. colon., 14–18 μ.

Hab. In a small stream near Tal-Y-Bont, Merionethshire, alt. 500–600 ft. Coll. C. Turner, 1924.

BYSSOCHLAMYS FULVA, SP. NOV.

By Mamie Olliver, B.Sc. (Messrs. Chivers & Sons, Ltd., Histon), and George Smith, M.Sc. (London School of Hygiene and Tropical Medicine).

(Plate 602.)

Westling (Svensk. Bot. Tidskrift, iii. 1909, 134) described a new monotypic genus *Byssochlamys*, whose chief interest lay in its systematic position, the asci being produced in roughly globose clusters, but without peridium or any trace of the hyphal web which characterises *Gymnoascus*, the new genus being thus a transition between the Endomycetaceae and the Gymnoascaceae. The new species here described clearly belongs in Westling's genus, but differs from his species, *B. nivea*, in colour and in dimensions of asci and spores.

B. fulva has been isolated many times from processed fruits, and appears to be of fairly widespread occurrence. It is of considerable economic importance as a cause of spoilage in canned and bottled fruits of various kinds, and a more detailed account of this aspect of its history will be published in due course. The conidial fructification is very similar to that of *Paecilomyces varioti* Bainier, and the fungus is readily disseminated by the small and very abundant conidia.

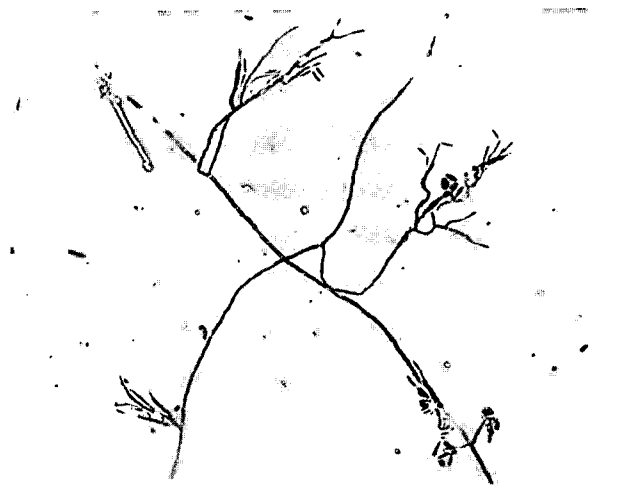


Fig. 1.

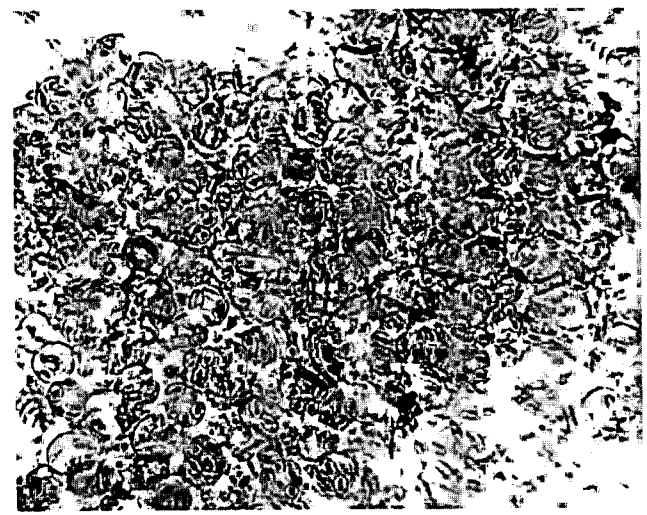


Fig. 2.

BYSSOCHLAMYS FULVA Olliver & Smith, sp. nov.

Diagnosis.—Fungus coloniis albis deinde fulvis, paulo floccosis aut funicularibus; reverso brunneolo; *conidiophoris* ex hyphis longis repentibus, irregulariter ramosis, hyalinis, 2–3 μ diametris; *basidiis* verticillatis aut solitariis, basibus afflatis, et apicibus conidioferis longis, pertenuibus, curvis: *conidiis* ellipticis, 4–9 $\mu \times 2{\cdot}3$–$2{\cdot}5\,\mu$, in catenis longis; *ascis* abundantibus, aggregatis sed sine peridio, globosis, octosporis, 11–12 μ diametris; *sporidiis* ellipticis, glabris, hyalinis, 6–$6{\cdot}5\,\mu \times 4{\cdot}3$–$4{\cdot}5\,\mu$.

Colonies growing well on most solid media, better on natural than on purely synthetic media, most readily at temperatures between 30° and 37° C.; on liquid synthetic media growing fairly slowly at 20°–25°, better at 30°; at 37° the spores are readily wetted by liquid media, and growth is very slow until the submerged mycelium reaches the surface: surface white, then buff to pale brown in central areas, slightly floccose or funiculose, after seven to ten days showing clusters of asci visible to the naked eye as minute globose masses partially embedded in the mycelial felt; reverse slowly turning pale brown; conidial fructification of the *Paecilomyces* type, conidiophores very variable in length, arising as side-branches from long trailing hyphæ, simple or variously branched, 2–3 μ in diameter, bearing whorls of sterigmata or solitary sterigmata at various points along the length, sessile or on short side branches; sterigmata short tubular or much swollen at the base and terminating in long slender tubes, frequently curved or bent away from the main axis, up to 25 μ long and usually 2–3 μ in diameter, but occasionally up to 7 μ; conidia one-celled, hyaline, ovate to elongate, very variable in size but mostly 4–9 $\mu \times 2{\cdot}3$–$2{\cdot}5\,\mu$, borne in very long, unbranched, tangled chains; asci abundant on all media, produced in roughly globose clusters without any trace of peridium or enveloping hyphæ, globose, 8-spored, 11–12 μ in diameter; ascospores smooth, hyaline, ovate, 6–$6{\cdot}5\,\mu \times 4{\cdot}3$–$4{\cdot}5\,\mu$.

The natural habitat has not yet been discovered, all isolations having been made from canned and bottled fruits. The mature spores can survive cooking for thirty minutes at 87°–88° C., which explains their survival in the processed cans and bottles, since the maximum temperature of sterilization, although it may exceed 90°, is maintained for only a few minutes.

We tender our best thanks to Mr. J. Ramsbottom, of the British Museum (Natural History), and to Mr. F. T. Brooks, of the School of Botany, Cambridge, both of whom have kindly examined our fungus and confirmed our placing; also to Messrs. Chivers & Sons, Ltd., for permission to publish the work carried out in their laboratories.

Explanation of Plate 602.

Fig. 1. Conidiophores, showing typical sterigmata, × 250. From slide-culture on *Czapek agar*.

Fig. 2. Portion of cluster of young asci, × 500.

SOUTH-EASTERN UNION OF SCIENTIFIC SOCIETIES.

Thirty-eighth Annual Congress, Norwich.

The Thirty-eighth Congress of the Union was held at Norwich, from June 7–10, under the presidency of Professor E. J. Salisbury, F.R.S., who chose as the subject of his address "The Influence of Man on Vegetation." The President deplored the failure to give adequate recognition to human activities as a means of dispersal of plants throughout the world, though his effectiveness in this respect is probably greater than that of any other agent, and there is no *à priori* reason why introductions by man should not colonize the same situations as if they had been introduced in any other way. Sycamore and Pine are testimony to the fact that human introductions can become completely assimilated by natural vegetation. The striking correspondence in the distribution of the remains of neolithic man and the members of the Lusitanian floras suggests that he may have been an important agent in their dispersal, and their occurrence in suitable habitats in no way militates against this fact. The corn and flax seed, which he brought with him from the south, was surely not less contaminated by weed seeds than were modern agricultural seeds prior to the introduction of efficient screening methods.

The cultivation of land from the time of neolithic man to the present day provided habitats for plants of open communities, which must previously have been restricted to the very limited areas, where competition was not severe, presented by naturally disturbed soil. Many of these have become weeds of cultivation, and have thus attained a prominence which may bear no relation to their original and natural frequency. With the extension of cultivation the abundance of the introductions and of the potential weeds amongst the aboriginal flora has thus increased.

Regarding 1 per cent. of seed impurity as representing about 5000 seeds in a pound, the returns for a given year suggest that on a conservative estimate between two and six billion weed seeds from abroad are sown in Britain with the Clover and Grass seed imported from abroad. Such introductions involve mainly species characteristic of arable land. Seeds or fruits of plants from communities representing later phases in the plant succession, if brought by man, are mostly incidental to human movement. A series of experimental germinations from the mud on boots or the dust from trouser brushings after a week gave some striking figures showing what considerable collections of seed may be accumulated in a comparatively short distance.

The moment human intercourse between Britain and the European Continent began, the relative biological isolation

of these islands ceased and the rate of influx of plants was accelerated; the introductions persisted or perished according as the suitability of the new environment permitted. The efficacy of these changes increased with improvement of methods of transport.

On the other hand, man's activities have depleted our flora in numbers, if not also in kind. The deliberate burning of considerable areas by palæolithic man for increasing available grazing, and thus the population of the herbivorous animals which he hunted, and the migratory cultivation of neolithic man, changed large areas of forest into grassland or scrub. The chalk downs of the south-east were the nursery of English agriculture, and reasons were given for the belief that they were originally clothed with forest and were cleared for cultivation at an epoch when the alluvial soils would be too wet for the purpose. On slopes where the topography ensures good drainage removal of forests lowers the water-table, and the retentive upper layers of soil become quickly eroded, so that we cannot judge from the relatively arid soil on the slopes of the denuded downs of to-day as to the soil-conditions which obtained in the remote past.

In the higher precipitations of the west and north the rate of accumulation of humus is much more rapid, and, even after removal of trees and shrubs may more than keep pace with the rate of decomposition, so that in place of erosion there is peat accumulation. The evidence that present-day moorlands (including heather moors) occupy the sites of former forests rests, not only on the occurrence of buried tree-trunks in the peat, but on the numerous place-names indicative of forest in Saxon or Danish times in areas which are now bare moorland.

The flint implements of neolithic man were more suited to the cutting down of soft-wooded trees such as Birch, Willow, Scotch Fir, and Alder, than to the felling of hard-wooded trees such as the Oaks. The small remnants of climatic Birch-wood still extant may well be due largely to the fuel demands of neolithic man; the Scotch Fir, which is abundant in the submerged forests of neolithic age, was probably the earliest tree to be extensively exploited for fuel, and this may account for the disappearance of native Fir woods in Southern Britain. Later, the smelting of iron ore caused extensive forest destruction, particularly in the north and south-east of England, and by the latter half of the 16th Century prohibitive measures were passed to check the destruction in Surrey and Sussex. The Gorse- and Bracken-clad heaths of Sussex and East Anglia, the Heather-clad Commons of Surrey and Hampshire, bear witness in their flora to their woodland origin, and, like much of the grassland, revert under protection to woodland vegetation. The continued

effect of man's presence maintains their vegetation in the successive phases of grassland, scrub, or seminatural woodland. The construction of hedges as windbreaks has provided sanctuaries for the marginal species of the woodland, which are probsbly more abundant and frequent than in primitive times. The practice of coppicing results in a periodic impetus to the light-loving species of the woodland flora, with an increased pressure of competition upon the shade species of the interior.

Examples were quoted of the effect of fires, such as preventing the natural colonization of heath vegetation by trees or causing spread of Bracken at the expense of Heather. If it were possible to permit all the land in Britain to revert to its natural state, the increase of forest and consequent reduction of area occupied by heath and scrub would bring with it a diminution of many of the species we most prize.

At the meeting of the Botanical Section a report was received on the progress of preparation of the Flora of Sussex by Lt.-Col. A. H. Wolley-Dod, which was initiated at the Hastings Congress in 1927. The work is now approaching completion, and the Editor begs that lists should be sent to him as soon as possible (address, Berkeley Cottage, Mayfield, Sussex).

Prof. F. E. Fritsch, F.R.S., was President of the Section, and his address, an examination in detail of the evolutionary sequence traceable among the Desmids, was a valuable contribution to our knowledge of a subject on which we have hitherto had but little information. It was illustrated by a large series of lantern-slides.

The enormous range of form displayed by these unicellular plants invites a study of the group from the point of view of form-evolution, and the President claimed that a general evolutionary trend is very patent and that in miniature the Desmids afford more abundant instances of parallelism in evolution than is at present evident in any other group. He supported Oltmann's view that the Mesotaeniaceae, characterized by a cell-wall of one piece, represent the primitive form from which the Desmidiaceae proper, with a wall composed of two equal portions, may have been derived. Deeply constricted forms are regarded as more advanced than those with little constriction, and a further specialization is indicated by flattening of the cell and ornamentation of the wall.

The genus *Cosmarium*, with more than 800 species, was used to illustrate certain marked evolutionary tendencies, afforded by diversity in the shape of the cell, the absence or presence of ornamentation on the wall and the type of ornamentation, and the number and characters of the contained chloroplast. The tendency towards a triangular outline of the cross-section was shown to be widespread among the more specialized Desmids.

In the colonial Desmids, most of which are filamentous, the outline of the individual cell is usually relatively simple, and the wall is generally smooth. This supports the view that these are an early development from simple cosmarioid and staurastroid types, an hypothesis which is supported by their zygospore-features.

Two main evolutionary tendencies are indicated by a study of the zygospores, namely: (*a*) a change from the smooth globose type, undoubtedly the primitive one, to a more specialized form with less or more elaborate ornamentation, and (*b*) a tendency towards the elimination of zygospore-formation.

The whole range of forms may be studied in the genera *Cosmarium* and *Staurastrum*. In the filamentous Desmids the simple type of zygospore preponderates, and the highly complex type is unknown. Among the widely distributed species of the genera taken as a whole, there is a marked tendency to diminish the capacity for producing zygospores in the more advanced types.

It is clear that, in the evolution of Desmids, there has been widespread parallelism, implying a general evolutionary trend that has been followed along many different lines and has led to the ultimate development of a large number of homoplastic types. In view of the large areas of the earth's surface that still await full investigation of their algal flora and the many new forms of Desmids that are constantly being described, we may predict that in course of time the majority of the evolutionary series will be clearly discernible.

The Presidential address was followed by an interesting lantern lecture on "The Mycetozoa" by Mr. H. J. Howard, F.L.S., who has for many years made an intensive study of the group in Norfolk.

Botanical excursions were made to Stratton Strawless woods, where fine specimens of Cedar, Chestnut, Lime, and other trees were seen, and to Calthorpe Broad and Horsey, under the guidance of Messrs. Howard and Ellis and Major Anthony Buxton, D.S.O.

Pleasant social occasions were provided by a garden party in the grounds of the ancient Carrow Abbey (where *Aristolochia Clematitis* still grows in abundance under an old wall) by kind invitation of the Misses Colman, and an evening Reception by the Lord Mayor of Norwich (Alderman H. N. Holmes, J.P.) and the Lady Mayoress, in the old Norman Castle, now a very well-arranged and interesting general Museum.

Thanks are due to the able Hon. Local Secretary, Dr. Howard A. Costigan, for an enjoyable and successful meeting.

An invitation from Reading for the 1934 Congress was gratefully accepted. The President-Elect is Prof. H. L. Hawkins, D.Sc., F.G.S., Professor of Geology at Reading University.

A. B. RENDLE.

OBITUARY.

SPENCER HENRY BICKHAM

(1841–1933).

THE death of Spencer H. Bickham, J.P., F.L.S., at Underdown, Ledbury, on April 7, removes a keen amateur botanist and a valued member of the Watson Botanical Exchange Club, of which he was Treasurer from 1907 to 1920. Before coming to Ledbury in 1891, he was a member of a Manchester business firm. He had been a student at the Owens College and a pupil of Leo Grindon, the Manchester botanist and naturalist. In his younger days he travelled much abroad, and had accumulated a considerable herbarium. In his beautiful gardens at Underdown he grew more than a thousand kinds of plants from various parts of the world; his rock garden was particularly interesting. He contributed some short notes to this Journal:—'*Silene noctiflora* in Worcester' (1903), 'William Peete and his Herbarium' (1916), '*Carex pseudo-paradoxa* S. Gibson' (1917), and a few others. He took an active and prominent interest in local affairs and had been a magistrate for forty years. He joined the Linnean Society in 1896. A portrait and biography by H. S. Thompson appeared in the recently issued Forty-ninth Annual Report of the Watson Botanical Exchange Club.

REVIEWS.

The Flora of the Clyde Area. By JOHN R. LEE. Sm. 8vo, pp. xvi, 391. John Smith & Son (Glasgow) Ltd., 1933. Price 7*s.* 6*d.*

NEARLY seventy years have elapsed since the publication of the first edition of Hennedy's 'Clydesdale Flora,' and more than forty since it was revised by the late Professor King. Since then many changes have occurred in the Clyde area, particularly in the more densely populated districts, and a new account of the flora of this varied part of the country is therefore to be welcomed. Like its predecessor, but unlike most local Floras, Mr. Lee's handbook gives not only a considerable amount of parochial information, but also full descriptions of the flowering plants and ferns occurring wild or established within the drainage area of the River and Firth of Clyde. The area covered embraces the counties of Lanark, Renfrew, Dumbarton, and Bute, together with large parts of Ayrshire, Stirlingshire, and Argyll and the small portion of West Perth draining by the River Falloch towards Loch Lomond. An outline map showing the exact boundaries of the district would have been helpful, but it is clear that a considerable part of south-west Scotland is covered, and the Flora is consequently a useful addition to the rather

small number of floristic works dealing with Scottish botany. The distribution of species is based primarily upon the Watsonian system of vice-counties, modified to suit local requirements, ten sub-areas being distinguished, each denoted by a letter. Records of plants occurring on Ailsa Craig are shown separately. Under each species a note of the habitat is given, and for the rarer species reference is made with caution to the localities in which the plant has been found.

The general arrangement of the Flora shows a noteworthy departure from that of previous British Floras. The author has been impressed with the need for showing the student some sort of phyletic sequence in the arrangement of families, and has made a praiseworthy attempt to meet this requirement. While it is obviously impossible to illustrate fully plant relationships in any linear sequence, the system which is here adopted brings the classification of families more into line with modern ideas. The 'Apetalae' as a separate group disappears, and the families formerly placed therein are distributed through the Archichlamideae according to their possible affinities. The arrangement is, in fact, a compromise between the system of De Candolle and the scheme suggested by Hutchinson. It may be argued that the main purpose of a Flora, particularly one which is concerned only with a restricted area, is to afford a ready means of identification, yet the reviewer feels that no opportunity should be lost in bringing before the student the evolutionary concepts that underlie modern taxonomy. In this respect Mr. Lee's handbook is a step in the right direction. With regard to terminology the author might have adopted "Family," now generally used, in place of "Natural Order."

Artificial keys to the families are provided as well as similar keys to the genera and species. So far as they have been tested the keys seem to work satisfactorily. The names of species are printed in heavy type, making reference conveniently easy, and by the use of small type and a number of abbreviations quite considerable descriptions of the species have been attained. A conservative view as to the limits of species has been taken and no attempt has been made to deal with "critical" genera, though the *Batrachium* section of *Ranunculus* is treated fully along the lines of Mr. Pearsall's monograph, to which reference is made in the text. This procedure might usefully have been extended, but the only other reference noted under "aggregate" species comes under *Rubus fruticosus*, where Roger's 'Handbook' is quoted. Well-marked varieties are included, but, as the author states, it is often a matter of opinion whether they should rank as varieties or as subspecies. Here and there, however, more exact information might have been given, as, for example, under *Alchemilla vulgaris*, which is said to ascend to over 2500 feet, without any reference to the fairly distinct altitudinal range

of the three forms which are mentioned, viz. *minor, pratensis,* and *alpestris,* the last being the mountain plant. The exclusion of micro-species generally results, however, in uniform treatment of the material as a whole, but some readers may be surprised at the inclusion of a considerable number of plants which are certainly not native, such as *Aesculus Hippocastanum, Laburnum vulgare, Neillia opulifolia, Sambucus racemosa, Abies pectinata, Picea excelsa,* and others. The author takes the view, however, that such trees as the Spruce Fir and the Horse Chestnut "have as good a right to be regarded as British as have the Sycamore and the Lime." In compiling a Flora the question as to what should be included and what excluded will always remain a difficult one, but it would, perhaps, be less misleading to those unacquainted with the vegetation of Britain if the names of introduced or planted species were distinguished from natives by some such device as the use of different type.

With regard to nomenclature the author adopts a somewhat conservative attitude. He has not hesitated to use, as a rule, the older and more familiar names, believing that "the avoidance of confusion and inconvenience is a matter of more practical importance than mere conformity" to rules *. The volume includes a glossary of botanical terms, drawn up for the convenience of beginners, and ends with a double index—one of orders and genera, the other of popular English names.

Altogether, this little volume is to be thoroughly commended, and should prove a useful handbook to students of field botany in the Clyde area. Convenient in size for the pocket, the book is well produced and the price is reasonable.—J. R. MATTHEWS.

Fortschritte der Botanik. Erster Band. Berichte über das Jahr 1931. Edited by Prof. Dr. FRITZ VON WETTSTEIN. Roy. 8vo, pp. v, 263, 16 text-figs. Springer: Berlin, 1932. Price R.M. 18.80.

FIFTEEN authors have united to give a concise account of the more important botanical work published in and about 1931. Each author deals with that branch of botany in which his own investigations lie. The result is the first of a projected series of annual surveys, written for the professional botanist and intended to enable the specialist to keep in touch with the general development of botanical knowledge. The contributions are arranged in four large groups—morphology, systematics and evolution, the physiology of metabolism, and developmental physiology, including genetics. Certain aspects of ecology and plant biology are described in an appendix.

* [A regrettable attitude! The object of the "Rules" is to ensure uniformity, and neglect to observe them engenders confusion, such, for instance, as a want of uniformity with similar works.—ED.-JOURN. BOT.]

The material is not presented in a uniform manner. Some authors relate the facts without much comment; others allow their own points of view to appear, sometimes rather strongly. Here and there, facts hitherto unpublished are to be found.

It seems that the book is addressed chiefly to German readers, for an analysis of the literature lists shows that over 64 per cent. of the works cited were published in Germany or in Austria. The United States comes next with 11 per cent., followed by the British Empire with 9 per cent., Scandinavia with 6 per cent., and France with 3 per cent. A few references to work from the rest of Europe, Japan, and South America complete the list.

The volume is crammed with information set out in an interesting narrative form. Even if the accounts are somewhat deficient in range, the working botanist, immersed in his own investigations, and menaced with the stultifying effects of narrow specialisation, should be able to get some idea from the book of what is going on in those branches of botany with which he cannot, for lack of time, be fully and personally conversant. The book indicates clearly some of the directions in which botanical work is proceeding, and it is hoped that many similar annual volumes will be issued. They will lighten the labour of botanists in dealing with the literature, and facilitate reference to the original works when more details are needed.

The addition of an index would increase the value of the book, and, though a small matter, a uniform method of printing systematic names could well be adopted.—B. BARNES.

Handbuch der Pflanzenanalyse. Edited by G. KLEIN. Bd. III. *Spezielle Analyse,* Theil II. Roy. 8vo, pp. xiii, 1613, text-figs. 67. Springer: Vienna, 1932. Price R.M. 162.

THE earlier volumes of this monumental work were noticed in the previous volume of this Journal (p. 177). The present volume supplies a continuation of the section on Organic Compounds, classified under headings nos. 14–34, and including Membrane-compounds (pp. 1–343)—Cellulose, Gums, Mucilage, Lignin, &c.; Natural Tannins, Lichen acids, Ethereal oils, Caoutchouc and Gutta Percha, Resins, Glucosides &c., Flavones &c., Anthocyanin, Saponin, Carotin, and finally Chlorophyll and the pigments of Algæ and Fungi. As in the earlier sections the chemistry of the numerous compounds is fully treated, the source in the plant of the substance is indicated, and the systematic distribution and occurrence in the various families, genera, or species. The work has been distributed among thirty-one specialists.

The whole work forms a valuable reference library on plant chemistry, in which the botanist will find much of interest.

BOOK-NOTES, NEWS, ETC.

BRITISH MYCOLOGICAL SOCIETY.—Vol. xvii. pt. iv. of the Transactions of this Society contains a description of the British species of the genus *Diaporthe* Nits., and its segregates, by L. E. Wehmeyer, and notes on the life-history of the four-spored form of *Sordaria fimicola* by Winifred M. Page. C. L. Hear gives some account of the original MSS., notes and drawings for James Bolton's work, "An History of Fungusses growing about Halifax" (4 vols., 182 copper plates), 1788–91. The MSS. has recently been purchased by the Library of the U.S. Department of Agriculture from a bookseller in Zurich. A useful Index to Berkeley and Broome's "Notices of British Fungi" (1837–1885) is contributed by J. Ramsbottom. G. E. Deacon describes the effects of *Botrytis cinerea* in producing die-back in roses, and W. P. K. Findlay supplies a note on the conditions required for the germination of the spores of *Merulius lacrymans*.

FLORA OF SURINAM.—As a thesis for a doctorate at the University of Utrecht, P. J. Eyma has published (J. H. de Bussy, Amsterdam), in English, a number of notes on new and critical species of the families Polygonaceae, Guttiferae, and Lecythidaceae in the flora of Surinam.

'COUNTRY-SIDE.'—The Summer number of the organ of the B. E. N. A. contains a sympathetic appreciation, with a photograph, of the life-work of the late Sir J. Arthur Thomson by his friend Sir Leslie Mackenzie. Sir Maurice Abbot-Anderson gives suggestions for a botanist's holiday in June on sand-dunes and shingle; J. F. Rayner describes, with good figures, some of the commoner malformations occurring in plants; and J. Lamb recalls the examination of a Somerset peat-bog in mid-July. 'Nature Records' include notes on first flowering of plants, from a selected list, from a number of counties.

SIR JOHN KIRK.—By the courtesy of Dr. Spurrier, Curator of the Zanzibar Museum, we have received a copy of the Supplement to the 'Official Gazette' containing an account of the Centenary Commemoration at the Museum on December 19, 1932, of the birth of Sir John Kirk. During his thirty years' connection with East Africa, from his appointment as botanist amd medical officer to Livingstone's expedition for the exploration of the Zambesi, in 1857, to his retirement from his office as His Majesty's Agent and Consul General at Zanzibar in 1880, Kirk did much to advance our knowledge of the botany and natural resources of East Africa.

NOTES ON THE TAXONOMY OF BRITISH MATERIAL OF *ANTHYLLIS VULNERARIA*.

BY E. M. MARSDEN-JONES AND W. B. TURRILL.

FOR the past seven years we have been breeding and making field studies of populations of British *Anthyllis Vulneraria*. The results have been published in the 'Journal of Genetics' (1933). In the course of our investigations it became necessary to consider certain of the names which have been applied in floras and monographs to variations of this species. As indicating how very unsatisfactory for exact genetic research is much of the published systematic work on polymorphic species, the following account should be of interest to taxonomists. If it serves to reduce the giving of names to variations within a highly polymorphic species, in the absence of experimental evidence as to the nature of the variation, it will serve a useful purpose. We have limited our remarks to the names given in Druce's 'List,' ed. 2, or to those which concern plants used in our experiments.

From the modern taxonomic standpoint *Anthyllis Vulneraria* dates from Linnæus, Sp. Pl. 719 (1753). His description is very brief, but he quotes five synonyms which are sufficient to fix this name to the ordinary yellow-flowered inland kidney-vetch. In addition he has a var. β based on Dillenius's "Vulneraria supina, flore coccineo" (Dill. elth. 431, t. 320, f. 413). No trivial is given to this variety. In the 'Flor. Suecica,' ed. 2, 249 (1755), Linnæus repeats the specific description and has four varieties based essentially or entirely on flower-colour: α *lutea*, β *alba*, γ *coccinea*, and δ *rubra*. These names have been largely ignored by subsequent writers.

The var. *lutea* is apparently the common inland yellow-flowered plant of N.W. Europe, *e. g.*, the plant used in the Transplant Experiments at Potterne, and fully described in Journ. Ecol. xviii. 369 (1930). The var. *alba*, with white corolla, must be of rather rare occurrence. It is probably the same as *A. communis* Rouy α *genuina* Rouy subvar. *albiflora* Rouy (Flor. Fr. iv. 286 : 1897). We have not seen any British material with really white flowers. The var. *coccinea* is important and has often been given specific rank, or included as a variety, under such names as *A. Dillenii* Schultes and *A. rubra* Gouan, both of which are *nomina nuda* according to the references in 'Index Kewensis.' The variety is dated back to Ray, and Dillenius's Hort. Elth. (1732) by Linnæus's synonymy. For an account of the specimens in the Dillenian Herbarium at Oxford, Druce & Vines, 'The Dillenian Herbarium,' pp. 100, 183 (1907), may be consulted. The type-material of Dillenius was collected at Newborough in Anglesey, but a reference is also given by Dillenius to Ray's 'Synopsis' and material collected "in agro

Pembrochiensi ab Ed. Lhwydio." The flower (*i. e.*, corolla) colour is described as " coloris ab initio pallide flavescentis, lineis rubris picti, mox dein in sanguineum vel coccineum toti versi," while the calyces are " ad basim albicantes, in summitate & segmenta versus e fusco rufescentes." The figure is excellent, and shows the habit of the plant well. Linnæus's locality is given as " in Oelandia 54.71. prope tumulum lapillosum Borckholmensem."

Our researches have shown that there is more than one " red-flowered " variation in British material, and it is difficult to fix exactly to which the name var. *coccinea* should be applied.

The var. *rubra* of Linnæus is based by him on Tournefort Inst. 371. In the 3rd edit. (1719) the page is 391 and the full reference " Vulneraria flore purpurascente. *An Lotus latifolia Dalechampii Lugd.* 509 ? " Linnæus says var. *rubra* occurs " in Oelandia *campestri ubique.*" It is worth noting that Linnæus adds the following : " Observatione dignum, quod in Oelandia campestri (Alwar), ubi sola argilla calcarea (Bleke) rufescens e rufescente lapide calcario, ibi flores hujus plantæ rubri ; at in Gotlandia, ubi argilla calcarea alba, ibi flores plerumque albi sunt." It seems probable that the name var. *rubra* should be applied, if desired, to the grassland (often inland) red-flowered variation (? fluctuation, in part) found, *e. g.*, on Salisbury Plain.

The material in the Linnean Herbarium is of little help in elucidating the nomenclatural details of the plants with which we are concerned. There is one sheet written up " *vulneraria* " and consisting of three flowering shoots. In dried material of such age it is impossible to be certain of flower colour, but examined with a lens the appearance of the middle piece suggests a red colour in the keel and upper part of the calyx ; of the right-hand piece, colour in the keel ; and of the left-hand piece, colour in the upper part of the calyx, at least. Attached by a pin to this sheet is a second sheet with one flowering piece, with a large head of flowers and with the word "Alpi " written below it in Linnæus's handwriting. The present condition of the flowers of this strongly suggests that the corollas were red. The leaflets (2–3 pairs in the cauline leaves) of the " *vulneraria* " sheet are relatively long and narrow and the calyces densely hairy. The "Alpi " sheet has four to five pairs of shorter broader leaflets and the calyces much less densely hairy.

It seems reasonable that for the material with which we have been working the name var. *coccinea* should be retained for the sea-coast deeply coloured plant standardized by Cornish material collected at Bude, Cornwall, and grown at Potterne as Stock-Plant 3.

A. P. De Candolle* (Prodr. ii. 170, 1825) describes seven varieties under *A. Vulneraria*. His var. α is the common yellow-

* Several authorities give Seringe as the author, but we do not know on what evidence,

flowered plant " floribus flavis, foliis caulibusque parcè villosis aut subglabratis." Var. β *albiflora* is apparently the var. *alba* L. Var. γ *rubriflora* probably includes all red-flowered variations except those which are very hirsute, *e. g.*, both var. *coccinea* L. and var. *rubra* L. would be included. Of his other varieties we have seen no wild British material. All British specimens named var. *Allionii* DC. seen by us are wrongly determined.

The next plant with which we are concerned is *A. maritima*. This dates from Schweigg. in Hag. Chlor. Boruss. 265 (1819), where the following description is published :—" Caule diffuso, incano ; pilis in caule petiolisque densis, adpressis : capitulis axillaribus sparsis : foliis pinnatis, inæqualibus, sericeis ; foliolo terminali maximo, lanceolato. Schweigger.

" In arena mobili maris baltici reperta a Cl. Schweigger. Jul. Caul. multo altior priori, sæpe 2-pedalis, et ramosior ; ramis elongatis. Foliola angustissima, subtus sericeo-tomentosa. Capitula 4–7 in singulo ramo ; terminale subsolitarium. Petala flava." As a species the plant is kept up in Reichb. Flor. Germ. Excurs. 515 (1832) and figured in Icon. crit. 2, t. 122 (1824). It was made a variety of *A. Vulneraria* by Koch, Deutschl. Flor. v. 124 (1839), according to Ascherson u. Graebn. Syn. vi. ii. 626 (1908), and Syn. ed. 2, 175 (1843). It is a tall, many-headed, densely hairy plant with yellow flowers.

L. Corbière, Nouv. Flor. Norm. 148–9 (1893), retains *maritima* as a subspecies of *A. Vulneraria*, and describes under it a variety β *ochroleuca*. " Souche ligneuse, grosse, très rameuse, à rameaux courts, étalés-ascendants. Plante toute pubescente-soyeuse, à poils appliqués. Fleurs *jaune très pâle, presque blances* ; carène obtuse à sommet d'un *jaune plus foncé*, mais *non rouge sang* (comme dans la var. *polyphylla* Koch et l'*A. affinis* Briting.). RR.—M. falaise de Carteret ! "

Again, with the more detailed descriptive work necessary in genetic studies it is difficult to know to what character combination this name should be applied. We have worked with two pale-yellow-flowered plants of immediate wild origin—one from Porlock Weir, Somerset, and a second (with still paler yellow flowers) from the Chesil Beach, opposite Wyke Regis, Dorset. In both the corollas were monochrome except for a blotch at the base of the standard in the Chesil plant ; but it is possible Corbière did not separate keel and androecium when he described the keels of his *ochroleuca* as darker in colour at the summit. The anthers give a false appearance of deeper colour near the top of the keel if the latter is viewed with the androecium unremoved. We have taken our Porlock Weir material (Stock-Plant 2) as a standard for var. *ochroleuca*, and accept our pale-flowered Chesil Beach plant as a still paler but unnamed variation. Other pale-yellow-flowered plants have occurred in wild populations,

There can be little doubt that the var. *bicolor* (Rouy & Fouc.) Druce is one of the various heterozygotes found in populations involving var. *coccinea* and a yellow-flowered variety. Rouy's description (of the plant placed as *A. Vulneraria* subsp. *A. communis* var. *affinis* subvar. *bicolor*) is " Corolle orangée ou rouge, au moins au sommet." Whether Druce's material (if he had any) and Rouy and Foucaud's are phenotypically identical remains uncertain.

No description of var. *villosa* Corb., given in Druce's ' List of British Plants,' ed. 2, p. 26 (1928), has been traced. Ascherson and Graebner (*l. c.* 636) quote under their subspecies 1 C. *A. vulnerarioides* (i. e., *A. vulneraria* var. *Allionii* DC.) a var. *villosa* Car. u. St. Lager : Etud. des fleurs, 8 éd. 169 (1889 ?).

The publication of such names as *A. maritima* Schweigg. var. *Corbierei* Salmon & Travis (Journ. Bot. lv. 320, 1917), *A. Vulneraria* L. modif. *Normanniae* Riencourt, and *A. Vulneraria* L. sub. var. *Campaniana* Rienc. modif. *elongata* (Rep. B. E. C. viii. 304, 1927) furnishes examples of what we have previously termed " the tyranny of names."

At Par Harbour and on Par Sands, Cornwall, amongst other variations, there occurred a striking variation of suberect growing habit with deeply coloured flowers, which segregates for stem indumentum characters. Technically the plants can be classified under *A. Dillenii* Schult. subsp. *tricolor* sensu Asch. u. Graebn. *l. c.* 630. Unfortunately the original description of *Anthyllis tricolor* Vuk. in Rad. Jugoslav. Akad. xxxiv. 121 (1876), does not fit the Par plant, especially in flower-colour. Ascherson and Graebner record a number of variations in the indumentum of the stems and calyces in their subspecies, which occurs mainly from the Balkan Peninsula to Asia Minor and Palestine. We have little doubt that the Par Harbour Amaranth Purple plant was introduced from abroad.

In the European Herbarium of the British Museum (Natural History) is a specimen named *Anthyllis communis* Rouy var. *tricolor* Rouy, collected at Montserrat, rochers calcaires, entre 750 et 950 m., F. Sennen, Plantes d'Espagne no. 2588. This specimen is nearer to the Par material than any other dried or living material we have seen. Since we are unable to retain *A. Dillenii* or *A. communis* as a distinct species, it is convenient to refer to the Par plant simply as *A. Vulneraria* var. "Amaranth Purple." For further references to var. *tricolor* see Rouy et Fouc. Flor. Fr. iv. 288 (1897), and Sagorski in Deutsch. Bot. Monatschr. viii. 139 (1890).

There remains one other plant about which a few words must be said. In 1927 we received seeds of an *Anthyllis* from Zürich Botanic Gardens under the name *A. Vulneraria*. These produced plants of a characteristic erect bush growth with leaflets up to fifteen per leaf, rather narrow except for the terminal leaflet

of the lower leaves, red-purple calyces, and yellow corollas except for red keels. The plant bred true for all characters. In the vegetative parts this plant matches Hungarian material of *A. Vulneraria* var. *polyphylla* (Kit.) DC. remarkably closely ; yet its calyces are those of *A. Vulneraria*—in fact are, in the flowering state, rather more bulging than those of most of the *A. Vulneraria* material with which we have worked, and contrast with the narrower yellowish-green calyces of true var. *polyphylla*. The original description (DC. Prodr. 170, 1825) of var. *polyphylla* reads : " floribus flavis, foliis 11–15-foliolatis parcè villosis, foliolis infer. oblongis, super. linearibus, caule erecto pedali—in Hungariâ, Volhyniâ, Lithuaniâ. *A. polyphylla* Kit. ex Bess ! in litt. (v. s.)." So far as it goes this description fits our plant, but the calyx character of Hungarian specimens is so distinct that we prefer to regard the Zürich plant as probably a hybrid segregate from a cross, with var. *polyphylla* as one of its parents, and to designate it for our purposes simply as *A. Vulneraria* var. " Zürich."

We have no intention of monographing *Anthyllis Vulneraria* as it occurs throughout its wide range of distribution. We hold that any attempt to classify the numerous variations and variation-combinations should be based on cultural and genetical, as well as on field, laboratory, and herbarium studies. It is interesting to compare the results of taxonomic studies in connection with which experiments have been neglected. Habitat fluctuations, genetic varieties, and heterozygous phenotypes are mixed together in almost hopeless confusion. The descriptions are frequently quite inadequate and the occurrence of character variations which can be separately inherited and which therefore occur in many combinations are not taken into consideration. Reference to the following will suffice to prove our statements :— Beck, Flor. Niederöst. ii. i. 853 (1892), et in Ann. K. K. Naturh. Hofmus. xi. 61 (1896) ; Rouy et Fouc. Flor. Fr. iv. 283 (1897) ; Sagorski in Allg. Bot. Zeitschr. xiv. 40, 55, 89, 124, 154, 172, 184, 204 (1908) ; Aschers. u. Graebn. Syn. vi. ii. 620 (1908) ; Dalla Torre u. Sarnthein vi. ii. 672 (1909) ; Becker in Beih. Bot. Centrlbl. xxvii. ii. 256 (1910).

A list of colour comparisons with Ridgway, ' Color Standards and Nomenclature,' Washington, 1912, will indicate how much more exact descriptions can be made by using published standards. We insist in our own work that at least two persons (preferably of different sex) should agree that the colour match accepted is the nearest obtainable in Ridgway. Unless otherwise stated the flower-colours given are those of flowers at their prime. Colour of calyx and corolla often changes from the bud to full anthesis and again after anthesis. Breeding work has shown that the keel colour is of great importance, especially for identifying back-crosses and some segregates.

A. Vulneraria var. *lutea.*

Harbury, Warwickshire (Stock-Plant 1).

Calyx: *Seafoam Green,* tipped *Barium Yellow*; sepals may be tipped or tinged *Prussian Red,* later becoming *Dark Corinthian Purple.*

Standard and wings: *Lemon Chrome* veined *Orange,* often a tinge of *Deep Purplish Vinaceous* at base of standard.

Keel: *Lemon Chrome.*

Ovary and gynophore: green.

Style: below bend *Seafoam Green,* above bend *Barium Yellow.*

Fruit: *Mummy Brown.*

Seeds: *Isabella Color* to *Ecru Olive.*

A. Vulneraria var. *ochroleuca.*

Cliffs beyond Porlock Weir, Somerset (Stock-Plant 2).

Calyx: *Seafoam Green,* tipped *Barium Yellow*; sepals tipped with a minute trace of *Dark Indian Red,* later becoming *Anthracene Purple.*

Standard, wings, and keel: *Pale Lemon Yellow,* standard with a *Deep Purplish Vinaceous* blotch at base.

Ovary and gynophore: green.

Style: below bend white, above bend *Barium Yellow.*

Fruit: *Tawny Olive* to *Mummy Brown.*

Seeds: *Tawny Olive.*

A. Vulneraria var. *coccinea.*

Bude, Cornwall (Stock-Plant 3).

Calyx: *Seaform Yellow,* lobes and uppermost part of tube and basal veining *Chocolate* becoming *Anthracene Purple.*

Standard: *Carmine*; wings, ground-colour *Chalcedony Yellow* heavily tinged with *Carmine*; keel *Ox-blood Red.*

Ovary and gynophore green, ovary nearly surrounded longitudinally on the abaxial side by *Spinel Red* and with a blotch at base of same colour and a trace of colour running into gynophore.

Style: below bend *Spinel Red,* above bend *Barium Yellow* tinged *Spinel Red.*

Fruit: *Mummy Brown.*

Seeds: *Orange Cinnamon* to *Tawny Olive.*

A. Vulneraria var. "Amaranth Purple."

Par Harbour, Cornwall (Stock-Plant 5).

Calyx: *Seafoam Yellow,* lobes and uppermost part of tube and veining throughout tube *Deep Corinthian Red* becoming *Anthracene Purple.*

Standard and wings: *Amaranth Purple*; keel, ground-colour *Seafoam Yellow,* upper portion *Violet Carmine* shading into *Amaranth Purple.*

Ovary and gynophore green, ovary nearly surrounded longitudinally on the abaxial side by *Spinel Red,* with blotch of same colour at base and a trace of colour running into gynophore.

Style: below bend *Spinel Red,* above bend *Ox-blood Red.*

Fruit: *Mummy Brown.*

Seeds: toning on the same seed from *Isabella Colour* to *Ecru Olive.*

It is evident that taxonomic studies of intraspecific variation should be based on experimental research if the subjective element is to be kept at a minimum and evaluation of characters given a stable basis in fact.

Taxonomists are urged to take more trouble in preparing descriptions which make new names valid, whether such names are published as specific, varietal, or as of some other taxonomic status. The possibility of using symbol-combinations instead of names for intra-specific variations should be more widely tried. Descriptions associated with "varietal" names should definitely be diagnostic of a taxonomic entity, or, alternatively and clearly stated, a phenotypic character should be named or otherwise symbolized and defined. The latter is the only method of avoiding an unnecessary and impracticable nomenclature in such a species as *Anthyllis Vulneraria* if the whole species polymorphism is considered.

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NEW AND RARE SPECIES OF NEW ZEALAND MOSSES.

By H. N. Dixon and G. O. K. Sainsbury.

The present list forms a Supplement to the "Studies in the Bryology of New Zealand," the last part of which was published in N.Z. Inst. Bull. no. 3, part vi., Jan. 1929. (This work is referred to in the following pages as "*op. cit.*")

The reference numbers given for the different specimens are those in which they appear in Herb. G. O. K. Sainsbury; they are not always identical with the collecting numbers of the various collectors.

The types of the new species and varieties must be considered to be those in Herb. H. N. Dixon.

Ditrichum fragilicuspis Dix. & Sainsb., sp. nov. Gracilescens; elatum, ad 3 cm. altum; superne atrovirens, inferne fuscum. Caules simplices vel hic illic dichotome ramosi. Folia confertiuscula, sicca æque ac madida patula, inferiora sæpissime *diffracta*; 3–3·5 mm. longa, e basi lanceolata *convoluta sensim*

in subulam longam linearem acutam, sat tenuem, integerrimam angustata, apice nunc subobtusa nunc hyalino-apiculata ; costa lata, male definita, in subula soluta. Cellulæ inferiores valde irregulares, nunc longiuscule lineares, nunc breviter rectangulares, ad marginem *haud angustiores* ; supra sensim abbreviatæ, medianæ rhomboideæ, superiores breviter rectangulares et subquadratæ, omnes *incrassatæ, læves.*

[Fructus ignotus.]

Hab. On bare limestone-dust patches in limestone basin, Castle Hill, Canterbury, Jan. 6, 1931 ; coll. *Miss L. B. Moore* (626), type. Summit rocks, Mt. Maungapohatu, Uriwera Country, north of L. Waikaremoana, North I., alt. c. 4000 ft., Jan. 23, 1932 ; coll. *Miss L. B. Moore* (655).

Quite distinct from all the New Zealand species, and very near to the South American *D. conicum* (Mont.). That plant, however, has the leaves contracted just above the insertion, the cells are less incrassate, and there is a marginal band of very narrow cells in the basal part. *D. hyalino-cuspidatum* Card. from South Georgia is also near it, but that is compared with *D. conicum*, and presumably has the same basal marginal areolation, while the base is more rapidly contracted and the subula finer than in the present plant ; the highly fragile leaves also are a marked character here. The apex is occasionally, but rarely, shortly hyaline-tipped ; the cells of the expanded part of the leaf are nearly always unusually short and wide, but are somewhat irregular. It is remarkable that it should have been gathered in two so widely separated stations, and by the same collector.

PSEUDODISTICHIUM BUCHANANI (R. Br. ter.) Dixon (" Studies in the Bryology of New Zealand," N.Z. Institute Bulletin, no. 3, 53, 363). This species has been found recently by Mr. Allison both at Rotorua, North Island, the original locality, and from there southwards to the Waikato River, 20 miles distant. It grows on poor soil in open places, usually on gently sloping ground, and is not uncommon in that district. Mr. Allison reports that in a fresh state the seta is markedly flexuose.

SELIGERIA CARDOTII R. Br. ter. (*op. cit.* 54). Lake Waikaremoana, Wairoa County, 2000 ft. (*Sainsbury*), c.fr. The only North Island Station at present known, but an extension of the distribution is probable. Found on calcareous rock, which accords with the usual habitat.

CAMPYLOPODIUM LINEARE (Mitt.) Dixon (*op. cit.* 71). An addition to the former localities, namely Canterbury, South Island, and near Wellington, North Island, is Mt. Ruapehu, North Island, where the species has been twice found (*Mundy* 217 ; *Sainsbury* 504) in widely separated stations. On earth, in forest, c.fr.

Campylopodium euphorocladum (C. M.) var. nov. **thermophilum** Dix. & Thér. Elatum. Folia *perlaxa, sicca atque madida fortiter divaricata, sæpe squarrosa,* subula sæpius *lata, breviuscula, subobtusa, apice denticulato.*

Hab. In hot moist places, Rainbow Hill, North I., Sept. 1929 ; coll. *A. Meebold*, comm. *Herzog.*

This is not var. *squarrosum* Besch., which from the description appears to have the form of the leaves typical, while the fruit has certain characters which do not appear here ; the capsule appears to be quite normal.

A note on the label states that the stones on or among which it was growing when picked up were too hot on the underside to hold !

EUCAMPTODON INFLATUS (Hk. f. & W.) Mitt. (*op. cit.* 95). Miss L. B. Moore reports that this interesting and beautiful moss grows in abundance among rocks with low-growing shrubs and on rather boggy slopes of Mt. Moehau, Coromandel, North Island, 2900 ft., and that it is often associated in large areas with the equally handsome and striking *Breutelia elongata* (H. f. & W.) Mitt. In Herb. Petrie at Auckland there is a specimen from Wairakei, near Taupo, North Island, which is apparently a completely isolated station for the plant. It has not been found in the nearby districts of Atiamuri and the Tongariro National Park, where mosses have received attention in recent years, and where, at any rate in the case of Atiamuri, the soil and climatic conditions are similar to those of Taupo.

DICRANOWEISIA ANTARCTICA (C. M.) Par. (*op. cit.* 72). Appears to be quite widely distributed in the North Island in mountainous districts. It has been collected on Mt. Egmont, Mt. Ruapehu, and the Rimutaka Ranges, as well as on Mt. Hikurangi, the culminating peak of the East Coast Range.

DICRANUM (TRICHODONTIUM) AUCKLANDICUM Dixon (*op. cit.* 81). The published localities are Auckland Island and South Island. It has since been found on Mt. Ruapehu (*Sainsbury* 541, Waihohonu, on earth, 3500 ft. ; on rock near Ohakune, 4500 ft.). These stations are separated by the main mass of the mountain, and an extension of the distribution both here and in other mountainous parts of the North Island is quite possible. In both cases the plants were in fruit and growing in the open.

D. TRICHOPODUM Mitt. A remarkable form of this was collected growing as an epiphyte on the top of wind-swept juvenile *Eleocarpus* on summit of Moehau Mt., Auckland, by Miss Moore. It varied much in size, but was often very small, blackish, reduced in many ways, with the nerve homogeneous,

scarcely thicker than the lamina itself, and was at first supposed to be a *Blindia*. Further specimens, however, intergraded with more normal *D. trichopodum*, of which it is no doubt an abnormal state.

A further striking and very pretty form was gathered by Sainsbury (656) in the Tararua Mts., near Levin, on the bark of subalpine scrub, emitting from the upper part of the stem very numerous long-leaved branchlets, exceedingly fragile and easily detached, evidently of the nature of " brood-branches."

DICRANOLOMA INTEGRIFOLIUM Dix. c. fr. Perichætia about ·75 cm. long, the leaves erect and convolute, the lower shortly cuspidate, the inner shortly tapering to broadly acuminate points. Seta 1–1·5 cm. high, theca short, curved, smooth, strumose ; lid paler, about the same length, decurved.

Hab. On bark, Mt. Arthur, Nelson, South I., Feb. 3, 1930 ; coll. *G. O. K. Sainsbury* (570, 590, 591).

The inner perichætial leaves are quite erect, not aristate or cuspidate as in most species, nor truncate and muticous as in *D. Billardieri*.

Fissidens Allisonii Dix. & Sainsb., sp. nov. (§ *Crenularia*). Pusillus, viridissimus ; caulis brevis, plurijuga, vix 4 mm. altus ; folia *conferta*, late vel anguste lanceolata, interdum linearilanceolata, acuta, sicca *falcata*. Lamina vaginans in *media* lamina apicali (inter costam et marginem) sæpius terminata. Folia *omnino immarginata*, minutissime crenulata ; costa *perpallida, longe infra apicem* soluta. Cellulæ parvæ, intense chlorophyllosæ, parietibus *pertenuibus*, pallidis, dense, humiliter papillosæ.

Dioicus. Seta terminalis, *brevissima*, vix 2 mm. alta, pallida ; theca erecta, *minuta*, anguste ovalis, leptodermica, viridis. Operculum *tenuiter rostratum*.

Hab. On earth on hillside, c. 1600 ft. alt., near Rotorua, North I., Oct. 1931 ; coll. *K. W. Allison* (644).

The first species of the section recorded from New Zealand, and not very closely allied perhaps to any known species. It is perhaps nearest to *F. abbreviatus* Mitt. from Raoul I., but apart from the presence, at times, of an inconspicuous limbidium on the vaginant lamina that species has a concolorous nerve and the cells of the vaginant lamina are distinctly enlarged.

FISSIDENS VITTATUS Hk. f. & W. (*op. cit.* 103). Any doubt as to the occurrence of this species in New Zealand is set at rest by its discovery near Wairoa, Hawkes Bay, North Island, by Mrs. E. A. Hodgson (478 and 506). On open hillside and land adjoining sea-beach ; without fruit.

F. SUBELAMELLOSUS Dixon (*op. cit.* 364). Further investigation shows that this is a form of *F. inclinabilis* C. M. with a very long seta and ventricose vaginant lamina. The species must therefore be dropped.

LEPTODONTIUM INTERRUPTUM (Mitt.) Broth. (*op. cit.* 121, 364). Further stations, all in the North Island, are Rotorua (*Allison*, 503, on heated soil) ; Maketu Beach, Bay of Plenty (*Allison*, 459, sand-dunes) ; Puriri, Poverty Bay (*R. C. Murphy*) and Masterton, Wairarapa (*N. K. Welch* 49). Cheeseman's Auckland specimens are the only known fruiting plants. Brood-bodies are sometimes present, clustered plentifully on cauline threads as described and figured by Correns (' Vermehrung der Laubmoose,' 65) for *L. styriacum* (Jur.) Limpr. The gemmæ in *L. interruptum*, however, are much shorter and normally obovoid. A striking association of this species with *Bryum campylothecium* Tayl. occurs on sand-dunes in the Bay of Plenty and Hawkes Bay.

Hyophila novae-seelandiae Dix. & Sainsb., sp. nov. Sat robusta, ad 2 cm. alta, atro-viridis, dense cæspitosa. Folia *conferta*, madida subsquarrosa, sicca *incurva, haud contorta*, 2 mm. longa, e basi *haud dilatata, late oblonga, concavo-carinata*, apice *obtuso, leniter recurvato*, raro minute apiculato ; costa sat valida, infra apicem soluta, dorso lævis vel sublævis ; margines erecti, *integri*. Cellulæ superiores subrotundæ, subincrassatæ, læves, basin versus subquadratæ, majores, infimæ basilares paucæ rectangulares, hyalinæ, parietibus tenuibus.

Seta *perbrevis*, c. 5 mm. alta ; folia perichætialia foliis caulinis subsimilia ; theca parva, deoperculata 1 mm. longa, *anguste elliptica, gymnostoma*.

Hab. On sandstone rock, c. 2000 ft., L. Waikaremoana, Hawkes Bay, Jan. 1927 ; coll. *Mrs. Hodgson* (624), type. Ibidem, Oct. 9, 1932 ; coll. *Sainsbury* (671). Summit rocks of Mt. Maungapohatu, Uriwera Country, north of L. Waikaremoana, Hawkes Bay, c. 4300 ft., Jan. 23, 1932 ; coll. *Miss L. B. Moore* (653).

This is the first species of the genus described from Australasia (*H. inflexa* (Tayl.) C. M. is a *Hymenostomum*), and is very distinct in the form of the leaves, the entire margin, the small ovoid capsule, and other points.

Triquetrella curvifolia Dix. & Sainsb., sp. nov. A *T. papillata* differt foliis parum decurrentibus, costa dorso *fere lævis*, cellulis *pellucidioribus*, papillis *multo humilioribus*, apice acuminato, *acute hyalino-apiculato*, costa *longe sub apice* desinente, pellucida ; ab omnibus speciebus foliis *siccis circum caulem arcte subspiraliter curvatis, unde caulis subcatenulatus fit*.

[Fructus ignotus.]

Hab. Among grass on hillside near Havelock North, Hastings, Hawkes Bay, Jan. 1929 ; coll. *Mrs. Hodgson* (540), type. Kakiranaki, Hawkes Bay, on hillside, June 1930 ; coll. *Mrs. Hodgson.*

A very distinct species in the leaves finely cuspidate, with a smooth hyaline tip, much less strongly papillose than in most species, and especially in the leaves closely twisted round the stem when dry, often forming an indistinct spiral. The stems are slender, elongate, flexuose, more or less prostrate, so that the triquetrous arrangement is not so marked as is usually the case when moist. The plant was growing with *Bartramia alaris*, sp. n.

DIDYMODON BINNSII (R. Br. ter.) Dixon (*op. cit.* 125). Port Lyttelton Hills, South Island, and Wairoa, North Island, are the only known localities. At Wairoa it is not uncommon, and grows in open places on bare exposed earth, fruiting rather scantily. When the coastal districts of New Zealand have been investigated with any degree of thoroughness there are quite likely to be further findings of this small and inconspicuous moss.

POTTIA STEVENSII R. Br. ter. (*op. cit.*, 139). Also reported from the North Island, Wairoa (*E. A. Hodgson* 454). On open silty ground near the sea, and without fruit.

POTTIA SUBPHYSCOMITRIOIDES Broth. Bowling green, Renmera, Auckland, July 29, 1919 ; coll. *D. Petrie.*

This was described for an Australian moss (Victoria : Tasmania) as "*P. physcomitrioidi* C. Müll., ex Argentina, valde affinis." It appears highly probable that the two are identical, but no specimen of the South American moss has at present been available for comparison.

Tortula viridipila Dix. & Sainsb., sp. nov. Pusilla. *T. atrovirenti* (Sm.) fructu affinis, foliis autem toto cœlo distincta. Folia in comam bulbiformem dense congesta, e basi latiore oblongo-lanceolata, 2·5–3 mm. longa, abrupte acuminata, *cum costa aristata*, concava, marginibus medio folio recurvis ; costa validiuscula, versus apicem paullo dilatata, *in aristam flexuosam viridem vix denticulatam, apice hyalino, quartam vel tertiam partem longitudinis folii æquantem* excurrens. Cellulæ superiores majusculæ, circa 13 μ latæ, subpellucidæ, subincrassatæ, dense altiuscule pluripapillosæ ; marginales vix mutatæ ; basilares per partem quartam vel tertiam folii perlaxæ, breviter rectangulares, parietibus tenuibus, marginem versus paullo angustiores. Folia superiora *latiora, subspathulata.*

Seta circa 1 cm. alta, rubra ; theca anguste elliptica, subnitens ; operculum oblique rostellatum. Calyptra longa, superne tubulosa, basi late dilatata. Peristomium rubrum, dentes ad basin in membranam brevissimam cohærentes, superne irregulariter in

crura filiformia, papillosa, hic illic conjuncta, obliqua vel subrecta divisi. Columella exserta. Spori circa 20 μ, muricati.

Hab. On earth, summit of Mt. Arthur, Nelson, 5800 ft. alt., Feb. 1930 ; coll. *Sainsbury* (571).

A well-marked species with leaves something of the form of *T. muralis*, but—the upper ones at least—broader above, and with a long green flexuose arista. The leaf-form and structure is similar to that of *Desmatodon*, but the peristome appears to be rather that of *Tortula.*

T. ABRUPTINERVIS Dix. It appears probable that the young leaf is normally terminated abruptly by a clavate prolongation of the nerve, which is broken off usually at a very early stage, and leaves the truncate end of the nerve as it is generally seen, the clavate tip being evidently of the nature of a reproductive "brood-body."

T. flavinervis Dix. var. nov. **gigantea** Dix. & Sainsb. Elata ; perrobusta, usque ad 10 cm. alta. Folia magna, superne lata, apice late rotundata, nonnunquam obtusa, pilo flavido longiore.

Hab. In grass in damp spot, Patoka, Hawkes Bay, Apr. 13, 1926 ; coll. *Mrs. Hodgson* (362).

The typical form has been further collected near Hastings ; on the Mahia Peninsula ; on the Waikato River, near Atiamuri, in the North I. Also in the South I. in Aniseed Valley, Nelson ; and Port Lyttelton Hills, Canterbury.

GRIMMIA OBTUSATA Hampe & C. M. Craigieburn Mts., on rock near Hogsback Creek, Canterbury, Jan. 9, 1931 ; coll. *Miss L. B. Moore* (631).

Otherwise only known from Australia, where it appears confined to two localities, one in Victoria, the other in New South Wales.

In Hampe's herbarium there are two tufts, labelled (α) and (β). The description says it is near *G. montana*, but differs in the curved seta and striate capsule. Now in all the fruit of (β) the seta is longer and cygneous and the capsule striate, while in (α) the seta is short and erect and the capsule smooth. There is also a difference in the length of the lid. The specimen (β) must therefore be considered the true plant, while (α) is probably a different species.

AMPHIDIUM CYATHICARPUM (Mont.) Broth. (*op. cit.* 162). There are two (montane) records for this moss in the North Island, *i. e.*, Mt. Ruapehu, at 4500 ft. (*Sainsbury*), and Whanakao, Raukumara Mts., East Coast, 3000 ft. (*L. B. Moore*, 466). In both cases on rock and fruiting. The Ruapehu plant has the leaves entire, whilst in the other they are usually bluntly denticulate towards the apex.

ZYGODON MINUTUS C. M. & Hpe. (*op. cit.* 167). Kaikoura appears to be the only specified South Island record (Herb. Cheeseman, 244, bark of tree, sea-shore). In the North Island it has been collected at Auckland (Herb. Petrie), Wanganui (*K. W. Allison*, 368), and Wairoa (*E. A. Hodgson*, 471). In the last-named district it is plentiful. All the stations are littoral, and the habitat is the rough bark of the indigenous Ngaio (*Myoporum laetum*), or the Weeping-Willow.

Z. HOOKERI Hampe (*op. cit.* 164, 365). The relationship of this plant to *Z. Reinwardtii* Hk. f. & W. is very close. One of the separating characters of the latter is the polygamous (synoicous and dioicous) inflorescence, but a dioicous form of the otherwise synoicous *Z. Hookeri* has been found at Whakapapa, Mt. Ruapehu, at 3800 ft. (*Sainsbury*, 538). The ordinary synoicous race also grows on this mountain.

ULOTA ANCEPS Vent. (*op. cit.* 365). To the two published South Island records can be added two in the North Island, *i. e.*, Atiamuri (*Allison*, 487, 489) and Whakapapa, Mt. Ruapehu (*Sainsbury*). The species seems to grow mostly in association with *U. lutea* Mitt.

The later gatherings agree in the appressed, not curled leaves, with Bell's specimens (referred to on p. 366, *op. cit.*), and it seems probable that it may actually be distinct from *U. anceps*. As N. Malta, however, is preparing a paper on the Australasian species of *Ulota*, it is perhaps best to leave the solution of this question to his judgment.

(To be continued.)

NEW VARIETIES OF MYCETOZOA FROM JAPAN.

BY G. LISTER.

I HAVE been favoured by receiving from Dr. H. Hattori, head of the Biological Laboratory of the Imperial Palace, Tokyo, Japan, some interesting specimens of Mycetozoa gathered last summer at Nasu, in the Tochigi prefecture, by the Emperor himself. They consist of varieties of two species, *Didymium leoninum* Berk. & Broome and *Arcyria pomiformis* (Leers) Rost., which appear not hitherto to have been described. They arrived in perfect condition, and are accompanied by photomicrographs illustrating the capillitium and spores.

Didymium leoninum var. nov. **effusum.** All previous gatherings of this species consist of groups of scattered subglobose sporangia borne on short orange stalks. The present gatherings have the form of flat effused plasmodiocarps, tawny or pale brown in colour, varying from a few millimetres to several

centimetres across, and sometimes completely covering one face of the maple- and birch-leaves to which they adhere. They were found maturing from "flame-scarlet" plasmodium, and, as Dr. Hattori writes, they might have been mistaken for a new species if similar plasmodium "from another collection" had they not produced in the laboratory sporangia that were undoubtedly those of *D. leoninum*. The intimate structure of the effused form resembles that of the typical sporangia in many ways. The cartilaginous sporangium-wall, chestnut-brown by transmitted light, breaks up on maturity into small areolæ, and is clothed with a layer of comparatively large stellate crystals of lime; the capillitium forms a close network of slender purplish-brown threads, and the pale violet-grey sporees, 8–9 μ in diameter, are marked with patches of very minute warts. But no definite columella is present, the thickened orange floor containing scanty deposits of nodular crystals like those in the subglobose columellæ of the stalked form. Typical *D. leoninum* has been obtained several times in Ceylon, where it was first discovered, from near Singapore, in Java, and also in Japan. The present remarkable effused variety, which appeared in some abundance in the woods of Nasu, shows no pulvinate or stalked sporangia among the flat plasmodiocarps, and seems deserving of varietal distinction.

Var. *effusum* may be defined as follows:—Sporangia forming flat effused plasmodiocarps with no definite columellæ.

Habitat. On dead leaves*.

It may be noted that effused plasmodiocarps not infrequently occur in *Didymium squamulosum* (Alb. & Schw.) Fries, but they are usually associated with stalked or pulvinate sporangia. *Didymium ochroideum* G. Lister, obtained from Japan, North India, and Long Island, U.S.A., shows affinity to *D. leoninum* in spores and capillitium, but differs in the slender plasmodiocarps having membranous walls mottled with pale orange patches.

Arcyria pomiformis var. nov. **heterospora.** This form of *Arcyria pomiformis* sent by Dr. Hattori consists of scattered and nearly sessile dull buff-coloured sporangia, seated on lichen (*Parmelia* sp.) and bark of a living trunk of *Cornus controversa* Hemsley. They differ chiefly from the usual form in microscopic characters. The capillitium threads are marked for a short distance near the base (where they are attached to the persistent cup) with two to three well-defined spiral bands; the remainder of the capillitium shows no peculiar features, the threads being thickened on one side and marked with transverse bands and spines arranged in a very open spiral, faintly warted or reticulated elsewhere. The spores are larger than usual, averaging 9–10 μ

* *Didymium leoninum* var. nov. *effusum*, peridiis (plasmodiocarpis) deplanato-effusis; columellis indistinctis.

instead of 7–8 μ, and, beside the few scattered larger warts, characteristic of the spores of *Arcyria*, they are minutely warted all over.

I propose to name this form var. *heterospora*, distinguished by the following characters:—Sporangia nearly sessile; basal capillitium threads marked with two to three spiral bands; spores 9–10 μ diam., minutely warted all over and marked also with a few larger warts *.

A. pomiformis is a widely distributed species, found on fallen branches and also on the bark of living trees; the sporangia are usually on slender stalks. In some British gatherings a trace of spiral markings has been observed on the basal capillitium threads, although they are generally smooth; some variation has also been seen in the size of the spores, but not to such a uniformly larger extent as in the present specimens.

A NEW SPECIES OF *DICTYDIUM* FROM AUSTRALIA.

By G. Lister, F.L.S.

Miss Lilian Fraser, writing from the Botanical Department of the University of Sydney, sent me last year a package of Mycetozoa which she had collected in New South Wales; they are part of a larger collection she has made there, and represent only those specimens as to the identification of which she was doubtful. Of the nineteen species sent eight had not been recorded, I think, from Australia previously, and one appears not to have been hitherto described. Miss Fraser wishes me to describe the new species, and intends to publish later a full account of her Australian collection.

Dictydium rutilum †, sp. nov. Plasmodium ? Sporangia gregarious or scattered, stalked, subglobose, carrot-coloured, 0·35–0·7 mm. diam. Stalk dark brown, straight or curved, 0·6–1·5 mm. high. Sporangium-wall persistent in the form of from 14–16 dark brown ribs, arching inwards and anastomosing above to form a *Cribraria*-like net; a few delicate transverse threads connect adjacent ribs; a shallow orange-red membranous cup is sometimes present; minute dark plasmodic granules, 0·3–0·5 μ diam., are imbedded in the ribs. Spores globose, smooth, 6–7 μ diam., pale orange, carrot-coloured in mass.

Habitat. On much decayed wood, near Sydney, Feb. 1931.

The specimen sent consists of about forty perfectly matured sporangia. The stalks do not taper at the slender apex, thus causing the sporangia to droop from their own weight as in the typical form of *D. cancellatum* (Batsch.) Macbride, but are of much the same width throughout, as in *D. cancellatum* var. *alpinum* *. Without a lens the species might be mistaken for *Cribraria rufa* (Roth.) Rost. from the bright carrot-red colour of the spores, but when magnified the structure of the ribs is entirely that of a *Dictydium*. It differs from any form of *D. cancellatum* in the smaller number of the ribs and in the colour of the spores; also the walls of the spores have no plasmodic granules adhering to them as have the spores of *D. cancellatum*. Miss Fraser writes that she thinks *D. rutilum* is not uncommon in the neighbourhood of Sydney.

The following is a short Latin diagnosis:—*Dictydium rutilum*, sporangiis gregariis, stipitatis, subglobosis, rufis, 0·35–0·5 mm. diam.; stipite nigro-brunneo, erecto vel arcuato, 0·6–1·5 mm. alto; venis 14–16; sporis diluto-aurantiis, 6–7 μ diam.

In conclusion, I wish to thank Miss Fraser for letting me see her interesting gatherings and for permitting me to name the new species.

* *Arcyria pomiformis* var. nov. *heterospora*, tubis capillitii basalibus 3–4 tæniolis spiralibus ornatis; sporis 9–10 μ diam.; verruculosis.

† From Latin *rutilus*, red inclining to gold-yellow, carrot-headed.

NOTES ON RUBI.

By William Watson.

I. What is *Rubus rhombifolius* Weihe ?

It is the purpose of the present communication to show that the plant which for the past fifty years on the Continent and in this country we have, through the dominating influence of Focke, been calling *Rubus rhombifolius* Weihe is not the plant of Weihe of that name, and by directing attention again to the descriptions and figures of Weihe and Nees to secure the needful rectification in the application of the name.

The confusion seems to have arisen in two stages:—firstly, the unfortunate combination by Focke of two distinct Weihean units under the name of the first (and earlier) unit, and, secondly, through the greater prevalence of the second unit, the exclusive attribution to it—in some quarters—of the name proper to the first unit. Focke himself seems not to have proceeded to the second stage, and his earlier contemporaries declined to accompany him even on the first stage. In this country we have gone on to the second stage, using a fresh (and altogether unnecessary) name for the first Weihean unit.

* M. Meylan considers that this alpine variety is worthy of specific rank, and names it *Dictydium mirabile* (in Bull. Soc. Vaud. Sc. Nat. lv. 243, 1924); it is clearly the same form as that named by Rostafinski *Heterodictyon mirabile*.

Rubus rhodanthus, sp. nov.—In Weihe and Nees' Monograph of the German Rubi, pt. iii. (1825), Latin version, pp. 36–7, German version, pp. 38–9, there is briefly described a bramble which is named—in the Latin version only—*Rubus carpinifolius b. roseus,* and is said to grow around Mennighüffen (in the Beeker Bog) and in other places. Weihe was a doctor at Mennighüffen, and it may be assumed that the description is from his observation of the living plant. In the same locality *R. carpinifolius* was plentiful, and Weihe was content to regard *b. roseus* as a variety of that species. From the descriptions in the two versions and from tab. xiii. *b* the following description of the plant has been drawn up :—

Rubus carpinifolius b. roseus W. & N. Stem rather slender, angled, with flat or furrowed sides, moderately patently pilose, neither glaucous nor glandular, green to red. Prickles purplish-based from the first, declining or more or less recurved, longer than the diameter of the stem. Leaves quinate-digitate; petiole villose, armed with many hooked prickles; intermediate petiolules one half as long as the terminal petiolule ; leaflets flaccid, not plicate, somewhat strigose above, velvety and whitish beneath, unequally or doubly serrate ; terminal leaflet ovate-lanceolate, gradually acuminate, twice as long as broad, base subcordate ; stalk of basal leaflets about 5 mm. long.

Flowering branch slender, panicle branches very patent, the lower ones racemose, the upper ones simple ; or the panicle more compound. Pedicels about 2·5 cm. long, armed with about seven fine declining prickles. Flowers up to 3 cm. across ; petals pink, oval, 8–9 mm. broad, margin slightly undulate, apex rounded ; stamens pink, much longer than the styles ; sepals greenish, acuminate, appendiculate and foliaceous on the terminal flower.

Habitat. Wet soils.

I have seen a specimen of this plant gathered by G. Braun in Weihe's district in 1876, and am acquainted with the same plant in England (*e. g.,* at Chislehurst Common, W. Kent, in marshy soil ; and at Wimbledon Common, Surrey, on the edge of the flood-plain of the Beverley Brook). From these sources I venture to supplement Weihe's description slightly as follows :—

Basal leaflets often longer than the petiole. Stipules glandular.

Panicle often almost unarmed and lax, the lower branches sharply ascending and exceeding the leaves in the axils of which they spring ; rachis clothed with long patent hairs, with patent prickles below, falcate ones above. Pedicels furnished with 1–2 sunken glands.

Lower leaves on the flowering branch composed of deeply incised nettle-like leaflets ; their petiole short, not more than about two-thirds the length of the terminal leaflet. Terminal leaflet of the ternate leaves obovate, narrowed to both ends, the sides curved, the base subtruncate, 5–7 mm. wide ; the teeth broad, ovate, regular.

Petals rose-pink, rather narrow oval-obovate. Sepals reflexed and deeply concave after flowering. Stamens pink, much longer than the pale pink styles. Young carpels glabrous.

Rubus carpinifolius stands rather isolated amongst European brambles. It goes best in the forefront of the *Thyrsoidei,* as a connecting-link with the *Suberecti.* Weihe and Nees' *b. roseus* is related more to *R. villicaulis* and *R. Lindleianus,* and ought consequently not to stand as a variety of *R. carpinifolius.* As there is already a *Rubus roseus,* a fresh name has to be found. I propose *Rubus rhodanthus,* and quote the sufficient description of Weihe and Nees and their plate (for both of which references are given in the first paragraph above), and as illustrative specimens G. Braun's exs. no. 34, Herb. Rub. germ.

RUBUS RHOMBIFOLIUS Weihe.—In the same work of Weihe and Nees, part iii., at pp. 38–40 of the Latin version, and pp. 40–42 of the German version, another bramble is described, under the name of *Rubus vulgaris d. rhombifolius,* and it is said to be exceedingly common around Mennighüffen. In the year previous to the appearance of part iii. Weihe had published a description of the same plant as a separate species under the name of *R. rhombifolius* in Boenningh. Prodr. Fl. Monast. at p. 151, and that is no doubt its proper status.

The authors point out that this plant, in its calvescent stem and its terminal leaflets narrowed to the base, differs from *R. carpinifolius* and *b. roseus,* which have a pilose stem and terminal leaflets with a cordate base. The following description is prepared from their descriptions and remarks and tab. xiv. *d* of their work :

Rubus rhombifolius Whe. Stem more or less distinctly angled, sparingly pilose, and where exposed to the sun more or less glabrescent. Prickles about 15 to each internode. Terminal leaflet oval-rhomboid, less than twice as long as broad, with a very long acuminate point, decreasing in width towards the obtuse base, and so subcuneate ; the other leaflets ovate-oblong acute. All leaflets hispidulous and shining above, softly pubescent and greyish felted beneath, the midribs and veins papulose when old. Intermediate petiolules one-half to one-third as long as the terminal petiolule.

Panicle pyramidal, much narrowed to the apex, conspicuously flexuose ; the middle branches somewhat patent, cymose. Flowers larger than in *R. Selmeri* and *R. polyanthemus.* Petals and stamens pink.

Habitat. In hedges and thickets.

I have seen a specimen of this bramble, gathered by G Braun in Weihe's district in 1876, and issued by him as no. 11 of his

Herb. Rub. germ. This is exactly matched by specimens collected at Shotover by Druce in 1896 and at Boar's Hill by Focke in 1894 (as *R. pyramidalis*). This bramble is also found on the commons south of London, but often poorly developed, *e. g.*, at Wimbledon Common, Barnes Common, Hayes Common (W. Kent), and Chislehurst Common (a forma *minor*); and also a magnificently developed specimen at Stedham Common (W. Sussex), which is quite comparable in vigour with Braun's specimen.

The following characters will serve further to distinguish the present bramble from its near allies and from *R. rhodanthus* :—

Stem obtuse-angled, sides flat or slightly concave, bearing an occasional short-stalked gland or pricklet. Petiole furrowed below, longer than the basal leaflets. All leaflets thick and coriaceous, becoming convex, often imbricate, clothed with shining pubescence and white felt beneath which becomes yellowish when old; teeth subequal, triangular-ovate, often rather shallow and sinuate, the principal teeth sometimes patent. Terminal leaflet less than twice as long as broad, on the lower leaves ovate-cordate, on the upper leaves more rhomboid-oval, with a somewhat truncate or narrowed entire base. Basal leaflets shortly stalked (about 2 mm.).

Panicle cylindrical and dense above, pyramidal below, lower branches shorter than the subtending leaves. Terminal leaflets narrowed below to a point, finely toothed. Lower leaves rather long-stalked, the petiole equalling the terminal leaflet. Rachis armed with patent or slightly declining prickles above and larger falcate and hooked long-based prickles below; the rachis and branches and lower bracts furnished with short-stalked sunken glands. Petals moderate, roundish oval, abruptly clawed, contiguous, rose-pink to pinkish. Sepals small, olive-green, grey-felted and villose, with a whitish margin, ovate, somewhat obtuse, aciculate, especially at the base, patent after flowering. Stamens much longer than the pink or pink-based styles. Anthers and young carpels pilose.

This bramble appears to fall best into the *Argentei*, near *R. incarnatus* P. J. Muell., which is distinguished by its leaves glabrous above, terminal leaflet ovate-deltoid, always entire-based, glabrous carpels, and the stem, panicle, and bracts completely eglandular.

For fifty years following the publication of the two foregoing plants by Weihe and Nees one finds very little notice of them. Wirtgen and Mueller appear to have mistaken the closely related *R. argenteus* for *R. rhombifolius*. Then Focke, collaborating with Banning and G. Braun, explored the Duchy of Minden with the object of re-discovering Weihe's species in their original stations. At the same time he grew plants of *R. carpinifolius b. roseus* in his garden from seeds and clones sent by Banning from Minden, apparently for the purpose of testing an idea which had formed in his mind that that plant was only the forma *umbrosa* of *R. rhombifolius*—at any rate it is clear that he expected his plants to develop into *R. rhombifolius*. They did not do this; but, instead of taking warning of the unsoundness of the conclusions which he had drawn from his field observations, he recorded it as an unexplained exception to his general experience of brambles that the seed faithfully reproduced the parent plant, and proceeded to combine *R. carpinifolius b. roseus* with *R. rhombifolius* in the systematic part of his ' Synopsis ' (1877).

His collaborator, G. Braun, did not share this opinion, and just as Focke's work issued from the press he distributed examples of each plant from the Minden district under the names used by Weihe and Nees, without any suggestion that they belonged to one and the same species. Braeucker also, who knew both plants in the neighbourhood of Cologne, described them a little later (1882) under the names that Weihe and Nees had used, and stated that Focke had done wrong in treating them as identical.

Notwithstanding these objections Focke clung to his opinion that both plants were *R. rhombifolius*, and so great was his reputation that his view has prevailed unto the present day. Even Sudre, who saw a specimen of each plant which had probably belonged to Lejeune and still bore the names used by Weihe, identified the one named *R. carpinifolius b. roseus* as *R. rhombifolius* on the ground that it agreed with specimens so named by Focke; the other specimen, labelled "*R. vulgaris d. rhombifolius*," he could then only refer to *R. argenteus* (as Wirtgen and Mueller had also done), although he recognized that it did not completely agree. In so far as he saw that the two plants were distinct he was right; his mistake lay in relying upon Focke's authority for *R. rhombifolius*. The plant described and illustrated in his ' Monograph ' as *R. rhombifolius* is *R. rhodanthus*.

In this country the bramble I have called *R. rhodanthus* has always been named *R. rhombifolius* since Focke gave that name to our predecessors for it. The true *R. rhombifolius* remained unrecognized until very recently (Rep. B. E. C. 1931, p. 643 *infra*). The plant was, it is true, noticed by Rogers in the Wye Valley as long ago as 1899, and was very cautiously referred to by him as " a second form of *R. incurvatus* distinct enough to be recognized by a glance, and yet perhaps hardly needing a varietal name." Eventually it won the name *R. incurvatus* var. *subcarpinifolius*. Specimens which reached Focke drew from him the remark that in England *R. rhombifolius* was frequently mistaken for a form of *R. incurvatus*. The plant issued in the ' Set of British Rubi ' as *R. rhombifolius* is *R. rhodanthus*.

The name *Rubus incurvatus* var. *subcarpinifolius* should thus disappear from our lists and be replaced by *R. rhombifolius* Whe., whilst the plant which we have been calling *R. rhombifolius* should in future be called *R. rhodanthus*.

II. *Rubus Colemanni* Bloxam.

In Kirby's Fl. Leic. (1850) Bloxam described a bramble which was discovered at Packington, Leic., by Coleman, who was at the time an assistant master at the Grammar School at Ashby-de-la-Zouch, two miles from Packington. The bramble was named after its discoverer *Rubus Colemanni*. No other station is given for the plant either in Fl. Leic. or in Rogers's review of the brambles of Leicestershire in the 'Victoria History' of that county. Bloxam's description therefore in all probability refers solely to the Packington bramble.

A specimen from Packington labelled "no. 33 *R. Colemanni*" by Bloxam exists in Hb. Mus. Brit., and as it answers exactly to Bloxam's description it may safely be regarded as a type of the original *R. Colemanni* Bloxam. Besides this I have seen a specimen from a bush grown at Cambridge from seed sent by Bloxam and a bush which is still growing at Kew from a clone sent by Bloxam. These also answer to Bloxam's description and must be regarded as authentic.

A very fair idea of the plant may be gained from Bloxam's description, taken in conjunction with Focke's suggestion that the plant originated from a cross between *R. villicaulis* (I should say rather *R. calvatus*) and *R. radula*. It is not, however, obviously a hybrid, as all the specimens I have seen are fertile.

This original Packington *R. Colemanni* seems to be a very scarce bramble, and the name has for long been strangely transferred to a different plant, which is perhaps most common in Surrey, although it occurs also in other southern counties and in the Midlands. This second species differs *in toto* from the Packington bramble, and, well known though it is to all who study the brambles, the following description has been prepared to accompany and validate the separate name to which it is entitled. The description has been made from a bush growing on Witley Common, Surrey, and a specimen from the bush has been placed in Herb. Mus. Brit.

Rubus crudelis, sp. nov.—*Turiones ramique florentes* angulati, expositi rubentes, pilosi, aciculis glandulisque in turionibus raris frequentioribus in ramis muniti. *Aculei* crebri inæquales; majores ad angulos dispositi, e basi compresso alii recti vel leviter declinati alii falcati vel magis recurvi, confluentes; minores sparsi, sæpe glanduliferi. *Folia* quinata, petioli breves, aculeis uncinatis confertis armati. *Foliola* omnia mediocriter et inæqualiter vel

potius duplicato-serrata, supra strigosa, subtus imprimis ad nervos appresse pilosa; infima breviter petiolulata; *terminale* ovato-cordatum, sensim acuminatum (ramorum obovatum, grosse dentatum).

Paniculæ pyramidalis rachis flexuosus acutangulus, rami axillares elongati angulo acuto ascendentes multiflori, medii 3–7-flori cymoso-partiti. Bracteæ latæ, hirsutæ, ad margines glandulosæ. Florum speciosorum *sepala* aculeis parvis falcatis armata, deflorata patentia, erectiuscula vel laxe reflexa; *petala* rosea, obovata; *stamina* roseola stylos tum virescentes tum roseolos multo superantia. Antheræ pilosæ. Germina glabra.

No. 12 in the 'Set of British Rubi,' collected by R. P. Murray, 14. 8. 1893, as "*Rubus Colemanni*" on a common near Witley, Surrey, represents *R. crudelis*, not *R. Colemanni* Bloxam.

R. crudelis is intermediate between *Silvatici* and *Vestiti*. As the leaves are green beneath, the sepals greenish externally, and the growth rather high-arching—unlike the grey-felted prostrate *R. Colemanni*—it goes better in the *Silvatici* in close association with *R. pyramidalis*.

SOUTH-WESTERN NATURALISTS' UNION.

Eleventh Annual Conference, Exeter.

The Eleventh Annual Conference of the Union was held at Exeter from June 2–5, by kind invitation of the local University College Field Club and Natural History Society, under the presidency of Mr. C. W. Bracken, B.A., F.E.S., a well-known Plymouth entomologist.

The attendance of delegates and associates of affiliated Societies was larger than usual, and showed that the need for such a Union of Natural History Societies was at last materialising.

The visitors were welcomed at the Royal Albert Memorial Museum by Mr. F. R. Rowley, F.R.M.S., President of the Exeter Society, at an evening Reception on Friday, June 2, and enjoyed a fine display of exhibits arranged by the Museum staff and the Field Club members. These were mostly of a geological and entomological nature, but a collection of nearly fifty conifers, mostly with cones, from the Pinetum of Streatham Hall, and a fruiting branch of the Cape Silver Tree, *Leucadendron argenteum*, received a good deal of attention. Maps and plans of Dawlish Warren from 1743 to the present day illustrated in a forcible manner the damage to the coast-line by sea-erosion—a whole line of sand-hills with their vegetation has practically disappeared.

An afternoon excursion on June 3 was taken to Stoke Woods, a few miles on the Tiverton road, where several nightingales were in full song. Species of *Lastrea*, *Polystichum*, with *Luzula sylvatica* and *Carex pendula* flourished luxuriantly under a canopy of fine oak- and beech-trees.

In the evening Mr. I. L. Sager, M.A., F.L.S., gave a popular address on the "Phyllody of the Corolla in *Primula vulgaris*," including an account of the primrose discovered in a disused burial ground at Lympstone, South Devon, in 1925, and exhibited at a meeting of the Linnean Society. The plant was transferred to an Exeter garden, where it has increased in size and still retains the abnormal character of the petals that resemble foliage leaves.

The second excursion was a whole-day motor-coach drive through the picturesque Teign Valley to Knighton Heath. The geologists learnt much about the different phases of the Exeter traps and Trusham Dolerite. In some of the quarries visited the botanists noted *Melittis Melissophyllum*, *Lathyrus Nissolia*, *Rubia*, *Rhamnus Frangula*, and *Luzula Forsteri*; but it was on Knighton Heath that most material for study was obtainable. The marsh-orchids *Orchis praetermissa* and *latifolia* were in great abundance, mingled with colour-forms of *O. maculata* and *elodes*, *Erica cinerea* nearly strangled by the threads of dodder, sedges and grasses in great variety, and *Potamogeton natans* assuming the narrower foliage of *P. polygonifolius* in an adjoining pond.

The Conference concluded with an interesting morning spent in a ramble round old Exeter, under the guidance of two local archæologists.

Mr. C. W. Bracken was re-elected President for the 1934 Conference, which will, it is hoped, be held at Bath, and Miss Roper and Prof. O. V. Darbishire Secretary and Treasurer respectively.—Ida M. Roper.

OBITUARY.

Matilda Cullen Knowles

(1864–1933).

The death of Miss Knowles, after a short illness, removes one of the few lichenologists of these islands, and the only botanist in Ireland who was making a special study of that group. From an early age Miss Knowles was interested in the Flowering Plants, and worked at them first in her native county of Antrim and the adjoining county of Londonderry. When 'Irish Topographical Botany' was planned in 1895 she undertook the survey of the county of Tyrone, and sent in a list of over 300 species. In 1902 she took up work in the Science and Art (now National) Museum in Dublin under Prof. T. Johnson, and five years later was appointed to a "Temporary" Assistantship, which post she held until her death. After Prof. Johnson's retirement some ten years ago she remained in charge of the Botanical Section. Her museum duties led to an extension of interests, and she acquired a good working knowledge of the British as well as of the Irish flora, including at least the more conspicuous and familiar of the Cryptogams. The Lichens made a special appeal to her, and when Miss Lorrain Smith undertook the working out of this group in connection with the projected Natural History Survey of the Clare Island district in Mayo, in 1909, she found an able helper in Miss Knowles. With her knowledge of the Lichens considerably enhanced by this Clare Island work Miss Knowles undertook a more intensive study, largely ecological, of the marine and maritime species as represented on the promontory of Howth, near Dublin. The results were embodied in a valuable paper in the 'Scientific Proceedings of the Royal Dublin Society' (xiv. (n. s.) no. 6, pp. 79–143, 1913); she then planned a more ambitious scheme—the working up of a complete list of Irish Lichens on a topographical basis, adopting for this purpose the forty "divisions" into which the country had been partitioned in 'Irish Topographical Botany' and a number of subsequent botanical and zoological papers. Lichen-study in Ireland had previously been concentrated on only a few areas, where the attractiveness of the flora or the presence of resident botanists had resulted in fairly full lists of species. For over half the Irish divisions the recorded Lichen flora was very small—for some, indeed, nil! Miss Knowles, working almost single-handed, raised the average flora of the forty divisions to 186, adding over 100 species to the Irish flora, and five new species. The whole, including an admirable Introduction and a Bibliography, was issued by the Royal Irish Academy, 1929*. The material for a Supplement had, at the time of her death, reached considerable dimensions.

Miss Knowles was an accurate and energetic botanist, a charming companion, and a wise and trusty friend. She will be missed by a circle much wider than that which she had created by her long-continued botanical activities.

She was born in Co. Antrim, January 31, 1864, and died in Dublin on April 27, 1933.—R. Ll. Praeger.

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

Notes on the Swiss Flora.—A Becherer ("Fortschritte in der Systematik und Floristik der Schweizerflora (Gefässpflanzen) in den Jahren 1930 und 1931," Separatabdruck der Berichte Schweizerischen Botanischen Gesellschaft, 1932, Bd. xli.) supplies

* 'The Lichens of Ireland,' Proc. Roy. Irish Acad. xxxviii. sect. B, no. 12, pp. 179–434, July 1929.

a number of interesting floristic and systematic notes on plants collected by Swiss botanists in the years 1930 and 1931. He also quotes a number of recent monographs and revisions of various genera. Some of these are in rather out-of-the-way publications, and are liable to be overlooked. Under Pteridophyta the name *Asplenium Breynii* Retz. takes the place of *A. germanicum* auct. vix Weis. Under Coniferae the author quotes under *Juniperus*, R. Pilger, 'Die Gattung *Juniperus*' L. in Mitt. Deutsch. Dendrolog. Ges. xliii. (1931), 255–269. Among the notes on Monocotyledons under the genus *Avena*, A. Saint-Yves, 'Contribution à l'étude des *Avena* sect. *Avenastrum*,' in *Candollea*, iv. 353–504 (1931), and under *Triticum*, C. Flaksberger, '*Eutriticum* verschiedener Länder &c.,' in Fedde Repert. xxvii. (1930) 241–253.

Various interesting Orchids are mentioned—*Orchis incarnata* × *latifolius* (*O. Aschersoniana* Hausskn.), *Orchis incarnata* × *maculata* (*O. ambigua* Kerner) are recorded for several localities, and *O. latifolia* × *maculatus* (*O. Braunii* Halaczy) and *Ophrys fuciflora* × *muscifera* (*O. devenensis* Rchb.) from near Aarau, etc. Among the notes on Dicotyledons the student of the Ulmaceae is referred to H. Walter in Kirchner, Loew and Schroeter, 'Lebensgeschichte der Blütenpflanzen Mitteleuropas,' ii. 1 Abt. (1931) 601–764. Under *Veronica* E. Lehmann's 'Geschichte und Geographie der *Veronica* Gruppe *Megasperma*,' in Bibl. Bot. 99 (1930), is quoted. The forms of *Plantago Coronopus* L. and its allies have been revised by R. Pilger in Fedde Repert. xxviii. (1930), 262–322.

Botanists interested in recent floristic and systematic work in Switzerland should consult the original paper.—E. G. B.

Devonshire Association.—The Report and Transactions of the Association for 1932 contain the 24th Botany Report, edited by the Recorder, Mr. G. T. Harris, a Second Report of the Botanical Section by the Hon. Sec., Mr. F. A. Brokenshire, an account of the Sea-weeds of South Devon by Mr. G. F. Tregelles, and a Supplementary Glossary of Devonshire Plant Names by Mr. R. Pearse Chope.

The Botany Report gives a large number of fresh stations for various plants, chiefly Phanerogams and Fungi, and a list of new county records. As in previous years the identification of a few of the Phanerogams seems to require confirmation by a competent botanist. The occurrence of *Peucedanum officinale* and *Cephalanthera rubra* as native species in Devon would be of considerable interest. Mr. Tregelles' list of sea-weeds is a full one, and likely to prove useful; the glossary also is comprehensive, and includes many curious local names. The explanations suggested for some of these names, *e. g.*, Adam-and-Eve, are not always convincing.—H. W. Pugsley.

SHORT NOTES.

An Army of Myosurus minimus.—A few years ago, while strolling in May along the main road that leads eastwards from Hereford to Ledbury and a few miles out crosses the marshy valley of the Lugg I made a startling discovery. At one of the many little bridges that span the marsh, to allow for drainage in time of flood, I paused to look over a gate, and my eyes opened wide with astonishment—before me lay a veritable army of little plants, each standing erect like a soldier, about 2–3 inches high, and each ending upwards in a slender tail like the tail of a mouse. It was *Myosurus*, as I speedily convinced myself by climbing over the gate. But why so many? Hitherto I had seen it only in dozens; but here, as a survey soon proved, there were very many thousands of Mousetails, covering an area as big as a small suburban garden.

The reason was soon seen. During the winter there had been extensive floods, and many banks of silt had been left behind when the waters subsided. It was one of these banks that was overrun by the little plant. But the point of interest was that it formed an almost pure cultivation—only a few small grass-tufts leavened its homogeneity. The seeds had been washed down in thousands, and, germinating quickly, had occupied the ground. Whence had they come?

Next year, and in succeeding years, I revisited the spot every May. The *Myosurus* still came up, being an annual that produces a great abundance of seed, but every year the number of grass-plants and other common weeds increased, and gradually the army of Mousetails diminished. After about five or six years it had vanished entirely, being smothered by its more vigorous competitors.—W. B. Grove.

Spartina Townsendi on the Portishead Salt-Marshes.—During a field-class held on May 22, 1933, plants of *Spartina Townsendi* were noticed growing on the lowest zone of the Portishead and Portbury salt-marshes. The district has been kept under observation by the Botany Department of the University of Bristol for some years, and hitherto the plant has not been observed there. A preliminary survey showed about eight plants in all. They were scattered between Portishead and Portbury, but all in the lowest zone of the salt-marsh near the high-water mark of the neap tides.

The occurrence and spread of this plant at Berrow, Somerset, since 1921 has been fully described by H. S. Thompson*. He suggests that the plant was probably introduced from the locality of Kingston Seymour near Clevedon, where it had been planted in 1913 as an experiment for the prevention of coast erosion.

* Journ. of Ecol. x. (1922), xviii. (1930); Proc. Bristol Nat. Soc. ser. 4, vii. (1928).

Miss Roper * describes the course of this experiment and shows how the plant has apparently been unable to withstand the tidal currents at this spot and has not flourished during the years of the experiment. In 1923 Miss Roper † recorded the appearance of *Spartina Townsendi* at Severn House Farm, near Berkeley, on the Gloucestershire coast.

From records kept of edaphic and physiographic factors of the Portishead marshes since 1924 it may be seen that considerable changes in the slope, and consequently in the frequency of tidal submergence, have occurred in the lowest zone of the marsh. Correlated with these changes a steady decrease in the number of *Salicornia* plants in the zone has been observed. It is hoped to start at once a thorough investigation into the nature of these changes, particularly with a view to accounting for the appearance of *Spartina Townsendi* in a new locality.—ROSE BRACHER, Department of Botany, University of Bristol.

STRYCHNOS NUX-VOMICA LINN.—In Waterhouse's 'Index Generum Avium' we find recorded the genus *Strychnos*, which is referred to Brehm, 'Der Vogelfang,' 1836, 135. This was duly recorded by me in the 'Index Animalium, 1801–1850,' with the addition of the specific name as given by Brehm in accordance with the usual practice. In revising the proofs of "S" I went further into the matter, and find that Brehm, in the midst of his birds, prints the plant name in the same type as the bird names, and Waterhouse must have copied it inadvertently as a new bird when recording for his Index. A proper note explaining the fact will appear shortly in the 'Index.'—C. D. SHERBORN.

REVIEWS.

Monograph and Iconograph of Native British Orchidaceae. By Colonel M. J. GODFERY. With 57 coloured plates from water colour drawings of living plants by HILDA M. GODFERY. 4to, pp. xvi, 259; 58 coloured, 9 monochrome pls., text-figs. University Press: Cambridge, 1933. Price £7 7*s*.

MEMBERS of the International Botanical Congress held at Cambridge in 1930 will call to mind an exhibit of a beautiful series of coloured drawings of European orchids, 229 in number, the work of Mrs. Hilda Margaret Godfery. Mrs. Godfery died shortly after the Congress, and a brief appreciation of her work will be found in the November number of this Journal. The present volume is a tribute to the memory of the "wife, companion, and enthusiastic fellow-student of Orchids, by whom this book is illustrated, and without whom it would never have been written." A happy photograph of the artist gathering flowers in a garden accompanies the dedication.

* Proc. Brist. Nat. Soc. ser. 4, v. (1919 & 1921). † *Op. cit.* vi. (1923).

This handsome volume is the outcome of many years of patient critical study of the Orchids at home and on the continent. The descriptions, like the illustrations, were made from living plants studied year after year in widely different habitats. The expense attaching to the reproduction of the drawings rendered publication privately or through the medium of the ordinary publisher prohibitive. Thanks are due to the Cambridge Press, which, with the support of a preliminary list of nearly one hundred subscribers, decided to undertake it.

The absence of a monograph of British Orchids amply illustrated with coloured plates has hitherto been a serious drawback to their study. Students of our flora are well aware of the difficulty of determining many of the species by help of the descriptions in the ordinary Flora, and, owing to the impossibility of preparing adequate dried specimens of the flower, herbarium material is unsatisfactory. Well-drawn coloured sketches of the flower and its parts are requisite. These Mrs. Godfery has been careful to supply. The appearance of the Monograph, a copy of which should be available in the library or otherwise accessible to the members of every Natural History Society, should stimulate the study of this especially interesting family. The hope may be expressed that it will not lead to a zeal for collecting. If anything, Col. Godfery's work impresses us with the interest of the living plant, especially the methods of its pollination by insect agency, which can be studied only *in situ*.

The drawings are reproduced by process—one could wish that the fresh beauty of the originals could have been preserved by hand-colouring; the cost was prohibitive—but the plates are beautiful and the details are generally clearly rendered. A drawback of process work is the difficulty of securing a balance which will accurately render the different shades of green in the leaves.

As regards the general plan of the work. In his Preface Col. Godfery acknowledges the help of many friends and fellow-students of the family. An "Introduction" is a general description of the orchid flower for the benefit mainly of the non-botanical reader. In two sections dealing with the Evolution of the flower and of the various recognised groups the author develops ideas of the position with regard to the Apostasiaceae and the relations of Diandrae to Monandrae, which he published recently in the 'Orchid Review.' The Diandrae and the great tribe of Monandrae form parallel lines of descent, and *Cephalanthera* is regarded as the most ancient and primitive genus of the latter, the least differentiated from the monocotyledonous type of flower, "the most ancient and I think the only genus of terrestrial orchids known to obtain the adhesive matter for fixing the pollinia to insects—not from the anther, as in *Cypripedium*, but by utilising the ordinary secretion of the stigma." *Cepha-*

lanthera " enables us to understand how cross-fertilization by the aid of insects could be brought about, before a rostellum had yet been evolved in the Orchidaceae." Later in the book (pp. 53–4) the author describes the experiments by which, after nine years of watching, the actual pollination of *C. ensifolia* by a small Hymenopteron was at last detected.

A detailed account is given of pollination, followed by sections on development of the seedling and mycorrhizal symbiosis, and hybridism. A brief section headed " Nomenclature," evinces a natural annoyance at the presumed effect of the Article of the International Rules which places " every name, however widely accepted, at the mercy of anyone who can find an older one, even though still-born [!]," and the confusion arising from the shuffling of *Epipactis*, *Serapias*, and *Cephalanthera* is cited. But the list of names of genera to be conserved does afford some security of tenure. The author shows a lack of acquaintance with the Fathers of Botany when he states (p. 229) that the proposal to replace *Ophrys aranifera* by a name *O. sphegodes* Mill. " from a gardening dictionary (Miller's (1768)) " has not been generally adopted. And we note a departure from the use of the capital initial for trivial names in specified cases—*Orchis morio*, *Microstylis rhedii* have an unfamiliar look.

Pages 37–243 are devoted to a description of the genera and species. Lindley's tribes are in the main adopted. Forty-seven species are recognized in the twenty-one genera. Keys are given of the genera and, where there is more than one in a genus, of the species. The species are very fully described, and reference is aided by use of clarendon type for the various organs ; full notes on pollination, in which Col. and Mrs. Godfery took a special interest, are included. General notes on habitat and distribution are also given. Also a limited synonymy. Departures from the type are noted and recognised varieties are fully treated. The study of variation is a special feature of the monograph. Thus plate 50 depicts twenty-four lip-forms of *Orchis maculata* ; and many recognised varieties are figured, especially in the genera *Orchis* and *Ophrys*.

Under *Spiranthes Romanzoffiana* Col. Godfery cites the authority of Prof. Oakes Ames and Prof. Fernald, both well acquainted with the species in North America, in favour of regarding the Northern and Southern Irish forms as conspecific. Of *Epipactis*, of which the author has made a special study, six British species are recognised, including *E. leptochila* and *E. dunensis*, both of Godfery.

Mention should be made of the beautiful stereographic photographs, the subject of four monochrome plates, which are reproduced by permission of Herr F. Pfeiffer-Wellheim of Vienna.

The typography and general production of the work are such as we expect from the Cambridge Press.—A. B. Rendle.

West African Agriculture. By O. T. Faulkner, C.M.G., B.A., and J. R. Mackie, M.C., B.Sc. 8vo, pp. viii, 168, with frontispiece. University Press: Cambridge, 1933. Price 8*s.* 6*d.*

This is an inexpensive volume dealing with the modern aspects and problems of agriculture as practised in the British colonies of West Africa. It has been " written especially for the candidates for Government service " in those countries, but can safely be recommended to interest a far larger circle of readers whose conception of farming in that part of the Empire is subconsciously affected by the conditions and reactions which obtain at home.

The writers, with the authority of many years' service and much experimental work in Nigeria, correct a number of mistaken ideas which had been promulgated by an earlier generation of agricultural officers ; they insist upon the necessity for experimentation, indicate the practical common sense of the native farmer, explain difficulties which have not yet been overcome, and without unnecessary detail provide as much information regarding the climate, soil, local methods, customs and polity, crops and stock as can safely be relied upon.

Such a book has long been needed as a modern and entertaining survey of the subject with no tedious statistical tables, but with an index that renders it a convenient source of reference.—R. H. Bunting.

In Search of Wild Flowers. By J. F. Rayner. Sm. 8vo, pp. xiii, 141. With 53 figs. in black and white, and a frontis piece in colours, by Margaret M. Ray. World of Youth Library, no. 13. Watts & Co. : London, 1933. Price 1*s.* 6*d.*

Mr. Rayner has a good first-hand knowledge of our British Wild Flowers, and in this little volume he is trying to interest young people in the study of the plants to be found respectively in woodlands, banks and hedges, pastures and meadows, pools and streams, heaths, bogs and sea-shores—to quote some of the headings of his eight chapters. Miss Ray's black and white drawings will help in their identification and tell something of their salient characters.

The book is written in a chatty style, and should answer its purpose of arousing interest in our more common wild plants.

Occasionally popular language involves inaccuracy. For instance, under Furze we are told that the leaves " pass into spines " and that the nodules on the roots " are said to be caused by a kind of fungus " which " is able to make salts out of the soil." And why call a male flower a " false " flower ? Self-examination is encouraged by a series of questions at the end of each chapter.

BOOK-NOTES, NEWS, ETC.

THE recently issued part of the 'Journal of the Linnean Society' (xlix. pp. 309–391) contains a description of the vegetative organs of the fossil fern, *Scolecopteris Oliveri*, by Dr. D. H. Scott and Dr. H. S. Holden; some contributions to our knowledge of the Colonial Volvocales of South India, by Prof. M. O. P. Iyengar, of the Presidency College, Madras; and a comparative study of geotropism in three species of *Lupinus*, by E. D. Brain.

GENTES HERBARUM, vol. iii, fasc. 1 & 2.—In these two fascicles the versatile and energetic author, L. H. Bailey, turns his attention to Palms. Fascicle 1 contains one article entitled "Palmæ," and deals with Palms and their characteristics. Though representing "the noblest family of plants," the palms have been neglected commercially and are still little known as a whole, except to special students. The author has long had in preparation an Index Palmarum, of genera, species, and varieties, which now numbers about 7000 cards. The literature is widely scattered and pictures are often inaccurate and even fantastic. To clarify the situation the author explains with some good illustrations, the general terms used in the description of the species, and then instructs us in the methods of collecting and preparing specimens for phytographic study. "Palms lend themselves readily to representation in herbaria," but one must abandon "the prevailing concept of an herbarium," which should not be to save space but adequately to represent the plants. His instructions follow the practice which has developed from his own experience.

Fascicle 2 comprises an article entitled "Quædam Palmæ Panamenses," and gives the results of the work of the author and his daughter, especially on Barro Colorado Island in the Canal Zone, in June and July 1931. Species of fourteen genera are described in detail, and discussions on the nomenclature, distribution, &c., of the genera concerned are also included. The consideration of the oil-palms yields so many dissimilarities as to impel the separation of the African and American species in distinct genera—*Elaeis* is retained for the African species and *Corozo* (Giseke in 'Linnæus Prælectiones in Ordines Naturales,' 1792) is adopted for the American. The most abundant palms on Barro Colorado are the Bactrids, of which six species are described, four of which are new. Some notes on the nomenclature of certain introduced palms in Panama are appended. The article is profusely illustrated by sixty-nine excellent photographs and line-drawings of habit, leaf-form, flower, and fruit.

We regret to note the death in London on July 18 of Mr. CHARLES CARMICHAEL LACAITA, F.L.S. An appreciation of his work will appear in the next number of the Journal.

NOTES ON *SELAGINELLA*.

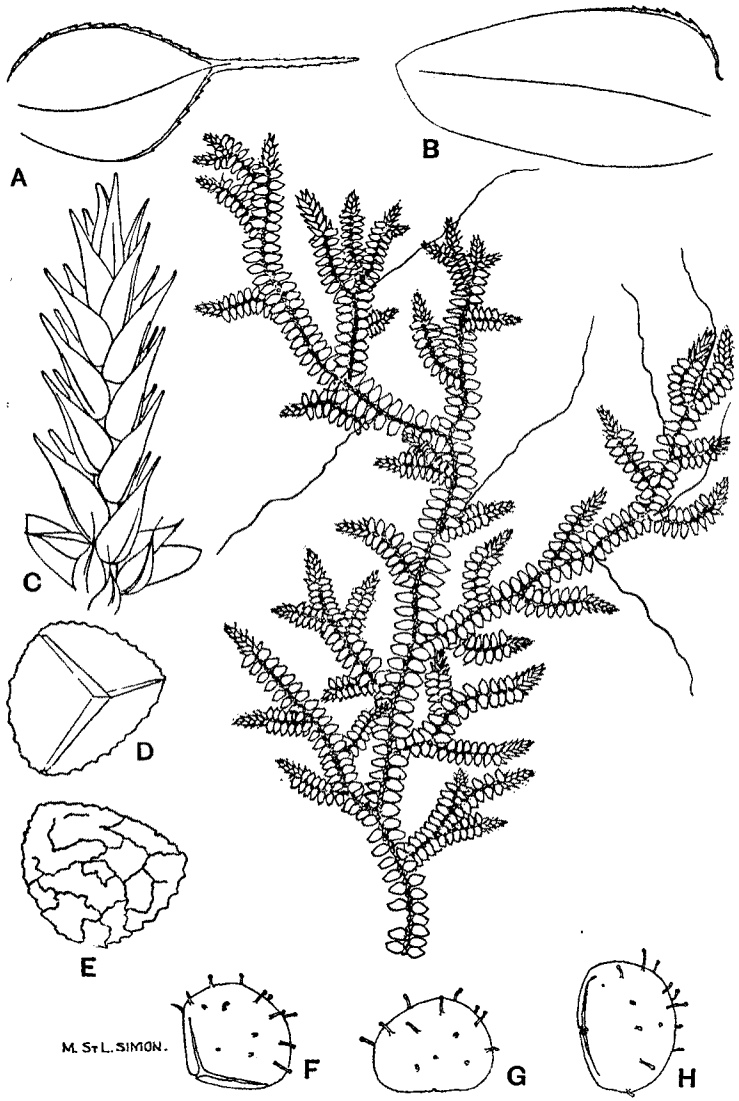
IV. A REVISION OF LIEBMANN'S MEXICAN *SELAGINELLAE*.

BY A. H. G. ALSTON, British Museum (Natural History).

RECENTLY Dr. C. Christensen very kindly sent me the Copenhagen set of Liebmann's *Selaginellae* for revision.

The botanist Frederik Michael Liebmann, accompanied by the gardener Rathsack, landed at Vera Cruz on Feb. 7, 1841, and travelled northwards through the low country of this province parallel to the coast, passing Santa Barbara (March 1841), Yecoatla (March), and Colipa (March), to Xicaltepec (April), where his companion, the Russian naturalist Baron von Karwinsky, left him. He then turned south through Misantla (April), Baranca de Huitamalco (May), Hacienda de Jovo (May), Papantla (June), and established himself at the Hacienda de Mirador, on the east side of Mt. Orizaba, a farm which belonged to the botanist Sartorius. Liebmann ascended Mt. Orizaba accompanied by the Belgian botanist Ghiesbreght in September 1841, and stayed several days in the Vacqueria del Jacal at 3000 m. He visited Huatusco (September), Sta. Maria Alpatlahua (June), Zacuapan (November), Consoquitla (October), Dos Puentes (August) (all in the state of Vera Cruz) from Mirador. Later he crossed the Cordilleras near Cumbre de Azulzingo and went south-west to Tehuacan. From thence he returned to Mirador and sent Rathsack home with the specimens. He left Mirador again in April 1842, and traversed the states of Puebla and Oaxaca, collecting at Tehuacan in Puebla and Chinantla, a village on the slopes of Mt. Sempoaltepec; after staying a few days at the Hacienda Yavesia he left Oaxaca in October and travelled south-west to the Pacific coast at Pochutla, where he stayed a few weeks and collected some algæ near Plaga de San Augustin. From thence he followed the coast south-east down to Tehuantepec, whence he returned to Mirador, leaving Vera Cruz on 26th March, 1843, for Copenhagen.

Liebmann became professor at Copenhagen, where he occupied himself with Mexican taxonomy till his death in October 1856. Some species of *Selaginella* are briefly mentioned in Oversigt Kongel. Danske Vid. Selsk. iv. 42–43 (1847), but he evidently intended to publish a separate paper on his *Selaginellae*, since unpublished descriptions and plates were left. Some of his names were quoted by Fournier and some species were described by J. G. Baker. The types of those described by Baker are at Kew, and have been compared with the Copenhagen specimens revised here. There is an account of Liebmann's life in Christensen's Danske Bot. Hist. i. 363–377, from which and from labels this account has been drawn up.



Selaginella faucium Liebm. Habit, nat. size. A. Median leaf, × 20. B. Lateral leaf, × 15. C. Strobilus, × 10. D-E. Megaspores, × 50. F-H. Microspores, × 750.

Key to Species collected by Liebmann.

Leaves uniform, spirally arranged	1. *S. Sartorii.*
Leaves dimorphic.	
Stems tufted.	
Lateral leaves reddish beneath	2. *S. lepidophylla.*
Lateral leaves pale beneath	3. *S. pallescens.*
Stems not tufted.	
Leaves uniform at base of main stem.	
Median leaves acuminate	4. *S. oaxacana.*
Median leaves aristate.	
Leaves of stem uniform to above first branch; stems straw-coloured	5. *S. pulcherrima.*
Leaves uniform at base of stem only; stems usually pinkish	6. *S. Hoffmannii.*
Leaves all unequal, spreading laterally.	
Stems sulcate, articulate	7. *S. Galeottii.*
Stems terete, not articulate.	
Median leaves acuminate	8. *S. saccharata.*
Median leaves aristate.	
Stems bearing leafy stolons; lateral leaves acute	9. *S. binervis.*
Stems bearing naked rhizophores; lateral leaves obtuse.	
Lateral leaves denticulate; rhizophores rigid.	
Median leaves auriculate	10. *S. stenophylla.*
Median leaves exauriculate	11. *S. faucium.*
Lateral leaves ciliate; rhizophores delicate	12. *S. Schiedeana.*

1. S. SARTORII Hieron. in Hedw. xxxix. 304, no. 14 (1900).

VERA CRUZ: in superficie rupium trachyticorum prope Mirador, 2062. *S. extensa* Und. is similar in habit, but has dark green leaves with very short terminal setæ; *S. Sartorii* has straw-coloured setæ and glaucous leaves.

2. S. LEPIDOPHYLLA (Hk. & Gr.) Spring in Mart. Fl. Bras. i. pt. 2, 126 (1840); Liebm. in Ov. Kong. Danske Vid. Selsk. Forh. iv. 43 (1847). *Lycopodium lepidophyllum* Hk. & Gr. in Hook. Bot. Misc. iii. 106 (1833).

PUEBLA: S. Lorenzo prope Tehuacan, in fissuris rupium calcarorum.

3. S. PALLESCENS (Presl) Spring, *tom. cit.* 132 (1840). *Lycopodium pallescens* Presl, Rel. Haenk. 79 (1825). *L. cuspidatum* Link, Hort. Berol. ii. 161, no. 2 (1841).

VERA CRUZ: in fissuris rupium trachyticis, Baranca de Mirador, 2044; in rupibus trachyticis prope Colipa, 2040; in fissuris rupium prope Sta. Maria Alpatlahua in declivitate montis Orizabæ alt. 6000 ft., 2041; inter S. Antonio Huatusco & S. Juan Cosmatepec, alt. 5000 ft., 2042; Dos Puentes in fissuris rupium, alt. 4500 ft., 2045; in rupibus trachyticis ad Consoquitla, alt. 2000 ft., 2043.

4. S. OAXACANA Spring in Mém. Ac. Roy. Belg. xxiv. 177, no. 117 (1850). *Lycopodium flabellatum* var. *strictum* Mart. & Gal. in Mém. Acad. Roy. Belg. xv. 12 (1842).

OAXACA: in sylvis umbrosis prope Lacoba, distr. Chinantla, 2051.

I have examined Spring's type, which was collected at Chinantla by Galeotti (6608 *bis*), in Herb. Paris. *Ghiesbreght* 602 from Chiapas is correctly referred to this species by Baker ('Fern Allies,' 104). *S. Wendlandii* Hieron. is the same species, judging from a fragment of Bernoulli's specimen at Kew.

5. S. PULCHERRIMA Liebm. ex Fourn. Mex. Pl. 147 (1872) nomen; Baker in Journ. Bot. xxiii. 117, no. 235 (1885). ? *S. amoena* Bull. Cat. no. 199, 16 (1884).

VERA CRUZ: in declivitatibus sylvaticis prope Hacienda de Jovo, 2061.

This species was compared with *S. pallescens* (Presl) Spring. *S. pallescens* is readily distinguished by its white-margined median leaves and strongly ciliate stem-leaves. Baker ('Fern Allies,' 94) referred *S. amoena* Bull to *S. caulescens* (Wall.) Spring, a species distinguished from all others by its winged megaspores. *S. microdendron* Baker from Cuba, *S. Harrisii* Und. & Hieron. from Jamaica and *S. Millspaughii* Hieron. from Yucatan are closely allied.

6. S. HOFFMANNII Hieron. in Hedw. xli. 184, no. 11 (1902). *S. undulata* Liebm. ex Fourn. Pl. Mex. 148 (1872) nomen; Hieron. in Hedw. lviii. 294 (1917) nomen. *S. Weberi* A. Br. ex Fourn. Pl. Mex. 149 (1872) nomen.

VERA CRUZ: in sylvaticis circa Yecoatla, prope Colipa, prope Misantla, 2075; in sylvis umbrosis circa Hacienda de Mirador, 2050; in sylvis frondosis circa Hacienda de Mirador, 2046.

This species has been collected also at Misantla by Purpus (no. 5938 in Herb. Mus. Brit.).

7. S. GALEOTTII Spring in Bull. Ac. Roy. Brux. x. 230, no. 129 (1843). *S. vexata* Liebm. ex Fourn. Mex. Pl. 147 (1872) in syn. *Lycopodium proliferum* Schlect. ex Nees in Linnæa, xix. 686 (1847) nomen, non Blume.

VERA CRUZ: in locis humidis sylvarum prope Yecoatla, 2052; in umbrosis humidis sylvarum prope Colipa, 2053; in sylvaticis prope Mirador, 2054; Sta. Maria Tlapacoyo in sylvaticis humidis, 2055; in Baranca de Mirador, 2056; Potrero de Consoquitla, 2057.

8. S. SACCHARATA A. Br. in Ann. Sc. Nat. sér. 5, iii. 272 (1865). ? *S. delicatissima* Linden Cat. no. 11, 20 (1856) nomen; A. Br. App. Ind. Sem. H. Berol. 1857, 13. *S. sanguinolenta* Liebm. ex Fourn. Mex. Pl. 148 (1872) in syn. *S. Spirillum* Liebm. ex Fourn. *l. c.* in syn.

VERA CRUZ: in rupibus trachyticis apricis prope Mirador, 2066; in rupibus apricis ad Zacuapan; in rupibus irrigatis ad Dos Puentes inter Totilla et Hiatusco, 2064.

OAXACA: rup. apric., prope Chinantla, 7000 ft., 2065.

S. delicatissima Linden of gardens is probably merely a slender form of this species.

9. S. BINERVIS Liebm. ex Fourn. Pl. Mex. 148 (1872) in syn.; Baker in Journ. Bot. xxii. 112, no. 131 (1884). *S. Moritziana* "A. Br.," Fourn. *l. c.* *S. sarmentosa* Liebm. ex Fourn. *l. c.* in syn.

VERA CRUZ: Dos Puentes, S. Antonio Huatusco in locis humidis, 2035; Sta. Maria Alpatlahua in rupibus irrigatis, 2036.

10. S. STENOPHYLLA A. Br. App. Ind. Sem. Hort. Berol. 1857, 22. *S. macroura* Liebm. ex Fourn. Pl. Mex. 148 (1872) in syn. *S. lychnuchus* "Spring," Fourn. *l. c.* *S. incurvata* Baker in Journ. Bot. xxi. 99, no. 43 (1883). *S. vaginata* Liebm. ex Baker *l. c.* in syn. *S. miradorensis* Hieron. in Hedw. xliii. 30, no. 38 (1904).

VERA CRUZ: in sylvaticis graminosis prope Misantla, 2071; parasitica in arboribus vetustis sylvarum prope Hacienda de Sta. Barbara, 2058; Baranca de Zacuapan in rupibus trachyticis.

S. macroura Liebm. was correctly referred to this species by Baker ('Fern Allies,' 123).

11. S. FAUCIUM Liebm. ex Fourn. Mex. Pl. 148 (1872) nomen; Baker in Journ. Bot. xxi. 333, no. 87 (1883).

VERA CRUZ: in Baranca de la Hacienda de Jovo in locis umbrosis humidis, 2048; in Baranca de Huitamalco in fundo faucium umbrosorum, 2047; in fundo faucium prope Consoquitla supra rupes, 2049.

I have seen no other collections of this species except those of Liebmann.

12. S. SCHIEDEANA A. Br. App. Ind. Sem. Hort. Berol. 1857, 14. *S. Liebmanni* Fourn. Mex. Pl. 148 (1872) nomen. *S. fimbriata* Liebm. ex Fourn. *l. c.* in syn. *S. lychnuchus* var. *rigidiuscula* "Spring," Fourn. *l. c.*

VERA CRUZ: In terra argillacea sylvarum circa Papantla, 2068; in terra uda umbrosa sylvarum prope Sta. Maria Tlapacoyo, 2069; in terra uda umbrosa sylvarum prope Colipa, 2070.

Liebmann's plants match well a Schiede and Deppe specimen from Papantla in Herb. Mus. Brit. *S. Liebmanni* Fourn. was correctly referred to this species by Baker ('Fern Allies,' 47).

NEW AND RARE SPECIES OF NEW ZEALAND MOSSES.

By H. N. Dixon and G. O. K. Sainsbury.

(Concluded from p. 220.)

Orthotrichum austro-cupulatum Dix. & Sainsb., sp. nov. *O. cupulato* Hoffm. affine et simile. Calyptra *sat dense pilosa*; theca omnino exserta, sicca suburceolata, striis 8 longioribus atque 8 brevioribus notata; stomata *immersa*, numerosa, magna, præcipue *per* mediam thecæ partem dispersa; peristomii dentes papillati, fusci, *hic illic præperistomii fragmentis nodosi*; processus *lati, bene evoluti, trabeculati vel nodosi, superne nonnunquam inter se conjuncti.*

Hab. On scattered limestone rocks, Mt. Arthur, Nelson, Feb. 3, 1930; coll. *Sainsbury* (611).

The characters given above will show that this, while near the Palæarctic *O. cupulatum*, is abundantly distinct both from that and from all the New Zealand species.

Funaria producta (Mitt.) Broth. (*op. cit.* 370). The first New Zealand station was Auckland (Herb. Cheeseman), and the plant has since been found at Wairoa, Hawkes Bay (*E. A. Hodgson*, 490). In the latter district the habitat is damp earth, shaded by scrub and grass. Here it grows with *F. cuspidata* Hk. f. & W., and such was evidently its association at Auckland, because one of the packets contains some stems of that moss and both specimens are sub. nom. *F. cuspidata*. *F. producta* is an interesting addition to the Tasmanian element in the New Zealand flora, the species being confined to these countries.

Bryum crassum Hk. f. & W. (*op. cit.* 212, and "Miscellanea Bryologica," Journ. Bot. 1927, 351). Mr. Allison states that this moss is quite common on rock bordering the Waikato River at Atiamuri, and on exposed hill-tops. It has also been found in quantity at Waihohonu, Mt. Ruapehu (*Sainsbury*). The habitat there is loose pumice soil amongst scrub.

Bartramia alaris Dix. & Sainsb., sp. nov. Humilis, glauco-viridis; caulis vix ultra 1 cm. altus, densifolius; folia sicca *flexuosa, suberecta, nec stricta nec crispata*, 4–4·5 mm. longa, basi *brevissima deltoideo-triangulari, ab insertione sensim in laminam lanceolato-linearem apice robuste subulato* angustata. Margines *ubique anguste, arcte reflexi*, superne bistratosi, fortiter geminatim seu plurifariam spinulosi. Costa 50–60 μ lata, per totum folium subæqualis, dorso prominens, apicem versus dorso spinosa. Cellulæ superiores *brevissime rectangulares vel subquadratæ*, parvæ, obscuræ, dorso grossiuscule papillosæ, inferiores in parte basilari dilatata pallidæ, inanes, *anguste lineares*, ad margines breviores, quadratæ, ad angulos *laxiores, alas parvas, distinctas sed male delimitatas* instruentes; infimæ ad insertionem aurantiacæ.

[Fructus ignotus.]

Hab. Hillside, near Havelock North, Hawkes Bay, Jan. 1929; coll. *Mrs. Hodgson* (563); with *Triquetrella curvifolia*.

It is difficult to say whether this should be referred to *Eu-Bartramia* or *Strictidium*, but the leaf form is more that of the latter section. In any case it is quite distinct. *B. strictifolia* Tayl. has elongate upper cells.

The margins are reflexed almost to apex, and are in the upper part spinulose in several rows.

Breutelia Sieberi (Hornsch.) Mitt. (*op. cit.* 232). Further collections at Maungatepopo, Mt. Ngauruhoe, 4000 ft. (*Sainsbury*, 493, 494), show that this species is inseparable from *B. pendula* (Hook.) Mitt., and should consequently be dropped. The specimens show too much variability in the length of the upper cells and the development of the alar cells to justify keeping the two species apart.

B. elongata (Hk. f. & W.) Mitt. (*op. cit.* 233). As before mentioned this handsome moss is associated with *Eucamptodon inflatus* on Mt. Moehau, Coromandel, North Island. It has also been found in two other mountainous stations in the North Island, *i. e.*, Mt. Maungapohatu, Uriwera Country, 4300 ft. (*L. B. Moore*, 428), where it is abundant at the summit in Sphagnum bogs and under low scrub, and Waiopehu, Tararua Mts. (*Sainsbury*), where it grows on the open summit, 3200 ft., on wet ground with *B. pendula* and *Polytrichum commune*. Fruiting plants have not as yet been found in the North Island.

Mittenia plumula (Mitt.) C. M. A Tasmanian species which was first collected in New Zealand by Mr. R. Mundy at Ohakune, 2000 ft., near Mt. Ruapehu (536). It has also been found near Taupo, 1200 ft. (*Allison* 333). The habitat is usually mounds in forest formed by roots of upturned trees in shaded sandy soil. Fruit is present in the gatherings, but only sparingly, and Mr. Mundy reports that the plant is a shy fruiter.

Polytrichum formosum Hedw. This moss, hitherto unreported in New Zealand, has lately been found twice in the South Island; at Mt. Arthur, Nelson (*Sainsbury* 575) and Arthur's Pass, Canterbury (*L. B. Moore*, 286). It has not previously been recorded from the Southern Hemisphere.

Buxbaumia aphylla Hedw. Damp ground near Atiamuri, Hawkes Bay, May 5, 1930; coll. *K. W. Allison* (581).

Since the publication of *B. novae-zelandiae* (*op. cit.* 369) further investigations have been made by Mr. Allison which have

helped to clear up some of the difficulties. It appears that there are two New Zealand species, viz., the above (*B. novae-zelandiae*), known by its long, smooth seta, and a second which agrees in every way with the plant of the Northern Hemisphere, including the immersed stomata.

A. Burges has recently described (Proc. Linn. Soc. N.S.W. lvii. 242) a new Australian species, *B. Colyerae*. This differs from *B. tasmanica* mainly in the leaves, which are only very shortly toothed, while in *B. tasmanica* they are described as ciliate; and also in the smooth, shiny seta (1·5–2·5 cm.). It seems probable that this may be identical with *B. novae-zelandiae*, a point which can only be settled by careful comparison of the leaves in both species.

CRYPHAEA OVALIFOLIA (C. M.) Jaeg. (*Cryphidium ovalifolium* Broth.). On wharf piles, Foxton, Manawatu, North I., 1932; coll. *Capt. R. Hayes* (661).—Distr. Australia.

The nerve is a little longer than in the Australian plant and less markedly tapering, but it agrees generally and seems fairly distinct from *C. dilatata* in the broadly rounded leaves with shorter nerve, tapering at the tip. The leaves in Capt. Hayes's plant are often sharply denticulate.

? Glyphothecium alare Dix. & Sainsb., sp. nov. *G. sciuroidei* habitu subsimile, gracilius, minus, foliis siccis *erectis*, sæpe *appressis*. Folia *polymorpha*, plerumque *oblongo-ovalia, perconcava, seu cymbiformia, cucullata, apice fortiter reflexo; cuspidato*; ecostata vel striis binis brevissimis prædita, integerrima, perpellucida. Cellulæ superiores elongatæ, rhomboideo-lineares, parietibus tenuibus, conflatis, lævissimæ, apicem versus breviores, rhomboideæ; basin versus subsimiles, *infimæ pulchre aurantiacæ*; alares *magnæ, subquadratæ, intense purpureæ, alas majusculas, subinflatas, valde conspicuas* formantes. Caules et rami sæpe *gemmigeri*, foliis superne magis angustioribus, superioribus minus concavis, haud cucullatis, sensim stricte, late acuminatis, apice parce denticulatis, propagulis (filis articulatis pallidis longis) permultis foliorum axillis prope apicem rami densissime congestis.

Dioicum videtur. Folia perichætialia caulinis subsimilia, magis acuminata; seta *perbrevis*, 4–5 mm. longa, lævis, fusca, leniter flexuosa; theca erecta, oblonga, circa 2 mm. longa, *profunde 8-plicata*, sat pachydermica. Cellulæ exothecii irregulares, plerumque isodiametricæ, subincrassatæ, circa 25 μ latæ. Peristomium duplex, dentes 16, flavidi, breviter late lanceolati, apicibus incurvis, infra orificium inserti, ad basin inter se disjuncti, dorso inferne dense transverse striolati, superne grossiuscule papillosi, pallidi, intus humiliter lamellati. Endostomium membrana, ut videtur, brevissima, processus circa dimidiam longitudinem dentium æquantes, pallidi, leniter papillosi, lanceolati. Operculum, calyptra, spori haud visi.

Hab. Marina Springs, Nelson, Apr. 1931; coll. *J. H. McMahon* (632), type. Base of Manuka, near Atiamuri, North I., 1931; coll. *K. W. Allison*. Mt. Tongariro, on bark, Jan. 1, 1932; coll. *Sainsbury*.

The position of this very interesting plant is exceedingly dubious. The tufted brood-filaments, with the alar cells, suggest *Clastobryum*, but the fruit is entirely different and agrees fairly well with *Glyphothecium*. It is quite probable that it should be made the type of a new genus, but it seems best to place it provisionally here.

PAPILLARIA FILIPENDULA (Hk. f. & W.) Jaeg. (*op. cit.* 259). In view of the extreme rarity of fruit in the genus *Papillaria* it is interesting to note that fertile plants of the present species have been collected in several parts of the North Island. In Herb. Petrie there is an unnamed specimen in fruit from Pukeatua, West Taupo County, and similar gatherings are recorded from Rotorua (*Allison* 160), Fielding, Manawatu (*Dr. H. H. Allan* 57), and Wairoa County (*E. A. Hodgson*). The seta is short, about 3 mm., and flexuose. It is sheathed for a great part of its length by the long dense hairs which clothe the vaginula. The capsule is erect, ovoid-oblong, and light brown. The outer peristome teeth are lanceolate, pale, somewhat papillose, and either entire or with median cracks in the upper half. The processes are developed from a low basal membrane and are about three-fifths the length of the teeth; linear, hyaline, and slightly papillose. Operculum with a slanting beak. Calyptra densely hairy. Spores about 16 μ.

Camptochaete brachydictya Dix., sp. nov. Stirps pernotata, habitu potius *Homaliarum* nonnullarum aut *Porotrichi oblongifolii*, cujus etiam foliorum formam atque areolationem subsimilem habet. *C. pulvinatae* habitu proxima, sed multo aliena. Folia *late oblongo-ovata, uno latere late inflexo, supra rotundato-obtusa*, raro late obtuso-acuta, paullo asymmetrica, integra, *breviter bicostata*, ad angulos breviter decurrentia. Cellulæ medianæ breviter rhomboideo-lineares, subsigmoideæ, circa 5–6 × 1, parietibus firmis, subincrassatis; superne *sensim breviores*, prope apicem *latiores, breviores, rhomboideæ*, apicales circa 2 × 1; basilares paullo longiores, alares sat numerosæ, isodiametricæ, opacæ, alas parvas bene notatas decurrentes instruentes.

[Fructus ignotus.]

Hab. Banks Peninsula, 1929; coll. *A. Meebold*, comm. *Herzog* (81).

The habit is that of *C. pulvinata*, with the leaves more or less falcato-secund as in that, but their form and structure is quite different; they are in no way narrowed to the point, but broadly rounded, as in *Homalia* (rarely very bluntly pointed), and the

short cells in the upper part of the leaf heighten the resemblance to *Homalia*; the short, double nerve in the present plant of course at once separates it from that genus. In the branch leaves all the cells are even shorter than the proportions given above.

EPHEMEROPSIS TJIBODENSIS Goeb. An account of the discovery of this remarkable moss at Atiamuri, North Island, by Mr. Allison has been given in this Journal (H. N. Dixon, 1928, 347), with a description of the New Zealand form. It has since been found by Mr. Mundy at Ohakune, North Island, and by Mr. J. H. McMahon in Marlborough, South Island. The habitat in New Zealand is always the bark of twigs and small branches, but it is not confined to the Manuka (*Leptospermum scoparium*) on which the plant was first collected by Mr. Allison. In the Rotorua and Atiamuri districts it has been found by him on shrubs of *Gaultheria* and *Cyathodes*, whilst at Ohakune it grows on, *inter alia*, the formidable prickly vine *Rubus australis*, cynically named by New Zealanders the "lawyer." At Ohakune the vegetation consists of typical low mountain forest of a dense type, and contrasts strongly with the rather open scrub country of Atiamuri etc. The finding of *Ephemeropsis* in such widely different surroundings, and also in the South Island, justifies the assumption that it may have a fairly wide distribution in New Zealand. Its protonemal gametophyte is, however, practically unrecognizable in the field, and though, according to Mr. Allison, fruit is nearly always present, the moss is, even in that condition, a very inconspicuous one.

ERIOPUS BROWNII Dixon (*op. cit.* 286). This interesting endemic species has recently been collected in three North Island localities. The original and only finding in the South Island was Port Nicholson Hills near Christchurch. The northern stations are Atiamuri (*Allison* 199, on rotten wood, c.fr.); *N. K. Welch* (Auckland Province), and Marumaru, near Wairoa, Hawkes Bay (*Sainsbury*, on rotten wood, c.fr.). As this is a shade-loving plant and a small one it may well have been passed over by collectors, and further findings may be expected.

HAPLOHYMENIUM HUTTONII (Mitt.) Broth. (*op. cit.* 299). An extension of the distribution of this moss is recorded by its discovery at Mahia Peninsula, Hawkes Bay (*Sainsbury* 577, on bark). The gap between the Peninsula and the northern localities is a wide one, but the climate of the former is mild and equable for its latitude, and this accounts for the Peninsula being the southern limit also of one of the indigenous hardwood trees, the Puriri (*Vitex lucens*).

PSEUDOLESKEA IMBRICATA (Hk. f. & W.) Broth. (*op. cit.* 300). The Mahia Peninsula, which is the southern limit of the previous species, is an isolated northern outpost of *Pseudoleskea*, and the only known North Island locality. In the South Island it has been found in Otago and Canterbury. The Mahia plant (*Sainsbury* 567) grows on limestone boulders and outcrops at the edge of the sea-beach.

AMBLYSTEGIUM RIPARIUM (Hedw.) Bry. eur., var. nov. **debilinerve** Dix. & Sainsb. Costa debilis, sæpe indistincta, nonnunquam perbrevis interdum fere obsoleta, vel bifurcata.

Hab. On shallow soil on rock in Waikato R., above Atiamuri, Hawkes Bay, Apr. 1928, coll. *K. W. Allison* (510).

Brachythecium cymbifolium Dix. & Sainsb., sp. nov. (§*Julacea*). Humile, *rigidiusculum*; caules irregulariter, subpinnatim divisi, ramis inæqualibus, usque ad 1 cm. longis, *turgidis*, sicca sæpe subjulaceis; folia caulina e basi subamplexicauli leniter decurrente *late cordata*, *perconcava*, *acuta*, *haud acuminata*, apice *breviter*, *late acuta*; sicca *sæpe subplicata*; margines plani, ubique fere *minutissime* denticulati. Costa ubique *tenuis*, circa 2/3 folii longitudinem attingens. Folia ramea subsimilia, paullo autem angustiora, breviter acuminata, paullo fortius denticulata, costa perangusta. Cellulæ pellucidæ, angustissimæ, teneræ, infimæ paullo laxiores, alares *sat numerosæ*, *inanes*, *laxiusculæ*.

Autoicum. Flores ♂ parvi, antheridia 5–6, majuscula. Perichætii folia breviuscula, *sensim angustiuscule acuminata*, denticulata, suberecta. Seta brevis, circa 1·5 cm. longa, *lævis*. Theca *suberecta* (nonnunquam etiam erecta), *brevis* (operculatum circa 2 mm.), inæqualis, sed parum curvata, operculo rostellato, obliquo. Exothecii cellulæ irregulares, *subisodiametricæ*, parietibus parum incrassatis, igitur theca *haud pachydermica*. Peristomium normale; cilia breviuscula, nodosa.

Hab. Among grass, Havelock North, Hawkes Bay, June 1930; coll. *Mrs. Hodgson* (613), type. Edge of asphalt pavement, Mt. Eden, Auckland, Dec. 3, 1930; coll. *Miss L. B. Moore* (616).

It is rather remarkable that this moss should have appeared in two such distant stations in the same year, and in both cases growing under somewhat artificial conditions. It is, however, quite distinct from any known species, and is pretty certainly indigenous. It bears a close resemblance to small forms of *Scleropodium purum* (Hedw.), but the seta is quite smooth.

The leaves vary considerably, sometimes being deeply cochleariform, closely appressed and julaceous, at other times less markedly so, with longer and spreading points. In the former case they are plicate when dry.

[*Brachythecium albicans* (Hedw.). Bry. eur. On lawn, Esplanade Gardens, Palmerston North, North I., 1931; coll. *Dr. H. H. Allan* (640).

Scleropodium purum (Hedw.) Limpr. On damp shallow soil on rocks, Mt. Eden, Auckland, July 6, 1930; coll. *Miss L. B. Moore* (589).]

These are placed in brackets, as they are very doubtfully native. In both cases the habitats were artificial. Neither species has been found in the Southern Hemisphere—unless the Argentine *Hypnum austro-purum* C. M. should prove identical with the latter.

Sematophyllum aciculum (C. M.) Dix., sp. nov. (*Rhaphidostegium aciculum* C. M., MS. in sched.). Dense cæspitosum, *stramineum*, subnitidum, gracilescens. Folia 1–1·5 mm. longa, *lanceolata, longiuscule acuminata*, concava, marginibus vel explicatis vel anguste reflexis; secunda, ascendentia; cellulæ *anguste lineares, pellucidæ*, alares infimæ vesiculosæ, majusculæ, supra-alares *numerosæ, sat magnæ, inanes, ad margines altiuscule ascendentes*.

Autoicum. Perichætii folia caulinis subsimilia, sed latiora, acumine obsolete denticulato. Seta *brevis*, 5–6 mm. longa, lævis; theca *minuta*, deoperculata ·5 mm. longa, *erecta*, ovalis, leptodermica.

Hab. On tree-stump, Ballina, N.S.W., June 1898; coll. *W. W. Watts*, det. *Brotherus* (*Watts*, N.S.W. Mosses, no. 1987), type. Daintree R., Australia, 1882, coll. *Pentzcke*, Herb. Mitten. Blackhall Range, Queensland, Apr. 1898; coll. *F. Whitteron*. Lochaber Creek, near Eidsvold, Queensland, Apr. 1922; coll. *T. V. Sherrin*, Herb. Mus. Brit. (55). Near Auckland, N.Z.; coll. *T. F. Cheeseman* (663).

The New Zealand specimen in Cheeseman's collection was labelled "*H. homomallum* C. M.," but with a note that Geheeb had seen it and recognized that it was not C. Müller's species.

It is a fairly well-marked species of the more narrow-leaved forms of the genus, with very narrow areolation, numerous supra-alar hyaline cells, a very short seta, and minute, erect capsule. It is probably frequent in Australia. Dr. Brotherus wrote to me in 1921 that he believed it was an unpublished species. I have not seen C. Müller's original specimen, but there is some advantage in describing the species from a specimen from a recognized exsiccata.

Pylaisia australis Dix. & Sainsb., sp. nov. Humilis, condensata; caules prostrati, *dense ramosi*, ramis erectis, circa 5 mm. longis; sordide viridis. Folia confertiuscula, madida patentia, sicca *patula, brevia*, ·5 mm. longa, *late ovalia, perconcava, breviter acuminata*, integerrima, ecostata. Cellulæ *breviter, anguste rhomboideæ*, subsigmoideæ, ab apice ad basin sensim elongatæ, alares multæ, subquadratæ, sæpe transverse elongatæ, obscuræ, alte ad margines ascendentes.

[Cetera ignota.]

Hab. Marlborough, South I., 1930; coll. *J. H. McMahon* (608).

No species of the genus has hitherto been recorded from the Southern Hemisphere. The leaves are wider and more shortly (though acutely) acuminate than in most of the species.

The generic position cannot be quite certain without fruit, but there is little doubt of its being a *Pylaisia*.

HYLOCOMIUM SPLENDENS (Hedw.) Bry. eur. Recently found for the first time in the Southern Hemisphere by Miss L. B. Moore on Mt. Hikurangi, East Coast, North Island (459). Miss Moore reports that the moss grows amongst rocks at and above 4700 ft. No fruiting plants were found.

SPHAGNUM IRRITANS Warnst. Stream edge, Government Gardens, Rotorua, Aug. 26, 1929; coll. *K. W. Allison* (559). Mt. Moehau, Auckland, in bog on summit, Aug. 2, 1930; coll. *Miss L. B. Moore* (612).

NEW OR NOTEWORTHY FUNGI.—PART XIII.

BY W. B. GROVE, M.A.

THIS list of British Fungi is a continuation of that published in the 'Journal of Botany,' 1932, vol. lxx. pp. 1–7, 33–38. I have again to acknowledge the valuable assistance given me by the discoveries of Rev. P. G. M. Rhodes and Mr. W. G. Travis.

Though I have left two species of "*Diaporthe*" still under that name, as they were placed by Saccardo, I wish to record here my belief that Saccardo's subgenus *Chorostate* is fully worthy of generic rank as assigned to it by Traverso, and that *Diaporthe* proper should be confined to his two subgenera *Euporthe* and *Tetrastaga*; and, furthermore, that those two subgenera are not founded upon any real distinction, but are merely states of growth, so that the same species is, in many instances, repeated under two names, one in each section.

ASCOMYCETES.

478. ROSELLINIA TUNICATA Kirschst. in Krypt. Fl. Brandenb. vii. 217. Sacc. Syll. xxiv. 828. Mig. 170.

Perithecia scattered or a few (2–5) together, emerging from just below the surface of the wood as a black knob, but becoming ultimately nearly free (only surrounded at the base by a few of the softened displaced longitudinal fibres), black, ovate on a broad base, 150–200 μ diam., beautifully papillate above; the

perithecium is shaggy in the lower and middle parts, with numerous short stiff upstanding brown-black bristles up to 30μ long, but the broad wart-like papilla is perfectly glabrous, deep black, shining, and rises to a total height of 250μ; wall thick, opaque, brittle, subcarbonaceous. *Asci* cylindrical, 120–130×8μ, wall thickened at the summit. *Spores* obliquely uniseriate, oval-oblong, faintly laterally compressed, unicellular, 13–17μ long, 8–9μ broad (face view), 6μ broad (side view), at first olivaceous and with a few guttules, at length dark brown-black. *Paraphyses* not numerous, simple, filiform.

On branches of *Quercus*, which were decorticated and lying on the ground in a part of the wood which had been burnt, Ockeridge Wood, Worcs; April.

In Kirschstein's description the perithecial hairs are said to be at first covered by a brownish-yellow mass (? gelatinous) up as far as the emergent ostiole, but to become naked later. No sign was seen of this covering, but all the other characters were perfectly correct.

479. **Anthostomella Myricae**, sp. nov.

Perithecia sparsa, subter epidermidem nigrificatam immersa, ca. 150μ diam. *Asci* fasciculati, cylindrici, superne rotundati, inferne breviter pedicellati, 80–130×8–9μ. *Sporidia* 2–8, stricte

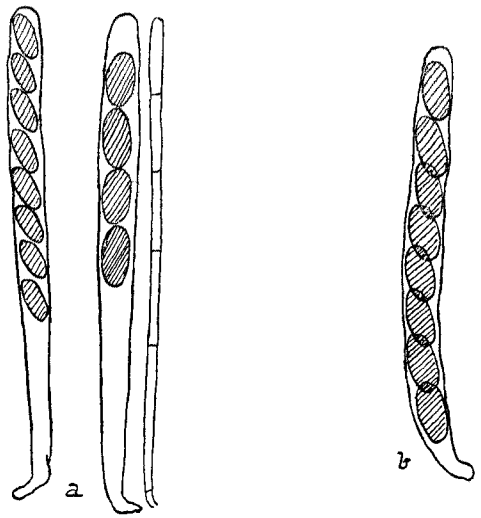


Fig. 1.—*a*, *Anthostomella Myricae*; asci with spores and a paraphysis, ×600. *b*, *A. Taxi*; an ascus with spores, ×600.

uniseriata v. interdum oblique monosticha, matura exacte ellipsoidea, utrinque obtusata, at e latere compressa, primo ovoidea, achroa et multi-microguttulata, dein granulosa et

pallide olivacea, uni- v. biguttulata, postremo atro-brunnea at non opaca, eguttulata, 12–14×5–6μ, e latere visa vix 4μ crassa, semper exappendiculata. *Paraphyses* sat numerosæ, filiformes, achroæ, septatæ, 2μ crassæ, non mucosæ. (Fig. 1, *a*.)

Hab. in ramulo emortuo *Myricae Gales*, sub Llechwedd, Harlech (*Rhodes*, no. 4306 D); Aug.

There was little of this and on only one branch, but its characters seem to be so decided that I venture to describe it. Owing to the black colour of the old periderm the perithecia were all but imperceptible to the naked eye. The paraphyses, when young, had each three or four distinct septa, but very few paraphyses remained when the spores were mature. About half the asci had only four spores, a few had eight, and the rest had various other numbers from two to seven. Even the eight spores did not occupy the whole length of the ascus.

480. **Anthostomella Taxi**, sp. nov.

Perithecia dense sparsa vel subgregaria, amphigena sed pro maxima parte epiphylla, immersa, scutulo nitido aterrimo ex epidermide efformato tecta, usque ad 200μ diam., subglobosa, proëminentia, tandem epidermidem ostiolo leviter protuberante rumpentia. *Asci* primo subclavati, dein cylindrici, recti, breviter et obtuse pedicellati, superne obtuse rotundati, 8-spori, 80–90×9–10μ. *Sporidia* uniseriata v. partim biseriata, ovalia v. subfabiformia, sæpius apice acutata, diu achroa et granulosa, dein saturate fusco-brunnea, guttula unica aut duabus instructa, 12–14×7–8μ, primo appendice brevi lata achroa mucosa inferne prædita. *Paraphyses* copiosæ, filiformes, guttulatæ, mucosæ, ca. 2μ latæ. (Fig. 1, *b*.)

Hab. in foliis emortuis *Taxi baccatae*, Hadzor Hall, Worcs, Nov.–Jan., socia *Phoma allostoma* Died. cujus forsan status perfectior est.

When the ascospores are completely formed there is a great deal of epiplasm left unused, and part of this remains attached for a time to the lower end of the spore, as happens in several others of the *Anthostomellae*. *A. Taxi* is allied to *A. Rehmii*, but the perithecia are more crowded, the spores are different, and the paraphyses do not turn blue on the addition of iodine solution.

481. **Mycosphaerella Rumicis** (Desm.) comb. nov.

Sphaerella Rumicis Sacc. Syll. i. 512. Cooke, Handb. 920.
Stigmatea Rumicis Schröt.
Venturia Rumicis Winter.

Forma nova **caulicola**, *peritheciis in caulibus aggregatis*.

Perithecia forming small clusters on the stems, occupying the centres of large scorched patches which are 10 mm. or more in length and scarcely paler in the middle.

On stems of *Rumex pulcher*, Polperro, Cornw. (*Rilstone & Rhodes*, no. 4177); July.

The spores are tinged with a greenish colour and do not differ appreciably from those which abound on the leaves of *Rumex*; nor, indeed, do the asci—for, though they are obovate-oblong and curved and measure about $35\times10\mu$, exactly the same is true of the asci of our leaf-form, which I have never seen tubular or cylindrical as they are described in books.

482. MYCOSPHAERELLA SAGEDIOIDES Lindau (sec. Migula).

Sphaerella sagedioides Wint. Sacc. Syll. i. 517.

Perithecia very abundant, rather densely scattered over a large area of the stems, covered by the epidermis, black, 100–120μ diam., depressed-globose, at length bursting the epidermis by the rounded summit; texture membranaceous, parenchymatous, dark brown, subopaque. *Asci* clustered, clavate-oblong, tapering slightly above, almost sessile, aparaphysate, 8-spored, $35–42\times8–10\mu$. *Spores* distichous, subclavate-oblong, more obtuse at the upper end, 1-septate, hardly constricted, colourless, 4-guttulate, $10–15\times3–3{\cdot}5\mu$ or even $16\times4\mu$. (Fig. 2.)

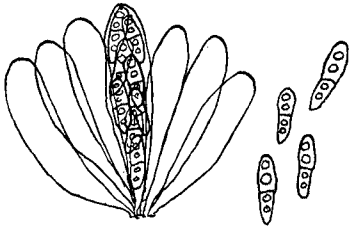


Fig. 2.—*Mycosphaerella sagedioides*; a clustered group of asci and four loose spores, × 600.

On dead stems and the midribs of the leaves of *Dipsacus silvestris*, Haselor Rough, Evesham (*Rhodes*, no. 4705); March. With it was *Didymella caulicola* (Moug.) Sacc., which is merely its immature state.

When the epidermis scales off, the perithecia, which are adnate to it, come off with it. The same thing is observed in this as in many of the stem and leaf fungi: though the perithecia are full of spores when gathered, they are found nearly empty after being kept in the herbarium for a year or so.

483. DIAPORTHE (CHOR.) CASTANEA Sacc. Syll. i. 624.

Valsa castanea Tul. Carp. ii. 202, pl. 23, f. 1–12.

Stromata valsoid, surrounded and partly covered by the reddish-brown periderm; perithecia few (3 or 4) in each stroma, ovoid or angular, black, about 300μ diam.; ostioles gently connivent, blunt, bursting the periderm by a roundish pore. *Asci* clavate, shortly stipitate, 8-spored, $40–50\times7–8\mu$. *Spores* biseriate, fusoid, very acute at both ends, nearly straight, 1-septate, hardly constricted, 4-guttulate, $14–15\times3–3{\cdot}5\mu$. No paraphyses seen.

On thin twigs of *Castanea vesca*, Ockeridge Wood, Worcs (*Rhodes*, no. 4537 A); June. Closely associated with its *Fusicoccum* stage (*F. castaneum*), the two kinds of spores not seldom occurring within the same conceptacle.

484. **Diaporthe Garryae**, sp. nov.

Perithecia sparsa v. subgregaria, tecta, dein epidermidem irregulariter rumpentia, nigra, cortici immersa, epidermide circum circa plus minus nigrificata et sæpe linea angusta atra circumscripta. *Asci* fusoidei, deorsum attenuati, vertice subangustato, ca. $60\times10\mu$. *Sporidia* disticha, oblongo-fusoidea, utrinque subobtusa, 1-septata, minime constricta, 4-guttulata, $12–14\times3{\cdot}5\mu$. (Fig. 3, *c*.)

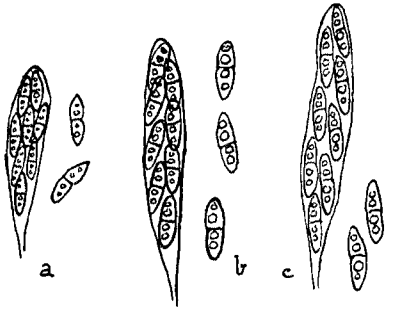


Fig. 3.—*a*, *Diaporthe Skimmiae*; *b*, *D. Mahoniae* f. *foliicola*; *c*, *D. Garryae*. Asci and spores, × 600.

Hab. in ramulis emortuis *Garryae ellipticae*, West Kilbride, Ayrshire (*Boyd*); Aug. 1918. In iisdem, Heythrop Park, Oxon (*Rhodes & Grove*); Jun. 1931.

The *Phomopsis* corresponding to this *Diaporthe* was described in this Journal, 1922, p. 43. It is worthy of notice that the spores there mentioned as "B-spores" were so named in error; they were what I have called "C-spores" (in 'Kew Bulletin,' 1919, p. 181, f. 4, & p. 425) and what Hahn (in Trans. Brit. Myc. Soc. 1930, xv. p. 46) calls "intermediate" spores. They were fusoid in shape, acuminate at both ends, only slightly curved, and measured $15–17\times1\mu$. The real B-spores were afterwards discovered in the specimen from Heythrop Park above mentioned; they were of the usual hooked shape and measured about $25\times1\mu$.

485. DIAPORTHE (CHOR.) HIPPOPHAËS Bomm. Rouss. Sacc. in Syll. ix. 107.

Perithecia aggregated (4–10 together) in scattered compact subvalsoid clusters, more rarely solitary or in pairs, globose, immersed in the cortex, surrounded by a black line and by the ruptured epidermis ; ostioles long, emergent, cylindrical, rugulose, often curved at the apex, diverging. *Asci* cylindrical or subfusoid, 8-spored, 48–64×9μ. *Spores* biseriate, cylindrical or fusoid, obtuse or shortly mucronate, 1-septate, slightly constricted, 4-guttulate, hyaline, usually straight, 12–16×4–5·5μ.

On dead branches of *Hippophaë rhamnoides*, Polperro, Cornw. (*Rhodes*, no. 5154) ; March.

The original specimens were found in Belgium and were accompanied by *Phoma consocia* B. R. & S., which, as Diedicke has shown (p. 256), is a *Phomopsis* with both A- and B-spores, the A-spores having sporophores subulate and up to 18μ long. This *Phomopsis* species should be found in this country also.

486. DIAPORTHE MAHONIAE Speg. in Mich. i. 456. Sacc. Syll. i. 682.

Forma nova **foliicola**, *peritheciis in foliis innatis*.

Stromata dispersed widely over the leaf, staining the epidermis black, at first angular and variable in form, 2–3 or even 4 mm. across, afterwards confluent and reaching even 10 mm. in length, flat, dull black outside, with the obtuse ostioles hardly projecting. *Asci* oblong-fusoid, about 50×10μ, 8-spored, aparaphysate. *Spores* distichous, elongate-ellipsoid, 12–14×4μ, obtuse at both ends, 1-septate, slightly constricted, with four or more rather large guttules, which are very distinct. (Fig. 3, *b*).

On fallen leaves of *Mahonia japonica* and possibly of *M. Aquifolium* also, Hadzor Hall, Worcs (*Grove & Rhodes*) ; Feb., Mar., 1930.

The fungus, as might be expected, attained greater development on the thick hard leaves of *M. japonica* than on those of *M. Aquifolium*, on which it was not conspicuous. It was accompanied on the same leaves, in both cases, by its pycnidial stage, *Phomopsis Mahoniae* Grove, for which see Journ. of Bot. 1930, 294. All the previous records of the *Diaporthe* that I have seen have been on the stems.

487. DIAPORTHE NOBILIS Sacc. & Speg. Syll. i. 682.

Perithecia sunk in the cortex, scattered or in small groups, raising the periderm convexly but scarcely piercing it, up to 1 mm. broad ; the bark is hardly at all discoloured, but a black line bounding the stroma-mycelium penetrates deeply into the wood. *Asci* clavate-fusoid, 50–58×8μ, aparaphysate. *Spores* mostly distichous, fusoid, straight, 1-septate, constricted at the middle, 4-guttulate, hyaline, 12–15×3–4μ, often with a minute colourless appendage at each end.

On a thick branch of *Laurus nobilis* (a very old tree) in Mrs. Marshall's garden, Landaviddy, Polperro ; April, 1930. Accompanied by the *Phomopsis*-stage (*Phomopsis laurella* Trav.) on the same tree, but on the younger branches. The *Phomopsis* has also been found (without the *Diaporthe*) in Ayrshire, in Co. Dublin, and in Kew Gardens ; see Journ. Bot. 1922, 44.

488. DIAPORTHE OROBANCHES Berl. Excurs. Mycol. Frioul, 8. Sacc. Syll. ix. 713. Trav. II. i. 231.

Perithecia few, arranged more or less in lines on oblong blackish-brown spots 1–2·5 mm. long, the surface of the wood below a spot being sometimes stained inky-black, immersed in the cortex, globose-depressed, very black, slightly protruding by an obtuse papilla. *Asci* elongate clavate-fusoid, tapering much more below than above, not perceptibly bifoveolate, aparaphysate, 50–60×7μ. *Spores* biseriate, somewhat fusoid, colourless, a little more acute below than above, 4-guttulate, then 1-septate, hardly constricted, 12–14×3μ.

On the lower part of dead peduncles of *Orobanche* (? *major* or *elatior*), Warminster, S. Wilts (*Rhodes*, no. 4733 B) ; May.

It approaches *D. maculosa* S. & S. in habit, but sometimes the spots are scarcely changed in colour. On the upper part of the same plants was the corresponding *Phomopsis*, described below. Berlese's Venetian species is described as having a short neck, which, however, was sometimes elongated-cylindrical and bent. He did not observe the *Phomopsis* in company with it.

489. **Phomopsis Orobanches**, sp. nov.

Pycnidia sparsa, minutissima, immersa, valde imperfecta, haud conspicua, epidermide vix elevatâ nec nisi leviter inquinatâ. *Sporulæ* elliptico-fusoideæ, utrinque subobtusæ v. basi acutatæ, achroæ, solito modo biguttulatæ, 8–9×1·5–2μ, sporophoris non visis.

Hab. in pedunculis emortuis *Orobanches* (? *majoris* aut *elatioris*), Warminster, Wilts (*Rhodes*, no. 4733 B) ; Maio.

The guttules were of the character and position distinctive of *Phomopsis*. The host was probably *O. elatior*, since no Leguminosae were observed in the immediate neighbourhood. On the lower part of the same plants was the *Diaporthe*.

490. **Diaporthe Skimmiae**, sp. nov.

Perithecia dense lateque ordine fere aequali sparsa nec minime contigua, cortici tantum infossa, linea atra nulla circumdata, subglobosa, 300–500μ diam., diu tecta, dein epidermidem vertice obtuso levantia eamque poro irregulari v. rima rumpentia. *Asci* clavati, deorsum attenuati, superne rotundati, aparaphysati, 40–50×8–9μ. *Sporidia* stipata, di-tristicha, oblongo-fusoidea,

sæpe altero apice aut binis acutata, 1-septata, vix constricta, 4-guttulata, hyalina, 12–14×3μ. (Fig. 3, *a*.)

Hab. in ramulis emortuis *Skimmiae japonicae*, Heythrop Park, Oxon (*Rhodes*, no. 4790). In iisdem, Harborne Hall, prope Birmingham (*Grove & Rhodes*); Mar.–Jun. Hic atque illic cum *Phomopsi Skimmiae* consociata, quam infra descriptam videas.

491. **Phomopsis Skimmiae**, sp. nov.

Pycnidia sparsa, nigrescentia, usque ad 500μ diam., primo tecta atque epidermidem acute levantia, tandem eam irregulariter rumpentia. *Sporulæ* oblongo-ellipsoideæ, raro apice uno acutiusculæ, biguttulatæ, hyalinæ, 7–9×2–3μ, sporophoris subulatis microguttulatis acutis, 10–18μ longis, suffultæ.

Hab. in ramulis *Skimmiae japonicae* locis duobus supra commemoratis.

492. Diaporthe Veronicae Rehm, in Ann. Mycol. 1916, xiv. 165.

Perithecia somewhat scattered, immersed in the cortex or partly in the wood, globose, brownish-black, 300–450μ diam.; ostioles short. *Asci* cylindric-fusoid, sessile, 8-spored, aparaphysate, 42–45×9–10μ. *Spores* oblong-fusoid, rounded obtusely at both ends, straight or nearly so, 1-septate, faintly constricted, 2–4-guttulate, hyaline, 9–15×4–5μ.

On dead branches of *Veronica Traversii*, Heythrop Park, Oxon (*Grove & Rhodes*); June.

There is sometimes a black line running through the wood, in the usual way. The corresponding pycnidial stage, *Phomopsis Veronicae-speciosae* Died., has been found several times on dead branches of the cultivated hybrid shrubby Veronicas, *V. speciosa*, etc., in Cornwall; see Journ. Bot. 1930, 296. But the *Diaporthe* has not yet been seen in that county. In Moravia Petrak reports the occurrence of both forms on that host in hot-houses, the *Phomopsis* appearing before and, later, in company with the ascophorous stage.

493. Didymosphaeria arenaria Mouton, in Bull. Soc. Myc. Belg. xxviii. 2, p. 73. Sacc. Syll. ix. 736. Mig. 346.

Perithecia subglobose or oblong, up to 250μ diam., black, scattered singly, immersed, then erumpent by the short black± cylindrical papillate ostiole, which in the end is rather widely open. *Asci* cylindric-clavate, broadly rounded above, 8-spored, 140–150×27–30μ. Spores uni- or biseriate, obovate-oblong, 1-septate, very strongly constricted, pale translucent golden-brown within, 28–32×12–15μ, surrounded by a broad (3μ) hyaline mucous layer, wall thick (2–2·5μ), uniform, darker brown. *Paraphyses* filiform, mucoid, longer than the asci.

On old leaves of *Psamma arenaria* Friog, Mer. (*Rhodes*, no. 4295); Aug. 1919.

The spores were surrounded by a very perceptible firm mucous layer, which is not mentioned in the original description; they seemed in that respect to approach near to *Massariella*. The tinge of colour on the epidermis round the ostiole recorded by Mouton was seen in only a few cases. This appears to be a very rare species.

494. **Didymosphaeria Spartinae**, sp. nov.

Perithecia sparsa, epidermide vix nigrificatâ tecta, dein emergentia atra, subglobosa, 300–400μ diam., dimidio emerso hemisphærico, subnitido, papilla brevi obtusissima tandem latiuscule aperta instructo. *Asci* cylindrici, superne rotundati,

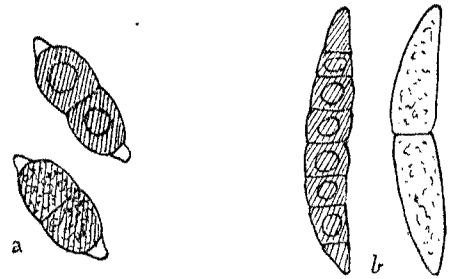


Fig. 4.—*a*, *Didymosphaeria Spartinae*; two ascopores, × 600.
b, *Leptosphaeria octophragmia*; one immature and one mature spore, × 600.

deorsum breviter attenuati, 8-spori, 150–180×15–16μ, paraphysibus filiformibus copiosissimis hyalinis mucosis asco sublongioribus obvallati. *Sporidia* uniseriata v. oblique monosticha, primo oblongo-fusoidea, dein ovoideo-oblonga, 1-septata, brunnea, 24–26×10–12μ (sine append.), interdum intus granulosa, loculo quoque guttula magna instructo, utrinque appendice subhyalina hemisphærica v. conoidea 4–5μ longa prædita. (Fig. 4, *a*.)

Hab. in stipitibus emortuis *Spartinae Townsendi*, Poole Harbour, Dorset (*Rhodes*, no. 5241); Jan. 1933.

(To be continued.)

OBITUARY.

Charles Carmichael Lacaita

(1853–1933).

The death of Mr. C. C. Lacaita on July 17 at the age of 80 removes a leading British amateur botanist, who was less known in this country than abroad, since his main interest was in the flora of Italy, where from 1877 he regularly visited the family estates.

He was born at Edinburgh on April 5, 1853, the son of Sir James Lacaita, K.C.M.G., "that remarkable Italian who was a friend of Gladstone, was naturalized in England, became a member of the first Italian Legislature, and is remembered as a Dante scholar and editor, and as one who combined the typical culture of his two countries." His mother, a daughter of Sir Thomas Gibson Carmichael, died the year he was born, and he was brought up by Scotch aunts. In 1867 he went to Eton, where he distinguished himself both in school and at games. In 1872 he went to Oxford as an exhibitioner of Balliol, taking first classes in mathematical moderations and Greats, Litteræ Humaniores.

He became a well-read classical and Italian scholar. French and, later, Spanish he spoke and wrote like a native; German and modern Greek he also spoke. His literary interests show in his early article "On the Etymology of the words Crocus and Saffron," an appendix to Maws' 'Monograph of the Genus *Crocus*' (1886). This characteristically comprehensive account may be compared with his later article on the Jerusalem Artichoke (Kew Bull. 321–339, 1919).

He was called to the Bar by Lincoln's Inn in 1879. In 1885 he became assistant private secretary to Lord Granville, Secretary of State for Foreign Affairs in Gladstone's Ministry, and M.P. for Dundee. He was re-elected at the Home Rule election of 1886, but parliamentary life did not suit his temperament, and he retired the following year.

He had married in 1885, and on retirement from Parliament his energies were turned to the building of his house at Selham (Sussex) and the creation of its fine garden from the natural countryside. From 1877 till his marriage he made botanical collections each year during his visits to the Italian estates at Leucaspide (Taranto) and Ravello (Salerno), and also in the Pyrenees (1878), Switzerland (1881), the Alpes maritimes (1882), Spain (1882 and 1884), and Greece (1883), correspondence concerning these collections bringing him into connection with such well-known botanists as Boissier, Willkomm, Reichenbach, Heldreich, and Halacsy. These collections were, however, put away in a store-room at Selham, and he settled down to the life and pursuits of a country gentleman. He was a Justice of the Peace on the Midhurst bench, a member of the Midhurst Rural District Council, and a Governor of the Midhurst Grammar School.

In 1895, on the death of his father, he inherited the estate at Leucaspide, which required regular visits, and later, from his aunt, the Ravello estate. But it was not until 1902 that his botanical collecting recommenced as the result of a chance turning out of his old herbarium. From 1906 onwards, except during the war, he collected regularly and seriously during his visits

to Italy. The investigation of these collections resulted in a series of notes (nos. 1–118; 1910–1927) entitled "Piante Italiane critiche o rare," published in the 'Nuovo Giornale Botanico Italiano.' These are valuable contributions to our knowledge of the various critical groups in which he became interested. Some deal with nomenclature, but only in so far as he was forced to consider it. In 1921 he published a catalogue of the vascular plants of the "ex-principatus Citra" (Bull. Ort. Bot. Nap. vi. 101–256).

In 1913 he visited Sikkim: a list of his collections was published in the 'Journal of the Linnean Society' (xliii. 457); the collection was presented to the British Museum in 1928.

Lacaita was essentially a field-botanist, with strong opinions as to the weaknesses of the so-called "herbarium botanist." His special interest started with plants met in the field, e. g., *Micromeria*, *Thymus*, and *Statice* at Leucaspide; *Pulmonaria*, *Onosma*, *Echium*, *Dianthus* at Ravello and elsewhere. At Selham he grew critical species for study; he was also keen on introducing species of horticultural value. *Pulmonaria* intrigued and puzzled him: he grew the species extensively, but never felt that he understood them, and his only note on them was a short one of corrections to Kerner's Monograph of the genus (Nuov. Giorn. Bot. Ital. n.s. xxxiv. 1163–5, 1927).

Occasionally his work brought him into contact with species of interest to British botanists, and a note in the 'Journal of Botany' followed—*Astragalus hypoglottis*, 1912; *Veronica Buxbaumii*, *Sagina maritima*, and *Calamintha nebrodensis*, 1917; *Crepis nudicaulis* and *Leontodon hirtus*, 1918; the home of *Inula Helenium*, 1920; *Cerastium hirsutum*, 1922; the caulescence of *Bellis perennis*, 1923; *Salvia controversa*, 1927; three Genistas of the Linnean Herbarium, 1929.

Travelling regularly to Italy he was able to visit the collections at Paris and Geneva *en route*, a facility which resulted in several valuable papers in the Linnean Society's 'Journal' (on *Echium*, xliv. 364, 1919; xlvii. 175, 1925; on *Onosma*, xlvi. 387, 1924; *cf.* also Journ. Bot. 1923, 280; on *Marrubium*, *Ballota*, and *Colchicum montanum*, xlvii. 155, 1925; short notes on *Thymus Sibthorpii* and *Crepis rutilans*, sp. n., xliv. 125–9, 1919).

His work on *Echium* took him to Spain (with E. G. Baker) in 1923 (*Echium polycaulon*, Journ. Bot. 1923, 259–260), and from then onwards his interest in the botany of that country developed. He made long trips there in 1925, 1926 (with E. Jahandiez), 1927 (with me), and 1928 (with J. Cuatrecasas), each time to clear up some problems and, inevitably, start some new ones. The results were published (in Latin) in 'Cavanillesia' (1928 and 1930: "Novitiæ quædam et notabilia hispanica" and in a short note on "Two rare Spanish Species of *Echium* (Journ. Linn. Soc.

xlvii. 175–6, 1925). His discovery of the value of Gay's MSS. descriptions (in Herb. Kew) of the new species in Durieu's Asturian exsiccata led him to collect and publish them (Journ. Bot. 1929, 107 &c.).

These trips were a severe strain on a man in the middle seventies, especially for one who went as hard as he always did, and his health suffered. In 1931 he met with a motor accident, in which he sustained a bad shaking and bodily damage which forced him to give up his tennis. The next two years he was engaged on a memoir (now in the press) of his father, whose intellectual and social tastes he shared.

When I visited him last May he was very weak, but even then "would like another trip to Spain," drying and identifying the plants which I was to collect. A sudden turn for the worse, an operation in London, and he was gone.

Lacaita quiescent was charming, gracious, and courteous; in action he was the essence of virility—alert, keen, and with a resounding voice which seemed to lend force to his arguments. Formerly he often took part in the discussions at the Linnean Society, which he joined in 1882, speaking clearly and to the point. He was a member of the Society's Council from 1918 to 1922, Vice-President 1921–2. At the Linnean Club he was a lively companion, sometimes almost boyish in his enjoyment of a good story or a *bon mot*. Few of his botanical acquaintances of his later years realised that he had been a Keeper of Rackets at Eton and a winner of the University tennis rackets at Oxford, but he was, in fact, a lifelong devotee of the game, playing regularly up to the time of the accident two years before his death.

He was a great friend of the Department of Botany at South Kensington and took a keen interest in its affairs. To it he gave the Monocotyledons of his herbarium in 1928, and bequeathed the remainder. During the last few years I saw much of him, and it was impossible not to admire his sound outlook on systematic work and his defence of any position he took up. His knowledge was so wide and his mind so logical and legally trained that he was not accustomed to find himself wrong, and was only able to accept an opposite point of view when satisfied that the evidence and research was of the high standard that he appreciated and demanded. I shall miss greatly those forceful and stimulating discussions and his friendly personality.

He was buried at Selham on July 20th. His only son, Capt. F. C. Lacaita, M.C., was killed in action in April 1918. His first wife died in 1924, but he is survived by his second wife (whom he married in 1929), and his daughter, the wife of Lt.-Col. George Windsor-Clive, M.P.—A. J. WILMOTT.

SHORT NOTES.

DOES JUNCUS TRIFIDUS OCCUR IN IRELAND?—On p. 104 of this Journal (April, 1933) Dr. R. W. Scully refers to my record (Journ. Bot. 1910, 227) of a small patch of *Juncus trifidus* on the summit of Carrantuohill, Co. Kerry, in July of that year, when in the company of my cousin A. Eliott. And he repeats what he said in his 'Flora of Kerry,' 1916, that before adding this to the Irish Flora "it is better to await actual specimens."

I have informed him that on the whole I now prefer to withdraw the "record," as being too uncertain and because there is as yet no other authentic record for Ireland. We were not collecting plants during those ten days in Co. Kerry except a small *Saxifraga* or two, and two small bits of the *Juncus* were put in an envelope and lost before I got to Dublin. I had seen *Juncus trifidus* growing only in the Alps (including Mte. Santa Maria in the Maritime Alps, and in the Mont Cenis district, as recorded in my 'Liste des Phanérogames, etc.,' 1908).

Since Dr. Scully's note appeared I realize that *Juncus tenuis* is abundant in many places in Co. Kerry, and in his 'Flora of Co. Kerry' he suggests that "the claims of this Rush appear sufficiently strong to entitle it to a place among the native plants both of Cork and Kerry." Though usually a lowland plant he tells me that it was seen by Dr. Praeger at about 900 ft. on Connor Hill and in some parts of Kerry, not far from Carrantuohill, is very abundant.

I did not know this somewhat similar Rush of possible North American origin until it was seen growing about footpaths near Bristol in and after 1915. I tentatively suggest that a plant or two of *that* species may have been introduced on the top of Ireland's highest mountain by the agency of birds. *Juncus trifidus* occurs widely in France on high mountains as far south as Provence, and in Spain and the Pyrenees; so there seems no great reason why it should not grow in mountainous S.W. Ireland.

I do not withdraw *Cardamine amara* from a moorland swamp in the Glencar Valley, S. Kerry, for I already knew that plant so well in the W. Midlands, and though apparently not found in S.W. England beyond W. Gloster, it grows in Ulster and is widely spread through most of France.—H. S. THOMPSON.

A LYCHNIS DIOICA FREAK.—A little girl, a keen nature student, brought me yesterday an interesting specimen of Red Campion. This species is exceptionally abundant in this district, and particularly floriferous this year. The freak was one of fourteen stems on a male plant growing amongst nettles outside the garden wall of a cottage. The flowers are of a very clear and even rose-colour and the petals are almost entire. Thirteen of the stems are normal so far as can be seen, but the one in

question bears rose-coloured buds and flowers only on one small branch, pure white flowers and at least one rose-coloured bud nearly ready to open on another, whilst the three other branches bear pure white flowers and probably pure white buds only. I have never met with a Campion like this before, but I found in a hedge near Malpas here in 1931 a male plant with pure white flowers, which I transplanted to the garden, where it flowered so profusely last year that it evidently exhausted its strength and has not appeared this year. I have also seen one other white-flowered plant, but considering the superabundance of the species in this part of the county it is very surprising that there is not more variation. Very richly coloured flowers are common, and pale pink ones by no means rare. I have seen nothing of *Lychnis alba* here yet, even on the Truro refuse-tips, where many unusual wild and garden plants have been found. The soil is practically all acid, and that probably explains the White Campion's absence.—C. NICHOLSON, Truro, May 18.

DISTRICT-NAMES IN SOUTH-WEST AFRICA.—We are indebted to Prof. Dr. Hans Schinz for an excerpt from Petermann's 'Geographischen Mitteilungen,' 1933, Heft. 7/8, in which he discusses the widespread misuse in publications and maps of terms to designate areas in South-west Africa, and the lack of geographical precision in their use.

Nama-land should replace Namaqua-land. The writer refers to a former communication of his own (Peterm. Mitt. 1885, 390) in which he shows that the "qua" is due to a misunderstanding by the early settlers at the Cape of the declension of the substantive name: an individual was a Namab (male) or Namas (female), a collection of men and women Naman, a Hottentot would never have used Namaqua in designating a race. The territory in question is the more or less arid region between the coast and, south of the Orange River, the western limit of the Calvinia-district and the northern limit of the Clanwilliam district, and, north of the Orange River, eastwards to the western limit of the Kalahari (longitude 19°) and northwards to 23° latitude. The areas north and south of the river may be distinguished as Great and Little Namaland respectively.

Confusion has also arisen in the name of the Owaherero country, which is spoken of as Hereroland or Damaraland, while in some cases two distinct geographical areas are implied. The confusion arose from the existence in the same country of two distinct peoples—the Bergdamara in the mountains, the Owaherero in the grassy plains. To call an Omuherero (in short Herero) Damara would be regarded by him as a deadly insult; this term they reserve for the subjugated and despised Bergdamara. Hence Prof. Schinz suggests the use of the precise term Hereroland in place of the misleading Damaraland.

On the north of Hereroland is the country of the agricultural Aajamba (singular Omuambo). On maps this is called indiscriminately Owambo-, Ambo-, Ovampoland. The syllable Owa implies the plural; similarly a number of Herero are Owaherero (singular Omuherero); and if we decide to use Hereroland, not Owahereroland, we should consistently write Amboland.

CARNIVOROUS PLANTS.—Prof. F. E. Lloyd's Presidential Address to the Royal Society of Canada (ser. 3, xxvii. Appendix A, 1933) forms a readable but critical review of the structure and functions of the insect-traps of the carnivorous plants, a world-wide group comprising 16 genera in five families. The traps are classified as (1) Passive—pitfalls (Pitcher-plants), and the sticky fly-paper type (*Drosophyllum, Roridula, Byblis*), (2) Active—sticky fly-paper with aggressive movement (*Drosera, Pinguicula*), steel-trap-type (*Dionoea, Aldrovanda*), and mouse-trap type (*Utricularia, Biovularia*, and *Polypomphylax*). This series follows an ascending scale of complexity so far as the mechanism is concerned, and associates groups widely separated taxonomically. The address is a valuable comparative study, but in *Utricularia* Prof. Lloyd is, so to speak, on his native heath. The text is illustrated by a number of clear line drawings and sixteen well-filled photographic plates. The address was illustrated by motion-pictures of *Drosera, Dionoea*, and *Utricularia*.

ADDITIONS TO THE CAMBRIDGE UNIVERSITY HERBARIUM.—In the obituary of the late Spencer H. Bickham on p. 202 of this Journal it is stated that he "accumulated a considerable herbarium," but there is no mention of its present location. This herbarium was bequeathed to the University Botany School, Cambridge. It consists of about 20,000 sheets of British plants, beautifully prepared, and from a variety of localities, and thus constitutes an important addition to the University's collections. Unfortunately, Bickham's sheets being larger than the Kew size employed here, it has not been possible to incorporate them with the general British herbarium founded by Babington, but they can be readily consulted. This is the second important collection of British plants acquired in 1933, since earlier in the year Mr. J. E. Little of Hitchin presented his rich and critical herbarium of about 6000 sheets. Other noteworthy recent additions include the herbarium of the Cambridge Forestry School and plants from the Azores, Bulgaria, Czechoslovakia, Asia Minor, Spain, and North America, about 4500 specimens of the last having been obtained by exchange with the New York Botanical Garden, and a set of Californian topotypes from the Dudley herbarium of Leland Stanford University; these usefully supplement the older historic collections and types in the Lindley, Babington, Lemann, Henslow, and Genevier herbaria.—W. T. STEARN.

REVIEWS.

A Monograph of Narcissus, *Subgenus* Ajax. By H. W. Pugsley, B.A., F.L.S. Reprinted from the Journal of the Royal Horticultural Society, lviii. pp. 17–93 (1933); with 16 pls. and 2 text-figs.: London, 1933. Price 2*s.* 6*d.* to Fellows, 4*s.* to non-Fellows.

The petaloid Monocotyledons include some of the most beautiful of garden plants, but the group is recognized by the systematic botanist as one of exceptional difficulty. This is partly because of the inadequacy of herbarium specimens, unless very specially prepared, partly because the origin of most cultivated material is unknown, and partly because of complexities, such as vegetative propagation, hybridization, polyploidy, and gene and chromosome mutations in the plants themselves. It follows that the revision of such a group as that of the Daffodils by an author who has made a special study of the living plants, the herbarium types, and the literature must command the attention of both horticulturists and botanists.

Mr. Pugsley accepts twenty-seven species in the subgenus, including nine described as new. These are classified into two sections—*Cyclaminopsis* and *Pseudo-Narcissus*—the former with two species (one new) and the latter with twenty-five species divided into six series. Concise descriptions in English are given for all the species, synonyms, plates, and a somewhat limited number of exsiccatæ are quoted. Particularly interesting are the historical details, which indicate much labour, especially in interpreting pre-Linnean literature. The paper is illustrated by photographs of type-specimens or living plants, reproductions of old figures, and drawings of fruits and flowers. Latin descriptions are affixed to new species and intraspecific units.

An Introduction discusses the botancial history of the subgenus, the taxonomic and morphological characters, and the distribution of the group. There is a useful conspectus of the species, but, unfortunately, no artificial dichotomous key.

British botanists will be interested in the descriptions of *Narcissus Pseudo-Narcissus* Linn. var. *humilis*, from Derbyshire and other counties in northern England, and *N. Pseudo-Narcissus* Linn. var. *insignis*, from the neighbourhood of Ross in Herefordshire and Dymock in Gloucestershire. Both are named as new varieties.

A hope may be expressed that Mr. Pugsley will have all his living plants examined cytologically. Cytological data would be much more valuable to taxonomists if they were more often based on authenticated material of known wild origin.—W. B. Turrill.

English Names of our Commonest Wild Flowers. Arranged and explained by Robert Fisher, M.A., Canon of York. Cr. 8vo, pp. xi, 249. T. Buncle: Arbroath, 1932. Price 6*s.*

Canon Fowler endeavours to meet the difficulty arising from the fact that most of our commonest wild flowers have more than one English name by giving to each plant a standard name. Under the standard name, which is distinguished in his list by capitals, the other names of the plant are given, so that a plant known by any particular or local name can be identified by reference to its standard name. An obvious criticism is that, in the absence of any rules, priority or other, for selecting the standard name, responsibility for the choice is thrown entirely upon the author; a decision must often have been difficult—for example, the selection of Cleavers and not Goose-grass for *Galium Aparine*, or Wild Pansy (is this a genuine popular name?) instead of Heartsease. The practice of prefixing "Common" to a very generally used English name in order to standardize it seems unnecesary—Dandelion, Chickweed, Birdsfoot Trefoil, Couch, Groundsel, Honeysuckle, Ragwort, and others have surely strong claims to standardization without the burden of the addition of Common. These become manufactured plant-names which should be taboo. The subject of common English names was one which the late Editor of this Journal, James Britten, was especially competent to deal with, and it is matter for regret that he did not prepare a later edition of the 'Dictionary of British Plant Names,' which, with Robert Holland, he compiled for the English Dialect Society. Unfortunately the volume has long been out of print.

But, apart from differences of opinion and what may be styled lapses from grace in the use of manufactured names, Canon Fisher's book contains much interesting information in a form accessible to lovers of our native flora. We gather from his Preface that it is merely an excerpt from a larger work, 'The English Names of our Wild Flowers,' which the author has in MS., and which includes nearly 17,000 names. As the cost of printing this was prohibitive Canon Fisher has included in the present volume the plants which are found in all the 112 comital districts, and has added the meaning and derivation of the names. We sincerely trust that the Canon will take steps to ensure the preservation of his valuable manuscript list.—A. B. R.

Soils: their Origin, Constitution, and Classification. An Introduction to Pedology. By G. W. Robinson, M.A., Professor of Agricultural Chemistry in the University College of North Wales, Bangor. 8vo, pp. xvi, 390, with 13 text-figs. T. Murby & Co.: London, 1930. Price 20*s.*

Text-books and monographs on soil are generally addressed primarily to agricultural students, and therefore stress the chemical

aspects of crop cultivation and the use of fertilizers. Academically the subject is a branch of agricultural chemistry, but in research work it is realized that the fundamental properties of soils are best considered not by chemical or physical analyses of the surface soil and subsoil to determine total or available plant-food and water, but through the detailed examination of the vertical soil section. The soil profile forms the natural unit, which expresses by its morphology and by the chemical composition of its successive horizons an integration of the processes involved in the evolution of the soil from its parent geological material under the influence of climate, vegetation, animals, and man. Its proper interpretation should afford the best guide not only to the processes still going on, but to the effects of the soil on the plants it supports. The new soil science, or "pedology," provides material interesting alike to botanist, geologist, chemist, and agriculturist.

Professor Robinson accepts whole-heartedly the modern view-point in the volume under review. He dismisses the definitely agricultural applications and the more purely microbiological and plant-physiological questions quite briefly. After explaining the essential processes of soil formation and emphasizing the importance of the inorganic and organic colloids as the essential weathering complex and the seat of the fundamental reactions in the soil, he describes the major types of soil so far recognized, and discusses the more recent systems of soil classification.

In his chapter on the geography of soils he ranges over the whole world, and throughout the book his illustrations are chosen, often from personal experience, from many parts of the British Empire. The chapters on the methods of soil survey and soil analysis will prove useful to plant ecologists as a critical exposition of the standard methods of soil investigation, many of which were developed by Professor Robinson and his colleagues at Bangor.

The book may be confidently recommended to botanists, and especially to ecologists, as providing precisely those aspects of the subject needed for their own problems without undue dilution with definitely agricultural material.—E. M. CROWTHER.

Liverworts of the Western Himalayas and the Punjab Plain.—Part I. Supplement. Part II. By SHIV RAM KASHYAP, assisted by RAM SARAN CHOPRA, Punjab University. 8vo, Supplement, pp. 10; Part II. pp. iii, 137, with 31 pls. University of Punjab, Lahore, 1932.

A NOTICE of the first part of this work (dated 1929) appeared in this Journal in 1932 (p. 254), where the scope of the work was described. Part I. dealt with the Anthocerotales, the Marchantiales, the Anacrogynous Jungermanniales, and the

Sphaerocarpales. It was intended in Part II. to deal only with the Acrogynous Jungermanniales, but in order to bring together the Jungermanniales the Anacrogynae and the closely allied order Sphaerocarpales have also been included, and the latter have been brought up to date. Prof. Kashyap records his thanks to Mr. F. Verdoorn for the determination of the Frullanias in the Punjab herbarium, to Prof. Herzog for that of species of *Lejeunea*, and to Mr. W. E. Nicholson for that of species of other genera. Also to his Demonstrator, Mr. R. S. Chopra, for help, including the drawings of the diagrams of the Acrogynae.

The small Supplement includes additional information, with a few corrections, on the genera treated in Part I. Part II. follows the plan of Part I.; new species are described, in English only, in the genera *Madotheca*, *Scapania*, *Solenostoma*, *Jungermannia*, and *Calycularia*. The long series of clear collotype drawings provides a helpful addition to the descriptions. A Bibliography cites papers dealing exclusively with Indian Liverworts or works of a more general nature in which reference is made to these.

The work, which gives evidence of careful investigation and preparation, should stimulate the study of the Liverworts of North-West India.

The Genetics of Gossypium. By S. C. HARLAND, Empire Cotton Growing Corporation Cotton Research Station, Trinidad, B.W.I. Reprint from 'Bibliographia Genetica,' ix. (1932) pp. 107–182. M. Nijhoff: The Hague, 1932. 4.40 gld.

STUDIES of the genetics and cytology of the species of *Gossypium* "are gradually clearing up taxonomic difficulties, and it is now possible to present a more or less coherent scheme of classification." Two sections are recognized with 26 and 13 chromosome types respectively. These comprise eleven species, but do not provide for some of the species admitted by Watt in his 'Wild and Cultivated Cotton Plants of the World,' which are either incorporated with other species, excluded from the genus, or insufficiently known. Short descriptions of the species admitted are given. Then follows a detailed consideration of the various characters and their behaviour in crossing, grouped under the headings of Plant, Leaf, Flower, Boll, Lint, Seed, and Physiological. The last category comprises resistance to various diseases and to the shedding of flower-buds. A few correlations are discussed, and, in conclusion, a list of the factors so far definitely established is given, followed by a table of the data on linkage relationships so far as published. A list of references is appended.

Bibliography of Ohio Botany. By ETHEL MELSHEIMER MILLER, Ohio Biological Survey Bulletin 27 (vol. v. no. 4). 8vo, pp. 283–376. Ohio State University Press : Columbus, Ohio, 1932. Price $1.00.

THE present list includes the entries of previous bibliographies, the last of which was published by W. A. Kellerman in 1896. It has not been considered feasible to annotate many of the references in the present bibliography, and the reader is referred to the former lists for more complete annotations. The plan of Dr. Kellerman's bibliography has been generally followed—the list includes only such articles as refer particularly to plants that occur in Ohio ; articles are arranged chronologically under each author's name: names of authors follow in alphabetical order. Purely physiological and morphological papers have been excluded. Teratological and plant pathological papers have been included, but not articles relating strictly to horticulture, forestry, or agronomy.

BOOK-NOTES, NEWS, ETC.

NATIONAL BOTANIC GARDENS OF SOUTH AFRICA.—In his Annual Report for 1932 the Director, Prof. R. H. Compton, points out that next year Kirstenbosch will celebrate its coming-of-age. He suggests that the moment is appropriate for a determined effort to place its finances on a stable and adequate basis. By a substantial increase in the Government and Municipal grants and the establishment of an endowment fund it will then be possible to fulfil the various proper functions of the Gardens, which have so far hardly been touched upon. These would include study of the improvement of South African plants for horticultural purposes by means of hybridization and selection, the introduction and trial of plants of economic value, and the establishment of a laboratory for botanical research and a museum and library for botanical study.

ORCHID REVIEW.—In the July number Edith Coleman discusses the floral structure and method of pollination in the Australian genus *Prasophyllum*. The pollinia are removed by small honey-loving beetles which are attracted by nectar-secreting glands on the labellum.

DEATH has been busy of late among our British botanists. On August 3rd Dr. Otto Stapf, F.R.S., formerly Keeper of the Herbarium and Library at the Royal Botanic Gardens, Kew, and Editor of the recently published ' Index Londinensis,' died while on holiday at Innsbruck ; and Dr. Eric Drabble, a frequent contributor to our pages of papers on critical British plant genera, died at his home at Moon's Hill, Isle of Wight. Some account of their work will appear in a later number of this Journal.

THE BACTERIOPHILOUS SPECIES OF *PSYCHOTRIA*.

BY C. E. B. BREMEKAMP, D.Sc.

THE first reference to a bacterial symbiosis in Rubiaceae is found in a paper published in 1902 by A. Zimmermann *. Bacterial nodules were observed by him in the botanical gardens at Buitenzorg, Java, on the leaves of three species of *Pavetta* and on those of a plant labelled *Grumilea micrantha* Hiern : as it had neither flowers nor fruits it was impossible at that time to verify this identification. Shortly after his departure, however, it flowered and proved a new species of *Pavetta*, which Th. Valeton (Icon. Bogorienses, ii. fasc. 2, tab. 143, 1904) described under the name of *P. Zimmermanniana*.

That bacterial nodules are present, however, in a genus very nearly related to *Grumilea*, namely in *Psychotria*, was shown a few years later by Valeton (*op. cit.* iii. fasc. 3, tab. 271, 1908), when he described a species of that genus cultivated also in the Buitenzorg gardens. It was thought there to have come from the Comores, and as it appeared to be distinct from all other Mascarene species, Valeton regarded it as new and named it *Psychotria bacteriophila*. Comparison of this plant with the bacteriophilous species of *Psychotria* in the Kew Herbarium has shown, however, that it is identical with *P. punctata* Vatke from the coast of tropical East Africa, where it is apparently common. Its occurrence in the Comores, though not quite impossible, seems doubtful, as no other bacteriophilous species of *Psychotria* occurs in these islands, and it is not included in any of the collections made there.

That bacterial nodules are not confined to this species was shown by Boas †, who described them in two West African species. In one of these they are, like those of *P. punctata*, more or less circular in outline and irregularly scattered over the whole surface of the leaf, whereas in the other they are linear and arranged in a double file along the midrib.

The presence of bacterial nodules in a third genus of Rubiaceae is very probable. Zimmermann (*l. c.*) pointed out that the pustules on the shoots and leaves of *Heterophyllaea pustulata* Hook. f. (*Hindsia Fiebrigii* K. Krause), of which a description is found in Solereder's ' Systematische Anatomie der Dicotyledonen,' show the same structure as the bacterial nodules of *Pavetta*. Similar pustules are found in *Lecanosperma lycioides* Rusby (Bull. Torr. Bot. Club, xx. 420 cum fig., 1893). Though there is a striking difference in habit between these two plants, they are doubtless very closely related.

* A. Zimmermann, " Ueber Bakterienknoten in den Blättern einiger Rubiaceae," Jahrb. f. wiss. Bot. xxxvii. 1 (1902).

† F. Boas, " Zwei neue Vorkommen von Bakterienknoten in Blättern von Rubiaceae," Ber. d. Deutsch. Bot. Ges. xxix. 416 (1911).

Bacterial nodules occur also in a second Dicotyledonous family, the Myrsinaceae, where they were discovered and studied by Miehe * in *Ardisia crispa* A. DC. They are present, however, in every one of the thirty or more species of the subgenus *Crispardisia* and probably also in the small genera *Amblyanthus* and *Amblyanthopsis*. The leaves of these Myrsinaceae are crenate, and the nodules are found at the base of the incisions. In the bacteriophilous Rubiaceae, on the other hand, where the leaves are entire, they are either confined to a narrow strip along the midrib or they are more or less irregularly scattered.

Morphologically entirely different are the bacteriodomatia of *Dioscorea macroura* Harms, studied by Matthew Young Orr †. The leaves of this plant run out in a fleshy linear appendage, which contains four cylindrical cavities filled with bacteria embedded in slime : four longitudinal slits in the upper surface lead into these cavities. A similar appendage was found by J. R. Junger ‡ in the somewhat smaller leaves of an unnamed species, which may have been *Dioscorea Welwitschii* Rendle : in that species at any rate the appendage is also present.

That in the Myrsinaceae the presence of bacterial nodules is a character of taxonomic importance can hardly be doubted : the nodules are confined to a single subgenus of *Ardisia* and to the genera *Amblyanthus* and *Amblyanthopsis*, which are evidently closely allied to *Ardisia*. In the Rubiaceae, however, the situation is less simple. The South American genera *Heterophyllaea* and *Lecanosperma* have several ovules in the ovary cells and are, therefore, widely separated from *Pavetta* and *Psychotria*, and, though the two latter are doubtless related, they are by no means very near allies : in both genera, moreover, groups of species are included which are always entirely free from bacteria. In my revision of the South African species of *Pavetta* (Ann. Transvaal Mus. xiii. 182, 1929) I have shown that in that genus form and distribution of the nodules are of taxonomic importance ; in my monograph of the genus I will discuss this question more fully : now, however, I will confine myself to the genus *Psychotria*.

Bacterial symbiosis is comparatively rare in the genus *Psychotria*, though much more common than one would have expected. So far this condition has been described in three

* H. Miehe : "Die sogenannten Eiweiszdrüsen an den Blättern von *Ardisia crispa* A. DC.," Ber. d. Deutsch. Bot. Ges. xxix. 156–7 (1911) ; "Javanische Studien.—V. Die Blattknoten an den Blatträndern der *Ardisia crispa* DC.," Abh. d. math.-phys. Klass. Kön. Sächs. Ges. Wiss. xxxi. 399 (1911).

† Matthew Young Orr : "The Leaf-glands of *Dioscorea macroura* Harms," Notes R. Bot. Gard. Edinburgh, xiv. 57 (1923) ; "On the Secretory Organs of the *Dioscoreaceae*," *ibid.* xxv. 133 (1926).

‡ J. R. Junger, "Anatomien hos familjen *Dioscoreae*," Sv. Vet.-Ak. Bih. xiii. 3 (1888).

species only, but the list appended to this paper contains 42 names, and the number will doubtless increase. All these species occur on the African continent ; in America, the Mascarene Islands, and Asia they are unknown. They belong to the genus *Psychotria* as it is now generally understood, not a single one belongs to the genera *Chasalia* and *Grumilea*, which were formerly often included in *Psychotria*. In the subdivision of the genus proposed by Schumann in his monograph of the Rubiaceae in Engler and Prantl's 'Natürliche Pflanzenfamilien,' they all fall in the subgenus *Eupsychotria*. Even of the African representatives of this subgenus, however, only a small part are bacteriophilous. Free from nodules, for instance, are the species which Schumann includes in Müller Argau's section *Inundatae*, and which form a well-defined group characterized by very peculiar large bicaudate and alate stipules, a rufous indumentum, large bracts, and costate pyrenes. The classification of the remaining species offers considerable difficulties. A number of thin-leaved forms might be grouped round *P. abrupta* Hiern, and a number of small undershrubs round *P. amboniana* K. Sch. : the species belonging to these two groups also are always free from symbiotic bacteria. Among the rest the bacteriophilous species form the most important group with the following characters.

They are small shrubs, 1–6 feet high, forming part of the undergrowth of bush or forest. The leaves are usually herbaceous and of moderate size ; the blade is contracted at the base ; the lateral nerves are alternate or subopposite, and the smaller veins few and inconspicuous ; the bacterial nodules are either more or less circular in outline and irregularly scattered, showing no definite relation to the veins, or they are linear and arranged in a double file along the midrib ; bundles of raphides are present, though sometimes difficult to see ; acaridomatia or tufts of hair in the axil of the lateral nerves are absent. The stipules are either bicuspidate or bicaudate, and as a rule caducous. The inflorescence is terminal, pedunculate, and either paniculate or more often corymbose or contracted in a simple umbel ; the bracts are minute and caducous. The white or greenish-white flowers are shortly pedicelled, tetramerous or more often pentamerous, and heterostylous. The calyx varies from very shortly denticulate to deeply lobed with narrowly triangular segments. The corolla is hypocrateriform, its throat hairy or, rarely, glabrous. The stamens are inserted about midway in the tube ; their filaments are glabrous and the anthers dorsifixed. The disc is annular and thick. The style is glabrous ; the stigmatic lobes spreading or slightly reflexed. The ovary is two-celled, with a solitary erect ovule in each cell. The fruit is a red drupe with a very thin endocarp, and one or two pyrenes, which are usually smooth, rarely slightly ribbed ; the seeds

are either smooth or wrinkled, and, on the ventral side, provided with an intrusion of the testa, which penetrates usually as far as the centre of the seed, where it widens into a disc. The embryo is small and its radicle inferior. The species are all African.

The nearest approach to these characters is found in the species related to *P. amboniana* K. Sch. These resemble the smaller species of the bacteriophilous group; they have, moreover, bundles of raphides in the mesophyll; their seeds show the ventral intrusion of the testa; and they too are confined to the African continent. In contradistinction with the species of the bacteriophilous group they are, however, always provided with acaridomatia and with tufts of hair in the axil of the lateral nerves. This difference is doubtless small, and it is questionable whether it is of sufficient importance to justify a separation of these two groups. As the presence of the nodules enables us, however, to isolate a considerable number of species, and as the nodules themselves are on the whole easily recognizable, the character has doubtless a practical value.

Difficulties in the recognition of the nodules may arise when the leaves are very hairy, or in the case of herbarium specimens when they are very dark. In hairy leaves it will sometimes be found necessary to remove the indumentum, and very dark leaves will have to be made more transparent by boiling: this treatment causes, moreover, a swelling of the nodules. In those species in which the latter follow the midrib, it is usually necessary to remove the epidermis: the nodules appear in that case as black strips between the greenish mesophyll and the white tissue of the midrib.

On the other hand, it should not be forgotten that a black dot on a leaf is not necessarily a bacterial nodule. Such dots are sometimes caused by parasitic fungi. The type-specimen of *Psychotria subpunctata* Hiern, for instance, shows on the lower side of the leaf the black fructification of a fungus, which has been described as *Microthyrium Psychotriae* (Massee in Journ. Bot. xxxiv. 152, 1896): similar fungi are found on the leaves of numerous other plants including several species of *Psychotria*. Even without the aid of a microscope these fructifications are, as a rule, easily distinguishable from bacterial nodules: the latter extend from the upper to the lower face of the leaf, and as they do not burst through the epidermis, their outline is less sharply defined; they are, moreover, as a rule present in every leaf. Other markings are due to the presence of secretions: as, for instance, in several Mascarenean species, where the lower side of the leaf is finely marbled.

The bacteriophilous species fall naturally into three groups. In the first the bacterial nodules follow the midrib, in the second and third they are irregularly scattered; the species of the second group have a ring of hairs at the insertion of the stamens,

whereas in those of the third group the corolla-tube is glabrous inside. The first group is confined to the cisequatorial part of tropical West Africa, the third to East Africa; of the species of the second and largest group a few with tetramerous corollas are found in the same region as the species of the first group, whereas the far more numerous species with pentamerous corollas occur in East Africa, Rhodesia, the Congo, and Angola.

Key to the Bacteriophilous Species of Psychotria.

Group I.—*Nodules along the midrib.*

- Leaves elliptic; stipules bicuspidate.
  - Leaves glaucous ..... 1. *P. calva.*
  - Leaves green ..... 2. *P. kisantuensis.*
- Leaves lanceolate; stipules bicaudate.
  - Tips of the stipules straight ..... 3. *P. umbellata.*
  - Tips of the stipules recurved ..... 4. *P. recurva.*

Group II.—*Nodules scattered; a ring of hairs at the insertion of the stamens.*

- Flowers 4-merous; inflorescence a many-flowered panicle.
  - Leaves small, ±6-nerved ..... 5. *P. Verschuereni.*
  - Leaves large, 11–18-nerved.
    - Calyx denticulate; shoots always green.
      - Leaves glabrous ..... 6. *P. setacea.*
      - Leaves pubescent beneath ..... 7. *P. kimuenzae.*
    - Calyx shortly lobed; shoots at first rufous.. 8. *P. variopunctulata.*
- Flowers 5-merous.
  - Inflorescence a many-flowered panicle.
    - Calyx denticulate; leaves lanceolate, glabrous ..... 9. *P. Fleuryi.*
    - Calyx shortly lobed or subtruncate; leaves elliptic.
      - Leaves glabrous ..... 10. *P. faucicola.*
      - Leaves pubescent ..... 11. *P. griseola.*
  - Inflorescence corymbose or umbellate.
    - Calyx dentate or denticulate; inflorescence corymbose.
      - Stipules bicaudate; leaves glabrous or pubescent.
        - Leaves ovate or obovate.
          - Leaves obovate; inflorescence reflexed ..... 12. *P. refractiflora.*
          - Leaves ovate; inflorescence not reflexed.
            - Leaves abruptly acuminate, with ±10 pairs of rather faint nerves, glabrous ..... 13. *P. stigmatophylla.*
            - Leaves not abruptly acuminate.
              - Leaves with 8 or more pairs of nerves.
                - Leaves with 8–12 pairs of nerves, pubescent and somewhat scabrid above, grey tomentose beneath ..... 14. *P. Swynnertonii.*
                - Leaves with 12 or more pairs of nerves, glabrous ..... 15. *P. Welwitschii.*

Leaves usually with less than 8 pairs of nerves.
Leaves adpressedly puberulous-pubescent beneath with ±6 pairs of nerves..... 16. *P. Kaessneri.*
Leaves glabrous.
Shoots rufous pubescent; leaves small, pallid beneath, with 5–7 pairs of nerves ..... 17. *P. reducta.*
Shoots and leaves green.
Leaves with 6–8 pairs of nerves ..... 18. *P. beniensis.*
Leaves with 4–6 pairs of nerves..... 19. *P. lubutuensis.*
Leaves elliptic or lanceolate.
Leaves lanceolate, with ±7 pairs of nerves.
Leaves glabrous ..... 20. *P. rutshurensis.*
Leaves pubescent ..... 21. *P. maculata.*
Leaves elliptic or oblong.
Shoots rufous; nerves slightly rufous beneath ..... 22. *P. sabukuensis.*
Shoots and leaves green or pallid.
Leaves with 7–10 pairs of nerves.
Inflorescence small..... 23. *P. brevipaniculata.*
Inflorescence many-flowered.
Leaves 16–21 cm. long .... 24. *P. monticola.*
Leaves 4·5–8·5 cm. long .... 25. *P. gracilescens.*
Leaves with 5–7 pairs of nerves.
Shoots and petioles shortly tomentose, blade glabrous. 26. *P. cinerea.*
Shoots and leaves glabrous.
Leaves green, not white-bordered ..... 27. *P. nairobiensis.*
Leaves pallid with a white border..... 28. *P. marginatum.*
Stipules bicuspidate; leaves glabrous.
Leaves long-acuminate, elliptic to lanceolate ..... 29. *P. Guerkeana.*
Leaves shortly acuminate, acute or rounded at the top.
Leaves elliptic or obovate, rounded or shortly acuminate at the top, with ±5 pairs of nerves ..... 30. *P. punctata.*
Leaves elliptic, acute at both ends.
Nerves in 6–7 pairs; young shoots pubescent ..... 31. *P. petroxenos.*
Nerves in 9–12 pairs; young shoots glabrous ..... 32. *P. pachyclados.*
Calyx lobed; inflorescence corymbose or umbellate; stipules always bicaudate.
Calyx lobes broad and short.
Leaves glabrous; nerves in ±8 pairs .. 33. *P. mucronata.*
Leaves hairy on the nerves beneath ... 34. *P. perbrevis.*
Leaves puberulous; nerves in 6–7 pairs.
Leaves lanceolate ..... 35. *P. collicola.*
Leaves ovate, acute ..... 36. *P. pubifolia.*
Leaves obovate, obtuse..... 37. *P. Kirkii.*

Leaves densely pubescent or tomentose.
Leaves green on both sides, nerves in 4 pairs ..... 38. *P. Volkensii.*
Leaves grey tomentose beneath, nerves in 6–7 pairs ..... 39. *P. tarambassica.*
Calyx-lobes narrow and long ..... 40. *P. nigropunctata.*

Group III.—*Nodules scattered; corolla-tube glabrous inside.*

Leaves ±8 cm. long; midrib white ..... 41. *P. alsophila.*
Leaves ±4 cm. long; midrib red ..... 42. *P. Eickii.*

List of the Bacteriophilous Species of Psychotria.

1. P. CALVA Hiern in Oliv. Fl. Trop. Afr. iii. 199 (1877). Hutch. & Dalz.; Fl. W. Trop. Afr. ii. 124 (1931). *P. Brassii* Hiern, *l. c.* 204. *Grumilea micrantha* Hiern, *l. c.* 217. West Tropical Africa.

2. P. KISANTUENSIS de Wild. Ann. Mus. Congo, sér. 5, ii. 184 (1907). Congo.

3. P. UMBELLATA Thon. in Schum. & Thon. Beskr. Guin. Pl. 109 (1827); Hiern, *l. c.* 199. *P. ivorensis* de Wild. Pl. Bequaert. ii. 375 (1924). Upper Guinea.

4. P. RECURVA Hiern, *l. c.* 206. *P. adafoana* K. Sch. in Engl. Bot. Jahrb. xxviii. 90 (1899). Fernando Po; Gold Coast.

5. P. VERSCHUERENI de Wild. Pl. Bequaert. ii. 434 (1924). Congo.

6. P. SETACEA Hiern ex Hutch. & Dalz. Fl. W. Trop. Afr. ii. 125 (1931). *P. setacea* Hiern in Oliv. Fl. Trop. Afr. iii. 197 (1877), and *P. leptophylla* Hiern, *l. c.* 200. North-west Tropical Africa.

7. P. KIMUENZAE de Wild. Ann. Mus. Congo, 5, ii. 184 (1907). Congo.

8. P. VARIOPUNCTULATA de Wild. Pl. Bequaert. ii. 432 (1924). Congo.

9. P. FLEURYI de Wild. *l. c.* 365. Gaboon.

10. P. FAUCICOLA K. Sch. in Engl. Bot. Jahrb. xxxiv. 336 (1904). *P. amaniensis* K. Krause in Engl. Bot. Jahrb. xliii. 152 (1909). Tanganyika.

11. P. GRISEOLA K. Sch. *l. c.* 337. Tanganyika.

12. P. REFRACTIFLORA K. Sch. *op. cit.* xxviii. 98 (1899). Gaboon.

13. P. STIGMATOPHYLLA K. Sch. *l. c.* 100. Congo.

14. **P. Swynnertonii,** sp. nov. Fruticosa, partibus annotinis pubescentibus, ramis veterioribus cortice brunneo vestitis, striatis. *Folia* ovata, 5–13 cm. longa, 2–7·5 cm. lata, apice acuta, basi in petiolum brevem contracta, supra viridia, scabrido-pubescentia, subtus griseo-tomentosa, nervis lateralibus utroque facie conspicuis, griseis, utroque latere costæ 8–12. *Stipulæ* triangulares, breviter bicaudatæ, brunnescentes et mox deciduæ. *Inflorescentia* trichotome corymbosa. *Flores* 5-meri. *Calyx* breviter et irregulariter dentatus. *Corolla* hypocrateriformis tubo ad insertionem staminum barbato, lobis dimidio brevioribus quam tubo.

Hab. Tanganyika, Kilossa, *Swynnerton* 770 & 771, Herb. Mus. Brit. (type); N.W. Rhodesia, Katenina Hills, *Kaessner* 2201, Herb. Mus. Brit.

Very near to *P. Welwitschii* (Hiern) Brem., but with hairy leaves and a smaller number of nerves.

15. **P. Welwitschii** (Hiern), comb. nov. *Grumilea Welwitschii* Hiern, Cat. Welw. Afr. Plants, ii. 496 (1896). Angola.

16. **P. Kaessneri,** sp. nov. Fruticosa, 1–2 m. alta, partibus annotinis pubescentibus, primum griseo-tomentosis; ramis veterioribus cortice griseo vestitis, striatis. *Folia* ovata, 3–6 cm. longa, 1·5–3·5 cm. lata, supra viridia, subtus griseo-puberula et nervis pubescentia, apice acuta an subacuta, basi rotundata an truncata, petiolum versus semper contracta, margine incrassata, nervis utroque latere costæ circ. 6, subtus interdum albidis. *Stipulæ* bicaudatæ, mox brunnescentes et deciduæ. *Inflorescentia* trichotome corymbosa. *Flores* breviter pedicellati, 5-meri. *Calyx* cupularis, 5-denticulatus. *Corolla* hypocrateriformis lobis tubo fere æquilongis, tubo intus ad insertionem staminum barbato. *Drupa* rubra, monopyrena; semen corrugatum, facie ventrali sulco profundo testæ ad centrum dilatato intrusum.

Hab. Kenya, Muka, *Kaessner* 923, p.p. Herb. Kew (type). Kirimiri, *Rob. E. & Th. C. E. Fries* 2096, Herb. Kew. Galunko, *Kaessner* 847, Herb. Kew.

Differs from the two preceding species in its smaller leaves with a smaller number of nerves, and from the three following in the short but very distinct grey indumentum on the lower side of the leaves.

17. P. REDUCTA de Wild. Pl. Bequaert. ii. 411 (1924). Congo.

18. P. BENIENSIS de Wild. *l. c.* 333. Congo.

19. P. LUBUTUENSIS de Wild. *l. c.* 383. Congo.

20. P. RUTSHURENSIS de Wild. *l. c.* 417. Congo.

21. P. MACULATA S. Moore in Journ. Bot. xliv. 84 (1906). Uganda and Tanganyika.

22. P. SABUKUENSIS de Wild. *l. c.* 418. Congo.

23. P. BREVIPANICULATA de Wild. *l. c.* 340. Congo.

24. P. MONTICOLA Hiern in Oliv. Fl. Trop. Afr. iii. 199 (1877). St. Thomas.

25. P. GRACILESCENS de Wild. Ann. Mus. Congo, 5, ii. 182 (1907). Congo.

26. P. CINEREA de Wild. *l. c.* 181. Congo.

27. **P. nairobiensis,** sp. nov. Fruticosa, usque ad 1·20 m. alta, glabra, ramis striatis. *Folia* elliptica an oblonga, 2·5–7·5 cm. longa, 0·8–3·2 cm. lata, herbacea, sicc. olivacea, margine recurvata et ibidem plerumque conspicue undulata, apice acuta, basi acuta an subrotundata, sed semper petiolum versus contracta, nervis lateralibus utroque latere costæ 5–6; petiolus brevis, usque ad 1 cm. longus. *Stipulæ* bicaudatæ, mox brunnescentes et deciduæ, intus parte inferiore sericeo-villosæ. *Inflorescentia* trichotome corymbosa, ramulis pilosis in axillis bractearum parvarum et deciduarum. *Flores* breviter pedicellati, 5-meri. *Calyx* cupularis, 5-dentatus. *Corolla* albo-viridis, hypocrateriformis, lobis tubo fere æquilongis, tubo intus ad medium, ubi stamina inserta sunt, barbato. *Drupa* monopyrena an bipyrena, endocarpio tenui; semen corrugatum, facie ventrali sulco profundo testæ, ad centrum seminis dilatato, intrusum.

Hab. Kenya, Nairobi, *W. J. Dowson* 490 (type); ibidem, *Dümmer* 2021; ibidem, *Miss E. R. Napier* 565; Machalos distr., *Garner* 2172. Tanganyika, Mbulu distr., *Burtt* 2294 (flowers 4-merous); Eastern Kilimandjaro, *Haarer* 690 p.p. All in Herb. Kew.

Related to the preceding and to the following species, but easily recognizable by the wavy border of its leaves. In the neighbourhood of Nairobi apparently common.

28. **P. marginata,** sp. nov. Fruticosa, parva, glabra, ramis novellis applanatis, sulcatis, veterioribus cortice griseo-brunneo, transversaliter fracto, obtectis. *Folia* elliptica an oblonga, 3–4·5 cm. longa, 1–2 cm. lata, subcoriacea, sicc. præsertim facie inferiore pallida, margine albida, incrassata, recurvata et undulata, apice acuta, basi cuneata, nervis lateralibus utroque latere costæ 6, infra prominentibus, albidis; petiolus brevis an nullus. Stipulæ breviter bicaudatæ, subpersistentes, pallidæ, intus parte inferiore sericeo-villosæ. *Inflorescentia* longe pedunculata, trichotome corymbosa, ramulis pilosis in axillis bractearum parvarum, deciduarum. *Calyx* cupularis, irregulariter 5-dentatus. *Corolla* alba, hypocrateriformis, lobis tubo fere æquilongis, tubo intus ad insertionem staminum barbato.

Hab. Tanganyika, Kondoa distr., near Kolo, *Burtt* 1258. Herb. Kew.

Very near to the preceding species, but at once recognizable by its pallid white-margined leaves and by the transversely cracked bark of its twigs.

29. P. GUERKEANA K. Sch. Bolet. Soc. Brot. x. 131 (1892). St. Thomas.

30. P. PUNCTATA Vatke in Oester. Bot. Zeitschr. xxv. 230 (1875); Hiern in Oliv. Fl. Trop. Afr. iii. 203 (1877). *P. melanosticta* K. Sch. Phys. Abh. k. Akad. Wiss. Berlin, 1894, 16, 26. *P. bacteriophila* Val. Icones Bogor. iii. fasc. 3, tab. 271 (1904). Apparently common along the coast of tropical East Africa from South Somaliland southward, also on the islands near the coast; usually on the dunes, but also on coral rock.

31. P. PETROXENOS K. Sch. & K. Krause in Engl. Bot. Jahrb. xxxix. 557 (1907). Kenya.

32. P. PACHYCLADOS K. Sch. & K. Krause, *l. c.* 558. Zanzibar, Kenya.

33. P. MUCRONATA Hiern, *l. c.* 211. Country of the Djur; Cameroons (*Ledermann* 3946, Herb. Berol.).

34. P. PERBREVIS K. Sch. in Engl. Bot. Jahrb. xxviii. 96 (1899). Cameroons.

35. P. COLLICOLA K. Sch. *op. cit.* xxxiii. 364 (1903). Tanganyika.

36. P. PUBIFOLIA de Wild. Pl. Bequaert. ii. 408 (1924). Congo.

37. P. KIRKII Hiern, *l. c.* 206. *P. hirtella* Oliv. in Trans. Linn. Soc. ser. ii. 336 (1887). *P. subhirtella* K. Sch. in Engl. Pflanzenw. Ost-Afrikas C. 390 (1895). It is not impossible that *P. pubifolia* also belongs to this species: the differences are so very small that they may fall within the range of variability. Tanganyika, Nyasaland, Northern and Southern Rhodesia, Southern Congo.

38. P. VOLKENSII K. Sch. *l. c.*. Tanganyika.

39. **P. tarambassica,** sp. nov. Fruticosa, 1·8 m. alta, partibus annotinis pilosis, ramis veterioribus cortice griseo obtectis, striatis. *Folia* elliptico-lanceolata, 5–8 cm. longa, 1·5–2·5 cm. lata, apice acuta, basi in petiolum contracta, supra viridia et pilis sparsis paulo scabrida, subtus griseo-tomentosa, nervis lateralibus utroque facie conspicuis, albis, utroque latere costæ circ. 7. *Stipulæ* longæ, bicaudatæ, mox brunnescentes et deinde decidentes. *Inflorescentia* trichotome corymbosa. *Flores* 5-meri. *Calyx* breviter 5-lobatus. *Corolla* alba. *Drupa* rubra, dipyrena; semina lævia, facie ventrali sulco profundo testæ intrusa.

Hab. Kenya, Kamasia distr., Tarambass Forest, *J. R. Dale* 2436, Herb. Kew.

Nearly related to the three preceding species, but at once recognizable by the grey tomentose lower side of the leaf.

40. P. NIGROPUNCTATA Hiern in Oliv. Fl. Trop. Afr. iii. 207 (1877). Congo and Angola.

41. P. ALSOPHILA K. Sch. in Engl. Pflanzenw. Ost-Afrikas C. 390 (1895). Tanganyika.

42. P. EICKII K. Sch. & K. Krause, in Engl. Bot. Jahrb. xxxix. 555 (1907). Tanganyika.

I wish to thank the Keeper of the Herbarium at Kew, the Keeper of the Herbarium of the British Museum, the Director of the Herbarium at Brussels, and the Director of the Herbarium at Berlin-Dahlem for the opportunity to study the material entrusted to their care, and the Director of the Herbarium at Copenhagen for the gift of a photograph of the type-specimen of *Psychotria umbellata* Thon.

NEW OR NOTEWORTHY FUNGI.—PART XIII.

By W. B. GROVE, M.A.

(Concluded from p. 259.)

495. LEPTOSPHAERIA DENSA Bres. in Hedwig. 1896, xxxv. 199. Sacc. Syll. xiv. 568. Mig. 387.

Perithecia in dense crowds, punctiform, 120–130 μ diam., subglobose or lens-shaped, dark-brown, immersed. *Asci* in close fascicles, somewhat clavate, about $50\times10\,\mu$. *Spores* triseriate, linear-oblong, attaining nearly 30×3–$4\,\mu$, yellow, triseptate, the second cell sometimes slightly swollen. No paraphyses seen.

On a dead leaf of *Acorus Calamus*, Harvington Hall, Worcs (*Rhodes*, no. 4466); March.

There can be little doubt that this is merely a young state of Bresadola's species. The spores were immature, for they could not be induced to quit the ascus. The asci were united at the base in a fascicle, and could with difficulty be separated from one another.

496. LEPTOSPHAERIA EPICALAMIA (Riess) C. & de Not. Schem. 236. Sacc. Syll. ii. 72. *Sphaeria epicalamia* Riess, in Hedwig. 1854, no. 6, and pl. iv. fig. 6.

Perithecia scattered or in short rows, globose, papillate, at first immersed, then erumpent by the papilla, black, ca. 120 μ diam. *Asci* broadly clavate-fusoid, 55–65×10–$11\,\mu$, rounded above, shortly pedicellate, 8-spored, surrounded by abundant filiform mucose paraphyses. *Spores* distichous or subtristichous, fusoid, obtuse at both ends, 5-septate, hardly constricted, 22–$25\times3{\cdot}5$–$5\,\mu$, with only a faint tinge of colour.

On dead peduncles of *Luzula maxima*, Ribbesford Wood, Worcs; March.

There can be little doubt that this, though technically a *Metasphaeria* in these specimens, is merely a young state of the *Leptosphaeria*; the whole appearance of the asci etc. suggested immaturity.

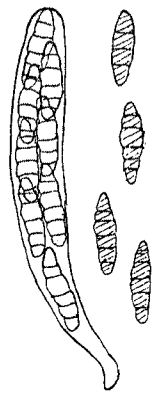


Fig. 5.—*Leptosphaeria Obiones* f. *evolutior*; an ascus with spores, also one young and three mature spores, × 600.

497. LEPTOSPHAERIA OBIONES Sacc. Syll. ii. 24. *Pleospora Obiones* Crouan, Finist. 22.

Forma nova **evolutior,** *sporidiis septis usque ad* 5–6 *instructis.*

Perithecia subgregarious, black, depressed-globose, 240–260 μ diam., covered, then erumpent by a short obtuse papilla which is pierced at the apex by a distinct pore. *Asci* crowded,

subclavate or subcylindrical, 80–85×14 μ, with a short knotted pedicel. *Spores* oblong, rounded at both ends, mostly straight, rarely slightly curved, with 3, then 5–6 septa, biseriate (but when seen from the side obliquely uniseriate), hardly constricted at the septa, yellowish, 17–18×5–5·5 μ (or even 20×7 μ), each loculus provided with one or two guttules. *Paraphyses* few, filiform, gelatinous. (Fig. 5.)

On dead stems of *Obione portulacoides*, Sandplace, near Looe, Cornwall (*Rhodes & Rilstone*, no. 4203 B); July, 1929; accompanied by *Coniothyrium Obiones* Jaap (*Rhodes & Rilstone*, no. 4204 C).

This fungus seems to be a more developed form of *L. Obiones* Sacc. The texture of the pycnidium is thick and opaque; the spores, when 3-septate, measure about 14×4 μ; when 5-septate and 17–18 μ long or more, they have the third loculus occasionally slightly swollen, but scarcely become torulose as stated by Saccardo.

498. LEPTOSPHAERIA OCTOPHRAGMIA Trav. & Frag. in Bull. Soc. Bot. Ital. 1915, p. 23. Sacc. Syll. xxiv. 993.

Var. nov. **major**, *omnibus partibus major.*

Perithecia in dense groups, immersed, then erumpent by the upper half, prominent, globose, hardly papillate, 400–500 μ diam., fulvous-brown, opaque, smooth; texture of minute, fuliginous-chestnut cells. *Asci* remarkably clavate, rounded above with a thin wall, about 150×25 μ. *Sporidia* bi–triseriate, elongate-fusoid, obtuse at both ends, often gently curved, as first 1-septate in the middle and there distinctly constricted, then 7-septate, dark olivaceous-brown, the terminal cells roundish-conoid and paler, the other cells discoid and each of them provided with a large central guttule, 50–58×8–10 μ. *Paraphyses* very abundant, thin, filiform, colourless, gelatinous, about as long as the asci. (Fig. 4, *b*, p. 259.)

On a very old thick dead stem of *Lippia* (*Aloysia*) *citriodora*, in a garden, Landeviddy, Polperro, Cornwall (*Rilstone*); March.

Fragoso's species was found on the same host in a garden at Seville; it was evidently very similar to the variety here described, but measured about half as large in every dimension (perith. 250 μ; asci 75–90×12–14 μ; spor. 25–30×6–7 μ). But the likenesses are too many to permit one to regard them as distinct species; the difference may possibly be due to the superior humidity of the Cornish habitat. The spores of the British specimen, when mature, break apart easily at the median septum; they present somewhat of a resemblance to the spores of *Coryneum Kunzei*.

499. TREMATOSPHAERIA MEGALOSPORA Sacc. Syll. ii. 120. *Sphaeria megalospora* De Not. Schema, 221. *Melanomma megalosporum* Sacc. Mich. i. 545. Rehm, Ascom. no. 536.

Perithecia rather densely gregarious, carbonaceous, globose-conical, black, 250–300 μ diam., the base sunken in the wood, apex then emerging with a distinctly papilliform obtuse glabrous shining ostiole, which is pierced by a round pore, but at length opens widely. *Asci* clavate, at first thick-walled, obtusely rounded above, shortly pedicellate below, 120–150×20–22 μ, 8-spored, surrounded by a crowd of gelatinous paraphyses. *Spores* distichous, fusoid, somewhat clavate above, when mature

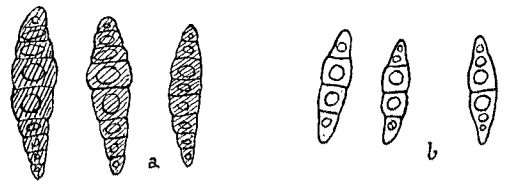


Fig. 6.—*a*, *Trematosphaeria megalospora*, three mature spores, × 600; *b*, *Metasphaeria rustica*, one immature and two mature spores, × 600.

usually 7–8-septate (6–9, *Sacc.*), slightly constricted at the middle septum, olivaceous, at length ±fuliginous, 30–40×8–10 μ, the upper locules tending to be shorter and broader than the lower ones, each locule with a rather large guttule, the terminal locules paler than the intermediate ones. (Fig. 6, *a*.)

On the bare wood of an old decorticated branch of *Quercus*, Lathom Park, Lathom, S. Lancs (*W. G. Travis*, no. 371); July 1929.

500. MASSARINA ALNI Sacc. Syll. xi. 332. Mig. 3. iii. 443. *Epiphegia Alni* Otth, Mittheil. Bern. 1870, p. 104. *Massarina Ploettneriana* Henn. Verh. Bot. Ver. Prov. Brandenb. xli. 98 (1899). Sacc. Syll. xvi. 535.

Perithecia scattered, forming a conical protuberance in the periderm, not for a long time bursting it at the summit, black within, about 1 mm. diam. *Asci* clavate, obtusely rounded

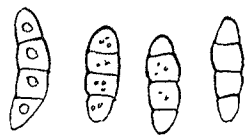


Fig. 7.—*Massarina Alni*; four ascospores, × 600.

above, pedicellate below, 80–90×12–13 μ (100×15–16 μ, *Rhodes*). *Spores* distichous, oblong, faintly curved in side view, obtuse at both ends or slightly attenuated, smooth, 3-septate, granular-guttulate within, quite colourless, gently constricted when mature, 21–23×6–7 μ (up to 27 μ long, *Rhodes*), surrounded by a thin mucous layer; no paraphyses seen. (Fig. 7.)

On thin dead twigs of a branch of *Alnus glutinosa*, placed to obstruct a gateway of a field, midway between Builth and Llandrindod Wells, Radnor; and also at Fenni Fach near Brecon (*Grove & Rhodes*); May 1929.

On the numerous twigs of this branch there were present also *Ditopella ditopa* Schröt., *Cryptosporium Neesii* Cord., and *Stenocybe byssacea*. The diagnosis of this species given by Saccardo, though incomplete, is sufficient to identify it, but its brevity has led Hennings to rename a specimen of it *M. Ploettneriana*. The Radnorshire specimens exactly combine all the characters of both, except for a trifling difference in the breadth of the spores and asci, in which Hennings may have made an error; he gives the spores as 8–10 μ wide, while Saccardo says 5 μ wide.

501. METASPHAERIA RUSTICA Sacc. Syll. ii. 157. *Leptosphaeria rustica* Karst. Myc. Fenn. ii. 105.

Perithecia scattered or collected here and there in loose clusters, immersed in the cortex, at first covered by the epidermis, then protruding the broad ostiole or becoming ±superficial as the epidermis secedes, globose, black, glabrous, up to 480 μ diam. *Asci* subcylindrical, 100–120×10 μ, 8-spored. *Spores* subdistichous, elongate-fusoid, straight or rarely somewhat curved, soon 1-septate in the middle, then 3-septate, distinctly constricted at each septum, hyaline, 5–6-guttulate, 26–28×5 μ; paraphyses numerous, very delicate, filiform. (Fig. 6, *b*.)

On dead stems of *Spiraea Aruncus*, Oscott College Grounds (*Rhodes & Grove*); Oct.

The middle septum is formed early, and each loculus then becomes inflated and sharply swollen on each side of the septum and close to it, thus leaving a deep constriction at that point, with a large guttule adjoining the septum on each side and usually two other smaller ones in each cell. Then a constriction arises about the middle of each loculus, and finally the two other septa are formed as shown in the figure. The terminal guttules, when there are five or six, always remain very small, and seem never to be cut off by a septum. When free from the ascus, the spores often take on an olivaceous tint, and the guttules may disappear. This species is very similar to *M. rupicola* Sacc. (Fung. Ital. pl. 282), on dead stems of *Aconitum*, but the perithecium is much larger, and the asci are distinctly narrower.

502. ZIGNOELLA FALLAX Sacc. Syll. ii. 218. Mig. 181. *Melanomma fallax* Sacc. in Mich. i. 41; Fung. Ital. pl. 298.

Perithecia scattered or loosely gregarious, nearly superficial or sunken at the base in the wood a little, subglobose, then conoid, glabrous, 250–330 μ diam., very black, somewhat shining, carbonaceous, with a short papillate pierced ostiole. *Asci* cylindrical, shortly stipitate, 100–110×9–10 μ, 8-spored, surrounded by numerous filiform paraphyses. *Spores* ±mono-

stichous, occasionally subdistichous, fusoid, straight or faintly curved, 27–28 (25–31, *Travis*) ×6–7 μ, subacute at both ends, with a row of six conspicuous highly refringent guttules, colourless, at length 5-septate.

On a bare chip of slightly decayed wood, Limbo Lane, Irby, Cheshire (*Travis*, no. 390); March.

The perithecia can be seen to originate in the soft wood just below the surface, and then to force their way upwards and become nearly superficial (but some could be seen to be still covered over at the sides by loose adhering fibres). Ostioles bluntly conical and rather broad. The guttules of the spores are large and clear, especially the two middle ones; the septa are exceedingly delicate, and difficult to see except in the maturest spores. Migula describes the spores as only 3-septate.

503. PLEOSPORA EUONYMI Fckl. Symb. Myc. 133. Sacc. Syll. ii. 258. Mig. 423.

Forma nov. **caulicola,** *sporidiis fuscis, monostichis.*

No spots. *Perithecia* like those of *Pleospora herbarum*, mostly scattered or rather crowded at times, subglobose, black, up to 500 μ diam., immersed, then raising and cracking the epidermis, at last erumpent by the convex vertex or a faintly papilliform ostiole. *Asci* cylindrical, 150–170 μ × 10–12 μ, rounded at apex, 8-spored. *Spores* at first strictly monostichous, or later obliquely so, oblong, rounded but slightly tapering at each end, most often not quite straight but bent and faintly constricted at the middle septum, when young 3-septate, pale brownish, then dingy-brownish and at length gradually 5–7-septate, with the 4–6 middle loculi each divided by a longitudinal septum, 22–28×6–8 μ, the upper half being often a little broader than the lower; the three primary septa always remain more distinctly marked than the others; paraphyses few, filiform, subgelatinous.

On small dead twigs of *Euonymus europaeus*. Sneyd's Coppice, Worcs; May.

This seems to be quite distinct from any form that could be fairly called *Pleospora herbarum*, not only by its habitat, but also by the total absence of any trace of a yellow or amber colour in its spores, as well as by their shape, monostichous arrangement, etc. The ascus is at first remarkably cylindrical, and the spores are in a straight line.

504. LOPHIOSTOMA INSIDIOSUM C. & de N. Schema, 220. Sacc. Syll. ii. 703; Fung. Ital. pl. 226. Mig. 255. *Sphaeria insidiosa* Desm. 1841, p. 16, pl. 14. *L. caulium* Fckl. *non* Fr. ? *L. bicuspidata* Cooke, Handb. 848; and in Trans. Bot. Soc. Edin. ix. 328, pl. 6, f. 4.

Perithecia subgregarious, on a dusky black spot, wholly or partially immersed, oval, black, 400–500 μ diam., with a

±narrow protruding compressed truncate or convexly rounded ostiole. *Asci* clavate, narrowed below, 90–100×10–12 μ, 8-spored. *Sporidia* biseriate, fusoid, slightly curved like a bow, 20–22×4·5–5 μ, 5-septate, constricted at the middle septum only, the loculus above the middle sometimes swollen, olivaceous-brownish, provided at each end with an acute colourless appendage, which is turned obliquely so as to form a part of the curve of the spore. *Asci* surrounded by numerous colourless filiform paraphyses, about as long as themselves. (Fig. 8.)

On an old dead decorticated stem of *Lavatera arborea*, Perelle, Guernsey (*Rhodes*, no. 4981); Sept. 1931.

Saccardo records numerous forms on herbaceous stems belonging to many different families. Whether this species



Fig. 8.—*Lophiostoma insidiosum*; an ascus with spores, × 300; two mature spores, × 600.

is what Cooke called *L. bicuspidata*, and referred with hesitation to Currey, Linn. Soc. Trans. xxii. p. 321, pl. 58, f. 64, is doubtful, for he describes occasional "transverse" (*i. e.*, longitudinal) septa such as no one else seems to have met with; but it is undoubtedly like his var. β, on dead *Clematis Vitalba*. It is remarkable that neither Saccardo nor Cooke makes any mention of the copious paraphyses which surround and embed the asci of this species. It is probable that *bicuspidata* is one of those more advanced forms, developing longitudinal septa in special circumstances, of which many instances are now known, e. g., *Pleosphaerulina* Passer. (See my notes in Journ. Bot. 1919, p. 210; 1928, p. 355; 1930, p. 100.)

505. Microthyrium gramineum Bomm. Rouss. & Sacc. Syll. ix. 1059.

Var. nov. **major**, *sporidiis evolutioribus*.

Perithecia scattered, round, rather flat, dimidiate, 300–400 μ diam., black, easily seceding; texture, in the middle, of small dark parenchymatous cells irregularly arranged, but all round these, towards the circumference, of paler narrow-linear radiating cells (2 μ broad); margin finely and elegantly fimbriate, nearly colourless. *Asci* numerous, subclavate-oblong, rounded above,

shortly pedicellate below, 8-spored, 70–80×7–8 μ. *Spores* obliquely monostichous, or biseriate above and uniseriate below (according to the angle of view), oval-oblong, obtuse at both ends, colourless, biguttulate, ? ultimately uniseptate, 14–15×4–5 μ. *Paraphyses* very abundant, as long as the asci, filiform, rarely branched (apparently), hyaline, sometimes slightly thickened at the summit.

On outer surface of the rolled-in dead leaves of *Psamma arenaria*, Sandwich Bay, Kent; Aug. 1929.

The lower proliferous stratum of the perithecium was thin and dark olivaceous. The spores were not seen with an absolutely indubitable septum, but there were sufficient indications that they would ultimately develop one. The perithecia, at first sight, reminded one of the cast-off sporangia of *Pilobolus* such as are often found attached to grass-stems and leaves in suitable places. The type-form of *M. gramineum* was found at Ostend, on leaves of *Psamma arenaria*, but it is described as having much shorter asci (27–30 μ) and smaller 3-guttulate spores (9×3 μ).

506. **Microthyrium Rhododendri**, sp. nov.

Perithecia solitaria, longe secundum ramulos sparsa, nigra, rotundata v. oblonga, usque ad 400 μ longa, 200 μ lata, dimidiata, juniora applanata, seniora convexa atque medio in modum jugi formata, rima dehiscentia, ætate fragilissima, contextu prosenchymatico radiante mediana parte opaco marginem versus membranaceam dilatatam subtranslucentem olivaceam sensim tenuiore. *Asci* globoso-pyriformes, apice obtusissimi, inferne in pedicellum abruptum attenuati, sporidiis 6–8 foeti, 35–40×20–25 μ. *Sporidia* tristicha v. stipata, ovali-oblonga, utrinque rotundata, achroa, infra medium 1-septata, ad sepimentum constricta, loculo quoque magna guttula unica prædito, 20–24 (–25)×9–10(–11) μ; paraphysibus nullis visis.

Hab. in ramulis emortuis v. semimortuis vetustissimorum *Rhododendrorum* cultorum, Caerdeon prope Barmouth, Mer., Mart., 1933.

The attacked branches were mostly about one-quarter inch or less in diameter; the loose spores in some of the perithecia which were old (exolete) had assumed, by decay, an olivaceous tint.

507. Trochila Tini Quel. Ench. Bot. 339. Sacc. Syll. viii. 729. Mig. 862. *Phacidium Tini* Duby, Bot. Gall. ii. 722.

Apothecia gregarious, on extensive pallescent spots, at first closed, immersed, then raising the epidermis, tearing it into laciniæ, and disclosing the disc, which is roundish, marginate, cinereous-blackish, and flat, externally blackish-brown, 200–500 μ diam. *Asci* cylindrical, rounded above, shortly pedicellate, 40–45×7–7·5 μ, 8-spored, surrounded by a few filiform paraphyses. *Spores* oval, usually provided with a large central oil-guttule, which is of a pale yellowish-green colour, 8–9×4 μ.

On the under side of dry fallen leaves of *Viburnum Tinus*, Hadzor Hall, Worcs ; January.

This is a convenient opportunity to record an interesting fact, bearing upon this genus *Trochila*. In the *Journal of Botany* for 1912, p. 53, I recorded a new species of *Gloeosporium*, *G. phacidiellum*, on living leaves of *Prunus Laurocerasus*, and at the same time suggested, on the grounds of its *Phacidium*-like form and its occurrence in company with *Trochila Laurocerasi*, that it was the pycnidial stage of that Discomycete. Just lately I have received a communication from Dr. Mary J. F. Gregor, of the Mycological Department, University of Edinburgh, stating that she had reared from a pure culture of a single ascospore of the *Trochila* a *Gloeosporium* stage. By examination of the type-specimen of *G. phacidiellum* from my herbarium, she has now ascertained that it agrees in all essential respects with the culture-stage which she had obtained.

BRITISH ASSOCIATION.

THE Annual Meeting of the British Association was held at Leicester from September 6 to 13, with an attendance of about 2000 members. In his address the President, Sir Frederick Gowland Hopkins, Pres. R.S., reviewed the advances in recent years of our knowledge of biochemistry, and emphasized the precision which had been attained in the determination of the molecular structure of the activating substances by which vital processes are initiated. An illustration of progress was the increase in our knowledge of hormones and the closely related vitamins. We have already, he said, exact knowledge of the actual molecular structure of not a few of these, and "are justified in believing that within a few years such knowledge will be extensive enough to allow a wide view of correlation between molecular structure and physiological activity." In the latter part of his address the President discussed the relation of biology to human welfare, its bearing on which is increasingly evident. The need for recognizing biological truth as a necessary guide to individual conduct, to statecraft, and social policy is emphatic.

The botanical section (Section K) deliberated under the presidency of an overseas botanist, Prof. F. E. Lloyd, of the McGill University, Montreal. Prof. Lloyd introduced a striking innovation into his address which he gave in a picture theatre, and illustrated by a long series of lantern-slides and motion pictures. By this means a highly specialised and technical subject was made to provide an hour and a half's instructive entertainment to a large and appreciative audience. The subject—"The Types of Entrance Mechanisms of the Traps of *Utricularia* (including *Polypompholyx*)"—depicted the variety

and the minutiæ of structure and behaviour of the door, or valve, and its contactual parts, particularly the threshold, of some 75 species of Bladderworts, which should be sufficiently representative of the 250 known species. The species may be grouped as floating, such as *U. vulgaris*, or so-called "terrestrial," such as *U. reniformis* and *U. coerulea*. The structure of the bladders, or traps, is remarkably uniform in the submersed forms, but the contrary is true of the terrestrial ; the difference can scarcely be due to lack of uniformity of environment in the latter, as these grow in a very wet substratum and are usually as much submersed as the floating forms.

The action of opening and closing of the door is extremely sudden, and falls within the limits of 1/16 second. The side-walls of the trap spring out, the shape of the periphery as seen in lateral view alters correspondingly, the door opens and closes, falling into a semi-relaxed position : during the short interval a column of water, carrying with it any small animals, rushes into the interior of the trap. After discharge the trap resets itself within a period of 15 to 30 minutes in *U. vulgaris* or as long as two hours in *U. purpurea*. In this operation water leaves the interior of the trap by diffusion through the walls, thus providing a reduced pressure within ; as a result the pressure of the outer water pushes the door in. The energy required for the actuation of the trap on stimulation by contact is derived from the water-pressure plus the outward spring of the walls.

The door is rendered watertight by the velum, a cuticular development from the pavement epithelium of the threshold.

"The resetting consists in the close adjustment of the door at all points with the threshold. The resulting posture of the door enables it to resist the even, if considerable, pressure of outside water on it, the watertightness being achieved by the sealing along the door-edge by the velum. The effectiveness of the door-posture depends on the shape of the threshold, which is always slightly funnel-shaped, the sides converging inwardly. In addition, there is a more markedly outfacing ridge or surface against which the middle reach of the door-edge finds application, resisting the inswing of the door.

"The structure of the door is correlated with the function of its various regions. It is composed of two courses of cells, the relative depths of which vary according to the function. While the whole is remarkable in its capacity for bending, we can recognise areas which can bend very freely and through a large arc. This is hinge-tissue, in which one course of cells is thin, the other thick. The thick course always takes the maximum compression. The upper part of the door and the regions around the sides are hinge-tissue. The capacity of compression and extension of the deep cells depends on their bellows structure, their periclinal walls being corrugated, each corrugation being supported by stiffening

rods in the anticlinal walls. The occurrence of props in the anticlinal walls is general throughout the door-tissues, so that the chief characteristic of hinge-tissue is the corrugation of the periclinal walls (inner and outer). The middle portion of the lower half (more or less) of the door has cell-courses of equal thickness very strongly supported by large numerous rods. The cells themselves become exceedingly small, especially as they approach the door-edge. The structure is such as to give some and equal pliability in either direction, combined with considerable rigidity. This is the part of the door which has to remain in a rigid condition to give the door its footing on the threshold. The extent of these parts of the door varies with the species and peculiarities of shape of the entrance-structures.

"There are two general classes of trap :

"(*a*) Those in which the threshold is broad (from back to front), the outer zone bearing a broad velum, the middle zone being broad also, and the inner zone narrow. The door in such cases is longer than broad, and is so placed that when the trap is set the door-edge is held in position by the downthrust of the lateral hinge, contributing with longitudinal thrust to the firm application of the door-edge to a more or less upturned surface near the inner limit of the threshold. The angle made by the plane of the door with that of the threshold is a small one. The door is devoid of special organs for actuation, unless sessile or short trichomes scattered on the upper convex surface of the door may be so regarded. At all events, actuation follows only on the application of sufficient pressure by prey trying to enter to make an initial dent in the surface. This allows the outside water to exert its pressure in folding the door lengthwise. The fold, travelling to the door-edge, releases it from the downward thrust of the sides, and the door is opened. The action is by no means as vigorous as in the other kind presently described, nor as easily procured. But procured it can be, and is vigorous enough to carry in the intruding prey.

"(*b*) Those in which the threshold is narrow. The outer zone is relatively broad, and bears an ample velum ; the middle zone is narrow in the middle, widening toward the sides relatively more than in the class (*a*), and with an inner zone which is broader. The surface of application of the door-edge is at the front of the middle zone along the middle reach ; along the lateral reaches the surface of the door is applied to broader fan-shaped extensions of the middle zone facing outwards, procuring the funnel-like shape of the entrance, into which the door is cramped under pressure of water. Here the velum also is broader and deeper. The door stands at a large angle to the plane of the threshold. It is provided with trichomes which constitute a latch-lever for the actuation of the trap. Contact therewith disturbs the door-edge sufficiently to allow the pressure of water against it to become effective in opening the trap and engulfing the prey.

"One cannot boast that all the species fit nicely into one or the other of the above two categories. Beyond the general statement as made, each kind of trap demands its own description."

For these reference must be made to the detailed descriptions in the printed address with their accompanying sketches. These are arranged under several types. The simplest includes *U. cornuta* and *U. juncea*, New World species ; the *U. capensis*-type includes a Tasmanian species, *U. lateriflora*, and an undescribed species from Ceylon. An Old World type, *U. coerulea* includes several African and Ceylon species ; *U. monanthos* is the type of a group of Australasian species ; and *U. globulariaefolia* represents a neotropical group. Other types are represented by *U. vulgaris*, *U. reniformis*, and *U. purpurea*.

The sectional papers were of varied interest. While some were merely informative, others raised points which called for discussion. It is to be regretted that, owing to the very full programme, time was rarely allowed for discussion. The great value of a meeting which brings together a number of workers should lie in the opportunity for ventilating and discussing matters, often of considerable interest, which are put forward. There is a call for the blue pencil in drawing up the programme.

The section opened with a paper by Prof. Seward on the past and present floras of the Kerguelen Archipelago. A general account of the geological and physical features of the Archipelago was given, and the main features and geographical relationships of the present flora were discussed.

The fossils, which include fragments of ferns, angiosperms, and other plants are believed to be of Tertiary age. Impressions recently collected by Dr. de la Rüe represent foliage and cone-scales of *Araucaria*, apparently allied to *A. Rulei*. The present distribution of this genus, which is not adapted for dispersal over ocean species is difficult to explain other than by some theory of continental drift.

Morphology and anatomy were well represented, thus justifying the encomium of the President in his speech at the Sectional Dinner on the importance of the work of the English school in this somewhat neglected branch of the Science. The carpel is always with us. Dr. Hamshaw Thomas, in his paper on the nature and origin of the stigma, reiterated his rejection of the origin of the carpel from a folded leaf, and claimed that this theory did not allow an intelligible explanation of the origin of the stigma, especially in relation to the passage of the pollen-tube to the ovule. He suggested that the stigma represented an upward extension of the pollen-tube transmission-tissue in the wall of the ovary. The origin of the carpel was traced from the ovule-containing cupule of the pteridosperm. A fusion of two adjoining cupules with their projecting stigmatic appendages produced a hypothetical arrangement from which the various types of modern carpel might be derived, and, moreover, explained the very general presence of two stigmas. Robert Brown's

observation that each carpel had two stigmas which were lateral in origin was quoted in support of this view. This hypothesis would divorce the Ranales from pride of place as a primitive order, but what, after all, do we mean by primitive ? A paper which eminently called for discussion !

Prof. McLean Thompson eliminated the carpel from the inferior ovary of a large family of Monocotyledons, the Scitamineae, in which he has studied the development and morphology of the inflorescence and flower. He concludes that many forms of cymose inflorescence have arisen by reduction of branched cone-bearing strobili, with flowers arranged in spiral order, and that sub-floral branching is not involved. The final stages in reduction of the intermediate cymes are simple spikes. The flowers themselves are considered to have been crateriform, with vegetative organs displayed in spiral succession on the outer surface of the crater and with microsporangiophores on and towards the rim. There were neither carpels nor styles, but the crater was occupied by megasporangiophores produced in spiral manner. The latter are the modern ovules. The crater is considered to have been reduced and its margin to have been curtailed, so that upper microsporangiophores came to lie on the inner rim. Here they were sterilised to styles, and their subjacent areas of support within the crater became the modern placentæ. The acarpous view of the ovary is supported by evidence of progressive contribution of the andrœcium to the style without involving the organisation of the ovary.

Mr. F. F. Hyde gave a preliminary account of his investigation of the floral structure of the Campanulaceae, and described the structure of the flower in a number of genera, with special reference to the vascular anatomy. Miss M. M. Chattaway, continuing her studies on the medullary rays, described their development in the Sterculiaceae, and indicated an arrangement of the genera by these characters. Prof. Priestley and Miss Scott had extended their work on the nature of the Dicotyledonous shoot to the Monocotyledon. *Alstroemeria* supplied an illustration. The shoot is a jointed structure, and the fact that the first leaf-primordium encircles the apex determines the nature of the phyllotaxy—in this genus 3/8. In the development of the leaf-trace an axial portion precedes the foliar, and the pair of lateral unions suggest by their relative course earlier phases in development.

Dr. E. M. Thomas, discussing recent work on seedling anatomy, emphasized the importance of the transition between stem and root to establish the relation between the collateral and radial systems of the vascular bundles. One result of the last twenty-five years' work was the supersession of the types suggested by Van Tieghem.

Miss E. N. Sparshott described in detail the development of the tuber in the remarkable South African species *Testudinaria*

elephantipes. The embryo shows no tuberisation. The plumule remains very short and bears one relatively large leaf. Assimilates accumulate in the hypocotyl, which rapidly undergoes tuberisation. Early thickening results from division and hypertrophy of existing cells. Tuberisation is continued by secondary growth mainly from a pericyclic " growth zone," but also from successive phellogens. The " growth zone " resembles an inverted cup with a hole in the bottom—*i. e.*, beneath the apex of the tuber. Apex and base are further developed from the surrounding meristem and respectively produce a sympodium with reduced internodes and fibrous roots.

Miss L. M. Wicks gave the results of her work on the vascular system in the concentric leaves of Amaryllidaceae characterised by an adaxial system of small inverted bundles in addition to a system of large normally orientated bundles. Three types were found :—

(1) *The Ianthe type*.—Certain normally orientated bundles in the bi-facial leaf-base curve round and enter the concentric leaf-limb as inverted bundles.

(2) *The Agave type*.—The inverted bundles are formed by special branches given off from the normally orientated bundles in the leaf-base.

(3) *The Narcissus type*.—The most marked variation occurs in *Narcissus*, where the inverted bundles pass down from the leaf-limb into the upper part of the leaf-base, where they end abruptly in groups of small tracheids.

According to the Phyllode theory the concentric monocotyledonous leaves are morphologically petioles, the inverted bundles resulting from the flattening of a petiole with a circle of vascular bundles as seen in transverse section. It is difficult to see how such variations as shown in the three types here enumerated can be made to fit in with the phyllode theory.

The inverted bundles can be considered as secondary structures developed during the evolution of the primitive monocotyledonous leaf, possibly to increase the amount of vascular tissue in order to supply the increased amount of assimilating tissue of the concentric leaf.

Miss M. T. Martin illustrated a morphological and anatomical study of *Suaeda maritima* and *S. fruticosa*—the former a small herbaceous annual inhabiting the lower levels of salt-marshes, the latter a shrubby perennial characteristic of maritime shingle banks. An attempt was made to correlate their main features with environmental conditions, and to point out their bearing upon the general problems of halophytic vegetation.

Prof. H. S. Holden described a new pteridosperm stem, a link between *Lyginopteris* and *Heterangium* ; Dr. T. M. Harris spoke on the reproductive organs of some early Bennettitales ; and Prof. J. Doyle on the nature of heterospory. Prof. R. A. Fisher gave an explanation of the genetics of ever-sporting stocks.

Physiology was represented by several communications. The President showed an ingenious film which indicated that the secretion of *Roridula* does not entrap insects, since, owing to its resinous nature, it is not soluble in water. He demonstrated the schizogenous apical openings of intercellular canals from which the secretion escapes.

Prof. N. G. Ball described the effect of nocturnal illumination on the subsequent opening of flower-buds. The flowers of species of *Turnera*, *Asystasia*, and *Ipomoea*, and others, which normally open in the morning, are markedly affected when the buds are subjected to light during the previous night. The petals, although they become elongated, may fail to diverge, and short-lived flowers may become withered without opening. A somewhat similar result is obtained when the buds are illuminated two nights before they are due to open, even if this is followed by normal conditions during the second night. In most species where this effect of light has been observed, the failure of the flower to open is correlated with a partial inhibition of the normal hydrolysis of starch in the petals, which is associated with a decrease in the diastatic activity of the cell-sap. When a screen which only transmits the red rays is placed between the light and the plant, the result is the same as it is with white light, but the infra-red rays alone do not have this effect. On the other hand, when buds are exposed during the night to the blue and violet rays only, even when the intensity of the light is considerably increased, they behave in a similar manner to those which have been kept in the dark and open normally.

Dr. B. T. Cromwell found experimental evidence that the alkaloid berberine is a waste product of the metabolism of *Berberis Darwinii*, and that it is produced in largest amounts under conditions favourable for protein breakdown. Accumulation of the alkaloid in the root and stem bark takes place from year to year. Application of inorganic nitrogenous salts alone does not lead to increased alkaloid production, but if, in addition, glucose is supplied, or organic nitrogenous compounds, such as asparagine, are applied alone, rise in berberine content is observed. Light is an important factor in the synthesis, and all tissues growing in absence of light show high values. Withdrawal of essential elements leads to variations in yield. Under conditions of nitrogen starvation, alkaloid still accumulates: therefore it does not play the part of a nitrogenous reserve. It is suggested that the alkaloid is synthesised from carbohydrate and protein residues.

Professor F. A. F. C. Went of Utrecht gave an account of recent progress in the study of growth-substance (Auxin) in plants. Auxin was obtained for purpose of his experiments by placing the cut-off tip of an Oat seedling on a small block of agar, which takes up the auxin and can then be placed on the organ under experiment. Curvatures produced as a result of this

treatment suggest that they are due to an increase in growth on the side to which the auxin-containing block is applied. Another foreign guest of the section, Prof. Senn of Basel, gave some account of the movements of chlorophyll corpuscles.

An afternoon was devoted to mycology. Dr. B. Barnes discoursed on British aquatic fungi, Prof. Dame Helen Gwynne-Vaughan and Mrs. H. S. Williamson described the development of a coprophilous fungus, *Ascophanus Aurora*, and Miss M. Noble the life-history and morphology of *Typhula Trifolii*. A discussion was held on the teaching of botany in courses of biology, and the section also took part in joint discussions on genetics.

The programme concluded with a semi-popular lecture by Prof. J. R. Matthews on the British flora and some of its problems.

An exposition was given of a number of exhibits which had been arranged in the laboratories of the Department of Biology, University College.

The subject of the address by the Chairman of the Department of Forestry (K*), Major the Hon. Richard Coke, was "A System of Forestry for the British Isles." It emphasized the need for a system in accordance with nature's methods, which, besides aiming at the production of timber of the utmost commercial value that is possible under the local conditions, has due regard for sporting amenities. Reasons were given for and against planting large blocks of one species only, and for and against uneven-aged mixed woods known as "Jardinage" in France. Attention was drawn to the prevalent neglect of encouraging natural regeneration in the British Isles.

Lt.-Col. E. Pratt discussed the factors affecting the propagation and growth of the cricket-bat willow (*Salix coerulea*), and Dr. M. C. Rayner gave an account of recent experimental work on Mycorrhiza, which indicated a direct causal relation between its presence and satisfactory growth in seedlings of several species of Pine. Mr. J. A. B. Macdonald described some results of "shallow-turf" planting on poor *Scirpus* peat moorland, and there were other papers of a technical nature.

The continued summer weather favoured the excursions to Charnwood Forest, Belvoir Castle and its woodlands, the Peak district, and the woodlands of Rutlandshire—these and the usual social gatherings gave opportunity for renewing old friendships and making new ones.

Thanks are due for the success of the meeting to the local committee, and for the sectional arrangements to the indefatigable Local Secretary, Dr. E. J. B. Bish, and to our Leicester botanist, Dr. E. W. Miles Thomas.

During the meeting invitations were received by the General Committee from Norwich for 1935, Blackpool for 1936, and Nottingham for 1937. The meeting next year will be held in Aberdeen, with Sir William Bate Hardy, F.R.S., as President.—A. B. R.

OBITUARIES.

Otto Stapf

(1857–1933).

The death of Dr. Otto Stapf while on holiday at Innsbruck removes a botanist of world-wide reputation. Stapf was born, March 23, 1857, at Ischl in the picturesque Salzkammergut country, the son of Joseph Stapf, Oberbergrat. About two years later the family removed to Hallstadt on the beautiful lake of the same name, where his father was in charge of the salt-springs from which the famous baths at Ischl were fed, and here he spent his boyhood. He was educated at the University of Vienna, studying botany under Prof. Wiesner, and after obtaining his Ph.D. became assistant to Prof. Kerner von Marilaun, author of the classic 'Pflanzenleben.' He was also a privat-docent in the University.

His first important piece of work was the editing of the botanical results of the Polak expedition to Persia, 1882; the account was published by the Royal Academy of Sciences in 1885 and 1886 (Denkschr. K. Akad. Wiss. Math.-Naturw. Cl. l. pt. 2, li. pt. 2) and most of the families were elaborated by Stapf. The same volumes contained his "Beitrage zur Flora von Lycien, Carien u. Mesopotamien," an enumeration of the plants collected by Dr. F. Luschan, 1881–3. He was thus well equipped for his journey to Persia in 1885. He gave a sketch of the vegetation of South and Central Persia on his return (Bot. Centralbl. xxvii. 1886), but published no complete enumeration of his collections. His Persian herbarium of 1100 species was purchased by Kew in 1891. There is evidence that his concept of species was modified by the field-work incident to his travels.

The genus *Ephedra* had especially interested him, and he at once set to work on a monograph "Die Arten der Gattung *Ephedra*," which was published by the Academy in 1889 (lvi. Abt. 2). It is marked by the care and thoroughness of detail which characterise his work. In its preparation he had visited important European herbaria and had come into touch with the authorities at Kew, and in 1891 he was offered and accepted the post of Assistant for India in the Kew Herbarium, previously held by Hemsley, whom Stapf followed successively as Principal Assistant (1899) and Keeper of the Herbarium and Library (1909). He retired under the age-limit in 1922.

In the Kew Herbarium he proved a worthy successor to Oliver, Baker, and Hemsley in the production of floristic and monographic work. From 1891 onwards he published descriptions of new species in the 'Kew Bulletin' and Hooker's 'Icones Plantarum' almost yearly up to the time of his death. His

most important taxonomic contribution was on the Gramineae, with Hackel's generic revision of which he did not always find himself in agreement. Here, as generally, his work was marked by an exhaustive thoroughness and a certain independence of view—the *status quo* as such had no appeal for him. He assisted Hooker in the elaboration of the family in the 'Flora of British India.' His revision of the Grasses for the 'Flora Capensis' is a monumental piece of work, and it is to be regretted that other interests prevented his completion of the corresponding part of the 'Flora of Tropical Africa.' He also contributed to these Floras accounts of the Apocynaceae, Lentibularieae, and several other families; and elaborated the Pedaliaceae and Martyniaceae for the 'Pflanzenfamilien' (1895). His floristic work included determinations of important collections received at Kew; a notable one was 'The Flora of Mt. Kinabulu' based on Dr. Haviland's collections and published by the Linnean Society (Trans. Linn. Soc., Dec. 1894).

Stapf was not a "mere taxonomist"; the morphology of the flowering plant appealed to him, and his "Morphological and Anatomical Study of the Fruit of *Melocanna bambusoides*" (Trans. Linn. Soc. 1904) and the account of the "Structure of the Female Flower and Fruit of *Sararanga sinuosa*" (Journ. Linn. Soc. 1896) are good pieces of work.

The painstaking thoroughness evinced in his early monograph of the Ephedras was more than upheld in his work on 'The Aconites of India,' one of the handsome and profusely illustrated volumes of the 'Annals of the Royal Botanic Gardens, Calcutta' (x. pt. 2, 1905).

His contribution to the 'Festband' of Engler's Botanische Jahrbücher (1914) on the Southern Element in the British Flora represented an incursion into the field of plant geography; this was supplemented by a cartographic study published in the 'Proceedings of the Linnean Society' (1916–17). Other papers of interest to students of the British flora are those on *Spartina Townsendii* (Gard. Chron. ser. 3, xl. 1908, and Proc. Bournemouth Nat. Sci. Soc. v. 1914) and his separation of *Aconitum anglicum* as a new species distinct from the continental *A. Napellus* (Bot. Mag. t. 9088, 1926).

A facility in drawing was a great asset in his taxonomic work. The sketches with which he enriched the subjects of his study in the herbarium must be the envy of the conscientious taxonomist in their clear illustration of form and proportion.

Stapf's reputation with botanists is assured by his systematic work, which added much to our knowledge of the floras, especially of India, Malaya, and Africa. This is perhaps overshadowed by what the writer of his obituary in 'The Times' describes—in a sense, no doubt, rightly—as the chief work of his life, the editing of the 'Index Londinensis.'

The need of a new edition of Pritzel's 'Iconum Botanicarum Index' (1855–66) had long been clamant, and a few years before the War a concerted effort by the Royal Horticultural Society and the Royal Gardens, Kew, was made for its production. The effort did not materialise until after the War, when the Society undertook the burden of responsibility, while the work of compilation was to be carried out at Kew under the editorship of Dr. Stapf. The result was the six volumes of the 'Index Londinensis' issued by the Oxford Press between 1929 and 1931, " an emended and enlarged edition continued up to the end of the year 1920 of Pritzel's alphabetical register of representations of Flowering Plants and Ferns compiled from botanical and horticultural publications of the 18th and 19th centuries." The success of so exhaustive a compilation was only rendered possible by the world-wide co-operation of botanists; and the task of successfully enlisting and utilising help both at home and abroad was a testimony to the organising ability of the editor, as was the work itself to his erudition and accuracy. A work of this nature should be continuous, and up to the time of his death Stapf was engaged in preparing a Supplement to bring the 'Index' more nearly up to date.

When in 1922 the 'Botanical Magazine' was acquired by the Royal Horticultural Society, Dr. Stapf was called upon to edit the work, and the volumes since published were produced by him under the direction of the Society's Publications Committee. They maintain the high standard of beauty of illustration and accuracy of description which has been a tradition of the 'Botanical Magazine.' "The Botanical Magazine, its History and Mission" was the subject of a lecture given by Stapf before the Society in 1925. His services to horticulture found recognition in the awards by the Royal Horticultural Society of the Victoria Medal of Honour (1927) and the Veitch Memorial Medal (1931). In 1909 he was elected into the Royal Society. He was also a Corresponding Member of the Vienna Academy of Sciences and an honorary member of the Deutsche Botanische Gesellschaft.

In 1898 Stapf was elected an Associate of the Linnean Society, and in 1902 became a Fellow. His interest in the work of the Society was maintained until his death—as member of Council, Botanical Secretary (1908–16), and Vice-President (1916–17), and by his original botanical communications and his participation in discussion at the meetings. The last, modestly described by the speaker as " a few words " invariably showed an exhaustive knowledge of his subject. The award by the Council of the Linnean Gold Medal in 1927 was a well-earned recognition of his services to botanical science and to the Society. The appreciation of his fellow-workers is expressed in several genera which recall his name—*Stapfia* Chodat, a genus of Palmellaceous Algae, *Stapfiella* Gilg (Flacourtiaceae), and others.

A more competent authority will doubtless write of his official work in association with the great herbarium at Kew for more than thirty years. But I may be allowed some personal reference to a long-standing friendship.

I first met Stapf shortly after his arrival at Kew, when he came up to the Museum to look at the Ephedras, of which I was nominally in charge. I thought him shy and uncommunicative, but this was obviously due to his lack of knowledge of colloquial English; this he soon remedied, but though he wrote well the language of his adoption he never quite mastered its articulation. Better acquaintance revealed a genuinely kind heart and unselfish nature, ready to take endless trouble to help. In his homeland, in Vienna, where he attended the International Botanical Congress in 1905, he was a charming companion and I have pleasant memories of a holiday in the Salzkammergut spent under his direction after the Congress. He was my travelling companion in 1910, when, after the Brussels Congress, we attended the house-warming celebration of the new botanical garden at Dahlem, visiting on the way out and home Lippe-Detmold, the Harz Mts., and some of the old historic German towns. He had everything arranged with meticulous care, one simply followed and enjoyed. In 1924 he attended the Toronto meeting of the British Association, and keenly enjoyed camping out in the Niagara Gorge and the trip to Lake Timagami.

In his home-life the ill-health of his wife, who survives him and to whom we extend our sympathy, had been a source of anxiety, and latterly his own health had not been of the best, and a somewhat haggard look suggested that he might be working under pressure. But he did not complain, and when visiting Prof. Schinz and his family on his way to Innsbruck in July he cheerfully refuted any suggestion of ill-health. He passed away after a short illness on August 3. *Requiescat in pace!*—A. B. RENDLE.

WILLIAM GRANT CRAIB

(1882–1933).

THE untimely death of Professor Craib removes an admirable and efficient teacher and, what is a *rara avis* in our Universities, an investigator and exponent of systematic botany. In this he had carried on the tradition of Aberdeen, which under the late Prof. Trail was a recognised centre for the training of students in this old-fashioned but increasingly important department of Botany.

Craib was born on March 10, 1882, at Banff. After a preliminary education at Banff and Fordyce Academies, he entered Aberdeen University on the Arts side. Eye-trouble interrupted

his studies for a time and he served as an engineer on board ship, but was able later to return to Aberdeen, graduate as M.A., and study for the B.Sc. degree. A temporary appointment as Curator of the Calcutta Herbarium in 1908 again interrupted his University career. While in India he collected extensively in the North Cachar Hills.

In 1909 he accepted the post of Assistant for India at Kew. At this time Dr. Kerr was sending large consignments of specimens from Siam, and Craib's interest in the flora of this botanically little-known area was excited. In the 'Kew Bulletin' from 1911 onwards he published, under the title "Contributions to the Flora of Siam," descriptions of numerous novelties. In 1925 appeared the first part of his 'Floræ Siamensis Enumeratio,' a list of the plants known from Siam, with records of their occurrence. Other parts were issued at intervals, the last, in 1932, carried the account of the Dicotyledons to the end of Rubiaceae. We trust that the untimely death of the author will not prevent the completion of a much-needed Flora.

His "Flora of Banffshire," a list of the species of flowering plants and ferns with their local distribution, appeared as a paper in the 'Transactions of the Banffshire Field Club' in 1912.

Craib had left Kew in 1915 on the invitation of Bayley Balfour to become Lecturer in Forest Botany and Indian Trees at Edinburgh University. Here he published a series of papers on the "Regional Spread of Moisture in the Wood of Trees."

In 1920 he was appointed to the Regius Professorship of Botany at Aberdeen, and entered enthusiastically on the work of teaching and the training of research students. Unfortunately a serious accident during the Edinburgh meeting of the British Association in 1921, resulting in the loss of a leg, prevented an active life. His energy during term and vacation alike was concentrated on his work, and neglect of relaxation doubtless impaired his health. For some years it had been his custom to spend part of his long vacation at Kew working at his Flora of Siam, and it was while thus engaged that he died with almost tragic suddenness as the result of a cerebral tumour.

He was a Fellow of the Royal Society of Edinburgh, and had been a Fellow of the Linnean Society since 1920.

To quote from an appreciative article in 'The Times' of September 2, "His botanical colleagues mourn the loss of a distinguished systematist, always willing to give help and valuable advice, and his students a teacher of rare merit, who taught by drawing out to the full their powers of observation and deduction."

Our sympathy is extended to his wife, the daughter of the late Mr. James Turner of Acton, whom he married in 1917.—A. B. RENDLE.

REVIEW.

Transactions of the Bose Research Institute, Calcutta. Vol. vii., 1931–32. Edited by Sir JAGADIS CHUNDER BOSE. Cr. 8vo, pp. vi, 343, text-figs. 161. Longmans, Green & Co. : London, 1933. Price 25*s*.

THIS volume marks a departure from previous volumes in that chemical, zoological, and anthropological papers are included. The majority, however, are in continuation of the investigations described in previous volumes on the motile and conducting mechanisms of plants. In an introductory chapter the editor summarizes the results. Definite conducting channels for the excitatory impulse in the leaf of sensitive plants have been demonstrated between the central and peripheral ends of the leaf. New results have been obtained on the combined effects of direct and indirect stimulation; and the existence of special impulse-conducting strands in the petiole of *Mimosa* has been demonstrated. That environment as well as habitat will modify the activity of the organism is demonstrated by experiments with a native water plant, *Neptunia oleracea*. Other investigations show that an isotropic organ is rendered anisotropic by differential action of stimulus on its opposite sides; and that the growth of plants undergoes modification under different methods of external stimulation. These results are embodied in a series of seven papers by B. K. Dutt, S. C. Das, U. C. Sen, and A. Guha-Thakurta. N. C. Nag and H. N. Bannerjee, continuing their work on the proteolytic enzymes of *Carica Papaya*, find that commercial papain will also yield, as does the juice of unripe papaw fruit, two distinct proteolytic enzymes, peptic and ereptic, of which the former is the more predominant.

BOOK-NOTES, NEWS, ETC.

BOTANY OF HONG KONG.—Supplement No. 2 of the 'Hong Kong Naturalist' contains two useful contributions. H. N. Dixon supplies a list of the Mosses based on recent collections by Dr. Herklots and other records, and including also species from parts of the mainland. The list is a critical one and a number of new species are described. W. A. Setchell continues his discussion of the Sargasso-weeds of the Hong Kong area, further experience and study of which are required before settled determinations can be given. The eighteen plates which illustrate this discussion include excellent line-drawings showing the characters of species and varieties.

In vol. iv. no. 1 of the 'Journal' (April 1933) Dr. Herklots continues his description of the flowering shrubs and trees of Hong Kong, dealing with *Illicium*, *Uvaria*, *Melastoma*, and *Schoepfia*.

Société Royale de Botanique de Belgique.—Volume xv. Fasc. 1 & 2 (1932–33) contain a preliminary note by P. Martens on the origin of the "crochet" in the Ascomycetes; an anatomical study of the leaf of *Dyschoriste linearis* Gray, a Mexican medicinal plant, by M. F. Sternon, which in the author's opinion confirms the position assigned to it in the tribe *Ruelliae* of the family Acanthaceae; and a critique on the methods of study of cellular permeability by Marcel V. Homès. A biographical notice of Raymond Naveau, Vice-President of the Society, is accompanied by a photograph and a list of his botanical works. J. Coulouma discusses the geographical distribution of the species of *Cistus* in Languedoc; H. J. van Langendonck describes the ecology of the "Schorres" of the Zwyn and Philippine districts on the Belgian Coast; and V. Lathouwers gives some botanical impressions of a recent trip to the Belgian Congo. G. Verplancke describes inoculation experiments with the virus of the mosaic and yellow disease of the Beet; he finds that numerous species of common weeds may act as hosts for these diseases. A list of botanical works published in Belgium or by Belgian botanists in 1930 and 1931 includes 531 entries; by error two entries from the *Journal of Botany* are included—a new genus of Connaraceae from Tanganyika by Baker and Exell, and the 'Novitates Africanæ,' which are said to contain notes on new species from the Belgian Congo, but are all South African, mainly from the Cape Province.

Botany of the Belgian Congo.—The 'Bulletin du Jardin Botanique de l'État,' Brussels, vol. ix. fasc. 3, contains contributions to the study of the flora of the Belgian Congo. R. P. H. Vanderyst's collections of the freshwater Algae are described by l'abbé P. Frémy; his list contains 46 species of Myxophyceae and 20 of Isokontae; new species are described and new records for equatorial Africa are noted. J. Ghesquière gives a revision of the African species of *Cassia* of the section *Chamaecrista* Benth.; of the sixteen species included four are new, and a number of new varieties are also described. Dr. W. Robyns enumerates some new grasses in the tribe Paniceae from the Belgian Congo and Ruanda Urundi, and also records certain changes in nomenclature.

Journal of the Washington Academy of Sciences.—Recent botanical papers in vol. xxiii. include the description of a new genus (*Orinus*) of grasses from Kashmir, allied to *Leptochloa*, by A. S. Hitchcock, some account by C. Drechsler of the morphological diversity among fungi that capture and destroy nematodes and amœbæ, and a description of a new fungal disease of Dahlias, *Macrophomina Phaseoli* Ashby. Seido Endo records the occurrence of fruiting specimens of the eastern North American *Juglans cinerea* in the Upper Pliocene of Japan. It is also known as a fossil from the Pliocene of Europe and from Siberia.

THE EUPHRASIAS OF ICELAND AND THE FAROES.

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

I have recently had the opportunity of examining the Euphrasias from these islands (and also from Greenland) in the collection of the Botanical Museum at the University of Copenhagen. The set (excluding Greenland material) comprises about 200 gatherings, and affords an interesting comparison with Beeby's Shetland Eyebrights and Col. Johnston's specimens from the Orkneys. Many of the examples have been named by Wettstein, Townsend, or Ostenfeld. A notable feature of the collection is the divergence which it shows between the floras of the two island groups, only two species, *E. frigida* Pugsl. (*E. latifolia* Pursh ex Wettst.) and *E. curta* (Fr.) Wettst. being common to both.

The prevalent species of Iceland is evidently *E. frigida* †, using the name proposed in Journ. Linn. Soc. (Bot.) xlviii, 490 (1930), to replace the homonym *E. latifolia* Pursh ex Wettst. It may be mentioned in this connection that there are two original Faroes specimens here of *E. arctica* Lange ex Rostrup (Bot. Tidsk. iv. 47 (1870)), another name identified with *E. latifolia* but rejected in my "Revision of British Euphrasiae." One of these examples is labelled, in Rostrup's handwriting, "*E. arctica* Lge. Mspt. Sandyford, Strômö. 31. 8. 67. E. Rostrup"; the other, in a different hand, "*E. officinalis* L. **arctica* Lge. Thorshavn, Stromö. 31. 8. 67. C. A. Feilberg og E. Rostrup." The first specimen bears Ostenfeld's determination (undated):—"*E. latifolia* Pursh"; the second was seen in 1899 by Wettstein, who named it "*E. borealis* (Towns.) Wettst." The two plants are clearly conspecific, although their rather large flowers are not equally well shown, and Wettstein's determination (*E. borealis*) appears to be correct, albeit the specimens are a condensed form, and if glandular (which cannot readily be seen) may be crossed with *E. frigida*. From their broad and very obtuse foliage and subcapitate inflorescence they appear to be the material on which Rostrup's account of *E. arctica* is based, and as they resemble *E. borealis* rather than *E. frigida*, and the description does not definitely indicate either of these species, there seems good reason for the rejection of Lange's MS. name as a "nomen dubium." Lange's later plate of *E. officinalis* v. *latifolia* (Pursh) (Fl. Dan. t. 2910) shows five plants which differ considerably from Rostrup's specimens and appear referable to *E. frigida*, but unfortunately the characteristic capsules are not shown and the lower cauline leaves and cotyledons are missing.

† In the September number of 'Rhodora' Prof. Fernald deals at length with the nomenclature of this species. The points which he raises are mainly answered in this paper.

In Iceland *E. frigida* is polymorphic, and widely different Icelandic forms have been labelled "*E. latifolia*" by Wettstein. The stiff, erect plant, with very long lower internodes, and large, densely imbricated floral leaves, which is actually that described in Wettstein's Monograph, though not well represented by his figures, seems to occur less frequently than some other forms. This erect plant appears from herbarium material to be the prevalent form of Labrador and Greenland, and, as it now becomes necessary to distinguish other states of the species, it will be treated as typical *E. frigida*. A Greenland specimen of this character (with foliage glandular as well as hirsute), cited by Wettstein in his Monograph, is shown below as the specific type. In Jørgensen's 'Euphrasia-Arten Norwegens' five varieties of *E. frigida* are distinguished, and a great many examples of the species are figured in his plates. Hardly any of these, however, depict the typical species as defined above, and it appears from the excellent material in Herb. Mus. Brit. that this type is not common in Scandinavia. The Scottish plant, which lacks the peculiar habit of the type, closely resembles much of the Scandinavian material, and similar exsiccatæ from Iceland and the Faroes, accepted as *E. latifolia* by Wettstein, are present in this collection. The same form also grows in South Greenland. In general aspect these plants are very distinct from the typical species, and they appear from their different habit to constitute a well-marked variety. Another very hirsute form, found in several Icelandic stations, seemingly agrees with the description and figures of Jørgensen's variety *subcurta* of Northern Norway. In Northern Iceland a reduced simple form occurs, which grows also in Greenland. This has the facies of *E. minima* Jacq., but examination shows that its indumentum is that of *E. frigida*, to which also its leaf-cutting at times approximates. Another local form in Iceland, of comparatively tall growth, seems worthy of varietal distinction on account of its peculiarly long, attenuate capsules. In addition to these varying forms, the collection includes a few specimens of large, much branched plants, with luxuriant foliage, which, though not gathered early in the season, are without flowers and fruits. Wettstein has referred some of these examples to *E. latifolia*, though they are certainly not of æstival habit, and it is difficult from their immature condition to determine their real status. Two such forms recall *E. Marshallii* Pugsl. but are much less hirsute.

The remaining Icelandic species appear relatively scarce. Typical *E. curta* is included in the collection from two stations, and the diminutive variety *piccola* (Towns.) Pugsl., sometimes unusually glabrate, is known from the Reykir and Geysir districts. An example from Kjalhraun (Jónsson no. 50) resembles the form peculiar to the Faroes. Another specimen, consisting of four individuals collected at Búdahraun by H. Jónsson in late July 1897, when just beginning to flower, seems referable to *E. rotundifolia* Pugsl. of North Scotland and the Shetlands. But the most remarkable form is one, gathered in good and mature condition in 1900 by O. Davidsson at Reykjalang i Frijovkadal, and referred to *E. stricta* Host. The name was evidently suggested by the leaf-cutting, but the foliage is densely hirsute, the flowers minute, and the capsules broad; and as this *ensemble* of characters does not seem to indicate hybridity between any known Icelandic forms, the plant is described as a new species. Two glandular species, *E. brevipila* B. & G. and *E. tenuis* (Brenn.) Wettst., also figure among the Iceland exsiccatæ. The first was found by S. Stefansson in 1890 at Reykir and Skeggjabrekkudalur in a fairly typical form; the latter at Hraun in 1903 by O. Davidsson. The presence of these two plants in Iceland is somewhat unexpected, and they may possibly be of recent introduction.

The Euphrasias of the Faroes are dealt with in some detail by Ostenfeld in 'Botany of the Faroes,' i, p. 55 (1901), where six species are admitted, viz.:—*E. atropurpurea* (Rostrup) (*E. foulaensis* Towns.), *E. borealis*, *E. curta*, *E. gracilis* Fr. (*E. micrantha* Rchb.), *E. latifolia*, and *E. scotica* Wettst., the author remarking: "*E. latifolia* merges on the one hand into *E. atropurpurea* and on the other into *E. curta*; and *E. scotica* is difficult to distinguish from *E. gracilis*, while it also tends towards *E. atropurpurea*." At a later date Ostenfeld changed his views on these plants and referred all the specimens of *E. atropurpurea*, *E. gracilis*, *E. latifolia*, and *E. scotica* in Herb. Haun. to *E. minima* Jacq. I have not yet seen any boreal examples of *Euphrasia* that I should identify with this Central European species.

The Copenhagen collection indicates that the predominant species of the Faroes are *E. scotica* and *E. borealis*, both unknown in Iceland. The former of these is widely spread in the islands, and is often much more typical than in the Orkneys and Shetlands. Many of the specimens were named by Townsend. The variety *purpurascens* Pugsl. occurs in Strömö. *E. borealis* also is often typical, but tends to produce large, lilac-tinted flowers, thus approaching the Shetland variety *speciosa* Pugsl. None of the specimens resembles the more compact var. *zetlandica* Pugsl., which is common both in Orkney and Shetland. One gathering from Sandö, with very small flowers, named "f. *parviflora*" by Ostenfeld, is perhaps a hybrid with *E. frigida*. *E. micrantha*, which Ostenfeld regards as a plant "of fairly dry ground," appears to be scarce, although distributed over different islands of the group. The collection includes only six satisfactory gatherings, but there may possibly be more, for sometimes it is not easy to separate dried material of this plant from *E. scotica*. *E. frigida*, considered a plant of rock-ledges by Ostenfeld, also seems uncommon, but it is found in most of the islands. The typical plant grows in Viderö, but the majority of the specimens belong to the lax form seen in Scotland and Scandinavia. In addition, a curious condensed form, which is well represented

in the collection, occurs in Stromö. Of *E. foulaensis*, which is stated by Ostenfeld to grow on rock-ledges like *E. frigida*, but which is shown on some of his labels as inhabiting grassy slopes, there are several almost uniform gatherings, differing but little from the Shetland type. No specimens like f. *condensata* Pugsl., so frequent on the cliffs of Orkney, are present. The specimens of *E. curta* were mostly collected by Ostenfeld on the islands of Stromö, Osterö, and Viderö. They are fairly uniform and somewhat intermediate between the typical species and *E. frigida*. Their leaf-cutting seems sufficiently distinct to warrant varietal rank, and it is proposed to commemorate Ostenfeld in naming them.

Besides the species recorded by Ostenfeld there are three fairly typical gatherings of *E. confusa* Pugsl. Two of these are from Osterö and one from Syderö. The former were labelled by Wettstein "*E. foulaensis*" and "*E. foulensis* f. *ramosa*," but Townsend referred both of them to *E. scotica* as unusual forms, remarking in one case :—"*E. scotica* or hybrid ? A very unusual form, possibly a hybrid with *E. scotica* as one of the parents." The Syderö plant was named *E. minima* by Ostenfeld. This is an interesting extension of the range of a British plant which is frequent in Orkney and is known to occur in Shetland. A few specimens from the Faroes labelled "*E. borealis*" appear from their flexuous habit and small foliage to be hybrids with *E. confusa*.

Throughout the collection a small proportion of specimens exhibits intermediate characters which may be due to hybridity.

The following groups are mostly new :—

EUPHRASIA FRIGIDA Pugsl. in Journ. Linn. Soc. (Bot.) xlviii, 490 (1930) ; *E. latifolia* Pursh ex Wettst. Mon. 136 and auct. mult., non Linn.

Exsicc. Dansk Geol. Geogr. Undersøgelse Grönland, 1885, Hansen, Godthaabs Fjord, in Hb. Haun. (type) ; Vahl, Christianshaab, Greenland, 1833, in Hb. Haun. ; Woodworth, no. 366, Ryan's Bay, Labrador ; Jønsson, Knavarnes, S. V. Iceland, 1905, in Hb. Haun. ; Thoroddsen, Tjaldvatu, Iceland, 1889, in Hb. Haun. ; Davidsson, Horgardal, N. Iceland, 1900, in Hb. Haun. ; Carroll, Matarenje, Lapland, 1863, in Hb. Mus. Brit., as *E. officinalis*.

The typical species is fairly represented in Wettstein's tab. xi, f. 11, and in Journ. Bot. tab. 375 (as *E. latifolia*). The plants shown in Fl. Danica, t. 2910, are varying forms of *E. frigida* ; nos. 1 and 2 recall var. *laxa*.

β **subcurta,** comb. nov. *E. latifolia* v. *subcurta* Jørgensen, Euphr. Norweg. 116 (1919).

Icon. Jørgensen, *l. c.* tab. viii, ff. *k–o*.

Exsicc. Sörensen, Myvatu, N. Iceland, 1928, in Hb. Haun. ; Jønsson, Hafnarfjordur, Iceland, 1922, in Hb. Haun. ; Steenstrup, Iceland, in Hb. Mus. Brit., as *E. officinalis*.

Stem erect, often branched, flowering from about the fifth pair of leaves ; leaves frequently small (the cauline narrow), with shallow or rather fine teeth, plicate below, and generally densely hirsute on both surfaces. Corolla dorsally 5–6 mm. long. Capsule rather smaller than in the type.

γ **laxa,** var. nov.

Icon. Pugsl. *l. c.* pl. 27, ff. *a–e*.

Exsicc. Marshall, no. 2071, Cairngorm, as *E. foulaensis* (type) ; Pugsley nos. 457–461 ; Warodell, Östersund, N. Sweden, 1905, in Hb. Mus. Brit. ; Sherrin, Vitte Island, Kola Penins., 1917, in Hb. Mus. Brit. ; Ostenfeld, Haugen, Osterö, Faroes, 1897, in Hb. Haun. ; Jønsson, Borgarfjordur, Iceland, 1894, in Hb. Haun. ; Vahl, Julianshaab, Greenland, 1828, in Hb. Haun. ; Kruuse, Tasiusak, Greenland, 1902, in Hb. Haun.

Caulis sæpe flexuosus, gracilescens, internodis inferioribus quam in typo brevioribus, superioribus longioribus. Folia floralia haud imbricata, caulinis vix majora, sæpius parce pilosa. Aliter ut in typo.

δ **attenuata,** var. nov.

Exsicc. Stefansson, Helgavatorsfloi, Iceland, 1889, in Hb. Haun., as *E. officinalis* (type) ; Sörensen, Laxa, Iceland, 1928, in Hb. Haun.

Caulis strictus, gracilis, internodis inferioribus longissimis parce ramosus. Folia suberecta, floralia basi rotundata, haud alte dentata (utrinque ad 7 dentibus). Capsula anguste oblonga (ad 8 mm. longa), superne attenuata, subtruncata nec emarginata, calycis dentes plane superans.

ε **stromoënsis,** var. nov.

Exsicc. Ostenfeld, Havnedal, Stromö, Faroes, 1903, in Hb. Haun. (type) ; Ostenfeld, Gjanøse, Stromö, 1897, in Hb. Haun. ; Ostenfeld, Kirkebörejer, Stromö, 1903, in Hb. Haun. (all as *E. curta*).

Planta robusta, compacta, ad 7 cm. alta, internodis inferioribus brevissimis prædita, hinc inde ramosa. Folia floralia ut in typo imbricata, argute dentata, basi obscure cuneata, sæpius leviter pilosa. Corolla parva, dorso 4–5 mm. longa. Capsula oblongo-elliptica, valde emarginata.

ζ **pusilla,** var. nov.

Icon. Wettst. *l. c.* tab. xi. f. 12.

Exsicc. Stefansson, Sirdalur, Iceland, 1890, in Hb. Haun., as *E. officinalis* (type) ; Jønsson, Randasandi, Iceland, 1915, in Hb. Haun. ; Trapnell, Godthaab Fjord, W. Greenland, 1928, in Hb. Pugsley ; Porsild, Tartusak, W. Greenland, 1911, in Hb. Haun. ; Holm, Kangerdluarsuk, Frederikshaab, Greenland, 1886, in Hb. Haun.

Planta erecta, nana, ad 6 cm. alta, caule simplici internodisque relative longis, e foliorum pare primo ad quarto (sæpissime secundo) florens. Folia floralia suborbicularia, obtusa, basi breviter cuneata, utrinque bi- vel tri-dentata. Corolla 5–6 mm. longa, labii superioris lobis porrectis subintegris, inferioris paulo longioribus angustis retusis. Capsula oblongo-elliptica, emarginata.

Of these varieties *β subcurta* is a boreal form, apparently confined to Northern Norway and Iceland; var. *laxa* is the Scottish form of the species and seems to be common in Norway, growing also in Sweden and Lapland, as well as Greenland, Iceland, and the Faroes; var. *attenuata* has been seen only from a few localities in Iceland; var. *stromoënsis* is from the island of Stromö, in the Faroes, but a somewhat similar plant has been seen from a single station in Greenland; var. *pusilla* is a high arctic form of Iceland and especially of Greenland.

EUPHRASIA CURTA (Fr.) Wettst. *δ* **Ostenfeldii,** var. nov.

Exsicc. Ostenfeld, Torshavn, Stromö, Faroes, 1903, in Hb. Haun., as *E. curta* (type); Ostenfeld, Osterö, 1896 and 1897, in Hb. Haun.; Jønsson, Kjalhraun, Iceland, 1906 (no. 50), in Hb. Haun.

Caulis satis robustus, ad 10 cm. altus, e foliorum pare quinto vel sexto (rarò quarto) florens, simplex vel parce ramosus. Folia caulina superiora quam in typo angustiora, utrinque obtuse tridentata, floralia ±acuta, sæpius utrinque 4 dentibus acutis prædita. Corolla quam typi minor. Capsula quam in typo latior, emarginata, calycis dentes subæquans vel paulo superans.

This variety, characterized by narrow, bluntly toothed foliage and broad emarginate fruits, has been seen from the islands of Stromö, Osterö, and Viderö, in the Faroes, and also from one station is Iceland.

Euphrasia Davidssonii, sp. nov.

Exsicc. O. Davidsson, Reykjalang i Frijovkadal, Iceland, 1900, in Hb. Haun., as *E. stricta.*

Caulis erectus, *satis robustus,* 10–15 cm. altus, fuscescens, pilis longis crispulis deflexis albidis ad basin dense vestitus; *foliis caulinis internodos brevissimos superantibus, floralibus vix imbricatis* internodos sæpius alterne longiores brevioresque subæquantibus vel superantibus; vulgo e foliorum pare quinto florens; nonnunquam basi paucis ramis suberectis præditus. *Folia majuscula* (ad 10 mm. longa), lata, erecto-patentia, subopposita, tenuia, inferiora facile caduca; caulina relative parva, oblonga ad ovata (infima cuneata), utrinque 1–3 dentibus subacutis obtusa; *floralia* inferiora subrhomboidea, utrinque 4–5 dentibus acutis obtusiuscula, *superiora rhomboideo-deltoidea utrinque 5–7 dentibus patulis longe acuminatis vel aristatis mucronata*; omnia in utrâque paginâ pilis brevibus ad longis undulatis ±*dense hirsuta.* Spica longa, multiflora. Calyx ut folia pilosus, dentibus longis aristatis, fructifer vix accretus sed subinflatus. *Corolla minima,* dorso 4·5–5 mm. longa, externe aliquanto villosa, verisimiliter *sine striis coloratis albida,* in labio inferiore luteo-maculata: labio superiore lobis parvis subintegris; *labio inferiore vix longiore,* lobis angustis retusis trilobato. *Capsula* latiuscula, circa 4·5 mm. longa, *oblongo-elliptica, retusa,* longe ciliata et superne pilosa, calycis dentes subæquans.

This remarkable plant is represented in Herb. Haun. by a solitary Icelandic gathering, consisting of nine apparently normal individuals, showing good floral leaves, flowers, and fruits, but with most of the cauline leaves already fallen. The spreading aristate teeth of the floral leaves recall the foliage of *E. stricta* Host., and no doubt accounted for the original identification, but the plant presents no other feature indicating that species. Its short lower internodes and consequent basal branching produce a somewhat late-summer habit, but it flowers from a rather early node and the few branches that are thrown up are but slightly developed. Its long spikes of tiny flowers, subtended by large floral leaves, strongly hirsute and in shape subrhomboid, with spreading and aristate teeth, are unlike those of any known species; and its small broad capsules also seem to be characteristic. On the whole, it is perhaps most closely allied to *E. curta,* from which it differs chiefly in the shape, texture, and toothing of its leaves, its very small, nearly equally lipped corollas, and its broad retuse fruits. It may possibly be of hybrid origin, with *E. curta* or *E. frigida* as one parent, but this is in no way obvious. A peculiar feature is the occurrence in the spikes of occasional contracted internodes, each bringing two pairs of the subopposite leaves into close juxtaposition. The plant seems best placed in the Series *Nemorosae* between *E. Marshallii* and *E. curta.*

The species of the four island groups, so far as at present known, are shown in the subjoined table. In Greenland only one species, *E. frigida,* can be recorded with certainty :—

Iceland.	Faroes.	Shetlands.	Orkneys.
E. frigida.	*E. micrantha.*	*E. micrantha.*	*E. micrantha.*
E. rotundifolia.	*E. scotica.*	*E. scotica.*	*E. scotica.*
E. Davidssonii.	*E. frigida.*	*E. foulaensis.*	*E. foulaensis.*
E. curta.	*E. foulaensis.*	*E. rotundifolia.*	*E. Marshallii.*
E. brevipila.	*E. curta.*	*E. Marshallii.*	*E. occidentalis.*
E. tenuis.	*E. confusa.*	*E. curta.*	*E. nemorosa.*
	E. borealis.	*E. confusa.*	*E. confusa.*
		E. borealis.	*E. borealis.*
			E. brevipila.

THE GENUS *POSKEA* VATKE.

By G. Taylor.

Up to the present the genus *Poskea* has been considered to be a monotypic member of the Boraginaceae and limited to British Somaliland. The type-collection made by Hildebrandt is represented in the British Museum Herbarium and at Kew. These specimens were examined by Dr. Ivan M. Johnston in the course of his studies in the Boraginaceae, and he expressed the opinion that the genus *Poskea* did not belong to the family. It was a matter of interest to determine the proper taxonomic position of the plant and the following investigation resulted.

Vatke, in his original description of the genus (based on the single species, *P. africana*), gave the following characters: "*Stamina* 5 *vel abortu pauciora*" and "*Ovarium indivisum biloculare* (*vel forte adultum* 4-*loculare ?*)." In the absence of fruiting specimens he was apparently in some doubt as to the affinity of his new genus, but he referred it to Boraginaceae, though pointing out that it differed from all known members of that family in the form of the anthers. Dissection of flowers from Hildebrandt's type-collection shows that Vatke's interpretation of the structure must have been erroneous. The flower is zygomorphic with four stamens, and the ovary is unilocular with a single pendulous ovule. These characters suggest Globulariaceae, and search in that family reveals that *Poskea* certainly belongs there, and is apparently congeneric with the genus *Cockburnia* Balf. f., which was founded a year later than *Poskea*.

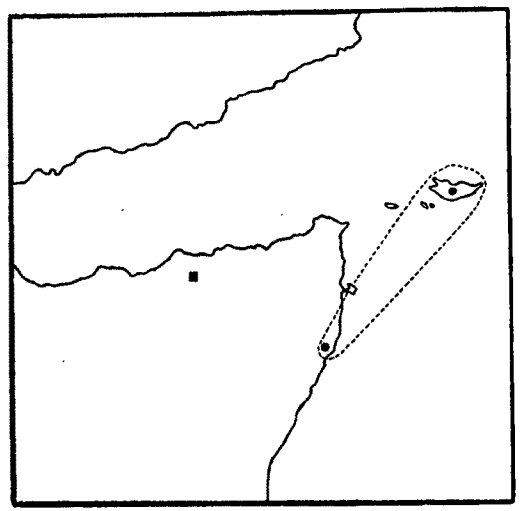
In his enumeration of the plants collected in Socotra, Bayley Balfour described the genus *Cockburnia*, regarding it as a member of the Selagineae (Selaginaceae) with the single species *C. socotrana* Balf. f. In a later publication *C. socotrana* was figured, and the dissections of the flower as portrayed correspond very closely with those of *Poskea*. No figure was given of the ovary, but in his description he described it as "1-*loculare*, 1-*ovulatum*." The pendulous condition of the ovule is apparent on dissection, and confirms the generic identity of *Cockburnia* and *Poskea*.

A further species, *C. somalensis* Chiov., was described ('Flora Somala,' 271 (1929)) from the north-east coast of Italian Somaliland, and an examination of the type of this species has shown that it is unquestionably conspecific with *C. socotrana*. The presence of *C. socotrana* in Somaliland was first recorded by Engler (in Engl. & Drude, Veg. Erde, ix. 213) in 1910, but the basis of the record was not stated.

The genus, so far as recorded, is restricted to British and Italian Somaliland and the island of Socotra. The distribution and approximate locality of each species is shown in the accompanying map. *P. africana* is apparently confined to British Somaliland, while the other species is found in Italian Somaliland and Socotra.

Poskea Vatke in Linnæa, xliii. 321 (1882). *Cockburnia* Balf. f. in Proc. Roy. Soc. Edin. xii. 90 (1883).

Species 2, confined to British and Italian Somaliland and Socotra. Type-species: *P. africana* Vatke.



Map of Socotra with the adjacent coasts of Arabia and Africa, showing the localities of the two species of *Poskea*. ■ *P. africana*; ● *P. socotrana*.

Key to the Species.

Flowers arranged in elongated terminal or axillary spikes, up to about 5 cm. in length; calyx-tube 1 mm. long, calyx-teeth about 1 mm. long; corolla densely pubescent outside, about 4 mm. long; suborbicular or elliptic to ovate or obovate, rounded, obtuse, mucronulate or emarginate at the apex, cuneate at the base, up to 1·2 cm long (including the petiole) and up to 1·0 cm. broad; on both surfaces more or less densely pubescent with short spreading hairs; branches densely and shortly pubescent with spreading (apparently glandular) hairs ..... 1. *africana*.

Flowers aggregated in dense terminal (occasionally branched at the base) spikes, up to almost 6 cm. in length; calyx-tube 2·0 mm. long, calyx-teeth 1·5–2·0 mm. long; corolla very sparsely pubescent outside, 5 mm. long; leaves obovate or oblanceolate, subacute, rounded, obtuse or emarginate at the apex, cuneate at the base, up to about 4 cm. long (including the petiole) and up to 1·5 cm. broad, sparsely and mi-

nutely pubescent on upper surface, more or less densely greyish tomentose on lower surface, rarely quite glabrous on both surfaces and in that case the lamina appears punctate ; branches velutinous, invested with a greyish-white tomentum of minute hairs ..... 2. *socotrana*.

1. POSKEA AFRICANA Vatke in Linnæa, xliii. 321 (1882).

Geographical Range.—North-eastern British Somaliland.

Tropical Africa. British Somaliland : Ahl-Gebirge, Damalle (? Dalmali), alt. 1000 m., Mar. 1873, *Hildebrandt* 848 (type ; Herb. Mus. Brit. ; Herb. Kew).

2. **Poskea socotrana** (Balf. f.) G. Tayl., comb. nov. *Cockburnia socotrana* Balf. f. in Proc. Roy. Soc. Edin. xii. 90 (1883), et in Trans. Roy. Soc. Edin. xxxi. 321, t. 78 (1888). *Cockburnia somalensis* Chiov. Fl. Somal. 271 (1929).

Geographical Range.—North-eastern Italian Somaliland and Socotra.

Tropical Africa. Socotra : Feb.–Mar. 1880, *Balfour, Cockburn & Scott* 262 * (type in Herb. Kew ; Herb. Mus. Brit. ; 317 (Herb. Kew ; Herb. Edin.) ; 558 (Herb. Kew) ; Westabfall des Di-Bagal, Apr. 26, 1881, at an alt. of 500 m., *Schweinfurth* 568 (Herb. Kew) ; Wadi Kischen, at an alt. of 600 m., Apr. 30 1881, *Schweinfurth*, 610 (Herb. Kew).

Italian Somaliland : Costa dei Migiurtini, Toh Jer, June 7, 1924, *Puccioni & Stefanini* 694 (Herb. Col. Fir. †) ; Costa dei Migiurtini, Boschetto di Tabantòh, June 9, 1924, 711 (type of *Cockburnia somalensis* in Herb. Col. Fir.).

The published field-notes indicate that this is a common plant on the hills of Socotra above an elevation of 300 metres.

A SECOND SPECIES OF *PACHYLARNAX* (MAGNOLIACEAE).

BY J. E. DANDY.

THE genus *Pachylarnax* Dandy (in Bull. Misc. Inform. Kew, 1927, 260) was founded on a single species, *P. praecalva* Dandy, from Penang and Annam. Its most noteworthy feature is the fruit : the carpels are concrescent and form a woody capsular fruit which is loculicidally dehiscent, each valve being composed of united halves of two adjacent carpels. Since the publication of the genus in 1927 a second species has been discovered in the Lakhimpur District of Assam, and this is here described as new under the name *P. pleiocarpa* Dandy. The Assam plant is very

* Of the five collections quoted in the original description and seen by me I have selected this as the type.

† I am indebted to Professor Giovanni Negri of the Colonial Herbarium, Florence, for the opportunity of examining the specimens collected by Puccioni and Stefanini.

similar to *P. praecalva* in general facies and characters, but the gynœcium consists of a greater number of carpels (hence the epithet *pleiocarpa*), while the flowers are larger and have more numerous tepals. In *P. praecalva* the carpels are only two or three in number and the tepals nine.

I am indebted to the Forest Botanical Officers at Dehra Dun (United Provinces) and Shillong (Assam) for the opportunity of studying material of the new species and for additional information concerning it.

Pachylarnax pleiocarpa Dandy, sp. nov. *Arbor* magna, sempervirens, omnino glabra ; cortex asper, sulcis longitudinalibus notatus ; ramuli juveniles fusco-virides. *Folia* ad ramulorum apices aggregata ; lamina elliptico- ad oblanceolato-oblonga, basi cuneata attenuatave interdum paulum inæqualis, apice rotundata ad obtusa vel rarius subacuminata sæpe leviter emarginata, usque ad c. 23 cm. longa et 7·5 cm. lata, coriacea, supra nitida, subtus pallidior costa prominenti, in sicco utrinque (præsertim infra) laxe reticulata, nervis lateralibus utrinsecus c. 10–18 parum conspicuis ; petiolus crassus, usque ad c. 3 cm. longus, supra subplanus haud canaliculatus. *Flores* fragrantes ; alabastrum lanceoloideo- vel anguste ovoideo-oblongum, initio in bracteis spathoideis 1–3 inclusum, bractea superiore (vel solitaria) in pedunculum intervallo brevi sub flore inserta ; pedunculus percrassus, c. 2–3 cm. longus. *Tepala* 13–15, 4–5-mera, carnosa, cremea, 4–5 exteriora oblanceolato- vel anguste elliptico-oblonga c. 5–6 cm. longa, 9–10 interiora spathulata intimis minoribus. *Stamina* c. 17–21 mm. longa, connectivo ultra antheræ loculos in appendicem brevem acutam producto. *Gynœcium* ellipsoideum ; carpella 5–8 ; ovula in carpello singulo 4–8. *Fructus* plus minusve ellipsoideus, c. 5·5–8·5 cm. longus, carpellis crassissime lignosis erostratis supra per dehiscentiam axi conico lignoso absolutis.

Hab. ASSAM : Lakhimpur District. Common in the hilly reserves along the foot of the Naga Hills. Specimens examined : Jaipur Reserve, Oct. 30, 1928, with immature fruit, *Beat Officer* 48427 (type in Herb. Brit. Mus.) ; same locality, Oct. 7, 1928, with flower and flower-buds, *Beat Officer* 48428 (Herb. Brit. Mus.). Digboi, June, 1931, with fruit, *Forest Officer* (Herb. Brit. Mus.) ; same locality, Nov. 10, 1931, with mature and immature fruit, *C. S. Purakayastha* 9635 (Herb. Shillong, Assam). Material in spirit has also been seen.

The above description includes details from a note supplied by the Working Plans Officer, Jorhat, Assam. According to him the timber is very valuable. The species flowers from August to October, and the fruit ripens from the middle of October to the end of November.

LICHENOLOGICAL NOTES.—VII.

By W. Watson, D.Sc.

During the past year a fair amount of progress has been made in our knowledge of the distribution of lichens in the British Isles.

In Glamorganshire, Messrs. A. E. Wade, D. A. Jones, and H. H. Knight have been showing that the county possesses a great wealth of lichens. The diversity of the soil and other physical features of the county render it very suitable for the development of lichens, though these favourable circumstances are partly discounted by the influence of smoke from the industrial districts. The presence of high hills and deep valleys, the exposure of both siliceous and calcareous rocks, and the occurrence of maritime and moorland associations give favourable habitats for these small plants. Corticicolous lichens are less numerous than in purer atmospheres, but a considerable number of the commoner species and a few of the rarer ones have been observed. All these have been submitted to me, and a complete list will be given by Mr. Wade in the projected county history. A few of the more important finds will be mentioned later.

In April the British Bryological Society held its annual meeting on the borders of Somerset and Devon, and, incidentally, a few new vice-county records of lichens were made. Those from South Somerset (v.c. 5) were *Evernia furfuracea* from Dunkery, *Stenocybe septata* from the Quantocks, and *Coriscium viride* from the Blackdown hills. From North Devon (v.c. 4) *Ramalina fraxinea* var. *calicariformis*, *Platysma glaucum* var. *fallax*, *Aspicilia lacustris*, *Squamaria saxicola*, *Ochrolechia tartarea* var. *subtartarea*, *Pertusaria leptospora*, *Coenogonium ebeneum*, and *Verrucaria rheithrophila* were obtained on the west side of Badgworthy Water, whilst *Biatorina erysiboides* was obtained at Watersmeet. During a meeting of the South-Western Naturalists' Union in the Plymouth district *Stenocybe septata*, *S. bryophila*, and *Buellia colludens* were first recorded for South Devon (v.c. 3). Ecological investigations by Dr. A. S. Watt at Lakenheath, W. Suffolk (v.c. 26), and by myself in the beech woods near East Dean, W. Sussex (v.c. 13) have yielded some interesting lichenological results. From Lakenheath the following were new records for v.c. 26, which had been well worked previously by the Rev. E. N. Bloomfield :—*Aspicilia calcarea* var. *contorta*, *Placodium fulgens*, *Rhizocarpon confervoides*, *Diploschistes scruposus* var. *bryophila*, *Leciographa parasitica*, *Cladina uncialis* form *adunca*, *Cladonia fimbriata* var. *subulata*, *C. pyxidata* var. *pocilla*, *C. pityrea* and form *hololepis*, *C. ochrochlora*, *C. degenerans* var. *anomaea*, *C. rangiformis* var. *foliosa*, *C. furcata* vars. *spinosa* and *palamaea*, *C. verticillata* and var. *phyllophora*, *C. crispata* var. *cetrariaeformis*, *C. bacillaris*, *C. Floerkeana* and var. *carcata*, *C. coccifera* var. *asotea*, *Peltigera rufescens*, *Leptogium turgidum*, *Verrucaria muralis* var. *submuralis*, *V. mauroides*, and *V. maculiformis*. It was also of interest to see the true *Cladina rangiferina* from this locality. An old record for the county existed, but, as in so many other cases of old records, there was some doubt whether confusion with *C. sylvatica* had occurred. The Sussex Downs woods yielded many lichen records for the incompletely worked vice-county of W. Sussex (13). Some of these are of particular interest and will be dealt with later. Some results obtained by Mr. Knight and myself in this vice-county and in the neighbouring vice-counties 12 (N. Hampshire) and 17 (Surrey) during the British Mycological Society's Foray at Haslemere will be published in due course in the Transactions of the Society *.

In September, during a fortnight in the Isle of Man, many of the plants given by Wheldon and Hartley in "The Lichens of the Isle of Man" ('North-Western Naturalist,' 1927) were seen. In that publication Wilkinson's record of *Lecidea discolorella* from near Ramsey ('Midland Naturalist,' 1893) is alluded to, and the authors state that "we sought it in vain." They might well do so, as it is obvious from Wilkinson's description of the lichen he found that it was not *L. discolorella*, but apparently *Biatora coarctata*. The isidiate form of *Parmelia prolixa* occurring on the shore at Glen Maye is var. *isidiostyla* Nyl. (see "Lichenological Notes.—III.," Journ. Bot. 1928). The common form of *Cladonia cervicornis* is the var. *subcervicornis*. *C. pyxidata* form *lepidophora* and *Buellia confervoides* are not included in Wheldon's list. The former is given in the opening notes as occurring on the north Manx coast, whilst the latter is given in the 'Monograph of British Lichens' (1926) from Douglas, where it is frequent. It also occurs at Port Soderick and other places. The scarcity of fruticose lichens was commented on; corticolous Ramalinas, Usneas, or Evernias being rarely seen. During my casual investigations only a few patches of *Usnea* and a little *Evernia prunastri* were seen. This might have been expected in an industrial locality, but was surprising for an area in which the humid conditions and pure air gave an environment which seemed favourable to these fruticose species. The presence of salt in the sea breezes may possibly account for their scarcity, though the trees in many maritime districts are often covered by such lichens. In such districts the sea breezes are, however, not continuous, as they are in such a small island as the Isle of Man.

The following additions to the lichen flora were noted :—*Usnea ceratina* f. *incurviscens* (Tholt-y-Wills), *Squamaria gelida* (Sulby Glen), *Lecanora expallens* and *L. conizaea* (Groudle Glen), *L. polytropa* f. *efflorescens* (Snaefell), *Biatora phaeops*, *Crocynia superba*, and *Solenopsora holophaea* (Port Soderick), *Biatorina prasina* (Groudle Glen) *Microphiale diluta* (Tholt-y-Wills), *Stereocaulon pileatum* (Sulby Glen), *Chaenotheca melanophaea* (Groudle Glen), *Verrucaria microsporoides*, *Arthopyrenia halodytes* and form *tenuicola* (Douglas), and *Porina leptalea* (Groudle Glen).

* Since this was written the results have been published (August).

A few records of plants collected by Messrs. W. G. Travis and H. Britten will be included in the general list. The latter has been collecting lichens in the Goyt Valley area, where a reservoir is being made.

In Ireland, the late Miss Knowles and her willing band of helpers have made further advances in their contributions to Irish lichenology. Lastly, Miss A. Lorrain Smith, by her generous help and advice, has been of great assistance in cases of doubtful determination.

Some uncommon habitats were noted for the following :— *Usnea articulata* is usually found on trees, but a specimen collected by E. J. Moore at Ayre in the Isle of Man, and determined by me, was growing on stones in heathy ground. It is mentioned by Moore in his account of the ecology of the Ayreland of Bride (Journ. Ecol. 1931, 125). *Placodium decipiens* is nearly always saxicolous, but was found on pales at Penarth (v.c. 41, A. E. W. !). *Pseudophyscia fusca*, another saxicolous lichen, was found on a tree at Reynoldston (41, D. A. J. !). *Sphaerophorus globosus* was found on the mossy trunk of a tree, 7–8 feet from the base, in the Doone Valley (4). *Coenogonium ebeneum* sometimes occurs on trees as at Tyndrum (88). Both *Cladonia parasitica* and *C. caespiticia* are occasionally found on soil. *Evernia prunastri*, *Ramalina fraxinea*, and *R. fastigiata* occur on the wall of a barn at Upper Cheddon, near Taunton (5).

In the general list which follows, the collector's names are indicated by initials. Their names have been given on previous pages. A note of exclamation indicates that the lichen has been seen by me. The numerals refer to the vice-county, and when starred are new vice-county records. Species or varieties new to the British Isles are indicated by small capitals :—

Usnea rubiginea (Mich.) Herre. Near Knightwood oak (11). Given from the New Forest in Leighton's ' Flora.'

U. ceratina form *incurviscens* Arn. East Dean and Henley (*13) ; Tholt-y-Wills (*71).

U. florida var. *hirta* (L.) Ach. Haslemere (*17).

Alectoria jubata var. *chalybeiformis* (L.) Ach. is not uncommon on Lakenheath Warren (26, A. S. W.). It has been noted previously from the neighbouring Thetford Warren.

Parmelia exasperata (Ach.) D. N. Llanrhidian (*41, D. A. J. !).

P. dubia var. *ulophylla* (Ach.) Harm. Reynoldston (*41, D. A. J. !).

Parmeliopsis ambigua (Wulf.) Nyl. Hillcot Wood (*33), Hay Park Woods (36), and Morlais Castle Hill (*41 and *42, D. A. J. !). In Leighton's ' Flora,' Hay Park, near Ludlow, is noted as a locality, but no county is given. Mr. Jones found it there and the locality is definitely in Herefordshire (36).

CETRARIA ISLANDICA f. MINOR Harm. In var. *tenuifolia* (*C. crispa* Nyl.) the margins are very spiny and connivent. In the form obtained at Skipworth Common (61) the margins are flatter and the spines much fewer. It has the general appearance of a small *C. islandica* and corresponds to the description by Harmand of his f. *minor* in Lich. de France, " Thalle plus reduit en longeur et en largeur." It has been placed previously with var. *tenuifolia*, and one can scarcely say that there is any definite distinction, though all the British specimens of *tenuifolia*, except one from Braemar, have spiny margins.

Squamaria lentigera (Web.) DC. On soil, Brean Down (*6), Avon Gorge (*34, D. A. J.). It still occurs on Lakenheath Warren (26).

Lecanora intumescens (Reb.) Krb. Henley (*13, with form *geographica* Wats.), Dolgelly (48).

L. Sambuci Nyl. Oxwich (*41, D. A. J. !).

L. Agardhiana Ach. Oxwich (*41, D. A. J. !). This is usually described as having the epithecium umber-brown, but in the Oxwich specimens it was blue. Apart from this they agreed in external appearance, internal structure, and reactions with authentic specimens, even in regard to the rosaceous tint of the epithecium with nitric acid. The same colour of the epithecium was also shown in *L. crenulata* and *L. Agardhianoides* from the same locality and also in specimens of the latter from Lulworth.

L. AGARDHIANOIDES Mass. differs from the preceding in the more immersed position of the apothecia which are so sunk in the rock and have the margin so indefinite that the plant resembles a foveolate *Verrucaria* rather than a *Lecanora*. On the fossil trees at Lulworth (*9); on Carboniferous Limestone, Oxwich (*41), and Sand Bay (*6). A specimen collected by Holl at Hartlepool (*66) and correctly named as this by Mudd, is in the British Museum.

L. conizaeoides Cromb. in Journ. Bot. 1885, 195. This is sometimes referred to Nylander, but, although he saw Crombie's specimens and suggested the name, I have been unable to find any description in his works. Crombie's description reads as follows :—" Subsimilar to *L. conizaea* Ach., but with the thallus less yellow (whitish yellow) and the spores more turgid (0·009–11 mm. long, 0·005–7 mm. thick). On trunks of old beech-trees, near the roots, Epping Forest and New Forest (*Crombie*) ; Buxton, Derbyshire (*Holl*). The Epping Forest and Buxton specimens are not paler than in *L. conizaea*, and appear to be identical with *L. pityrea* Erichs. (Verhandl. Bot. Ver.

Prov. Brandenburg, 1928), according to a specimen collected and named by Erichsen himself. The New Forest specimens have a thinner thallus, but such specimens often occur with the thicker ones, and Erichsen himself gives a form *tenuis* for his *L. pityrea*. The Brockenhurst (New Forest) specimens, as well as many specimens from other parts of the British Isles, agree well with Erichsen's description of his form *tenuis*. Crombie, in his original description, first refers to the Epping Forest specimen, but in his type-specimens he has put the one from Brockenhurst. *L. conizaeoides* is quite common in our islands, and, in addition to the somewhat variable external characters, can be distinguished by the broader spores. In the immature condition they are sometimes as narrow (9–14×3–5 μ) as in *L. conizaea*, but, when fully developed, they are distinctly broader (9–14×6–7 μ). Crombie's description in his 'British Lichens' (1894) is a fairly complete one, though more emphasis might have been placed on the swollen and sorediate character of the apothecial margin, whilst the spore is sometimes longer than he gives. Wembdon etc. (*5), Edington etc. (*6), Matley (11), East Dean (*13), Culworth (*32), Durdham Downs (*34), Errwood (*58), Skipwirth (*61), Greenfield (*63), Sicklinghall etc. (*64), Howth (*Ireland 21, M. C. K., named *L. pityrea* by Erichsen). Wheldon has recorded it from 49, 59, 60, 88, and 89 in his papers. Localities for I 36 and I 39 are given for *L. pityrea* in Knowles's 'Lich. Ireland.'

Lecanora epanora Ach. Sulby Glen (71). Several other localities are given by Wheldon and Hartley.

L. piniperda Krb. Cwm Bychan (*48, D. A. J.). The var. *glaucella* Krb. was also found by Mr. Jones at Llanbedr (*48).

L. inversa Nyl. On *Ulex* near Minehead (*5); Oxwich (*41, D. A. J.!).

(To be continued.)

OBITUARIES.

Eric Drabble

(1877–1933).

By the death of Dr. Eric Drabble at Freshwater on 3rd August last British taxonomic botany has lost another of its devotees who can ill be spared. Drabble was born in 1877 at Herne House, near Chesterfield, and was educated at the local Grammar School. At the age of 22 he proceeded to University College, Sheffield, and subsequently to the Royal College of Science, South Kensington, where he obtained the London B.Sc. degree, with 1st Class Honours in Botany. In 1901 he was appointed Lecturer in Botany at St. Thomas's Hospital Medical School, and in 1903

Lecturer and Senior Demonstrator in Botany at the Royal College of Science. In the same year he became D.Sc. of London: his thesis, "On the Anatomy of the Roots of Palms," was published by the Linnean Society (Trans. Linn. Soc. ser. 2, 1904). After two years' experience at South Kensington he obtained the post of Lecturer in Economic Botany at the University of Liverpool, but in 1908 he returned to London as head of the Botanical Department at the Northern Polytechnic. Here he remained till 1924, when ill-health caused his retirement to the Isle of Wight. Asthma and heart trouble debarred him from active service during the War, but he helpfully combined the botanical work of the Birkbeck College with that of the Northern Polytechnic. At Freshwater he recovered sufficiently to undertake the duties of examiner in botany and biology for London and other Universities, and he was able to do a considerable amount of work in taxonomy until the long illness which culminated in his death.

Drabble was a botanist in a broad sense who published physiological articles in the 'Bio-Chemical Journal' and other periodicals, as well as papers on systematic botany. His earliest contributions to this Journal appeared in 1906, when five short notes were printed, one being a record of *Viola carpatica* Borbas for Derbyshire. Other papers followed up to 1916, the most important being "The British Pansies," issued as a Supplement in 1909, and "Notes on the Flora of Derbyshire" in four parts. For ten years after 1916 he seems to have made no further contributions to systematic botany, but in 1926 he resumed writing and in each subsequent year produced papers both in this Journal and in the 'Report of the Botanical Exchange Club.' These papers dealt largely with the British Pansies, with which group his name will be chiefly associated, but latterly he wrote also on *Arenaria serpyllifolia*, *Veronica agrestis*, *Ranunculus acris*, *R. bulbosus*, *Crepis*, and *Valeriana officinalis*. In this Journal for 1927 there is an interesting paper from his pen on "Syrphid (Dipteran) Visitors to certain Flowers."

Drabble was a Fellow of the Linnean Society (elected 1902), and on the death of the late C. E. Salmon was made a referee of the Watson Botanical Exchange Club, to whose annual reports he contributed numerous notes. In his last years he was an enthusiastic worker on British flowering plants, and his pleasant humour and generous help to correspondents brought him a large number of friends. He was not a large collector, however, nor a great traveller, and he was strongly attached to his native county of Derbyshire. His interests were not entirely confined to botany, for he was a lover of English literature and always keenly interested in the Northern Polytechnic Operatic Society. He was a zealous Anglo-Catholic.

His widow, who often collaborated in his botanical work, survives him.—H. W. Pugsley.

INFORMATION of the death of a former member of the Herbarium staff at Kew has recently been received. Mrs. WILSON POPENOE, formerly Miss Dorothy K. Hughes, died at Guatemala City on December 31, 1932. Miss Hughes worked in the Herbarium as a temporary technical assistant, 1918–23, mainly aiding the late Dr. Stapf in his work on the Grasses. In 1921 she published a revision of the Australian species of *Stipa* in the 'Kew Bulletin,' and this was followed by other papers chiefly on Australian Grasses. On leaving Kew she worked in the Bureau of Plant Industry at Washington, D.C., and later married Mr. Wilson Popenoe, who was connected with the same department.

SHORT NOTES.

RECORD OF RE-INTRODUCTION.—*Acorus Calamus*, Chesterfield district, Derbyshire. In April 1918 *Acorus Calamus* occurred only at one locality in the Chesterfield district. It was plentiful in the canal at Chellaston, south of Derby, and there was a colony in the canal (which is part of a distinct system) at Ambergate, midway between Derby and Chesterfield. At Chesterfield it was thoroughly established in a pond close by Fields Farm at Upper Newbold, but it seems probable that it was at some time or other a deliberate introduction. Part of the pond appears to have long constituted a water-garden for an adjoining manor-type of house.

"Cutthorpe near Chesterfield" was noted as a locality for this plant by Pilkington ('Derbyshire, being an Account of the Geology, etc.,' 1789), and Linton ('Flora of Derbyshire,' 1903) states that to be the first record for the county. It is undoubtedly the present Fields Farm station, which is near Cutthorpe, that is referred to.

On April 28, 1918, I introduced rhizomes from the Fields Farm pond in the following places:—(1) Somersall Pond; (2) Small pond above Stubbing Great Pond; and (3) Hardwick Wood Pond, Wingerworth. The plants have now (May 1933) become thoroughly established at each of the three sites; large and vigorous colonies exist at localities 2 & 3.—C. S. GARNETT.

NEW VARIETY OF PRUNELLA VULGARIS.—While botanising on Kenfig Burrows, Glamorganshire, in August 1932, I collected seed of a low-growing pale-flowered form of *Prunella vulgaris* L. in the dry sandy ground between the church and the castle. Plants from this seed have now flowered and show the same characters as the original plants—namely, small flowers of a pale bluish-mauve colour, the absence of any purple coloration in the calyx and bracts, a low habit of growth, the tallest flowering branch being only about 9 cm. high, and small hairy leaves (1·5–2 cm. long) slightly toothed at the base, with very short petioles (4–5 mm. long).

Prunella vulgaris is a very variable species, and if populations from different areas were critically examined, no doubt nearly all the possible combinations of characters could be found. Pending, however, such an examination, it seems worth while to describe this form as a new variety, since the attention of future workers is thereby directed to it. Two other low-growing forms have already been described—namely, *P. parviflora* Poir. Dict. Suppl. i. 711 and *P. vulgaris* var. *dunensis* Druce, Rep. B. E. C. 1916, 748. Both these forms, however, have coloured bracts and calyces and the leaves of the former are described as nearly glabrous.

The following is a Latin description of the Kenfig plant:—

Prunella vulgaris L. var. nov. **pallida** Gilmour; a typo habitu humili (usque ad 9 cm. altitudine), foliis parvis (1·5–2 cm. longis), petiolis brevibus (4–5 mm. longis), floribus parvis pallidis, calycibus bracteisque viridibus differt.

Hab. in locis arenosis prope mare. Kenfig, Glamorganshire. Typus in Herb. Kew.—J. S. L. GILMOUR.

THE GERMINATION OF EUPHORBIA CYPARISSIAS L.—*Euphorbia Cyparissias* L. has been known in this country for over 130 years, and is usually believed to be an alien. In the 11th edition of the 'London Catalogue,' however, it appears as a native with the census number 7, while in Druce's 'Comital Flora' it is described as an alien, the numbers being for the United Kingdom 34 and for Ireland 3, with a north to south range from Aberdeen to South Devon. It is not recorded from Cornwall, but from South Devon in the west to East Kent and West Norfolk in the east.

I tried unsuccessfully for many years to find its seeds, but, although I knew it in the wild in several English counties, as well as in a good many gardens, I could never discover any. It was, therefore, somewhat of a red-letter day when in July 1931, in the company of Dr. D. H. Scott, who kindly took me there, I saw quantities of it in a lonely part of Hampshire in fine fruit; from the place where it was growing in abundance there was no building of any sort to be seen.

I collected some seeds, which, however, are not, as stated in Hooker's 'Flora,' globose, but ovoid, and I made a sowing early in September and again in the following June. Up to date not a single seedling has resulted from either of these attempts.

In July 1932, Dr. Scott and I again visited the Hampshire locality, and I spent about two hours searching for seedlings. I found none: all the little plants examined, which looked as if they might have been seedlings had developed from underground runners. However, I took another supply of seeds,

and, mindful of past experience with other species, I removed the elaiosome from fifty of them, an operation I had not performed on the 1931 seeds. Probably the service of the ants in nature in lacerating or removing this bait favours germination by facilitating the irrigation of the embryo ; but, however that may be, eight seeds germinated and produced healthy seedlings. This is not a large percentage, but it is proof that in Hampshire the species is capable of reproduction by seed ripened in the wild, and so, whether it be native or not in that county, it may certainly be said to have established itself there as a wild plant.—T. A. DYMES.

REVIEWS.

Phytopathological and Botanical Research Methods. By THOMAS ELSWORTH RAWLINS. 8vo, pp. ix, 156, 3 text-figs. Chapman & Hall : London, 1933. Price 15*s.* 6*d.*

THIS is an American book by the Assistant Professor of Plant Pathology, University of California. In it " an attempt has been made to present methods which are of use to phytopathologists. Before preparing the manuscript, considerable work was done to develop new experimental methods and to improve technics described by other workers. The methods described are those which were found to be most satisfactory." The book is divided into three parts : Part I. (4 pp.)—Choosing and planning a research project ; Part II. (94 pp.)—Experimental methods ; and Part III. (5 pp.)—Interpretation of experimental results. The separate chapters of Part II. are on microscopic methods, culture methods, virus studies, and miscellaneous experimental methods. There is a " bibliography " with 960 titles and an index.

The book contains a good deal of useful information, but it is difficult to visualise the class of reader specially catered for. For example, Chapter I. begins : " It is seldom, if ever, advisable to make a final choice of a research project until a thorough study has been made of related literature. On the other hand, it is necessary that a tentative selection of the project be made in order that the volume of related literature to be reviewed may be within practical limits," and goes on with similar statements, which would suggest that the unguided beginner is the public. Some of the experimental methods are of the most elementary, *e. g.*, " every plant pathologist should learn to cut satisfactory free-hand sections," giving reasons why. Much of the elementary details could have been omitted by assuming that a student should have some knowledge of botany before taking up research in plant pathology. This would, moreover, allow of an easier treatment of the more advanced methods. As it is, these are often merely referred to by name, and a reference

is given, with the result that the treatment appears very sketchy. It is not suggested that the book does not deal with some matters only to be found in original papers, but rather that the method of presentation is wrong. What is the use of two pages on such a subject as Photomicrography or five pages on Statistics, when research methods are the subject ?

A more reasoned account of culture media would have been useful. It is somewhat late in the day to describe merely the constituents of media which have been found useful by different workers when probably every laboratory has its own pet media. What is behind the modifications that are found useful and what determines the choice of one medium rather than another when the culture of a fungus is attempted ? It is information of this kind that would be more valuable to research workers than the constituents of a series of media with a series of modifications. And if a series of media are mentioned, why omit Sabouraud, Raulin, and others, whose pioneer work was based on fundamental reasoning ?

Almost a third of the book is a " bibliography." This is the part which will be found most useful, but it would have been well to have given some idea of the contents of some at least of the papers.

The title of the book is somewhat misleading, for the research methods considered deal only with plant pathology.

J. RAMSBOTTOM.

Erinnerungen, Bekenntnisse und Betrachtungen von Gottlieb Haberlandt. 8vo, pp. vii, 243, portrait (frontisp.), and 8 text-figs. Springer : Berlin, 1933. Price, in paper cover, 9.60 R.M.

THE period covered by Dr. Haberlandt's autobiographical recollections embraces the most active years of development of German botany. He was born in 1854 in the Schloss of the little Hungarian town, Altenburg, the headquarters of the School of Agriculture, where his father was Professor. Memories of the place, his parents, and his early life are given. An upheaval followed the war of 1866, causing the removal of the family to Gorizia, and in 1872 to Vienna, where the young man's education was completed. His teacher was Richard Wiesner, who was starting, in a humble way, a plant-physiological Institute in the University. But the chief stimulus for the young student was Sachs's ' Lehrbuch,' a study of which led him to Hofmeister, Nägeli, De Bary, and others. The anxieties of his examination for the Ph.D. in 1876 are recalled—his thesis was " On the Winter-colouring of Perennial Leaves." Next year he went to Tubingen to work under Schwendener, of whose methods of work he gives an interesting account. Schwendener was engaged on his " Mechanische Theorie der Blattstellungen," and

had little leisure to supervise his pupil's investigations. Haberlandt returned to Vienna in 1878 as a Privat-docent in the University, and in 1880 went to Graz, where the largest part of his working life was spent: this forms the subject of his "Second Book." The 'Physiologische Pflanzenanatomie' appeared in 1884 and was widely appreciated. A memorable interlude was a trip to Java, where he spent the winter of 1891–2, gathered material for his 'Botanische Tropenreise,' and enlarged his knowledge of plant-physiology.

The "Third Book" records his life in Berlin, whither he was summoned to take charge of the new Plant-physiological Institute at Dahlem in 1910. He retired in 1924.

Devised in the first instance to interest his near relatives, the book contains much of purely domestic interest, but there is also much to interest the botanist in the author's recollections of German and Austrian botanists and their influence on the development of the science in the last sixty years.

The Sutlej Deodar, its Ecology and Timber Production. By R. Maclagan Gorrie, D.Sc., Indian Forest Service. 8vo, pp. 140, map, 6 pls. and 3 figs. Government of India: Calcutta, 1933. Price 5*s.* 6*d.*

This brochure is one of the series of Indian Forest Records (Silviculture Series) (vol. xvii. part iv.), and embodies the author's thesis for the D.Sc. degree of Edinburgh University. The Deodar (*Cedrus Deodara*) is the most valuable tree in the North-West Himalaya, and the Sutlej Valley forests are one of the main sources of supply for Northern India. It grows under climatic conditions varying from the heavy monsoon of the outer hills to the arid country behind the main ranges of the Himalaya, where precipitation consists almost entirely of winter snowfall. The associated plants vary greatly between these two extremes, and the author's object has been to trace the relationship between the plant associates of the Deodar and its value as a timber-tree. Chapters are devoted to topography, geology, climate and other ecological factors, and a study in some detail of the botany of the various belts in the moist and dry zone formations, with an ecological analysis of the results. It is found that the habit of growth of the Deodar and its plant associates alter completely between the extremes of its range, and its capacity as a timber-producer varies considerably; these variations have been correlated with the changes in its plant associates.

Dr. Gorrie's report forms an interesting chapter in plant ecology, apart from its technical value to the forester.

Brasilien und seine Säulenkakteen. By Dr. E. Werdermann, Custos at the Botanical Museum, Berlin-Dahlem; First President of the Deutschen Kakteen-Gesellschaft. 8vo, pp. vii, 122, map, 4 coloured pls., 89 text-figs. J. Neumann: Neudamm, 1933. Price, paper 6.50 R.M., linen 8.50 R.M.

By the aid of funds from the German Cactus-Society, of which he was President, Dr. Werdermann has been able to travel through a considerable area of North-East Brasil, in the provinces of Pernambuco, Bahia, and Minas Geraes, lying east of the Rio San Francisco. In his attractive little book he gives an account in popular language of his travels, illustrated by small photographs of the scenery, specimens of the Cacti in natural surroundings, incidents during the journey, etc., from which the reader may form an idea of the country and its vegetation, and the difficulties associated with the work of collecting and preserving for future study specimens of the Cactus-flora.

The four coloured plates are reproductions from the author's 'Blühende Kakteen und andere sukkulente Pflanzen.' Three short chapters deal with the geographical distribution of the Cacti in Brazil and their relations to soil and climate, the collecting and transport of living specimens, and the preparation of a Cactus-herbarium.

The second part of the book, pp. 84–120, is a systematic description of the native species of columnar Cacti comprised in the genera *Strophocactus, Selenicereus, Cereus, Trichocereus, Harrisia, Leocereus, Acanthocereus, Pilocereus, Facheiroa,* and *Cephalocereus.* Keys to genera and species are included, and adequate descriptions, frequently supplemented by habit photographs, are given. A number of new species are described.

Infra-red Photography. By S. O. Rawling, D.Sc. Sm. 8vo, pp. x, 57, 12 pls. Blackie & Sons: London, 1933. Price 3*s.* 6*d.*

This little volume, one of Blackie's "Technique" series, is a description of the methods of infra-red photography in its present development. With the aid of numerous illustrations, the author indicates the scope of the process and the possibility of its value in scientific investigations.

BOOK-NOTES, NEWS, etc.

British Mycological Society.—The Transactions, vol. xviii, pt. 1 (August 1933) contain accounts of the Spring and Autumn Forays at Ludlow and Haslemere in 1932, with Miss G. Lister's Presidential Address, entitled "Field Notes on Mycetozoa." Also four original communications. Kathleen Sampson gives the results of work on the systematic infection of Grasses by

Epichloe typhina Tul., and T. Petch continues his "Notes on Entomogenous Fungi," which have involved a detailed examination of the characters and distribution of twenty-seven species, mainly of the genus *Cordyceps*. B. Barnes describes the abundant development in recent years on dead stems of herbaceous perennials in autumn, in a garden in South-east London, of *Helotium ciliatosporum* Boudier: the fungus was first recorded for this country in 1918. George Smith describes four new species of *Penicillium* isolated from cotton goods and mouldy Italian maize.

GARDENS' BULLETIN, STRAITS SETTLEMENTS.—In vol. vii, pt. 2 (May 1933) M. R. Henderson records forty-five species of flowering plants in various families as additions to the flora of the Malay Peninsula: twenty-nine are described as new. A species of *Myriophyllum* is the first record of the family from the Peninsula, and nine other genera are also first records; four of these are represented in the Philippine Islands, but are unknown in the Malayan Islands. C. F. Symington gives the results of a detailed study of the botany and nomenclature of a number of species of Malayan *Shorea*; and R. C. Bakhuizen van den Brink an enumeration of the Malayan Ebenaceae. The latter author finds no valid grounds for the separation of the genus *Maba* from *Diospyros*, and reduces it to the rank of a subgenus. A number of new species are described, and nomenclatorial adjustments are made.

The three papers are well illustrated by thirty-six plates, the value of which would be enhanced by the addition of the name of the species pourtrayed.

'SINENSIA, Contributions from the Metropolitan Museum of Natural History, Academia Sinica.'—Vol. iii. nos. 1–5 (1932) of this Journal are devoted to articles of taxonomic interest, which, with the exception of the first two, on Chinese plant names and botanic terms, are in English. An article by E. H. Walker, "On Chinese Botanical Serials," deplores the multiplicity of Chinese journals in which botanical papers are to be found—"in the past eleven years about twenty-four new ones have been established." Changes of title, not by any means confined to China, are also deprecated. A list of Chinese serial publications is given, with notes of date and place of issue; some have been short-lived, of others no copies are available. Taxonomic papers comprise a list of Cyperaceae from the Kweichow province by G. Kukenthal, Plantæ Tsiangianæ (Eleocarpaceae and Betulaceae) by H. H. Hu, *Microstegium biforme* Keng, sp. nov., from Kwangsi, Notes on Chinese Fungi by F. L. Tai and C. T. Wei, Studies of Chinese Ferns VIII. (*Woodsia* and *Cheilanthopsis*) by Ren-chang Ching, and Notes on Chinese Apocynaceae by Ying Tsiang.

LICHENOLOGICAL NOTES.—VII.

BY W. WATSON, D.Sc.

(Concluded from p. 318.)

Biatora gelatinosa Flk. On ground near Knightwood Oak, New Forest (*11).

B. viridescens (Schrad.) Mann. On ground, Port Soderick (71).

B. paucula (Nyl.) comb. nov. On vertical face of rock in gully of stream, Hawkshead (*69).

Lecidea dubia (Sm.) T. & B. Reynoldston (*41, D. A. J. !).

L. armeniaca var. *lutescens* (Anzi) Nyl. Snowdon (*49). New for Wales, having previously been noted for the British Isles in Perthshire only.

L. plana (Lahm.) Nyl. Burwarton (*40, K. & J.).

Pertusaria sulphurea (Tayl.) Schaer. Harlech (48, D. A. J. !), Moidart (*97). The latter corresponds to f. *variolosa* Schaer.

P. lactescens Mudd. Three species of *Pertusaria* having darkish spores which become purplish with potash have been recorded from the British Isles. Mudd, in his 'Manual' (1861), described *P. lactescens* from a specimen from Ayton in Cleveland (62). Nylander, in Bull. Soc. Linn. Norm. (1873), described *P. urceolaria* from a specimen collected by Larbalestier in Jersey, and in *Flora* (1881) named a specimen collected by Johnson at Ennerdale in Cumberland (70) *P. spilomanthodes*. The Ayton and Ennerdale plants have a different external appearance, but were included together as *P. lactescens* Mudd by Crombie (1894) and Lorrain Smith (1918). The internal characters of all the three species are sufficiently similar to be included in one species, though the spores, as may be expected, vary in size and in degrees of darkness. If the external appearances are sufficiently constant to be of specific value it seems legitimate to separate *P. spilomanthodes* from *P. lactescens*. The late Miss Knowles in 1931 collected some *Pertusaria* material from a wall near Ballynakill Lake, Connemara (I., 16); part of the material is *P. concreta*, but other parts she considered to be *P. urceolaria* and *P. lactescens* (as used in Br. Lich.). Her *P. urceolaria* is very similar to Larbalestier's Jersey specimens except for sparse development of papillæ. Her *P. lactescens* is unlike Mudd's specimen but like Johnson's Ennerdale plant which Nylander named *P. spilomanthodes*, and if the specific distinction between the three species is kept up, should be so named. The occurrence of the species on the same wall and the variability of their external appearances suggests that they are states of one and the same species.

Biatorella campestris Th. Fr. The thallus of this plant is often very evident and has an appearance similar to that of *Bacidia flavovirescens* or *Gongylia viridis*. Apothecia rarely appear till the thallus begins to disappear. When the thallus has become almost merged with the substratum numerous flesh-coloured apothecia become dotted over the darkened remains. It seems as if the apothecia develop saprophytically, obtaining the food necessary for their formation from the decaying remains of the thallus. During the earlier stages of apothecial development the walls of the asci are evident, but in the later stages become so thin as to be almost invisible. Because of its peculiar development it is probably often overlooked. Its thallus has been known to me for many years on the soil-cap of a wall near Taunton (*5), but its identity was not established till recently, when apothecia were noticed. Mr. Jones has since noted it at Newent (*34).

Ramalina breviuscula f. *gracilescens* Cromb. Gower (*41, D. A. J.).

R. polymorpha Ach. Gower (*41, D. A. J.).

Lecania albariella (Nyl.) Mudd. Brean Down (6), Cheltenham (*33, H. H. K.).

L. dubitans (Nyl.) Mudd. Chedworth! (*33, H. H. K.).

L. prosechoides var. *aeruginascens* (Wedd.) Oliv. Sand Bay (*6), Swanbridge! (*41). Magnusson, in a recent paper ("New or Interesting Swedish Lichens," VII, Bot. Notiser, 1932), has placed both *L. prosechoides* and *L. prosechoidiza* under *Lecanora helicopis* (Wahl.) Ach., thus reverting to the name used by Leighton (Lich. Flor.).

L. prosechoidiza (Nyl.) A. L. Sm. On calcareous rock, Sully Island (*41, A. E. W. !).

L. Nylanderiana Mass. Blakeney (*27), Harlech (*48).

Thalloidima candidum (Web.) Mass. Clifton (*34).

Biatorina prasina (Fr.) Syd. On tree, Castle Neroche (5), Leigh Wood (*6, D. A. J.). On soil, Groudle Glen (*71). This corticicolous species has been recorded previously as occurring on soil (Lich. Notes.—IV, Journ. Bot. 1929, where, by a clerical error, it and *B. erysiboides*, were put along with the Biatoras given). The connection between the corticicolous and terricolous plants is well shown at Dodhill, near Taunton (5), where the lichen occurs on the bark at the base of the tree and thence spreads on to the surrounding soil.

B. erysiboides (Nyl.) Th. Fr. On soil over decaying bryophytes, Watersmeet (*4). On trees, Leigh Wood (*6) and Blaise Castle Wood (*34, D. A. J.).

Toninia cambrica (Wheld.) comb. nov. Frequent on Snowdon (49). It occurs on volcanic rock which contains some calcium carbonate. The thallus is often without the yellowish tint given in Wheldon's description.

T. carbonacea Anzi. Morlais Hill! (*41, A. E. W. !).

T. caradocensis (Leight.) Lahm. Penzance (*1), Dodhill (5), Chedworth Wood (33, H. H. K.), Seatoller (*70).

T. squamulosa (Deak.) Mudd. Flat Holm (*41, A. E. W. !).

T. syncomista (Flk.) Th. Fr. (*T. lobulata* (Somm.) Lynge. *Bilimbia leucophaea* A. L. Sm.). Penrice (*41, A. E. W. !), Buckden (*64).

T. mesoidea (Nyl.) Zahl. Mullion Cove (*1), Goodrington (*3), Steep Holm and Brean Down (6).

Bilimbia subviridescens var. *trisepta* (Naeg.) A. L. Sm. On soil-capped rocks, Cwm-y-glo (*49).

B. metamorphea (Nyl.) Oliv. Newent (*34, D. A. J.), near Ballynakill Lake! (*I. 16, M. C. K.). New for Ireland.

B. Naegelii (Hepp) Anzi. Near Taunton etc. (5, Lich. Som.), Shapwick (*6), Savernake (*8, C. P. Hurst).

B. Nitschkeana Lahm. On Elder, Blackdowns (*5), Martinsell Hill (*8, H. H. K.).

B. albidocarnea (Nyl.) A. L. Sm. The varieties of this (including *chlorotropoides*) and *B. herbidula* seem scarcely separable except for slight differences which are probably due to environmental conditions. A plant growing on the sheltered side of limestone rocks at Brean Down (*6) agrees with var. *albovirella* (Nyl.) A. L. Sm. A plant found by Mr. Knight associated with *Clathroporina calcarea* on limestone, Coldwell Rocks (*34) was considered by him to be var. *alborubella* (Nyl.) A. L. Sm. A plant associated with *C. calcarea* on calcareous rocks, Hill of Usinach (I. 23, Knowl. Lich. of Ireland), collected by Lloyd Praeger and sent to me by Miss Knowles, was considered to be the subspecies *chlorotropoides* (Nyl.) A. L. Sm. The latter has been found by Mr. Jones at Blaise Castle (*34).

B. sabuletorum B. & R. var. nov. **angustispora**. Differt a typo sporis angustioribus (20–30 × 4–5 μ). The thallus and apothecia are as in the type, but the mature spores are constantly narrower. Over moss on wall, Park Mill (41, D. A. J.).

Var. **viridis,** comb. nov. This was given the status of a form in "New, Rare, or Critical Lichens" (Journ. Bot. 1917, 210), differing from the type in "the green and thicker thallus." It has been

found in several other places, and, as the spore is more constantly 3-septate, its status seems to be somewhat higher than that of a form. On soil over rocks or mosses, near Dunster (*5), near Frome (*6), Cardiff (*41, A. E. W. !), Harden Moor (63).

Bacidia inundata (Fr.) Krb. On rocks which are sometimes inundated, R. Perddyn (*41, A. E. W. !), Blakeney (*27), Blaise Castle (*34, D. A. J.), below Brecon Beacons (*42), Artro Valley (*48, D. A. J.), Nant Peris (*49), R. Dee, Llangollen (*50, D. A. J.).

B. incompta (Borr.) Anzi. Leigh Wood (*6, D. A. J.), Blaise Castle Woods (*34).

B. effusa (Sm.) Arn. On tree, Clifton (*34, D. A. J. !).

B. umbrina (Ach.) B. & R. Brecon (*42).

B. flavovirescens (Dicks.) Anzi. Near Brecon (42), Clogwyn (49), Borrowdale and Honister Pass (70), near Ardlui (99).

B. vermifera (Nyl.) Th. Fr. *Lecidea umbrina* f. *corticola* Zw., in Leight. Fl., ed. 3, 361, may refer to this.

Leciographa parasitica (Flk.) Mass. East Dean (*13), Lakenheath (*26, A. S. W. !).

Placodium cirrochroum (Ach.) Hepp. Rhossili (*41, D. A. J. !).

P. callopismum var. *plicatum* (Wedd.) Leight. has a deeper coloured form corresponding to the form *sympageum* (Ach.) of the type. This is given as form *aurantiacum* by Harmand (Lich. de Fr.), and has been noted at Compass Cove (3), Brean Down (6), and Lulworth (9).

P. erythrocarpum (Ach.) A. L. Sm. Harlech (*48, D. A. J.).

P. medians Nyl. On limestone wall, Weston (*6).

P. xantholytum Nyl. Rhossili (*41, D. A. J. !).

Callopisma luteo-album (Turn.) Mass. The rupestral form of this plant is much commoner than is generally supposed. It often occurs along with *C. ochraceum*, and, when the latter has its thallus bleached, is not readily distinguishable except by spore-examination. The latter has the spore-loculi widely separated, whereas in *C. luteo-album* f. *rupestre* (Nyl.) they are so near together that the spore almost appears to be one-septate. On limestone rocks, Quantoxhead etc. (5), Weston etc. (6), Port Eynon (*41, A. E. W. !).

Callopisma haematites (Chaub.), comb. nov. Aviemore (*96, H. H. K.).

C. rupestre (Scop.) Wats. Lich. Som. On the soil-cap of a mortared wall near Taunton a form is found which seems to correspond to *Lecidea rupestris* var. *terricola* Anzi. (*Blastenia terricola* Lindau, *Protoblastenia terricola* Lynge), though the spores are somewhat larger than are usually given for *terricola*. On the hardened mortar of the same wall typical *C. rupestre* occurred. The terricolous and saxicolous plants were similar in every respect, both externally and internally, so that the status of *terricolum* is a habitat form.

Physcia melops (Duf.) Nyl. Cefn Llyn (*41, A. E. W. !).

P. lithotea (Ach.) Nyl. On maritime rocks, Brean Down (6), Lulworth (*9), Caeran, etc. (*41, A. E. W. !).

P. elaeina (Wahl.) A. L. Sm. On trees, Lulworth (*9), Llancarfan (*41, A. E. W. !), Keswick (*70).

Rinodina atrocinerea (Dicks.) Krb. Ventnor (*10, leg. H. P. Reader !).

R. ALBIDO-RIMOSULA Harm. Lich. de Fr. 913. A specimen collected by Mr. Travis at Lizard Head (1) agrees with this. It differs from *R. atrocinerea* chiefly in the smaller spores, 14–17 × 7–9 μ as against 18–30 × 10–16 μ. The reaction with calcium hypochlorite is less definite both by itself or when preceded by potassium hydroxide.

R. Bischoffii (Hepp) Krb. On limestone, Clevedon (*6) and Port Eynon (*41).

R. umbrino-fusca (Nyl.) Oliv. On maritime rocks, Blakeney (*27).

Buellia praecavenda (Nyl.) A. L. Sm. Henley (*13).

B. aethalea (Ach.) Th. Fr. East Dean (*13), Brecon Beacons (*42), Borth (*46), Harlech etc. (*48).

B. impressula (Leight.) A. L. Sm. On siliceous rocks and walls, near Taunton etc. (5, Lich. Som.), Borth (*46), Talsarnau (48, D. A. J.), Eel Crags (70).

B. spuria (Schaer.) Krb. Blakeney (*27), Aber Edw (*43).

B. discolor (Hepp) Krb. Near Hepste Falls (*42).

B. stellulata f. *dispersa* (Leight.) A. L. Sm. On shingle, Borth (*46).

B. atrata (Sm.) Mudd. Borth (*46).

B. leptoclinoides (Nyl.) Stein. On sarsen stone, Fifield (*7).

B. ryssolea (Leight.) A. L. Sm. On maritime rock, Lizard (*1, H. H. K. !).

B. colludens (Nyl.) Tuck. Cornwood (*3, H. H. K. !), Cwm Bychan (48), Keswick and Thirlmere (70).

B. confervoides Kremp. Lizard (*1, H. H. K. !), Cawsand (*2), Chesil Beach (*9), Blakeney (*27), Borth (*46), Barmouh (*48), Port Soderick (71).

B. alpicola (Wahl.) Kremp. On the rocks of the W. Perth side of the summit of Ben Lui (*87).

B. Usneae Jatta. On *Usnea*, Llanbedr (48, D. A. J.!). Included under *B. parmeliarum* in Zahl. Cat. Univ. Lich.

B. ADJUNCTA Th. Fr.; *Karschia adjuncta* Arn. Parasitic on thallus of *Lecanora conizaeoides*, on Ash, near Craig Llanishen and on *L. expallens*, Cefn-lln (41, A. E. W.!). On *L. conizaeoides*, Errwood! (58, H. B.). As this has not been recorded previously from our islands the following description is appended:—Thallus none. Apothecia small (0·2–0·6 mm.), often separate, but sometimes minute and congregate (five or more together), dark, plane, with a thin proper margin or convex and immarginate; hypothecium and epithecium usually dark brown; hymenium usually tinged with brown; paraphyses somewhat coherent, not distinct at dark apices. Spores 8-næ, dark brown, one-septate, 13–16 × 6–9 μ. It has been previously collected on the thallus of *Lecanora symmicta* var. *straminea* in Finland and Norway.

Rhizocarpon geographicum var. *atrovirens* (L.) Krb. Sheepstor (*3), Cader Idris (*48), near Keighley (*63, *T. Hebden*!), Eel Crags (*70), Ben Doran (*98).

R. viridiatrum (Flk.) Krb. Gulval, near Penzance (*1), Singleton Forest (*13), Brecon Beacons (*42).

R. chlorophaeum (Hepp) A. L. Sm. Lelant (1), Volis Hill (*5), Penrice (*41, A. E. W.!), Harlech (48).

R. distinctum Th. Fr. On rock near Llanberis waterfall (*49).

R. geminatum Krb. On rocks near Two Bridges (*3, D. A. J.!), in R. Wye, near Errwood on the Radnor side (*43, H. H. K.!).

Baeomyces rufus var. *subsquamulosus* Nyl. Barmouth and Cader (*48), Llanberis (*49), near Ardlui (*99).

B. placophyllus Ach. On the side of an ant-hill, Nant Gwynant (49, D. A. J.).

Pilophorus cereolus (Ach.) Nyl. Cwm Moch (48, D. A. J.).

Pycnothelia papillaria (Ehrh.) Duf. Zennor (*1), Holmsley and form *papillosa* Fr. (11), Cwm Bychan with f. *papillosa* Fr., var. *apoda*, Nyl. and var. *molariformis* Nyl. (48, D. A. J.!).

Cladonia pyxidata var. *floccida* (Nyl.) Parrique, differs from the type in the granuloso-sorediate margins of the thalline squamules. On wall-tops etc. near Taunton (*5) and Cefn-on (*41, A. E. W.!). This and the corresponding variety of *C. fimbriata* have, no doubt, often been confused with *C. caespiticia*. The latter, however, has ascyphous podetia, or the apothecia are sessile on the thalline squamules, or are on such short stalks that the plants mimic *Baeomyces rufus* with a squamulose thallus.

C. FIMBRIATA var. FLOCCIDA B. de Lesd., Lich. Dunk. p. 85, resembles the previously-mentioned variety of *C. pyxidata*, but its podetia and scyphi are pulverulent, as in *C. fimbriata*. It has been noted on a tree-trunk near Chard (*5) and Goyt Valley (*58). A specimen collected by J. Glover in 1911 from a tree-trunk at Grey Abbey (*I. 38), and labelled *C. delicata*, is the same variety. A similar condition occurs in *C. macilenta* at Taxal (58).

C. crispata var. *cetrariaeformis* (Del.) Wain. On heaths, Studland (*9), Holmsley (*11), Lakenheath Warren (*26, A. S. Watt!), Maulin Mt. (*I. 20, *teste* Sandstede).

C. squamosa var. *multibrachiata* Flk. Princetown (*3), Hampton (*38), Cwm Bychan (*48), Cwm-y-glo (*49). Podetia ±scyphiferous with scyphi proliferous, with cortex subcontinuous or in scattered areolæ, not or little granulose or squamose, often darkish in colour.

Var. *muricella* (Del.) Wain. Princetown (*3), Blue Anchor etc. (5), May Hill (*34), Craig Llysfaen (*41, A. E. W.!), near Brecon (*42), Goyt's Quarry (*58), Keighley (*63).

Var. *polychonia* Flk. Brecon (*42), Hirynys (*48), Llanberis (*49), Cleveland (62). Podetia ±decorticate, granulose, ±scyphiferous with proliferous and re-proliferating scyphi, which are usually bordered with many sterile or spermogoniiferous teeth, often soredioso-farinose in places, not or little squamulose at the base.

C. parasitica Hoff. Reynoldston (*41, D. A. J.), near Bristol (*34, D. A. J.), Tyn-y-Groes etc. (*48), Llanberis (on Oak, *49), Taxal (*58).

C. caespiticia (Pers.) Flk. Craig-y-llyn (*41, A. E. W.!).

C. bacillaris (Ach.) Nyl. Holmsley (11), Mynydd Rudy with var. *subcoronata* (*41, A. E. W.), Stake Moss etc. (*58, H. B.!).

C. Floerkeana Fr. The type is commoner than the few records in the Mon. Br. Lich. imply. Many records are given for var. *carcata*, which is undoubtedly the common form on our heaths. The type has been noted from Blackdowns (5), Mendip (6) in Lich. Som., Wareham (*9), Lakenheath (*26), Blakeney Pt. (27, Richards, J. of Ecol. 1929), Hartlebury (37, Rhodes), Donats (*41! A. E. W.), Brecon, (*42), Dolgelly (*48), near Aviemore (96, Wh. & Wilson, Journ. Bot. 1908).

Var. *intermedia* Hepp. On heaths, Princetown (*3), Blagdon and Brendon Hills (5, Lich. Som.), Wareham (*9), Tyn-y-Groes (*48). Sandstede has determined plants from Liffey Head (I. 21) and Crochan (I. 39) as this.

Petractis clausa var. *dolichospora* (B. de Lesd.) Zahl. On limestone rocks, Thurlbear (5, Lich. Som.), Portland (*9, H. H. K.).

Gyalecta truncigena (Ach.) Hepp. Penrice (*41, D. A. J. !).

G. Flotovii Krb. Penrice (*41 !).

G. carneolutea (Turn.) Boist. Portland (H. H. K.) and Studland (*9), Carnforth (*60, J. W. Hartley !).

Coenogonium ebeneum (Dillw.) A. L. Sm. Near Plymouth (*3), Doone Valley (*4), Brecon (*42), Nant-y-Ffrith (*50), Maulin Mt. (*I. 20, Stelfox !).

Racodium rupestre Pers. Lynton (*4), Hepste Falls (42), Devil's Bridge (*46), Llanberis (*49), Keighley (*63, *T. Hebden*), Coniston (*69), near Keswick (*70), Maulin Mt. (*I. 20, Stelfox !).

Crocynia lanuginosa (Ach.) Hue. Penzance (*1), Blaise Castle (*34), Morlais Hill (*41, A. E. W. !), Goyt Valley (*58, H. B. !).

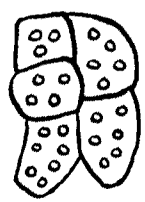
C. tephra Hue. On wall, Haslemere (*17).

C. SUPERBA Hue. On mosses over rocks, Rhossili (*41, D. A. J. !), Port Soderick (*71). This differs from other species of *Crocynia* in its manner of attachment to the substratum. Instead of being attached by all the lower surface it is attached here and there only, leaving spaces where it is quite free from the moss.

Leptogium subtile (Schrad.) Nyl. Hayle (*1), Pickering (62),

L. minutissimum f. *intermedium* (Harm.) Wats. Lich. Notes.—II. In nooks of limestone rocks, Brean Down (*6).

L. CALLOPISMUM (Mass.) Harm. On siliceous rocks, Cwm Dyli (*49, D. A. J. !). *Thallus* opaque, dark brown, of granules grouped into small masses, incompletely cellular, distinctly cellular at surface only, with algal cells single or in groups of two or three. *Apothecia* dark reddish-brown, 0·5 mm. diam.,



Surface-view of thallus of *Leptogium callopismum* × about 350.

slightly convex, disc with a reddish tint, margin rather indefinite and darker, hypothecium pale, apparently of small "cells," paraphyses discrete except at brown apices. *Spores* 8-næ, colourless, 5- or more septate and muriform, to 27×10 μ. In a surface-view the thallus presents an appearance as shown

in the accompanying figure. Harmand, in Lich. de Fr., records it from calcareous rocks, but there was little or no evidence of a carbonate in the rock from Cwm Dyli.

Collema terrulentum Nyl. On Elder, Blaise Castle (*34). This specimen has a similar appearance to the Scotch one in Herb. Brit. Mus., except that the granules are arranged in smaller groups.

Psorotichia lugubris (Somm.) D. T. & S. Near Devil's Elbow (89, H. H. K. !), Ben Doran (*98).

Ephebeia hispidula (Ach.) Nyl. Common on boulders above the level of the water in stream, Cwm Bychan (48). The chief characters by which this is distinguished from *Ephebe lanata* are the minute branchlets on many of the filaments and the presence of paraphyses in the apothecium. Additional information obtained from the examination of specimens is that the paraphyses are septate and the apothecia usually at the outer angles of the bends in the filaments.

Arthonia excipienda (Nyl.) Cromb. On tree, Tetton Wood, Quantocks (5).

A. subvarians Nyl. *Conida clemens* Mass. Dolgelly (*48).

Allarthonia lapidicola (Tayl.) Zahl. On limestone, Sand Bay (*6).

Lithographa tesserata (DC.) Nyl. On rocks, Clogwyn-dur-Arddhu, Snowdon (49). Recorded from the district previously.

Opegrapha saxicola Ach. On limestone, Brean Down and Sand Bay (*6), Gower (*41, D. A. J.), Cheltenham (*33, D. A. J. !): var. *Decandollei* Stiz. Flat Holm (*41, A. E. W.).

O. betulina Sm. Trevaylor (*1), near Marlborough (*8, H. H. K.), Stoborough (*9), Cefn Mably and Penrice (*41 !). Stirton's *O. prosiliens* is best regarded as a form of *O. betulina* with shorter apothecia. It occurs mixed with the type on an Elder at Kingston (5, Lich. Som.).

O. confluens Stiz. Pickering (62).

O. zonata Krb. Carbis Bay (*1), Harlech (48, D. A. J.).

O. Leightonii Cromb. On wall, Cheltenham (*33, H. H. K.).

Chaenotheca melanophaea (Ach.) Zw. On Spruce, Colesborne near Cheltenham (33, H. H. K. !). Joshua found this in the same vice-county near Cirencester. On Firs, Groudle Glen (*71).

Calicium quercinum var. *lenticulare* (Ach.) Nyl. On pales, Kingston and Minehead (*5).

Stenocybe byssacea (Fr.) Nyl. On Alder near water, Langford Heathfield (D. A. J. !), Culmhead and Hodder's Combe (*5), Beacon Hill (*6, D. A. J.), Lodore (*70, D. A. J.).

S. bryophila Wats. On hepatics, near Cornwood (*3; H. H. K.!), Seatoller (*70, D. A. J.), Killarney (*I. 2, D. A. J.).

Dermatocarpon miniatum (L.) Th. Fr. On limestone, Cannock Chase (*39), Penrice (*41, D. A. J.), Blaen Hepste (*42), Keld (*65), Coniston (*69): var. *complicatum* (Light.) Th. Fr. Blaen Hepste (*42).

D. hepaticum (Ach.) Th. Fr. Portland (*9), Pendolylan (*41, A. E. W.!).

D. lachneum (Ach.) A. L. Sm. Candleston (*41, A. E. W.!).

D. INSULARE (Mass.) Migula. In small insulated patches on calcareous rock with *Lecanora albescens* (*galactina*), *Placodium callopismum* v. *plicatum* and other lichens, Sand Bay near Weston (*6). Thallus of small roundish brown or chestnut-brown swollen or plane squamules, usually arranged in small island-like patches, K—, with green algæ. Perithecia small, black, at first entirely immersed but later with apices emergent; paraphyses none; ascus clavate; hymenial gelatine wine-red with iodine; spores 8-næ, simple, colourless, oblong-ovate, 9–15×5–6 μ. Previously found in similar insulated patches on calcareous rocks at Monte Baldano in Vall' Avesa, Italian Alps. The Sand Bay plant is very similar to the type-specimen in external appearance but has rather longer spores than were given by Massalongo (9×6μ).

Verrucaria maura var. *aractina* (Wahl.) Th. Fr. Clevedon (*6), Oxwich (*41, D. A. J.), Harlech (*48), near Beaumaris (*52).

V. scotina Wedd. Flat Holm (*41, A. E. W.!).

V. laevata Ach. On stones in R. Perddyn (*41, A. E. W.!), near Brecon (*42).

V. RHEITHROPHILA Zsch. On stones in a stream running into Badgworthy Water (*4). When moist the thallus is similar to *V. submersa*, being olive-green and smooth. The perithecia are more immersed and the spores are smaller, 7–12×5–7 μ. Some of the plants listed under *V. submersa*, in Herb. Brit. Mus., probably belong to this segregate of Zschacke, as in "some specimens the spores are persistently smaller" than in *V. submersa* (Mon. Br. Lich., 1926, 308).

V. macrostoma DC. Clifton (*34, D. A. J.!), Pyle (*41, D. A. J.!), Goyt's Bridge (*57, H. B.!): form *aphanostoma* Sh. & Hebd., near Wrexham (*50, D. A. J.!).

V. mutabilis Borr. On flints in the beech-woods near East Dean (*13).

V. maculiformis Kremp. On flints, Henley and E. Dean (*13), Lakenheath Warren (*26, A. S. W.!), Lisvane (*41, A. E. W.!).

V. dolomitica Mass. On limestone, Cleeve Hill (*33, D. A. J.!), Cefn On (*41, A. E. W.!), Berwig (*50).

V. muralis var. *submuralis* (Nyl.) Oliv. On chalk stones in the beech-woods near E. Dean (*13). On Carboniferous limestone, Swanbridge etc. (*41, A. E. W.!), Lakenheath (*26, A. S. W.!). Some of the plants from 41 and most of those from 13 belong to the form *minor* B. de Lesd.

Thrombium cretaceum, sp. nov. *Thallus* cinereo-viridis, tenuissimus, effusus, pulverulentus, cum gonidiis minutis (5–6 μ) viridibus. *Perithecia* minuta (circa 0·1 mm.), dispersa, nigra, globosa, sessilia vel leviter immersa, integra ut apparent. *Asci* cylindrici vel cylindrico-clavati, 50–60×12–14 μ; paraphyses persistentes, distinctæ, capillares, plusminusve erectæ sed sæpe leviter flexuosæ vel leviter implicatæ; hymenium cum iodo cœrulescens demum vinoso-rubrum, sine gonidiis. *Sporæ* octonæ, simplices, incolores, oblongæ, non seriatim sed interdum biseriatæ vel rarius uniseriatæ, 10–16×5–7 μ, utrinque obtusæ, interdum cum duabus guttulis.

Hab. On chalk stones, beech-woods near East Dean (*13). As on many other chalk stones of the beech-woods and the neighbouring scrub, blue-green algæ are sometimes present. Trentepohlioid algæ sometimes occur as well, but this is what might be expected since *Arthopyrenia saxicola* is sometimes present on similar stones. Steiner (in K. Akad. Wiss. math-naturh., 1896 & 1898) has described two species of *Thrombium* from calcareous rock, *T. stereocarpum* from Persia and *T. melaspermizum* from Greece, but both of these have larger asci and spores, besides slight differences in other characters.

Thelidium immersum (Light.) Mudd. Morlais Hill (*41, A. E. W.!).

T. papulare (Fr.) Arn. On rocks near Foxes Path, Cader (48).

T. sparsulum (Nyl.) A. L. Sm. This is not uncommon on chalk stones in the beech-woods on the S. Downs near E. Dean (13). It was put amongst the doubtful *Thelidia* in Mon. Brit. Lich. 1926, 327, because Nylander considered the alga to be blue-green. Blue-green algæ are not uncommon on the chalk stones in these beech-woods and are present when *Verrucaria muralis* or another lichen, even *Arthopyrenia saxicola*, is present whilst *T. sparsulum* is absent, so that little importance can be attached to their presence. The thallus is certainly scanty, but is more often green than blue-green or red, and the occurrence of algæ having either of the two latter colours may be considered incidental. The spores are 3-septate, usually about 26×12 μ, and the hymenial gelatine becomes wine-red with iodine.

T. FUMIDUM (Nyl.) Hazsl. On siliceous rock in stream, Cwm Idwal (49). Thallus dark brown or sometimes paler. Perithecia about 0·2–0·3 mm., seated in thalline warts with the rounded black apices emerging, ostiole with darker ring round it;

ascus about 70–80×20–30 μ; spores colourless, 8-næ, one-septate, 20–30×10–13 μ, usually with both ends rounded.

Normandina pulchella (Borr.) Cromb. On thatch of barn, Corfe Castle (*9); on mossy trees, Park Mill etc. (*41, D. A. J. !).

STAUROTHELE SUCCEDENS (Rehm.) Arn. On rocks near stream at 1000 ft., at the foot of Ben Lui (*88), with *Rhizocarpon obscuratum* form *ferratum*. Thallus crustaceous, dark, more or less plectenchymatous. Perithecia 0·4–0·5 mm., sessile, semi-immersed or emergent, hymenial algæ cylindric, spores 8-næ, colourless, 31–41×17–22 μ, muriform, with 6–9 irregular transverse and 2–4 irregular vertical septa. The thallus is rather browner than in a foreign specimen examined, but this is probably due to the intermixture of the *Rhizocarpon*.

Polyblastia Schraderi (Sm.) A. L. Sm. Durdham Downs (*34, D. A. J. !).

P. deminuta Arn. On Carboniferous limestone, Morlais Castle Hill (*41, A. E. W. !).

P. subviridicans (Nyl.) A. L. Sm. On stones in R. Perddyn (*41, A. E. W. !). New to Great Britain.

Gongylia viridis A. L. Sm. Craig-y-llyn (*41, A. E. W. !). On sandy material of soil-capped rock, Cwm-y-glo (*49). The apothecia are seldom directly on the bright green thallus but always very near to it.

Acrocordia monensis Wheld. On chalk stones, East Dean (*13). The thallus is greener than in Wheldon's plant, but this is what might be expected, as the habitat was somewhat shaded.

Arthopyrenia saxicola Mass. On chalk stones in the beech-woods of the South Downs near E. Dean (*13). The two chambers of the spores are slightly unequal; the asci are about 40×20 μ.

A. areniseda A. L. Sm. Similar incrustations to those on the sand-dunes near Southport occur on the sandy "slacks" at Mochras near Harlech (*48), but no apothecia were noticed.

Porina leptalea (D. & M.) A. L. Sm. At bases of conifers, Hillcot Wood (*33), Blaise Castle (*34, D. A. J.), Penrice (*41, D. A. J. !), Seatoller, etc. (*70), Groudle Glen (*71).

P. lectissima (Fr.) Zahl. On flint stones on "ride" in beech-woods, Charlton Forest (*13), associated with *Verrucaria maculiformis*.

P. olivacea (Pers.) A. L. Sm. Blaise Castle (*34, D. A. J. !), Penrice (*41, A. E. W. !), near Harlech (*48, D. A. J.), Lambash (*100, W. West !).

Microthelia micula Flot. Cefn Mably Park (*41, A. E. W. !). New for Wales.

Coriscium viride (Ach.) Zahl. On turf, Blagdon Hill (*5).

TROPICAL AFRICAN LEGUMINOSAE.

BY E. G. BAKER.

Crotalaria (*Eucrotalaria*, § *Mediocriflorae*) **Greenwayii,** sp. nov. *Herba* erecta usque ad 1 metr. et ultra ad *C. ivantulensem* Welw. accedens. *Stipulæ* lineares. *Folia* trifoliolata petiolata; foliolis pubescentibus anguste cuneato-obovatis 10–20 mm. longis, 5–11 mm. latis, petiolis gracilibus 15–20 mm. longis. *Flores* parviusculi in racemos plus minus elongatos et multifloros dispositi; pedicelli 5–6 mm. longi. *Calyx* in toto ±5 mm. longus dentibus acutis. *Vexillum* flavum suborbiculare 10–11 mm. latum et longum; *alæ* inæquilateraliter oblongæ basi unguiculatæ; *carina* dorso angulo fere recto curvata, rostrum rectum ±9 mm. longum. *Legumen* cylindricum rectum glabrum, 20–22 mm. longum.

Hab. TANGANYIKA TERRITORY: Kilimanjaro District, Arusha Chini, 3000 ft., Aug. 7, 1932, *P. J. Greenway* 3021. Herb. Mus. Brit.

"Annual herb up to 4 ft. tall with yellow flowers, somewhat stragging when solitary but erect when numerous. Should prove to be an excellent cover-crop in Sisal plantations as it smothers all other weeds." This species differs from *C. ivantulensis* Welw. by the much smaller flowers etc.

Crotalaria (*Eucrotalaria*, § *Parviflorae*) **tanganyikensis,** sp. nov. Herba annua gracilis erecta ramosa, caulibus teretibus sparse pubescentibus. *Stipulæ* lanceolatæ. *Folia* trifoliolata; foliolis lanceolatis vel oblongo-obovatis superne glabris subtus sparse pilosis 1–5 cm. longis, 4–9 mm. latis, petiolis brevibus 2–6 mm. longis. *Flores* parviusculi in racemos plurifloros et laxiusculos dispositi; inflorescentia 4–5 cm. longa. *Calyx* 5–6 mm. longus, dentibus subulatis. *Vexillum* ±8 mm. longum et latum lineis purpureis notatum; *carina* ±7 mm. longa, dorso angulo fere recto curvata apice in rostrum attenuata, alba lineis purpureis notata. *Legumen* oviforme 12–13 mm. longum, multispermum, sparse pubescens, ±maculosum.

Hab. TANGANYIKA TERRITORY: Shinyanga, Matini Road, alt. 3800 ft., March 30, 1932, *B. D. Burtt* 3782. Herb. Mus. Brit.

"Herb with white flowers marked with purple veins, growing in dense masses." An ally of *C. Junodiana* Schinz.

Crotalaria (*Eucrotalaria*, § *Parviflorae*) **minutiflora,** sp. nov. *Planta* annua ramosa ad *C. senegalensem* Bacle accedens. *Caules* pubescentes. *Stipulæ* lineares. *Folia* trifoliolata; foliolis oblongis vel ellipticis vel elliptico-obovatis, strigoso-pubescentibus, 5–10 mm. longis, 3–4 mm. latis; petiolis 3–10 mm. longis. *Flores* ±5 mm. longi in racemos laxos dispositi; pedicelli ±2 mm. longi. *Calyx* ±3 mm. longus. *Vexillum* late ovatum

unguiculatum ±4 mm. longum, ±5 mm. latum; *alæ* oblongæ; *carina* 4–5 mm. longa, dorso rotundata apice sursum curvata. *Legumen* oblongum pubescens, 8–9 mm. longum.

Hab. NORTH KENYA: Sukh plain near Kacheliba, 1931, *E. B. Worthington* sine no. Herb. Mus. Brit.

An ally of *C. senegalensis* Bacle, but the flowers are much smaller, with shorter rostra.

Crotalaria (*Eucrotalaria*, § *Parviflorae*) **citriocolorata,** sp. nov. *Herba* perennis procumbens pilis vestita. *Stipulæ* lineares. *Folia* trifoliolata petiolata; foliolis lanceolato-ellipticis vel anguste ellipticis 3–4 cm. longis, 10–17 mm. latis, subtus pilis strigosis vestitis; petiolis pubescentibus 10–15 mm. longis. *Flores* parviusculi in racemos densos et longe pedunculatos dispositi. *Bracteæ* parvæ persistentes. *Calyx* in toto ±6 mm. longus; dentibus acutis. *Vexillum* cum ungue 10–11 mm. longum; *carina* dorso rotundata 10–11 mm. longa. *Ovarium* hirtum.

Hab. TANGANYIKA TERRITORY: Kilimanjaro District, between Moshi and Himo, 3500 ft., Aug. 6, 1932, *P. Greenway* 3010. Herb. Mus. Brit.

"A procumbent perennial herb with lemon-yellow flowers growing in dark volcanic soil in *Combretum-Zizyphus* Bush Formation, not very common."

The standard is suborbicular, the claw being 2·5 mm. long, the wings are oblong or elliptic-oblong, the keel is rounded on the back, the rostrum short and upturned. It is allied to *C. ukambensis* Vatke and *C. unguenensis* Taub.

Indigofera (*Trichopodae*) **manyoniensis,** sp. nov. *Herba* erecta villosa copiose ramosa ad *I. ambelacensem* Schweinf. accedens. *Stipulæ* lineares villosæ. *Folia* imparipinnata; foliolis 5–7 oblongis vel oblongo-ellipticis, apice acutis, 9–12 mm. longis, 2–4 mm. latis, glandulosis. *Flores* parviusculi rubri graciliter et longiuscule pedicellati, pedicellis 1–2-floris. *Flores* 4 mm. longi. *Calyx* ±2 mm. dentibus acutis glandulosis. *Vexillum* ±4 mm. longum, suborbiculare dorso hirtum; *carina* ±3·5 mm. longa, navicularíforme. *Legumen* rectum cylindricum, 10–18 mm. longum ±10-spermum.

Hab. TANGANYIKA TERRITORY: Manyoni District, Chaya, alt. 4200 ft., May 19, 1932, *B. D. Burtt* 3643. Herb. Mus. Brit.

Indigofera (*Dissitiflorae*) **micropetala,** sp. nov. *Herba* prostrata gracilis, caulibus gracilibus ramis divaricatis 3–8 cm. longis. *Stipulæ* setaceæ 6–7 mm. longæ. *Folia* 1·5–3 cm. longa; foliolis 2–4 obovatis apice obtusis superne sparse pubescentibus subtus strigosis 3–9 mm. longis, 2–6 mm. latis. *Flores* minuti rubri; pedunculi sæpissime 2-flori, ±1 cm. longi. *Calyx* 1–1·5 mm. longus, lobis linearibus apice glandulosis. *Vexillum* obovatum

±2 mm. longum; *alæ* 1·5–2 mm. longæ; *carina* ±2 mm. longa, apice obtusa. *Legumen* rectum 6–10 mm. longum, 1–1·5 mm. latum, sparse pilosum 3–6-spermum.

Hab. TANGANYIKA TERRITORY: Manyoni District, Kazikazi, alt. 4200 ft., May 17, 1932, *B. D. Burtt* 3608. Herb. Mus. Brit.

"A prostrate herb with bright green foliage and minute bright red flowers." Allied in some respects to *I. geminata* Baker.

Indigofera (*Dissitiflorae*) **Hewittii,** sp. nov. *Annua* gracilis ramosa pubescens. *Stipulæ* lineares; stipellis linearibus. *Folia* imparipinnata 3–5-foliolata; foliolis lineari-oblongis 10–14 mm. longis, 2–4 mm. latis, superne glabris subtus pubescentibus. *Pedunculi* stricti graciles glandulosi pauciflori 4–7 cm. longi. *Calyx* ±2 mm. longus dentibus acutis tubo paullo longioribus glandulosis. *Vexillum* orbiculare 5 mm. longum; *alæ* oblique oblongo-obovatum; *carina* navicularíformis ±5 mm. longa. *Ovarium* lineare ±9-ovulatum sparse hirtum et glandulosum. [*Legumen* ignotum.]

Hab. NORTH RHODESIA: Mkushi District, Congo–Zambesi Basin, mountain vlei and veldt, alt. 4000 ft., granite quartzite soil, *Rev. G. H. Hewitt* 2. Herb. Mus. Brit.

Allied to *I. Dyeri* Britten. A slender annual with imparipinnate leaves and slender glandular peduncles comparatively few-flowered.

Indigofera (*Tinctoriae*) **goniocarpa,** sp. nov. *Suffrutex* erectus ramosus. *Stipulæ* acutæ ad basim connatæ. *Folia* imparipinnata 1·5–3 cm. longa; foliolis 4–8, ovalibus vel obovatis, 3–8 mm. longis, 2·5–5 mm. latis primum strigoso-canescentibus demum subglabris. *Racemi* 1–7 cm. longi, pluriflori; flores 5–6 mm. longi, rubri. *Calyx* ±2 mm. longus, strigosus dentibus subulatis tubo parum longioribus. *Vexillum* 5–6 mm. longum late ellipticum unguiculatum dorso pubescens; *alæ* 5–6 mm. longum; *carina* 5–5·5 mm. longa, apice obtusa. *Legumen* 25–42 mm. longum rectum apice acutum tetraquetrum, 7–8-spermum, minute strigosum.

Hab. TANGANYIKA TERRITORY: Manyoni District, Kazikazi, alt. 4200 ft., May 20, 1932, *B. D. Burtt* 3572. "Tall, slender woody herb, 7 ft. high, flowers bright red." Herb. Mus. Brit.

Allied in some respects to *I. dimorphylla* Schinz. The stipules are connate at the base between the stem and petiole.

Tephrosia Burttii, sp. nov. Planta perennis ramulis novellis argenteo-strigosis. *Stipulæ* lineares. *Folia* imparipinnata sæpissime 7-juga foliolis linearibus vel lineari-oblanceolatis 8–11 mm. longis ±2 mm. latis. *Flores* parviusculi in racemos dispositi. *Calyx* in toto 4–5 mm. longus dentibus acutis. *Vexillum* orbiculare unguiculatum cum ungue ±8 mm. longum; *alæ* anguste oblongæ; *carina* navicularíformis graciliter unguiculata.

Legumen lineare 40–50 mm. longum, 3–4 mm. latum, argenteo-strigosum marginibus brunneo-strigosum.

Hab. TANGANYIKA TERRITORY: Manyoni District between Kazikazi and Chaya stations, alt. 4000 ft., Aug. 14, 1932, *B. D. Burtt* 4001. "A silvery leaved erect bushy herb to 1½ ft. Flowers scarlet." Herb. Mus. Brit.

Allied to *T. linearis* Pers., *T. discolor* E. Mey., and *T. seminuda* Bojer.

Dolichos zanzibarensis, sp. nov. *Caulis* volubilis teres pubescens. *Stipulæ* lanceolatæ dorso longitudinaliter striatæ. *Folia* trifoliolata longe petiolata, foliolis terminalibus æquilateraliter ellipticis vel oblongo-ellipticis 8–10 cm. longis, 4–5 cm. latis lateralibus inæquilateralibus, pubescentibus; petiolis 10–15 cm. longis. *Flores* in racemos laxissimos dispositi. *Calyx* in toto 8–10 mm. longus, dentibus angustis acutis. *Vexillum* in sicco flavum suborbiculare cum ungue 12–14 mm. longum; *alæ* angustæ; *carina* dorso rotundata 12–13 mm. longa. [*Legumen* ignotum.]

Hab. ZANZIBAR ISLAND: 1931, *J. H. Vaughan* 1908. Herb. Mus. Brit.

A close ally of *D. Tauberti* Bak. fil., but differs by broader leaflets, etc. Also allied to *D. longistipellatus* Harms.

Acacia Burttii, sp. nov. *Frutex* erectus 2–3 m. altus, cortice pallide fulvo ad *A. formicarum* Harms accedens. *Spinæ* geminæ interdum in tumorum subglobosum confluentes. *Folia* pinnata rachi glabra circ. 3–4 cm. longa, pinnis 1–3-jugis, foliolis plurijugis (5–12) 7–17 mm. longis, 2–6 mm. latis, glabris obovato-oblongis usque linearibus acuminatis. *Pedunculi* dense fasciculati, 2–3 cm. longi, involucello ad basin pedunculi instructi; capitula 15–20 mm. diam. *Calyx* 2·5–3 mm. longus, glaber. *Corolla* ±5 mm. longa glabra, lobis acutis. *Stamina* ±7 mm. longa. *Legumen* applanatum semilunatum 1·5–4 cm. longum 1–1·7 cm. latum glabrum breviter stipitatum sæpissime 1-spermum.

Hab. TANGANYIKA TERRITORY: Tabora Province, Kahama District, alt. 3800 ft., 4 miles along Ngaya Road, 4500; 6 miles along Shinyanga Road, 4501 (type); 15 miles along Kahama–Ushirombo Road, 4502, *B. D. Burtt*, Jan. 1933. Herb. Mus. Brit.

Vern. name "Ilula," plural "Malula," Kisukuma dialect.

"An erect shrub with pole-like stem 6–10 ft. high, lateral branches short and stubby, giving the plant a columnar appearance; bark yellowish buff, powdery, contrasting strongly with the sienna-red bark of *Acacia formicarium*. Flowers very large for a gall acacia, glabrous, cream-white. Fruits kidney-shaped and very characteristic. Leaves broadly pinnuled and very distinct from any other gall Acacia. Galls ant-infested, ants having brown thorax and reddish abdomen. Common near Kahama."

NOTES FROM THE UNIVERSITY HERBARIUM, CAMBRIDGE.

SOME CHINESE SPECIES OF *EPIMEDIUM*.

BY WILLIAM T. STEARN.

H. LÉVEILLÉ in his 'Flore du Kouy-Tcheou'—a remarkable but scarcely legible autotyped work published under the stress of the German invasion of France and limited to eighteen copies—records three species of *Epimedium*, namely, *E. Komarovi* H. Lév., *E. acuminatum* Franch., and *E. macranthum* Morr. & Decaisne, from the Chinese province of Kweichow*, and distinguishes them as follows:—

" Folioles étroitement lancéolées; fleurs d'un blanc violet	*E. Komarovi.*
Folioles ovales asymétriques; fleurs non violettes .	2.
2. Fleurs roses; éperon pourpre intérieurt.	*E. acuminatum.*
Fleurs d'un blanc rosé; éperon gris intérieurement.	*E. macranthum.*"

This key is based on trivial and fluctuating characters useless for the distinction of species. By the courtesy of the authorities at the herbaria of Berlin, Breslau, the British Museum, Calcutta, Chicago, Edinburgh, Geneva, Harvard, Kew, Leningrad, New York, Paris, Upsala, Washington, Vienna, and elsewhere, it has been possible to examine the material cited by Léveillé in conjunction with numerous other Chinese collections, including nearly all the types. Léveillé's *E. Komarovi*, based on *Cavalerie* 954 from Pin-fa (26° 3′ N., 106° 30′ E.), proves conspecific in the writer's opinion with the earlier *E. acuminatum*, the type of which also came from Kweichow province. Léveillé's "*E. macranthum*," on the other hand, is very distinct from the true plant of Morren and Decaisne, and is here described as a new species:—

Epimedium leptorrhizum Stearn. "*E. macranthum*" H. Lév.: Fl. Kouy-Tcheou, 48 (1915), non Morr. & Decaisne.

Species anomala *E. sutchuenensi* Franch. proxima sed caule florifero sæpe monophyllo vel foliis caulinis inæqualiter evolutis, pube foliorum rufo, sepalis interioribus minus acuminatis distincta; ab *E. macrantho* Morr. & Decaisne (*E. grandifloro* C. Morr.) foliis tantum 3-foliolatis etc. facile distinguitur.

Planta florens c. 12–30 cm. alta. *Rhizoma* elongatum, tenuissimum, c. 1–2 mm. crassum, internodiis ad 20 cm. longis. *Folia* tantum 3-foliolata (vel radicalia raro 1-foliolata), petiolis pilosis; *foliola* demum subcoriacea, ovata vel anguste ovata,

* "Kweichow" is the standard spelling of the 'Chinese Postal Guide' adopted in the Royal Geographical Society's 'Second List of Asiatic Names' (1923). A number of variants are used on some maps. There is a town of the same name in Szechwan province.

basi profunde cordata lobis sæpe rotundatis, apice longe acuminata (raro acuta), margine spinosa, supra glabra, subter glaucescentia, papillosa et pilis rubris laxe pubescentia, c. 2·5–9·5 cm. longa, 2–4·5 cm. lata. *Caulis floriferus* monophyllus (vel interdum foliis 2 oppositis, uno valde evoluto, altero vix evoluto) ; *inflorescentia* simplex, glandulosa, c. 5–9 cm. longa, pauciflora (floribus 4–8) ; *pedicelli* c. 1–2·5 cm. longi. *Flores* magni, c. 2–4 cm. diam., " albi roseo-colore suffusi " vel " intense rosei " (*fide* Bodinier) ; *sepala exteriora* (" bracteæ " Franch.) obtusa, ovato-oblonga, c. 3–4 mm. longa ; *sepala interiora* (" petala " Morr. & Dec. : " sepala " Franch.) anguste elliptica vel lanceolata, acuta, c. 11–16 mm. longa, 4–5 mm. lata ; *petala* (" nectaria " Morr. & Dec.) corniculantia, basi sine lamina, calcare arcuato elongato ad 2 cm. longo, quam sepala longiora ; *stamina* c. 4 mm. longa, filamentis vix 1 mm. longis.

Hab. China, province Kweichow, near Kweiyang (Kouy-yang, Guiyang ; 26° 18′ N., 106° 40′ E.) :—" Environs de Kouy-yang ; bois de Kien-lin-chan ; rocailles. 1 seule feuille florale. Fleurs blanches légèrement roses ; éperons gris à l'intérieur, 14 avril 1898," *Emile Bodinier* 2184 (Herb. Mus. Hist. Nat. Paris, type ! Herb. Univ. Cantab. !). " Environs de Kouy-yang ; bois de la pagode Lan-yo-chan ; rocailles. Fleurs roses plus ou moins foncé. 10 avril 1899," *E. Bodinier* 2184 Double (Herb. Mus. Hist. Nat. Paris !).

Of this species I have seen fifteen flowering specimens : from two the stem-leaf or leaves have broken away ; eleven bear only one leaf, trifoliolate and normally developed, below the inflorescence, while two (including *Bodinier* 2184 in Herb. Cantab. !) have a second but rudimentary leaf thickly clothed in reddish hairs arising opposite the fully developed leaf : in other respects the specimens agree. It is significant that Bodinier in the field has noted " une seule feuille florale " as characteristic. In the genus *Epimedium* the number of leaves on the flowering stem is remarkably constant, though not absolutely invariable ; Franchet, however, remarked that it was a character " que je n'ai jamais vu varier, aussi bien dans les plantes cultivées que dans les plantes spontanées," and it forms the basis of his classification. If this character alone is considered, then most of the specimens of *E. leptorrhizum* must be placed next to *E. macranthum*, a Corean-Japanese species of the group *Monophyllon*, from which they differ conspicuously in their slender elongated rhizomes, trifoliolate (not biternate) leaves with firm leaflets, horn-shaped petals devoid of distinct basal laminæ, etc. These features they share with *E. sutchuenense* Franchet. This is a species of Hupeh and north-east Szechwan which bears two uniformly developed stem-leaves like other members of the group *Diphyllon*, but otherwise differs from *E. leptorrhizum* only in minor details. The two seem distinct, but their general resemblance and their

nearly adjacent areas suggest their differentiation from the same stock by isolation. The special interest of *E. leptorrhizum* is that it varies in a character usually constant within the genus and so of taxonomic importance. Convergence in one character must not be over-emphasised, however, by ignoring divergence in many others, and, although *E. leptorrhizum* in its usual state belongs technically to the group *Monophyllon* next to *E. macranthum*, phylogenetically it must be regarded as a somewhat anomalous species of the group *Diphyllon* nearest *E. sutchuenense*. Franchet's description of the flowers of the latter is incorrect, the petals being horn-shaped (as in *E. acuminatum*), about 1·5–2 cm. long, slightly exceeding or as long as the acuminate inner sepals and not " 6 mm. longo . . . sepalis fere dimidio breviore " ; it would have been impossible to determine other specimens of the species without examination of the type (*Farges* 1272 in Herb. Mus. Paris !).

Another unnamed *Epimedium* of Kweichow province is represented by specimens collected at " Ganchouen " (Anshun) (26° 3′ N., 105° 52′ E.) by Cavalerie *. This plant is so close to *E. pubescens* Maxim. in its flowers and general habit that it seems best treated as a southern variety or subspecies, distinguished chiefly by its broader inflorescence and sparsely pubescent leaflets :—

Epimedium pubescens Maxim. var. nov. **Cavaleriei.** *Planta* florens c. 40–60 cm. alta. *Rhizoma* c. 5 mm. crassum. *Folia* 3-foliolata ; *foliola* anguste ovata vel lanceolata, longe acuminata, coriacea, subter sparse pubescentia, c. 5–13 cm. longa, 2–4·4 cm. lata (vel forsan etiam usque ad 25 cm. longa, 6 cm. lata ; *vide infra*). *Caulis floriferus* diphyllus vel raro triphyllus ; *inflorescentia* paniculata, laxa, glabra, multiflora (floribus usque ad 60), c. 10–30 cm. longa, versus basin interdum 12 cm. lata ; *pedicelli* c. 1–2·5 cm. longi. *Flores* parvi, c. 1 cm. diam. ; *sepala exteriora* atra ; *sepala interiora* alba, c. 5 mm. longa ; *petala* (nectaria) saccata, c. 2 mm. longa.

Hab. China, province Kweichow :—" Ganchouen, bois, 1913," *J. Cavalerie* 1849 (Herb. Kew, type !), 4251, 8088, 7166.

Besides the above the Kew Herbarium contains two specimens of an *Epimedium* collected without flowers at " Ganchouen " by Cavalerie, which probably represent its mature leaf-state. On one the leaflets (probably basal) are about 25 cm. long, 6 cm. broad, with the common petiole about 10 cm. long and the petiolules 5–8 cm. long. On the other the leaflets (certainly cauline) are 16–19 cm. long, 3–4 cm. broad. These unusually large leaflets are papillose and sparsely pubescent beneath.

* Pierre Julien Cavalerie, French missionary and naturalist, born at Rousserac in 1869 and sent out to China (Kweichow province) in 1894 by the Missions Etrangères. *Vide* P. Fournier, ' Voyages . . . des Missionnaires naturalistes français,' ii. 101, 109 (1932).

E. pubescens var. *Cavaleriei* is comparable to *E. sagittatum* var. *pyramidale* *, and, in view of Vavilov's law of homologous series in variation, it is significant that *E. pubescens* and *E. sagittatum* (*E. sinense*) are a pair of closely allied species. The occurrence of large leaflets in *E. pubescens* is to be expected from the known variation of *E. sagittatum*. Other " espèces jumelles " of *Epimedium* are *E. pinnatum* Fisch. and *E. Perralderianum* Cosson ; *E. Davidii* Franch. and *E. hunanense* (Hand. Mazz.) ; *E. leptorrhizum* Stearn and *E. sutchuenense* Franch. ; *E. acuminatum* Franch. and *E. membranaceum* K. Meyer ; *E. diphyllum* Lodd. and *E. platypetalum* K. Meyer ; *E. alpinum* L. and *E. pubigerum* (DC.) Morr. & Dec. ; and possibly *E. elatum* Morr. & Dec. and *E. elongatum* Komarov, although these may be unrelated species that have converged and furnish a case similar to that of *E. leptorrhizum* and *E. macranthum*.

The three species of Kweichow province may be distinguished as follows :—

Stem bearing usually only one leaf. Inflorescence simple, few (4–8)-flowered. Leaflets pubescent beneath with spreading loose reddish hairs. Flowers large (2–4 cm. across) ; petals cornute, about 2 cm. long, slightly exceeding the inner sepals.	*E. leptorrhizum.*
Stem bearing two, rarely three, leaves. Inflorescence compound, many (10–60)-flowered.	
Leaflets glabrous when young, later setose beneath with appressed short bristle-like hairs. Flowers large (about 2–4 cm. across) ; petals cornute, about 2 cm. long, much exceeding the inner sepals	*E. acuminatum.*
Leaflets pubescent beneath with spreading loose hairs. Flowers small (about 1 cm. across) ; petals saccate, about 2 mm. long, much shorter than the inner sepals	*E. pubescens.*

E. acuminatum seems to be a heterochromic species, the flowers ranging from rose and pale violet to white and yellow, according to the notes of collectors. *E. membranaceum* has similar variation. The characters selected by Kurt Meyer to distinguish *E. membranaceum* from *E. acuminatum* do not hold, but the two species are nevertheless distinct. *E. membranaceum* has its leaflets pubescent beneath with lax multicellular hairs of the type usual in the genus. *E. acuminatum*, like *E. sagittatum*, is peculiar in developing with age appressed bristle-like hairs formed of a comparatively large upper cell and scarcely noticeable smaller basal cells ; these hairs are sometimes obvious to the naked eye ; sometimes they are so small, developing late or being suppressed, that they can be detected only with a strong lens, the leaflet then at first sight appearing glabrous beneath. To *E. membranaceum* belongs the Forrest material (nos. 13888, 16389, 19598) distributed as "*E. sagittatum*," actually a species with very different flowers. Detailed descriptions, synonymy, and distribution of the plants mentioned here will be given in a forthcoming monograph of *Epimedium* and allied genera of Berberidaceae. The research on which this paper is based has been aided by a Government Grant from the Royal Society.

* *Epimedium sagittatum* (Sieb. & Zucc.) Maximowicz var. nov. **pyramidale** (Franch.). *E. sinense* var. *pyramidalis* Franch. Pl. Delavay. i. 40 (1889), Komarov in Acta Hort. Petrop. xxix. 142 in obs. ross. (1908).

A typo panicula magna laxa, c. 20–37 cm. longa, c. 8–12 cm. lata, recedit.

Franchet gives the type-locality as " Yunnan," but the type-specimen (*Delavay* in Herb. Mus. Paris !) is dated " 31 mars 1882," and so must have been collected in east Szechwan near the Hupeh border. *Vide* Bretschneider, Hist. Europ. Bot. Discov. China, ii. 875 (1898).

FRULLANIA TAMARISCI (L.) DUM. VAR. NOV. *SCHIFFNERI*.

By W. E. Nicholson.

Frullania germana Tayl. was recorded from Cornwall many years ago, and I have been endeavouring for a long time to verify this record, without success. However, in June 1927 I gathered on rocks near the sea at Coverack in the Lizard peninsula a remarkable *Frullania*, which, while bearing much superficial resemblance to *F. germana*, appeared on closer examination to have more affinity with *F. Tamarisci*.

On my submitting this plant to Dr. V. Schiffner of Vienna he admitted that it was a very remarkable form, unlike any with which he was previously acquainted, that it was intermediate in its characters between the two species, and might indeed be described as a variety of either. On account, however, of the frequent presence of a vitta, however imperfect, and the often strongly recurved margins of the auricled underleaves, I have decided to place it under *F. Tamarisci*, as it would outrage most British hepaticologists to admit a form of *F. germana* with a vitta.

The following is a diagnosis of the variety :—

Frullania Tamarisci (L.) Dum. var. nov. **Schiffneri**. Robustior, dense depresso-cæspitans facies *F. germanae* Tayl. *Lobus* rotundatus rarissime breviter apiculatus. *Linea moniliformis* in foliis caulinis sæpe carens vel imperfecta vel sparsis cellulis composita. *Folia involucralia* supra marginibus integerrimis, rarissime breviter uno- vel bi-dentatis ad basin ciliatis sicut in typo. *Amphigastria* sicut in typo, sed marginibus nonnunquam minus recurvatis.

Hab. Rocks and walls near the sea, Coverack, Caerthillian Valley, Kynance Cove and other places in the Lizard peninsula. Penzance (*W. Curnow*, 1878).

It may seem rather a bold thing to describe a new variety of this common and widespread species which already has a large number of varieties to its credit, but the present form is so distinct

and at the same time so liable to be confused with *F. germana* that it seems advisable clearly to distinguish it. Dr. Schiffner, one of the greatest living authorities on the hepatics, approves this course and has kindly accepted the dedication of the variety to him.

The variety seems to be very frequent in the Lizard peninsula, and it will probably be found in other parts of Cornwall. It is generally to be distinguished with the naked eye by its large spreading tufts of a dullish colour, less shining than those of typical *F. Tamarisci*, but scarcely so dull as those of *F. germana*. The var. *robusta* Lindb. of *F. Tamarisci* resembles the present plant in size and in the frequently imperfect vitta in the stem-leaves, but in all other respects it agrees closely with the type and is not likely to be confused with the new variety.

By the courtesy of Sir William Wright Smith, Regius Keeper of the Royal Botanic Garden, Edinburgh, I have been able to see a specimen gathered by the late Mr. William Curnow near Penzance in 1878 and referred by him to *F. germana*, and this plant undoubtedly belongs to the variety above described. It is quite possible that the true *F. germana* may occur in Cornwall, but, although it might reasonably be expected to occur there on the ground of its general distribution, the facts which I have investigated seem to render it rather questionable.

BIBLIOGRAPHICAL NOTES.

XCIX. The Markwick Manuscripts.

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

William Markwick was born in 1739 at Catsfield Place (now called The Church House), near Battle, Sussex. His mother before marriage was Mary Eversfield, of Denne Park, Horsham. Markwick succeeded to the Eversfield estates on the death of his aunt in 1803, and in 1807 adopted the name of Eversfield. He married Mary Date, of Southampton, in 1789, and had two sons and three daughters. He died in 1813.

At Catsfield Place Markwick lived the life of a country gentleman, keeping hounds, shooting, and performing such public duties as those of magistrate and deputy county lieutenant. He was much interested in all forms of natural history, and published several papers in the 'Transactions of the Linnean Society' in vols. i–vi on birds and insects. He was a Fellow of the Society.

In addition to his published writings, he wrote a series of books and diaries, of which seventeen were devoted to botany. Most of these manuscript books, forty-six volumes in all, were presented to the Hastings and St. Leonards Natural History Society by Miss Bethune Eversfield in 1922, and have now been placed by the Society on permanent loan in the Hastings Museum.

The botanical books at Hastings are as follows :—

I. 'A Calendar of Flora, or Naturalist's Journal, made at Catsfield, near Battle, Sussex, in the year 1768 (or as the case may be), by Wm. Markwick, wherein is set Down the Times some of the most common Trees and Plants did first put forth their Leaves and Blossoms, and also when the Birds of Passage and Insects appeared and disappeared, etc.'

The Calendar is in three leather-bound quarto volumes, each containing a diary or calendar for almost every day of each year from 1768 to 1776, three years in each volume. The earliest entry is not until January 26, 1768, but the later years begin earlier, some on January 1.

The entries give the common English names of the flower, bird, or insect followed by the words "in blossom," "fruit ripe," "first appears," "last seen," and so forth, followed by the binary Latin name, and they are interspersed with remarks on the prevailing weather. The entries are mostly botanical, but birds, insects, reptiles, etc., are also mentioned, and a good index to both the Latin and English names is given at the end of each year, giving a reference to the date on which the entry can be found.

It may be safely assumed that all the plants observed by Markwick were in Sussex, and mostly, though not all, in the neighbourhood of Catsfield, a few being maritime or chalk plants not likely to occur there. There are also garden plants, and when the record is for a plant which may be wild or cultivated it is not always clear which is meant, though in many cases the garden plant is specified as such. Doubtful cases are not credited to the Flora of Sussex at all.

These Calendars for six years provide considerably over 300 early notices for the county of Sussex, almost all being the earliest known for the county, which is deficient in early records, the longest list being that of Mitten in Mrs. Merrifield's 'Natural History of Brighton' (1860), unless those in Forster's 'Flora Tonbridgensis' (1816), in which no distinction is made between Sussex and Kent, are used.

There are a few corrections to the names made by the author, sometimes in the calendar and sometimes in the index, or in both, showing that Markwick, though undoubtedly a very good botanist, made some egregious mistakes at first, but the corrections are fewer in the later years, as if his botanical knowledge had improved. It is at least as safe to use his records as those of most of his contemporaries, who also undoubtedly made mistakes, and but for the exclusion of all probable garden plants the list of records would have been longer.

The Calendars for the years 1770 to 1772 are also written in two smaller note-books (the second one containing two years' records) which contain identically the same information as the

larger ones. It is possible that small books were kept for the years 1768 and 1769 also, and that Markwick rewrote them all in the larger books.

Extracts from the Calendars are published in the 'Naturalist's Calendar' at the end of the second edition of 'The Natural History of Selborne,' 1802. This may have given rise to the suggestion that Markwick himself edited this edition, but the statement does not bear investigation, the editor having been J. White, nephew of Gilbert White. The latter died in 1793. The list in "Selborne" purports to cover the years 1768 to 1793, but these may be the dates of White's own records, since no Calendars of Markwick are known of a later date than 1776, though he wrote other works up to 1808. Later Calendars may exist somewhere, but are not known to the Selborne nor the Linnean Societies.

II. 'Centuria prima (or secunda) Plantarum Indigenarum, or a British Herbale containing the Figures and Descriptions of one Hundred Plants' (each). "Catsfield, July 23, 1779."

These are two leather-bound quarto volumes in which are recorded in manuscript, first, the English and Latin names, followed by the synonymy of Hudson, Hall, Bauhin, Ray, Parkinson, Gerard, etc. Then follows the "Classical Distribution" of Linnæus, Ray, and Tournefort, and then a detailed description of every part of the plant. These descriptions do not always bring out the special characters by which closely allied species may be distinguished, and there is a suspicion that they were copied from some other botanical work and were not drawn up from the specimens by Markwick himself, since in at least one instance, an *Oenanthe*, the figure and description differ in important specific characters, proving that they do not belong to the same species.

Opposite the first page of the notes on each species is a beautifully executed full-page pencil or crayon drawing, often with dissections, which for the most part is clearly recognisable without the author's name or description, though, as already remarked, closely allied modern segregates may not always be recognisable either from the figure or the description.

After the description follow paragraphs headed "The Place," "Time," and "Observations," after the manner of the older Herbals, the "Observations" giving first the animals which eat or refuse it, and then brief remarks about its medicinal and other properties. These later are amplified in an Appendix.

The "Place" is only localised in about fifty of the two hundred plants named, though many of the others are marked "common," as indeed most are, but, since some of them admittedly come from other counties, it would not be safe to regard any as being Sussex plants unless they are so specified.

The books are paged and each plant is numbered, but for some unexplained reason the numbers of the figures do not run consecutively. There is a Latin and an English index to each volume, also a list of over 70 books to which Markwick has made reference.

III. 'Fasciculus Plantarum indigenarum or a Collection of fifty British Plants described and drawn from Nature by William Markwick, F.L.S., Catsfield.'

There are eight volumes, each containing 50 plants, the dates of completion being:—Vol. 1, November 1st, 1786; Vol. 2, April 5th, 1787; Vol. 3, November 3rd, 1787; Vol. 4, October 3rd, 1788; Vol. 5, November 4th, 1791; Vol. 6, December 31st, 1794; Vol. 7, December 24th, 1801; Vol. 8, May 16th, 1808.

This work is drawn up on the same lines as the 'Centuriæ,' but the plates are coloured. They are for the most part excellent, but a few are so inferior that I suspect they were not done by Markwick himself. The only substantial difference in the style from that of the 'Centuriæ' is that the "Observations" follow the descriptions, instead of being in an Appendix. Only a few species are the same as those in the 'Centuriæ.'

In addition to these botanical books there are two folio volumes of 'British Ornithology,' with coloured drawings, largely devoted to Sussex birds, and four others of 'British Zoology' with drawings and descriptions of mammals, birds, fishes, insects, etc., mostly from East Sussex.

There are also two books at the Linnean Society, Burlington House:—

IV. 'Plantæ Sussexienses, or a Catalogue of Plants growing wild in the County of Sussex, by Wm. Markwick F.L.S.'

This is a foolscap manuscript of a paper read before the Linnean Society in November and December 1802, but not published in the 'Transactions.' It contains descriptions and notes of over 550 species, giving the relative frequency, ecological habitats, and in some cases the precise stations for each. Many of them have already been named in his former works, but some are new, and in many cases a more modern name has been used, though still there is no more segregation than before.

V. 'Descriptions and Figures of Several Grasses and Rushes drawn from Nature by Wm. Markwick F.L.S. 1800.'

A folio manuscript of 37 beautiful illustrations, coloured in sepia, of the commoner grasses, with two or three of the Cyperaceae, with full descriptions opposite to them, as in the Fasciculi. It is not stated whether they were drawn from Sussex specimens, though there is little doubt that they were so.

In drawing up the above account I have had very valuable assistance from Mr. W. R. Butterfield, the Curator of the Hastings Museum, also from Mr. Mark Webb, the Secretary of the Selborne Society and Mr. S. Savage, the Secretary of the Linnean Society.

SHORT NOTES.

CORRECT BOTANICAL NAME OF THE LUFFA SPONGE.—The determination of the correct Latin name for the Luffa Sponge, or Loofah of commerce, raises an interesting point in nomenclature, and the synonymy is worth stating in full, since my conclusion differs from that of Cogniaux and Harms (in Engl., Pflanzenr. iv, 275, ii. 62, 1924). The latter give the name *Luffa cylindrica* (L.) Roem., but Roemer never actually made this combination, as he based his *Luffa cylindrica* on "*Momordica cylindrica* Lour.," which he took to be different from *Momordica cylindrica* L. This is made clear by the fact that he kept up the latter name in the genus *Momordica*, indexing the two epithets *cylindrica* separately. From this it is evident that the type of *Luffa cylindrica* Roem. is Loureiro's specimen, and it cannot by any means be considered that the name is based on *Momordica cylindrica* L., which was excluded from it by Roemer. It is now generally considered that "*Momordica cylindrica* Lour." is taxonomically the same as *Momordica cylindrica* L., but this remains a matter of identification. By using the name *Luffa cylindrica* (L.) Roem. there is a fusion of two epithets "*cylindrica*" each with its own type. The name would have to stand or fall on individual opinion whether these two are taxonomically the same or not. This fatal confusion of taxonomy with nomenclature can only be avoided by rigid application of the principle "One name one type." Since *Luffa cylindrica* only dates from Roemer (not from Linnaeus, as Harms and Cogniaux indicate), and by the International Rules prevents the transference of *Momordica cylindrica* L. to the genus *Luffa*, the earliest valid name for the species, in the genus *Luffa*, is *Luffa aegyptiaca* Mill. Fortunately the species is, if anything, rather better known under this name than under the name *Luffa cylindrica*, so no confusion can arise.

The relevant synonymy is appended :—

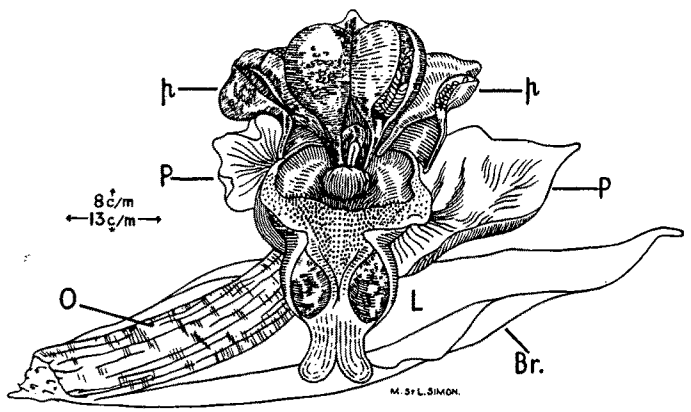
LUFFA AEGYPTIACA Mill., Gard. Dict. ed. 8 (1768). *Momordica Luffa* L., Sp. Pl. 1009 (1753). *M. cylindrica* L., loc. cit. *Luffa cylindrica* Roem., Syn. Mon. ii. 63 (1846): based on "*Momordica cylindrica* Lour., Fl. Cochin. 590 (1790)," and excluding *Momordica cylindrica* L. [*Luffa cylindrica* (L.) Roem. ex T. & H. Dur., Syll. Fl. Cong. 229 (1909), *nomen confusum*].—Cogn. & Harms in Engl., Pflanzenr. iv, 275, ii. 62 (1924).—A. W. EXELL.

PENTANDROUS FORM OF ORCHIS MASCULA L.—Mr. Ronald Burn has sent a specimen with remarkably abnormal flowers which he found in Elmsett Park Wood, West Suffolk, on April 28 last. The leaves were normal, much spotted; the spike, 5 cm. long, bore fifteen small flowers shielded by lanceolate-acuminate

bracts as long as the flowers, *i. e.*, longer and broader than usual. Mr. Burn describes the appearance as "that of a close-flowered spike eroded and yellow at the top and with flowers nowhere coming out into full bloom, all being rather adpressed as well as confined by the bract." We are indebted to Col. M. St. L. Simon, who has made a careful drawing of the flower under my direction.

The following is a detailed description :—

Sepals 3, much reduced, connivent at back of column, barely exceeding 1 mm. in length. Petals 2, short, deformed, spreading. Lip deeply emarginate, bearing below the lobe two pollen-sacs; spur reduced to a sac 1·5 mm. long. Column 5 mm. broad, bearing a pair of normal pollen-sacs, the base of the caudicles is protected by the rostellar cap, but no gland is present; on either side is a pair of imperfect pollen-sacs.



Br., bract; *O*, ovary; *P*, petals; *L*, lip, bearing two small closed pollen-sacs; *p*, lateral imperfect pollen-sacs.

The flower when spread open, as represented in the drawing, is 7 mm. long from the tip of the lip to the top of the column. When growing, Mr. Burn describes the lip as making an angle of barely 90° with the column, which is anterior, as the ovary is not twisted. He describes the petals and lip as crimson-purple, and the pollen-sacs as yellow with dark purple caudicles, except those on the lip which are purple.

The specimen recalls the monstrosity described by W. Zimmermann (Allg. Bot. Zeitschr. xxi. 54, 1915) as "Orchis mascula forma anomala apetala triandra—floribus triandris, perigonii phyllis absentibus seu pæne absentibus," but the spur is shorter in Mr. Burn's specimen, the lateral petals have no spur, and there is an additional pair of pollen-sacs on the face of the lip.

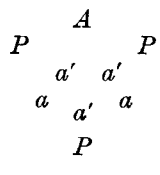


Diagram of relative position of petals and stamens in the monandrous Orchid flower. *P*, petals, the median one is the lip; *A*, *a*, stamens of outer whorl; *A*, fertile; *a*, *a*, represented by auricles on the column in *O. mascula*; *a′*, stamens of inner whorl, normally absent.

Compared with the normal flower there is a development of the anthers at the expense of sepals and petals. The lateral pollen-sacs on the column represent the auricles of the normal flower, that is, the lateral stamens of the inner whorl, *a′*, *a′*, in the diagram. If we regard the pollen-sacs on the lip as representing the lateral stamens, *a*, *a*, of the outer whorl, the flower is pentandrous and the position of the anthers on the lip is of interest in view of Darwin's hypothesis, based on the course of the vascular bundles, that the lip of the typical Orchid represents the union of the median petal with the lateral stamens of the outer whorl. It must be remembered, however, that the development of an anther on the lateral petals has also been observed in abnormal flowers.—A. B. RENDLE.

REVIEWS.

Watson Botanical Exchange Club.

THE Forty-ninth Annual Report (1932–33), edited by the Hon. Sec., Mr. H. Stuart Thompson, shows that the increased work of the Club noticed in last year's report has not been maintained, the number of contributors falling to seventeen, with a total of 2183 specimens sent in. The distribution was again carried out by the Hon. Treasurer, Mr. G. Goode.

A large number of notes on critical plants appear in the Report, which also contains obituary notices, with portraits, of three deceased distinguished members, Messrs. White, Bickham, and Groves. Among the plant-notes the following seem of more general interest:—

Silene nutans L. var. *Smithiana* Moss. Origin from seeds of plant on Nottingham Castle rock, its first-known British locality. Grown in my garden at Nottingham for many years past, and collected in June 1932. Sent for comparison with the Derbyshire *S. nutans* sent last year.—J. W. CARR. When cultivated this plant evidently increases in luxuriance, and becomes indistinguishable from the reputedly taller form of Dover Cliffs, about which so much confusion has arisen (*vide* Report, 1930–31, 61, and 1931–32, 113). The account of *S. nutans* L. in E. B. 465 (1798) was taken from the plant growing at Nottingham, the "Nottingham Catchfly," and this led to this form being erroneously regarded by British botanists as the typical species. Smith (Fl. Brit. ii. 467 (1800)) introduced in addition *S. paradoxa* L. into the British Flora, as the "Dover Catchfly," on the strength of a record by Ray, and apparently without any first-hand knowledge of the plant; and no evidence can be traced of the species having ever existed at Dover. The only specimen from Dover in Smith's herbarium is unnamed, but it is annotated in Smith's hand "True Dover Campion, 1822." The specimen is *S. nutans* var. *Smithiana* Moss. In 1825 Peete found a different plant at Dover, which he described and figured as *S. patens* in E. B. S. 2748 (1832). This was subsequently identified with *S. italica* Pers., and the original figure was used by Syme to illustrate that species in E. B., ed. 3, 208. No specimen of *S. italica*, which was confused with typical *S. nutans* (*S. dubia* C. E. Salmon) in the 'Flora of Kent,' has been seen from Dover, other than Peete's, although the species still grows in North Kent. I think that one form only grows on the Dover Cliffs, that no real difference exists between the Dover and the Nottingham Catchfly, and that Moss was right in merging them both in one variety *Smithiana* of *S. nutans* L.—H. W. PUGSLEY.

Euphorbia exigua L. var. Mayfield, East Sussex, Oct. 23, 1932.—A. H. WOLLEY-DOD. These specimens may not deserve the rank of variety, but at least are a very peculiar state, due to their immense size. Each plant formed a tuft 18 inches broad and 6 to 8 inches high; and the dried specimens give no idea of their appearance when growing. I made almost 40 sheets from one plant, with the exception of about half a dozen selected from a second one. The chief feature lies in the broad obliquely truncate base of the leaves, which are usually produced into a lobe on the anterior side. This form is not mentioned in any description known to me. The plants were growing in an old pasture whence the turf had recently been removed, and were associated with such things as *Linaria Elatine* and *spuria*, both quite rare species near here, but probably brought by birds and found an attractive spot for their germination.—A. H. WOLLEY-DOD. Not a variety, but the secondary bracts inordinately multiplied at every fork of the inflorescence. I have seen *E. Peplus* doing this.—J. FRASER. H. W. P.

The Botanical Society and Exchange Club of the British Isles.

THE Annual Report for 1932 is printed in the usual two parts. The first part, by the new Secretary, Mr. W. H. Pearsall, extends to 424 pages, and, while modelled on the previous reports, presents several new features. A balance-sheet of the club and a complete list of members are now furnished, and the plant-notes and records appear more carefully prepared than in recent years. Two new species of *Hieracium* are described from Orkney

by Dr. Dahlstedt—doubtfully welcome additions to our flora at the present juncture; and Hitchin, Herts, continues to provide new *Taraxaca*. Full descriptions of the linear-leaved Potamogetons are extracted from Prof. Fernald's recent Monograph of the group, and the volume is reviewed at some length, but the full citation of the author's criticisms of the late Arthur Bennett's work seems hardly necessary.

The Report has been largely compiled by the efforts of numerous members of the Club, who have contributed a variety of articles. Messrs. Wilmott and Gilmour give a set of abstracts of recent papers concerning the British Flora: Mr. P. M. Hall has a long review of Col. Godfery's new Monograph of our orchids: Mr. Pearsall treats of *Zanichellia*: Mr. W. D. Miller gives an interesting account of the rare plants of Somerset: Dr. Sprague writes a synopsis of the Rules of Plant Nomenclature, which the botanical members should find most useful: and Mrs. Sandwith supplies a full account of the Adventive Flora of Bristol. These seem to be the outstanding papers, but there are others of interest, and the report as a whole reflects considerable credit on the club.

The second part is the Report of the Exchange Club, occupying 33 pages, and edited by the Distributor, Dr. W. A. Sledge. The number of specimens contributed is 2291, sent in by 22 members—a material decrease even as compared with last year. The decline in the activities of the exchange members, taken in conjunction with the similar symptoms shown by the Watson Club, appears to indicate a diminishing interest in critical taxonomic botany. Dr. Sledge's Report, nevertheless, fully maintains the standard of interest of its predecessors.—H. W. P.

Handbuch der Pflanzenanalyse. Edited by G. Klein. Bd. IV. *Specielle Analyse*, Theil III. Roy. 8vo, pp. xii, 1868, text-figs. 121. Springer: Vienna, 1932. Price R.M. 190.

This volume, which is issued in two parts, concludes the section on Organic Compounds from Vol. III, a notice of which appeared in this Journal for July (p. 205), and follows the same general plan of treatment. Twenty-six specialists have contributed to the various sections, which deal with amino-acids, amides, proteids, nuclein, alkaloids, enzymes, toxins and antibodies, plant-hormones, and vitamins. The volume concludes with a section on special methods of analysis. As in previous parts the distribution of the various substances among plant families (with indication of species) is given in detail. The treatment of the work is naturally chemical, but with the increasing interest in bio-chemistry it should be a valuable addition to a well-equipped botanical library.

Chemistry and Physics for Botany and Biology Students. By E. R. Spratt, D.Sc., F.L.S. Second Edition. Sm. 8vo, pp. vii, 284, frontisp. and 128 text-figs. University Tutorial Press: London, 1933. Price 3*s.* 6*d.*

The addition of chemistry and physics to the syllabus of school examinations in botany has been a source of difficulty to teachers, especially in schools not equipped with a chemical laboratory. Dr. Spratt's little handbook will help to smooth the way for them. The apparatus used in the experiments is of the simplest, the line-figures are conveniently placed, and the explanatory text is clearly expressed. The frontispiece is a well-planned picture of the relation between chemistry and physics and the life-processes of the plant, but the book is in no sense a botanical text-book, and contains much that is not required by the examiners of the elementary student. The overworked teacher who has often to make bricks with very little straw will find in the volume a handy and inexpensive friend.

An Index to the Genera and Species of the Diatomaceae and their Synonyms, 1816–1932. By F. W. Mills. Part 1, Vol. I, A–C. 4to, pp. 74. Wheldon and Wesley: London, 1933. Price 10*s.*

The study of Diatoms has become nowadays largely a matter for the specialist, but even he is confronted with a huge array of species and a complicated synonymy. Every attempt to give an oversight helpful to the systematist is therefore to be welcomed. Mr. Mills's 'Index' has such an object in view, and it is evident that the compiler has been at pains to produce a synopsis of real value. It may be doubted, however, if any single individual could accomplish such a task successfully, and a cursory inspection of the 'Index' shows that it is far from being complete. One of the more serious omissions is that of Carlson's paper on the freshwater Algae of the Antarctic (Wiss. Ergebn. d. Schwed. Südpolar-expedition, 1901–3, iv, 1913) from the bibliography, and the consequent absence of a species and a form of *Achnanthes*, described by him, from the relevant part of the index. The basis upon which the bibliography has been compiled is not clear. Thus, it is not comprehensible why Klebahn's valuable paper on *Rhopalodia*, in view of its exclusive morphological and cytological interest, should be included, while the recent one by Geitler dealing with form-variation and many other matters of taxonomic interest is omitted. Many other criticisms of a similar type cannot find a place in a brief review.

The 'Index' appears in typescript, and, apart from doubts as to the degree of permanence of this method of reproduction, it has led to the presence of innumerable errors, which would

largely have been avoided in a printed work. The citations, for instance, of Brandt's paper on p. 6 and of Klebahn's on p. 30 are travesties of the true titles. The complete absence of French accents is disturbing.—F. E. FRITSCH.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY OF LONDON.—At the first General Meeting of the Session, the President, Prof. F. E. Weiss, F.R.S., read the names of those Fellows who had died during the recess, the Fellows present showing their sympathy by rising from their seats. The President stated that during the recess Dr. Alexander Zahlbruckner, F.M.L.S., had celebrated the completion of fifty years' research in Lichenology, having taken his doctor's degree at the University of Vienna in 1883. The President exhibited and gave an account of an example of phyllody in *Tropaeolum majus* sent by Miss P. M. Taylor, F.L.S. The Botanical Secretary, Mr. J. Ramsbottom, gave an account of some correspondence between C. H. Persoon and James Edward Smith relative to a number of specimens in the possession of the Society which proved to be types of some of Persoon's species of Fungi. At the Meeting on November 9, the President exhibited and commented on a specimen of white-fruited *Euonymus europaeus* from near Bristol, sent by Mr. H. Stuart Thompson. Mr. A. D. Cotton exhibited balls of the freshwater Alga *Cladophora*, from Ireland, and described their structure and habit. Mr. C. V. B. Marquand gave an account, illustrated with an excellent series of lantern-slides of the topography and vegetation of the Island of Rum.

THE LATE DR. JOHN BRIQUET.—The 'Journal de Genève,' October 7, gives an account of the inauguration ceremony in the Museum of the Botanic Garden of the bust of Dr. John Briquet, which was presented to the town of Geneva by a committee representing botanists and friends of the late Director.

CANON BULLOCK-WEBSTER'S CHAROPHYTA.—It is much to be regretted that owing to serious illness Canon Bullock-Webster has been unable to continue the work on the Charophytes in which he so admirably partnered the late James Groves. He has recently made a generous distribution of sets from his collection to the Universities of Leeds, Bristol, and Cardiff, and also to Mr. G. O. Allen, whom we are glad to know is carrying on the work in this group.

APPOINTMENT.—We congratulate our contributor Dr. B. F. Barnes, Lecturer in Botany, Birkbeck College, on his appointment to the headship of the Department of Biology, Chelsea Polytechnic, to succeed Mr. H. B. Lacey, who is retiring after many years of service.

INDEX.

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