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CORRIGENDA.

P. 27, last line, for "WILLMOTT" read "WILMOTT."
P. 30, l. 30 from bottom, for "Sibthorpe" read "Sibthorp."
P. 35, l. 19, for "foliis immaculatis" read "foliis maculatis et immaculatis."
P. 38, l. 8 from bottom, for "have unspotted" read "sometimes have unspotted."
P. 60, l. 26, for "Grose" read "Ghose."
P. 83, l. 12, for "LATIFOLIA" read "*latifolia*."
P. 96, l. 37, for "1923" read "1918–23."
P. 98, l. 19, for "*bulbocodium*" read "*Bulbocodium*."
P 99, l. 32, for "Solons" read "Solms."
P. 106, l. 25, for "*mexicnna*" read "*mexicana*."
P. 166, l. 20, for "domonstrated" read "demonstrated."
P. 210, l. 21, for "idiochrosomes" read "idiochromosomes"
P. 224, l. 39, for "Malmo" read "Malmö."

SUPPLEMENT.

P. 33, l. 4 from bottom, read "**glabrifolium.**"
P. 38, l. 35, for "**F.**" read "**E.**"

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THE FLORA OF STEART ISLAND.

By H. STUART THOMPSON.

ON August 13, 1923, I made a fairly exhaustive survey of the phanerogamic vegetation of Steart Island at the mouth of the river Parrett in Somerset, which small flat isle I had not visited for many years. Two days earlier I did the same thing on Steart Point, that narrow stretch of marsh land, sand, and mud immediately west of the Parrett mouth. At low tide the Point is connected with the island by three-quarters of a mile of mud, across which cattle have from time to time been driven in order to graze upon the herbage in the centre of the island.

The river Parrett is half a mile wide at the northern extremity of Steart Point. Its sudden contraction between here and Combwich, where was an ancient passage, is the chief cause of the tidal bore so well known at Bridgwater. The fact that Steart Point is remote from villages, though the little hamlet of Steart, or Stert on the old maps, possesses a church, a couple of farms and various other houses, explains why it has not often been visited by botanists. I believe the late E. S. Marshall was one of the last to go there, in 1915; he and Mr. C. E. Salmon also botanised there in 1907. Among earlier botanists who collected both at Steart and on the island was Thomas Clark, jun., many of whose specimens in my possession are dated 1824 and 1826. His friend, the Rev. J. C. Collins, sent MS. notes of some of these to H. C. Watson for the *Supplement* to the *New Botanists' Guide*, 1837; but both there and in Murray's *Flora of Somerset* the name Steart was used somewhat vaguely—sometimes for the Island and sometimes for the Point, or "Steart Marsh," as it appears occasionally in Murray and in Mr. White's *Flora of Bristol*.

The object of this article is to make some observations on the ecological and other features of Steart Island and Steart Point, to enumerate some plants not hitherto specially recorded thence (prefixed by an asterisk), to mention a few probably extinct species, and to correlate these observations with the flora of the mainland about Burnham and Berrow on the east and about the coast west of the Parrett. The river divides v.c. 6 ("N. Somerset") from v.c. 5 ("S. Somerset") as far as Langport, thence its main tributary, the

Yeo, is followed to Ilchester; but Watson then chose an arbitrary line "curving round to the northern extremity of Dorset," instead of following in a natural manner the Yeo to the Dorset border just east of Yeovil. Steart Island is actually in v.c. 5, for the channel of the Parrett separates it from the coast at Burnham; but sometimes the island has been taken as belonging to N. Somerset, and here again there has been ambiguity. However, that Steart Island records should appear in the *Flora of Bristol* (1912) was certainly worth while, and adds to the interest of that most useful book. Marshall put the Island in Murray's Div. 3 of Somerset, whereas he put Steart Point in Div. 2; the dividing-line between 2 and 3 runs right up to Steart Point.

At high tide it is a simple matter to get rowed across from Burnham pier to the island, less than three-quarters of a mile to the S.W. It is difficult to get back at low tide, on account of the extensive stretches of soft mud. On August 13th I had arranged to be met and return at low tide; but after crossing much mud and soft sand I got involved in a quicksand and turned back, to be picked up 2½ hours later. I was then told that slight quicksands are better negotiated quickly, and not at the cautious pace at which I was proceeding.

The most apparent and pleasing thing about the flora of both Steart Island and Steart Point is the great quantity of *Glaucium flavum* and *Eryngium maritimum*; these handsome plants have become extremely scarce between Burnham and Brean Down, where formerly they flourished. Both appear in Herb. T. Clark from Steart Island, 1824.

All round the island Salicornias abound in greater or less quantity. On the southern beach of flat pebbles and mud, four to six feet lower than an area of shingle and sand, small plants of **Salicornia dolichostachya* (new to v.c. 5) appeared among *S. herbacea* and *S. ramosissima*, with *Suæda maritima* and *Spergularia neglecta* in small quantity. Some acres of the south-western shore are more muddy and bright green with *Salicornia*.

On the south-east side of the island a sandy beach extends 150 yards to low-water line; then due east is a salt-marsh with pools and small channels. *Salicornia*, *Triglochin maritimum*, and *Suæda maritima* are dominant, *Spergularia salina* var. *neglecta* Syme sub-dominant, *Glyceria maritima* not very frequent, and *Glaux maritima* still less so. *Thrift (*Armeria maritima*) is small, and as yet very scarce. There is no record for Thrift in v.c. 5 nearer than Bossington and Porlock, many miles westward. The plant is strangely local in Somerset.

Adjoining the salt marsh is a large dry sandy area partly covered with *Salicornia*, *Spergularia*, and *Suæda maritima* cropped by rabbits. Further north the marsh is mostly covered with *Plantago maritima*, *Triglochin maritimum*, *Juncus Gerardi*, and a little Thrift.

The north end of the island below high-water mark is chiefly flat pebbles and mud, rather bare of phanerogamic vegetation except for *Salicornia* here and there; but with a few algæ such as *Fucus canículatus*, *F. serratus*, *Enteromorpha intestinalis*, and the red alga *Chondrus crispus*.

The west and north-west shore below high-water is also of mud and pebbles, with less *Salicornia* than at the S.W. end, and with hardly any other vegetation.

The island, which tapers at both ends, is only about 250 yards wide at the broadest part of the crown, and perhaps 300 yards wide at high-water mark of ordinary tides. Its length is about 750 yards at H.W.O.T.

To return to the south end—about three feet below the main grassy area of the island is a strip of dry sand and shingle 90 yards wide and within the influence of the highest tides. Its vegetation consists of *Salsola Kali*, *Arenaria peploides*, *Euphorbia Paralias*, *Eryngium maritimum*, *Glaucium flavum*, **Ononis horrida*, **Sedum acre*, *Erodium cicutarium* var. *vulgatum* Syme (var. *chærophyllum* in Herb. Clark), *Cerastium *tetrandum*, burnt up, *Arenaria serpyllifolia* var. **viscidula* Roth., **Leontodon nudicaule*, **Carduus arvensis*, *C. *lanceolatus*, **Convolvulus arvensis*, **Plantago Coronopus*, **Chenopodium rubrum*, *Atriplex hastata* var. *salina*, **Rumex crispus*, *Carex arenaria*, *Triticum junceum*, and a great quantity of a fleshy form of **Anagallis arvensis*, mostly burnt up by the drought. Here on the dry sandy ground was the lichen *Cladonia rangiformis* Hoffm., mixed with *Camptothecium lutescens*, which moss is frequent on the drier parts of the isle. The only other lichen collected has been named *Peltigera canina* Willd.

Some of the above, and particularly *Eryngium maritimum*, *Glaucium flavum*, *Euphorbia Paralias*, Docks, etc., are prevalent as strand-plants on the pebbly eastern side, where also are *Beta maritima*, *Conium maculatum*, *Atriplex patula*, **Sonchus arvensis*, much **Senecio Jacobæa*, *Carduus tenuiflorus*, **Dipsacus sylvestris* (also on the Steep and the Flat Holm Islands), and a small depauperate form of **Galium Aparine*, some of which were only two inches high but fruiting. Strand-plants are very few on the west side, doubtless because of the force of the prevailing winds which cause greater wave-action.

The main sandy grass area is largely composed of *Carex arenaria*, *Festuca rubra*, *Lotus corniculatus*, *Ononis horrida*, *Galium verum*, *Sedum acre*, *Eryngium maritimum*, *Arenaria peploides*, and *A. serpyllifolia*. *Ammophila arenaria*, not in flower, extends from the wooden hut to the bank of pebbles and sand four feet high on the east side. This small hut is the only building on the island. In smaller quantity, chiefly on the rabbit-warren, are *Plantago Coronopus*, *P. maritima*, *Cerastium triviale*, **Carduus tenuiflorus*, *Leontodon nudicaule*, **L. autumnale*, **Crepis virens*, and *Beta maritima* only 6 inches high. A depression of clean sand, flooded in winter, contained *Chenopodium rubrum* seedlings and small **Juncus compressus* cropped by rabbits. In another depression was **Sagina maritima* in a dried-up state. The greenest part of this main area owes its fresh colour to the presence of the following:—*Festuca rubra*, *Agropyron pungens*, *Juncus Gerardi*, *Hordeum pratense*, *Agrostis alba* *var.

stolonifera (but very short, as also at Steart Point), **Trifolium repens*, **T. fragiferum* in small quantity, *Lotus corniculatus*, **Potentilla Anserina*, and *Cerastium vulgatum*. There was also one small plant of **Œnanthe Lachenalii* and a little **Carex hirta*. A colony of dwarf **Phragmites communis* occupies a space nearer the west shore.

I saw not more than about 70 species and varieties of phanerogams at Steart Island; probably not 100 phanerogams and no vascular cryptogams have been collected or recorded thence. This number is not large, but there are factors which diminish the chances of a large flora, viz., the very exposed position, no fresh water (not even *Hydrocotyle* was seen), and the "rock" is nothing but sand, pebbles, or saline mud. Moreover, the highest part is not 10 feet above the level of the highest spring-tides.

I failed to find *Artemisia maritima*, which T. Clark collected there in 1829; this is extremely common on the Parrett wall between Steart and Combwich, where in 1907 Marshall and Salmon found the variety *gallica*. Nor did I see *Erigeron acre* (Herb. Clark, 1824), *Trifolium arvense* (Herb. Clark, 1824, and J. W. White, 1884—this plant is less abundant on the mainland sand-hills than 30 years ago), *T. striatum* (J. W. White), *Statice binervosa* (1902, C. E. Moss), *Triglochin palustre* (Herb. Clark, 1824), or *Cakile maritima* (loc. cit. 1824). Marshall said in 1914, "It still grows in plenty at Steart Point"; but I saw it there in very small quantity. It varies much in its appearance from year to year on the Somerset coast, and was far more frequent north of Burnham in 1923 than in 1921.

Among other plants of the mainland expected to grow at Steart Island, but not seen by me, nor specially recorded thence, are *Lycopsis arvensis*, *Cynoglossum officinale*, *Calystegia Soldanella*, *Trifolium scabrum*, *Euphrasia*, *Hordeum marinum*, *Festuca uniglumis*, and *Phleum arenarium*.

Steart Point.

Steart Point resembles the island in having no exposed rock. It is a mere expanse of sandy alluvium separated from the sea by a tract of more sandy ground and a long shingle or pebble beach. Below the pebbles is a narrow belt of hard sand, beyond which stretch northwards for two miles the muddy Steart Flats, covered at every high tide. The island of Steart is at the eastern extremity of these flats.

Approached from Cannington and Otterhampton the road passes through an alluvial tract cut up into large grass fields by rhines containing many of the usual water-plants of the Somerset levels near the sea. The very large pastures nearer Steart are composed almost entirely of *Hordeum pratense*, with a small *Poa* beneath, which was too dried up in August for identification.

In a corner of a large pasture adjoining the bank of pebbles was a little **Juncus compressus* and *Bupleurum tenuissimum*. Let us work our way eastwards towards the church and beyond. The broad bank of shingle has plenty of *Glaucium flavum* and *Eryngium maritimum*, *Sedum acre*, *Hordeum marinum*, *H. murorum*, *Festuca*

rubra var. **arenaria*, a little *Euphorbia Paralias*, and *Matricaria inodora* var. *salina*. The vegetation between the pebble beach and the field is chiefly *Carex arenaria*, *Triticum pungens*, *T. junceum* (small), a little *Carex distans*, *Galium verum*, *Plantago Coronopus*, *Arenaria peploides*, and a little *Trifolium *fragiferum*. Close by were *Juncus Gerardi*, *Spergularia neglecta*, *Leontodon autumnale*, *Lotus corniculatus*, *Cerastium tetrandrum*, and *Ononis horrida*.

The next field towards the village has a closer pasture, with *Festuca* spp., *Carex arenaria*, *Lotus corniculatus*, and *Ononis horrida* dominant. The sand-bank near the church produces **Salvia Verbenaca*, *Lycopsis arvensis*, and a curious form of *Phleum pratense* with short awns to its truncate glumes, but outwardly more like *P. arenarium*. *P. pratense* of normal height, but with still shorter awns to the glumes, has since been found by Mr. Gibbons at Bedminster, Bristol.

On the shingle opposite the village are *Anthriscus vulgaris* and *Atriplex Babingtonii*. And on low incipient dunes are *Carduus tenuiflorus*, *Beta maritima*, *Triticum junceum*, *Carex arenaria*, *Festuca rubra* var. *arenaria*, with a little *Cakile maritima*, Teasels (*D. silvestris*), and *Solanum nigrum*—all as strand-plants at or just above high-water mark. The sandy top of the pebbles here has *Malva rotundifolia*, small *Agrostis alba* var. *stolonifera*, great masses of *Salsola*, *Polygonum aviculare* var. *littorale* Koch, *Lychnis alba*, and *Senecio Jacobœa*. I saw no *Polygonum Raii*, which in 1907 Marshall found abundant in sand; but this is erratic in its appearance, and has at least temporarily disappeared from the mainland N. of Burnham.

Orobanche minor, on *Ononis*, was seen in a field of close herbage nearer the actual Point. About half a mile north of the furthest farm-house is the last low stone wall separating the enclosures. Beyond this are no strand-plants on the pebbles. Saltings called "Eighty Acres" extend from this low wall to the end of Steart Point.

Whatever vegetation there may be on the muddy Parrett side of the Point, I saw on August 11th only fourteen plants of *Salicornia* (*S. ramosissima* and *S. europæa*) on the whole of the north coast, and in a very confined area. Nor did I see any *Suæda maritima* except on the Parrett bank a mile south of the village, where towards Combwich it and *Salicornia* are frequent. The almost total absence of *Salicornia* or of any phanerogamic vegetation on the actual seashore at Steart Point is remarkable, especially since acres of the island shores are green with *Salicornia*. *Elymus arenarius*, recorded by Collins from "Steart," has not, I believe, been seen there since. It is very rare on the Somerset coast, but is now well established in an enclosure of sand on the coast at Burnham.

Conclusion.—An examination of the facts concerning the flora of Steart Island and that of the mainland is somewhat disappointing. Apparently the Island does not produce, and has not for a hundred years, a single species or variety which does not occur in greater or less frequency on the seven miles of sandy seaboard between the Brue and Brean Down; and few species which have not also been observed

at Steart Point. At least four times as many Phanerogams occur on those seven miles of littoral, within 500 yards of the shore, as upon the Island. But that coast is particularly rich; several freshwater ditches come within that distance of the sea, and formerly there were good marshes on the dunes.

Insular floras are usually of extreme interest, partly because large islands surrounded by deep water, *e. g.* those of the Mediterranean, are often sanctuaries for plant types which have become extinct on the mainland. Steart Island is so small and so nearly connected by shallow water with the mainland, as well as being geologically recent, that it does not contain a single endemic species or variety in so far as even the county of Somerset is concerned. Nor do any of the islands of the Bristol Channel contain any such endemic plant not found on the mainland, unless the Steep Holm Peony, not noticed till near the end of the 18th century, be regarded as indigenous—which is contrary to the usual belief. *Allium Ampeloprasum*, naturalized since 1688 on the Steep Holm, is an alien there and on the Flat Holm. The total number of Phanerogams and Vascular Cryptogams found on Steep Holm island has been put at about 150; but it must be remembered that this is a Carboniferous Limestone island 250 feet high, and part of it has long been cultivated, so that many weeds of cultivation have been introduced. Very few aliens have become established on Steart Island—*e. g.*, neither *Œnothera biennis* nor the Patagonian *Œ. odorata*, both of which retain their hold on the Burnham sand-hills. The former was first recorded thence in 1834 by Dr. Gapper in the Bath and Bristol Mag. vol. iii. and the latter was gathered by T. Clark in 1859.

Carex arenaria appears to be the most generally distributed plant on the sandy island of Steart and on the sandy littoral of Somerset both east and west of the Parrett. Where the low front dunes are subject to erosion, its long underground stems can sometimes be traced for 8 or 10 feet—occasionally quite exposed. Both there and further inland, where there is a gradual transition to "Dune Pasture," it is the chief agent in matting the sands together, for it extends much further landwards than Marram Grass, and is the dominant species of the Association of Dune Sward-forming plants. *Triticum junceum*, *Festuca rubra* var. *arenaria* Fries, *Euphorbia Paralias*, *Ononis horrida*, *Lotus corniculatus*, *Sedum acre*, *Erodium cicutarium*, *Arenaria serpyllifolia*, *A. peploides*, *Cerastium tetrandrum*, *C. semidecandrum*, *Leontodon nudicaule*, *L. autumnale*, *Plantago Coronopus*, *Galium verum*, and *Salsola Kali* are among the next most frequent plants common to the Island and sandy mainland. Of salt-marsh plants common to these areas the most abundant are *Salicornia herbacea*, *S. ramosissima*, *Triglochin maritimum*, and *Spergularia neglecta*. *Suæda maritima*, *Plantago maritima*, *Spergularia salina*, and *Aster Tripolium* are increasing locally. *Glyceria maritima* is abundant only on the muddy mainland at the mouth of the R. Brue and S.W. of Berrow Church, as far as this part of the coast is concerned.

Since my paper on "Changes in the Coast Vegetation at Berrow, Somerset," was published in the *Journal of Ecology* (May 1922), further great changes have been observed. The rapidly forming salt-marsh now extends on the south to within 25–30 yards of the sand-dunes proper. Hundreds of plants of *Aster Tripolium* are now visible, and scores of *Spartina Townsendi*, many quite small and of low stature, are scattered over a large area, whereas in 1921 there were only three clumps. The deep and long channel then mapped by me as entering the Parrett mouth near the small Lighthouse has become almost entirely silted up. Important changes in the configuration of some of the exposed dunes have also been observed. The phenomenal tides on and about October 10, 1923, have probably caused fresh changes.

A RECENSION OF LOPEZIA.

By T. A. Sprague, B.Sc., F.L.S., and L. A. M. Riley, B.A.

The genus *Lopezia* (*Onagraceæ*) is interesting on account of the pronounced median zygomorphy of its flowers, which have a single posterior stamen, an anterior petaloid staminode, and one or two glistening sham nectaries resembling drops of gum on each of the two posterior petals, the two anterior petals being unmodified (Eichler, *Blüthendiagramme*, ii. 457, f. 188 E). Pollination is effected in *L. coronata* and *L. racemosa* by means of an explosive mechanism. In the first stage the stamen is enclosed in the staminode, the filament being in a state of upward, and the claw of the staminode in a state of downward, tension. The visiting insect—attracted, according to Delpino, by the sham nectaries—alights on the staminode, the lamina of which jerks downwards, while the stamen jerks upwards and scatters its pollen on the lower surface of the insect's body. The style, which at this stage is only about half as long as the stamen, elongates rapidly and acts as a new alighting-place. The true nectaries are situated at the base of the stamen and staminode (Knuth, Handb. Blüthenbiol. ii. 403; Engl. ed. ii. 447).

Lopezia appears to be confined to Mexico and Central America, its extreme range being from the State of Chihuahua in the north to the volcano of Chiriqui, Panama, in the south. H. Leveillé described (Fedde Repert. iv. 226; 1907) a supposed new species from Brazil, based on Glaziou 14701, but this number is *Diplusodon virgatus* Pohl (*Lythraceæ*) according to Glaziou's *Liste* (Bull. Soc. Bot. France, Mém. 3, 302; 1909).

The genus *Lopezia* is commonly cited from Cav. Ic. i. 12, t. 18 (1791), and the name *L. racemosa* Cav. (*l. c.*) is adopted for the type-species. But an excellent coloured plate of this species with enlarged figures of the flower was published five years earlier by Jacquin (Ic. Pl. Rar. ii. t. 203) under the name *Lopezia mexicana*. The title-page of Ic. Pl. Rar. vol. ii. is dated 1786–93, and the letterpress relating to *L. mexicana* appears on p. 1, t. 203 being the third plate in the volume—hence we may assume that both text and plate appeared in 1786. Consequently, under International Rules (Art. 37),

L. mexicana takes precedence of *L. racemosa*, under the provision that plates accompanied with analyses are equivalent to a description.

It is a moot point, however, whether a plate with analyses can be regarded as the equivalent of a *generic* description. Art. 38 states that a genus named "without being characterised conformably to Art. 37 cannot be regarded as effectively published." The question is whether the words "conformably to Art. 37" cover the second paragraph of that article or not. If not, the species *Lopezia mexicana* Jacq. (1786) is valid, although the genus *Lopezia* was not effectively published until 1791. Similarly, the species *Philgamia hibbertioides* Baill. was effectively published in 1894 (Grandidier, Madag., Bot. t. 265), although the genus was not validated by any sort of description until 1908 (Dubard et Dop in Rev. Gén. Bot. xx. 354). If, on the other hand, a plate with analyses is equivalent to a generic description, then the genus *Lopezia* should be cited as *Lopezia* [Cav. ex] Jacq. (1786) instead of *Lopezia* Cav. (1791). But if this interpretation of Art. 38 is correct, a botanical name-monger may secure effective publication of any number of new generic names, *without giving diagnoses*, simply by citing plates with analyses published before 1908. The text of the Rules obviously requires emendation.

The generic name was given by Cavanilles in honour of the Licentiate Thomas Lopez of Burgos, who lived in the reign of the Emperor Charles V. The type-species must have been in cultivation in the Botanic Garden, Madrid, for some years prior to 1791, when Cavanilles published his description and plate, for Jacquin states (Coll. v. 1) that he received seeds of it under the name *Lopezia mexicana*, and his plate was published in 1786 (Ic. Pl. Rar. t. 203). Jacquin's description of *L. mexicana* (Coll. v. 1), though not published until 1796, was apparently written in 1786 or earlier, as he cited "Jacq. Coll. vol. v." under *L. mexicana* in Ic. Pl. Rar. ii. 1, t. 203.

A revision of the species has long been required. Many of the older ones are very imperfectly known, and much valuable information as to their characters and affinities is obtainable only by a prolonged search in the scattered literature of the genus. The most important recent contribution to our knowledge is a paper by Rose in Contrib. U.S. Nat. Herb. xii. 298–301. He devoted a large amount of time to "a review of the names of 33 species of *Lopezia*," but unfortunately did not publish his conclusions, confining himself to describing nine new species, all from Mexico. No adequate revision of the genus can be written until a thorough recension of the known species and especially the older ones has been accomplished. For the present it is convenient to group the species in two series according to the number of tubercles on the posterior petals:—

Ser. I. UNITUBERCULATÆ: *mexicana, hirsuta, coronata, axillaris, cordata, minuta, oppositifolia, minima, lineata, hæmatodes, albiflora, gracilis, angustifolia, foliosa, elegans, glandulosa, parvula, Pringlei, Smithii, corymbosa.*

Ser. II. BITUBERCULATÆ: *miniata, pubescens, trichota, paniculata, cornuta, oaxacana, Palmeri, stricta, violacea, tepicana, pauciflora.*

The number of tubercles is not known in *L. pumila* Bonpl., *L. integrifolia* DC., and *L. conjugens* [sic] Brandegee. In the following synopsis the species are arranged in chronological sequence, an index to the trivial names being given at the end.

1. L. MEXICANA Jacq. Ic. Pl. Rar. ii. 1, t. 203 (1786), Coll. v. 1 (1796); Willd. Sp. Pl. i. 18 (1798), excl. var. β; Vahl Enum. i. 3 (1805); Roem. et Schult. Syst. i. 32 (1817); Link Enum. i. 6 (1821); Schult. Mant. i. 49 (1822); Spreng. Syst. i. 16 (1825); Schlecht. in Linnæa, xii. 273 (1838); Loes. in Bull. Herb. Boiss. sér. 1, ii. 551 (1894).—*L. racemosa* Cav. Ic. i. 12, t. 18 (1791); Curtis Bot. Mag. t. 254 (1794); Ait. Hort. Kew. ed. 2, i. 10 (1810); Schrank in Nov. Act. Nat. Cur. ix. 90 (1818); J. E. Smith in Rees Cyclop. xxi. sp. 2 (1819); Mordant de Launay Herb. Gén. Amat. iv. t. 275 (1820); Drapiez Herb. Amat. viii. t. 578; DC. Prodr. iii. 62 (1828); G. Don Gen. Syst. ii. 698 (1832); Zuccarini in Abh. Akad. Muench. ii. 342 (1837); Burnett Pl. Util. iv. t. 119 A (1850)—*Pisaura automorpha* Bonato, Pisaura, p. vii, t. 1 (1793).—*Enthomanthus fibrosus* Mociño & Sessé ex Ramirez in An. Instit. Med Nac. Mex. vi. n. 2, p. 83 (1903).

MEXICO. Federal District: near Mexico city (fide Cav. *l. c.*); valley of Mexico, fl. Sept., *Bourgeau* 767; valley of Mexico, 7500 ft., fl. Oct., *Pringle* 6580; valley of Mexico, *Schaffner* 147; fields near Eslava, 7800 ft., *Pringle* 11990. Mexico State: Ozumba, 8500 ft., fl. Nov., *Pringle* 9796. Hidalgo: Real del Monte, *Coulter* 178; in cornfields and woods, and on mountains, Mineral del Monte, *Ehrenberg* (fide Schlecht. *l. c.*). Puebla: Rancho Posadas, fl. Sept., *Nicolas*; Talus, fl. Jul., *Nicolas*. Vera Cruz: valley of Cordoba, fr. Dec., *Bourgeau* 1603 partim. In fields near Velasco (position not traced), *Hartweg* 288.

Vernacular name "Parrilla" (Loes. *l. c.*).

"The first seeds that arrived in this country [England] were sent in a letter from Madrid in 1791 by the Abbé Cavanilles to the writer of the present article, and produced plants at Kew and Chelsea the following year, which bloomed abundantly in the autumn and were much admired" (J. E. Smith, *l. c.*). There are specimens in Herb. Mus. Brit. from Hort. Chelsea 1796 and Hort. Kew. 1797. There is also a sheet endorsed by Lambert "Mexico. Herb. Pavon" with a ticket: "Lopezia racemosa Gen. n. de Mexico." Pavon himself was never in Mexico, and it is conjectured that the Mexican plants in his herbarium formed part of the collections of Mociño and Sessé: see Hemsley, Bot. Biol. Centr.-Amer. iv. 120. The plants from Pavon in Herb. Mus. Brit. were purchased at Lambert's sale in 1842. Ramirez (*op. cit.* 68) quotes a document, dated 28 June 1814, from which it appears that certain manuscripts and herbarium specimens relating to the Expedición Botánica de México, left behind by Mociño when he fled from Spain, were handed over to Ruiz and Pavon.

The species figured by Bonpland (Descr. Pl. Rar. Malm. 65, t. 25; 1813) as *L. racemosa* is represented as having two tubercles on the claw of a posterior petal, whereas *L. mexicana* has only one.

2. L. HIRSUTA Jacq. Obs. v. 5, t. 15. f. 4 (1796); Vahl *l. c.*; Ait. Hort. Kew. ed. 2, i. 10 (1810); J. S. Kerner Gen. Pl. Sel. Spec. t. 2 (1811) [not seen]; Roem. et Schult. *op. cit.* 34; Schrank *l. c.*; J. E. Smith *op. cit.* sp. 1; Link *l. c.*; Spreng. *l. c.*; DC. *l. c.*; G. Don *op. cit.* 699; Zuccarini *op. cit.* 341; Schlecht. *l. c.*; Rev. Hort. 1877, 190, cum tab. col.; Gleason in *Addisonia*, vii. 35, t. 242 (1922).—*L. mexicana* var. β *hirsuta* Willd. Sp. Pl. i. 18 (1798).

MEXICO. Vera Cruz: in thickets near Jalapa, la Joya and Jalacingo, *Schiede* (fide Schlecht. *l. c.*); Jalapa, *Galeotti*; fields near Jalapa, 4000 ft., fl. and fr. April, *Pringle* 8127; valley of Cordoba, fl. Dec., *Bourgeau* 1603 partim; Orizaba, fl. Aug., *Sallé* 516; Fortin, fl. March, *Kerber* 391. Michoacan: San Miguel near Morelia, fl. Nov., *Arsène*; near Morelia, fl. and fr. April, *Arsène*.

Jacquin's description and figure of *L. hirsuta* are very inadequate. He merely stated that it agreed with *L. mexicana* but for the terete and long-hirsute stem and branches, more villous leaves, and the staminode being of the same colour as the petals. As in *L. mexicana*, the posterior petals are unituberculate (*cf.* Schrank, *op. cit.* 92, differential characters of *L. fruticosa*; J. E. Smith, *l. c.*, generic description).

According to Schlechtendal (*l. c.*) *L. hirsuta* was the only *Lopezia* seen by Schiede near Jalapa. Material belonging to various species has been referred to *L. hirsuta*. In the absence of any evidence to the contrary, we have accepted Schlechtendal's identification of the Jalapa species. Loesener has recorded *L. hirsuta* as collected by Seler in San Luis Potosi—we suspect, however, that Seler's specimens may be conspecific with Schaffner 640 from the same State. This was originally distributed as *L. hirsuta* and was subsequently referred to *L. pumila* (S. Wats. in Proc. Am. Ac. xvii. 357), but appears to be neither.

3. L. CORONATA Andr. Bot. Rep. t. 551 (1808); Ait. *l. c.*; Roem. et Schult. *l. c.*; J. E. Smith *op. cit.* sp. 3; Link *l. c.*; Schult. *l. c.*; Spreng. *l. c.*; Sweet Brit. Fl. Gard. ii. t. 108 (1825); DC. *l. c.*; G. Don *l. c.*; J. F. Jacq. Ecl. ii. t. 110 (1844).—*L. mexicana* var. *coronata* DC. Cat. Hort. Monsp. 1813, 39.

MEXICO. Stated to have been introduced into cultivation in England in 1805 by Messrs. Lee and Kennedy (Ait. *l. c.*). It is not known from what part of Mexico it came, and we have seen none but cultivated specimens.

L. coronata is closely allied to *L. mexicana*, from which it differs in the darker green colour of the stem and leaves, narrower and more coarsely toothed leaves, long unbranched inflorescences with foliaceous bracts, longer pedicels, and larger capsules. The posterior petals are unituberculate.

The plant figured in Rev. Hortic. 1905, n.s. v. 216, 217, as *L. coronata* is certainly not that species. It may be *L. mexicana*, judging from the relatively broad leaves, which are described as obscurely toothed, the short branched inflorescence, and the small bracts.

4. L. AXILLARIS [Thunb. ex] Schweigger in Königsberger Archiv, i. 236 (1811); and Enum. Hort. Regiomont. 44, adnot. 26 (1812); Schrank, *op. cit.* 91.

Reduced to *L. coronata* Andr. in Roem. et Schult. *l. c.* and DC. *l. c.*—probably correctly. We have seen no material. Schweigger stated that he had received the species under the name *L. axillaris* from Thunberg, and as *L. coronata* from England. His original description fits *coronata*, but the statement (Enum. Hort. Regiomont. 44, adnot. 26) that the capsule is pyriform in *mexicana* and globose in *axillaris* is puzzling. The capsule of *coronata* is, if anything, more "pyriform" than that of *mexicana*, but the shape seems to vary in both species.

5. L. MINIATA Lagasca ex DC. Cat. Hort. Monsp. 1813, 121; Willd. Enum. Hort. Berol. Suppl. 1 (1813); Lagasca Gen. et Sp. Nov. 1 (1816); Link *l. c.*; Spreng *l. c.*; DC. *l. c.*; G. Don *l. c.*; Zuccarini *l. c.*; J. F. Jacq. *op. cit.* t. 109; Ortgies in Gartenfl. vi. 265, t. 203 (1857); Loes. *l. c.*—*L. frutescens* Roem. et Schult. in Gmelin Hort. Carlsruh. 163 (1811), nomen nudum; Roem. et Schult. *l. c.* descr. *L. fruticosa* Hort. Par. ex Schrank *op. cit.* 92; Pl. Rar. Hort. Monac. t. 20 (1818).

MEXICO. According to Lagasca, *l. c.*, *L. miniata* was raised in the Botanic Garden, Madrid, from seeds sent from Mexico by Sessé in 1804. Loesener (*l. c.*) has referred specimens collected by Seler near Cuernavaca, Morelos, to *L. miniata*. The posterior petals are bituberculate (Zuccarini *op. cit.* 93; J. F. Jacq. *l. c.*), in which respect *L. miniata* differs from all the previously described species. We have seen cultivated material only. The type-specimen of *L. frutescens* Roem. et Schult. is in Herb. Mus. Brit.

6. L. PUMILA Bonpl. Descr. Pl. Rar. Malm. 67 (1813); H. B. K. Nov. Gen. et Sp. vi. 95 (1823); DC. *l. c.*; G. Don, *l. c.*; S. Wats. in Proc. Am. Acad. xvii. 357 (1882); et *op. cit.* xxii. 413 (1887).

MEXICO. Guanajuato: on hills at 6000–7740 ft. between Guanajuato and Santa Rosa, *Humboldt and Bonpland*.

A doubtful species. According to S. Watson (*op. cit.* xvii. 357) small specimens collected at Guanajuato by Dugès agree with the original description. These we have not seen. It is questionable whether Schaffner 640 from San Luis Potosi, and Palmer 487 from Guadalajara, Jalisco, which were referred more or less doubtfully by Watson (*ll. cc.*) to *L. pumila*, really belong to that species.

7. L. CORDATA Hornem. Hort. Hafn. ii. Add. 949 (1815); DC. *l. c.*; G. Don *op. cit.* 698.

Reduced to *L. mexicana* in Schultes *l. c.* and Sprengel *l. c.*, but kept apart by DeCandolle.

8. L. MINUTA Lagasca Gen. et Sp. Nov. 1 (1816).

Reduced to *L. coronata* ("fide Lagasca in litt.") in Schultes, Mant. i. 49 (1822), and DC. *l. c.* Sprengel (*l. c.*), on the other hand, cited it under *L. mexicana*.

9. L. OPPOSITIFOLIA Lagasca Gen. et Sp. Nov. 1 (1816); Schrank *op. cit.* 91; DC. *l. c.*; G. Don *op. cit.* 699.—*L. annua* Cerv. ex Lagasca *l. c.*; Hort. ex DC. *l. c.*

Cited under *L. mexicana* by Sprengel, Syst. i. 16 (1825). Posterior petals unituberculate—Schrank distinguished *L. fruticosa* from *L. oppositifolia* and other species, *inter alia*, by the bituberculate posterior petals.

10. L. MINIMA Lagasca ex Schrank *op. cit.* 92; Schult. *op. cit.* 50; G. Don *op. cit.* 698.

Known only from Schrank's description, reproduced by Schultes. Posterior petals unituberculate.

11. L. THYMIFOLIA Humb. et Bonpl. ex Schult. *l. c.* nomen nudum.

12. L. PUBESCENS H. B. K. Nov. Gen. et Sp. vi. 96 (1823); DC. *l. c.*; G. Don *op. cit.* 699.

MEXICO. Michoacan: in meadows near the town of Pazcuaro, 6780 ft., fl. Sept., *Humboldt and Bonpland*; dry wooded hills near Patzcuaro, fl. Nov., *Pringle* 3593.

Pringle's specimen agrees fairly well with Willdenow and Bonpland's description, except that the sepals are not glabrous, but minutely setulose outside towards the apex. The small hairs, however, may easily have been overlooked. The posterior petals are described as having 4 cruciate glands above the claw. This doubtless means 2 tubercles and 2 appendages, as in *L. miniata* and several of the new species figured by Rose (Contrib. U.S. Nat. Herb. xii. 299, 301).

13. L. INTEGRIFOLIA DC. Prodr. iii. 62 (1828); G. Don *l. c.*

MEXICO. Alaman.

Known to us only through DeCandolle's brief description, which does not mention whether the posterior petals are unituberculate or bituberculate.

14. *L. grandiflora* Zucc. in Flora xv. ii. Beibl. 101 (1832); Rev. Hort. 1879, 50, cum tab. col. = JEHLIA GRANDIFLORA Rose in Contrib. U.S. Nat. Herb. xii. 297 (1909).

15. L. LINEATA Zucc. in Abh. Akad. Muench. ii. 339 (1837); Benth. Pl. Hartweg. 37 (1840); Bot. Reg. xxvi. t. 40 (1840); Hemsl. Biol. i. 465 (1880); Gard. Chron. 1908, i. 294, f. 131.

MEXICO. Hidalgo: Banco, *Hartweg* 287. Vera Cruz: Orizaba, *Bilimek* 161.

According to Zuccarini, the pedicels of *L. lineata* are about 1 inch long, and the sepals are sparingly glandular-pilose outside. The above specimens, which have been referred to *L. lineata* by Bentham and Hemsley respectively, have shorter pedicels, and the sepals are not glandular-pilose but setulose outside.

16. L. TRICHOTA Schlecht. in Linnæa, xii. 273 (1838); Hemsl. *op. cit.* 466; S. Wats. in Proc. Am. Acad. xvii. 357.—*L. trichotoma* Steud. Nom. ed. 2, ii. 68 (1841), sphalm.

MEXICO. Chihuahua: cool ledges on mountains near Chihuahua, fl. Sept., *Pringle* 733. San Luis Potosi, *Parry and Palmer* 256; in swampy places near the town of San Luis Potosi, fl. Sept., *Schaffner* 641. Hidalgo: Cerro Ventoso above Pachuca, 8500 ft., fl. Aug., *Pringle* 9798; rocky hills near Metepec Station, 8300 ft., fl. June, *Pringle* 11991. Cuesta Blanca, among porphyry rocks, *Ehrenberg*.

L. trichota is a very distinct species, possessing several unusual characters. The ovary is densely glandular-pilose, all the petals are ligulate and villous, and the posterior are larger than the anterior. The former are bituberculate, the tubercles being unequal in size. The midrib of the staminode is produced into the sinus as a thick apiculus 0·3 mm. long.

Schlechtendal described the stamen of *L. trichota* as pilose, but all the specimens above cited have glabrous stamens. S. Watson was the first to indicate this discrepancy.

17. *L. macrophylla* Benth. Pl. Hartweg. 83 (1841); Fl. des Serres vii. 177, t. 709 (1851–52); Journ. Hort. Soc. vii. 278 (1852); Bot. Mag. t. 4724 (1853); Hemsl. *op. cit.* 465; Donn. Smith Enum. iii. 33 (1893) = JEHLIA MACROPHYLLA Rose, *l. c.* f. 39.

18. L. HISPIDA Sweet ex Steud. Nom. ed. 2, ii. 68 (1841), nomen nudum.

19. L. HÆMATODES Kunze in Linnæa, xvii. 579 (1843).

MEXICO. Described from a plant raised from Mexican seeds in the Botanic Garden, Leipzig.

Evidently closely allied to *L. mexicana*, from which Kunze distinguished it, *inter alia*, by the glandular-pilose pedicels and the white staminode, which, as a matter of fact, are also characters of *L. mexicana*. There is an authenticated specimen of *L. hæmatodes* in Herb. Mus. Brit.

20. *L. macrantha* Benth. ex Regel in Schweiz. Zeitschr. für Gartenbau, viii. 25 (1850).

Presumably a misprint for *L. macrophylla* Benth. We have not seen the periodical cited above, which was a precursor of *Gartenflora* (Bolton, Cat. Sc. Period. 517).

21. L. ALBIFLORA Schlecht. in Linnæa, xxiv. 696 (1851).

A doubtful species, described from a plant cultivated in the Botanic Garden, Halle. *L. albiflora* Donn. Smith, Enum. i. 14 (1889), differs notably in the shorter petioles, long-hirsute ascending pedicels, and densely setose sepals, and is described below as a new species, *L. corymbosa* (44).

22. *L. Galeottii* Planch. in Fl. des Serres, vii. 178 (1851–52) = JEHLIA GALEOTTII, comb. nov.

23. L. PANICULATA Seem. Bot. Herald, 120 (1853).

PANAMA. Veraguas: Volcano of Chiriqui; Boquete, fl. and fr., Febr.–March, *Seemann* 1225.

We find that the posterior petals are bituberculate. This character was not noted by Seemann.

24. *L. longiflora* Decne in Rev. Hort. sér. 4, iii. 221, t. 12 (1854) = PSEUDOLOPEZIA LONGIFLORA Rose *l. c.*

25. *L. insignis* Hemsl. Diagn. 16 (1878); Biol. i. 464, t. 30 (1880) = PSEUDOLOPEZIA INSIGNIS Rose *l. c.*

26. L. CORNUTA S. Wats. in Proc. Am. Acad. xxi. 429 (1886).

MEXICO. Chihuahua: Cumbre, *Palmer* 367. Durango: barranca below Sandia, 7000 ft., fr. Oct., *Pringle* 10103.

Remarkable for its horned capsules. We have examined a flower of Palmer 367, and find that the posterior petals are bituberculate. This was not mentioned by S. Watson.

27. L. GRACILIS S. Wats. in Proc. Am. Acad. xxi. 429 (1886).

MEXICO. Chihuahua: Cumbre, *Palmer* 337: San Diego Cañon, fl. Sept., *Hartman* 738; Sierra Madre, on damp shaded slopes, fl. and fr. Sept.–Oct., *Pringle* 1243; near Colonia Garcia, 7500 ft., fl. Aug., *Townsend and Barber* 281.

The posterior petals are ovate-oblong and unituberculate, the tubercle being flattened and inconspicuous in a dried state.

28. *L. clavata* Brandegee in Proc. Calif. Acad. Sc. ser. 2, ii. 157, t. 4 (1890)=PELOZIA CLAVATA Rose *op. cit.* 296, f. 37.

29. L. ANGUSTIFOLIA Robinson in Proc. Am. Acad. xxvii. 168 (1893).

MEXICO. San Luis Potosi: limestone ledges of Las Canoas, fl. Oct., *Pringle* 3990.

30. *L. Glazioui*, Léveillé in Fedde Repert. iv. 226 (1907)= DIPLUSODON VIRGATUS Pohl (vide Bull. Soc. Bot. Fr. Mém. iii. 302; 1909).

31. L. FOLIOSA Brandegee in Zoë, v. 250 (1908).

MEXICO. Vera Cruz: moist banks in the Barranca de Tenampa near Zacuapan, *Purpus* 2303 (Mus. Brit.).

The posterior petals are unituberculate with setulose claws, characters not given by Brandegee.

32. L. ELEGANS Rose *op. cit.* 298, f. 40.

MEXICO. San Luis Potosi: near Alvarez, fl. Sept.–Oct., *Palmer* 159.

33. L. GLANDULOSA Rose *l. c.* f. 41.

MEXICO. Zacatecas: on the road between Bolaños and Guadalajara, fl. and fr. Sept., *Rose* 3034.

34. L. OAXACANA Rose *op. cit.* 299, f. 42.

MEXICO. Oaxaca: San Felipe, fl. Oct., *Conzatti and Gonzalez* 509; *C. L. Smith* 844.

35. L. PALMERI Rose *l. c.* f. 43.

MEXICO. Durango: San Ramon, fl. April–May, *Palmer* 85.

36. L. PARVULA Rose *l. c.* 300, f. 44.

MEXICO. Durango: near La Providencia, 6500–8000 ft., fl. Sept., *Nelson* 4987.

37. L. PRINGLEI Rose *l. c.* f. 45.

MEXICO. Oaxaca: Sierra de San Felipe, 10,000 ft., fl. Sept., *Pringle* 6005; near Reyes, *E. W. Nelson* 1716.

38. L. SMITHII Rose *l. c.* f. 46.

MEXICO. Oaxaca: near Jaquacatlan, 4300 ft., fl. Nov., *Smith* 294.

39. L. STRICTA Rose *l. c.* 301, f. 47.

MEXICO. Jalisco: Sierra Madre west of Bolaños, fl. Sept., *Rose* 2979.

40. L. VIOLACEA Rose *l. c.* f. 48.

MEXICO. Morelos: Sierra de Tepoxtlan, 7830 ft., *Pringle* 8358.

41. L. CONJUGENS [sic] Brandegee in Univ. Calif. Publ. Bot. vi. 59 (1914).

MEXICO. Sinaloa; near Cofradia, *Brandegee.*

Brandegee remarks that "this species is intermediate between *Lopezia* proper and *L. clavata*, which has been included by Dr. Rose in his genus *Pelozia*." We have not seen any specimens. It is doubtful whether Brandegee intended to name the species "*conjugans*" or "*conjungens*," hence we have retained the original spelling.

42. **L. tepicana**, sp. nov. *Planta* gracilis, ramosa, caulibus teretibus retrorsum setulosis. *Folia* lanceolata vel ovato-lanceolata, usque ad 3·5 cm. longa et 1·7 cm. lata, perinconspicue denticulata, utrinque dense setulosa; petioli usque 1 cm. longi. *Racemi* caulem et ramos et ramulos terminantes, usque ad 25 cm. longi; bracteæ subulatæ, 1–3 mm. longæ, inferiores lineari-lanceolatæ, usque ad 6·5 mm. longæ; pedicelli minutissime sparse glanduloso-puberuli, sub fructu patentes vel sursum curvati. *Sepala* glabra. *Petala anteriora* ungue longo lineari, lamina obovata; petala posteriora bituberculata, biappendiculata.—*L. hirsuta* Hook. et Arn. Bot. Beech. 291; Benth. Bot. Sulph. 93; Seem. Bot. Herald, 283; non Jacq.

MEXICO. Tepic, *Sinclair* (Hb. Kew.).

More detailed descriptions of this species and the next will be given in L. A. M. Riley's "Contributions to the Flora of Sinaloa," which is in course of publication in the *Kew Bulletin.*

43. **L. pauciflora**, sp. nov. *Caulis* teres, flexuosus, patule ramosus, superne crispule pilosus, inferne breviter retrorsum setulosus. *Folia* lanceolata, acuminata, usque ad 5 cm. longa et 2·5 cm. lata, denticulata, utrinque breviter pubescentia; petioli usque ad 2 cm. longi. *Racemi* caulem et ramos terminantes, laxi, pauciflori; bracteæ foliaceæ; pedicelli pilosi, sub fructu patentes. *Sepala* extra setulosa. *Petala* anteriora ungue longo lineari, lamina oblongo-obovata; petala posteriora bituberculata, biappendiculata.—*L. racemosa* Seem. Bot. Herald, 283 (1856), partim, non Cav.

MEXICO. Western Sierra Madre, *Seemann* 2169 partim (Hb. Kew.).

Seemann's No. 2169, which he identified as *Lopezia racemosa*, comprises two species, *L. pauciflora* and *Pelozia laciniata* Rose. Many of Seemann's Mexican plants are labelled merely "Sierra Madre," and may have been collected either in Sinaloa, Durango, or Tepic. For an account of Seemann's itinerary in Sinaloa, see Kew Bull. 1923, 103.

44. **L. corymbosa**, sp. nov. *Caulis* erectus, ultra 40 cm. longus, inferne subteres, ceterum tetragonus, grosse hirsutus, rubidus, circiter 3 mm. diametro 30 cm. infra apicem; rami ascendentes, inferiores usque ad 15 cm. longi, dense hirsuti, in corymbos desinentes. *Folia* lanceolata, acute acuminata, basi cuneata, 2–3·3 cm. longa, 0·7–1·3 cm. lata, manifeste denticulata, utrinque præcipue subtus dense subappresse pilosa; petioli 3·5–7 mm. longi, hirsuti; folia ramorum pro rata minora. *Corymbi* 10–30-flori, 3–3·5 cm. longi; bracteæ foliaceæ, inferiores usque ad 1·5 cm. longæ, reliquæ sursum sensim minores; pedicelli 1·5–2 cm. longi, longe hirsuti, sub fructu ascendentes. *Alabastra* obtusa. *Flores* violacei (Galeotti). *Sepala* 5 mm. longa, extra præcipue superne dense setosa. *Petala anteriora* unguibus linearibus 3 mm. longis; petala posteriora unituberculata, ungue setuloso 1 mm. longo, lamina spathulato-lineari 3·3 mm. longa superne 0·5 mm. lata. *Anthera* 1·75 mm. longa. *Staminodium* ungue (statu applanato) 1·8 mm. longo basi 1·2 mm. lato sursum

cuneatim angustato, lamina subquadrata 2·4 mm. longa 3·2 mm. lata apice anguste excisa, sinu 0·6 mm. alto medio minute tuberculato.—*L. albiflora* Donn. Smith, Enum. i. 14 (1889), non Schlecht.

GUATEMALA. Alta Verapaz: Coban, 4300 ft., fl. Sept., *Tuerckheim in Donn. Smith* 766 (type in Hb. Kew.). MEXICO. Oaxaca: Chinantla, 4000 ft., *Galeotti* 3050.

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MYCETOZOA FROM NORTH INDIA.

BY G. LISTER, F.L.S.

AN interesting collection of Mycetozoa from North India was obtained by the Department of Botany, British Museum, in the spring of 1921 from Mrs. J. Drake. The specimens were gathered by her between the years 1912 and 1919 in four different districts, two in low-lying places and two on the hills, viz.: from Serampore, near Calcutta, and Bim Tal, United Provinces, both in the lowlands of the Ganges Valley; from Kotgarh, N.E. of Simla in the Sutlej Valley, over 1000 ft. altitude, and from Tindharia on the high land near Darjeeling, Sikkim. Many of the species are inconspicuous, and show that the collector had a trained eye and a skilled hand. The leaves and wood on which the specimens occur are fastened with

thread to the floor of pasteboard boxes, a method which enables them to be rearranged more easily than if they had been glued down. The good condition of the collection bears witness to the care that has been taken in preserving and packing these fragile objects.

Comparately few Mycetozoa seem to have been collected previously in North India, and the present series is especially valuable in extending our knowledge of the distribution of many species. Five of the thirty-seven species in Mrs. Drake's collection are new to Asia; five had not been recorded nearer to North India than from Japan, and twenty-three had not been found nearer than Ceylon and Malaya. One of the forms possesses such unusual features as to entitle it to receive a new varietal name.

The following is a list of the species found:—

BADHAMIA VERSICOLOR Lister. On bark, Bhim Tal, Sept. 1910. Clusters of small pinkish-brown sporangia with characteristic clustered spores. A rare species, or perhaps one that is often overlooked; recorded from Cornwall, Aberdeenshire, Germany, Switzerland, Ottawa, and Colorado.

PHYSARUM MELLEUM (Berk. & Br.) Massee. On dead leaves, Serampore, Sept. 1918. A fine colony of many hundreds of white-stalked orange sporangia, from which most of the spores have fallen. An abundant species in the tropics. Mrs. Drake writes that she found the specimen "under a Kadam tree" (*Anthocephalus Cadamba* Benth. & Hook., Fam. *Rubiaceæ*, a plant bearing heads of fragrant orange flowers), "when they [the sporangia] looked like the flowers of the tree in miniature, and reminded me of the exclamation of an aged hill-man when he saw some Mycetozoa, 'Oh! the children of the flowers!'"

P. LUTEO-ALBUM Lister. On wood, Kotgarh, Oct. 1912. Over a hundred dark orange sporangia on stout white stalks, which are often confluent in pairs and are arranged in rows. The pale yellow columellæ are not smooth and subglobose as usual, but are irregularly lobed and show a tendency to break up into large lime-knots. Recorded before from S.W. England, Holstein, North Italy, and Colorado.

P. NUCLEATUM Rex. On dead wood, Serampore, 1919. A small group of iridescent grey sporangia; the lime in the capillitium is in the form of crystalline nodules. Abundant in the tropics; recorded also from Cornwall, Roumania, South Africa, and the United States.

P. VIRIDE (Bull.) Pers. var. HINNULEUM, n. var. On much decayed wood, Tindharia, Oct. 1915. A large colony of lenticular nodding sporangia; they differ from the typical yellow form in being pale fawn-coloured or reddish brown, and having the fusiform lime-knots of the same colour; the stalks, instead of being dull brown below from enclosed refuse-matter, are ochraceous-yellow and are distended with calcareous deposits except at the slender apex; the base of the stalk is often constricted. Typical yellow sporangia have been found with deposits of lime in the stalks, but this is a rare occurrence; while in the present specimens lime-deposits are present in every stalk. Such a striking variety seems to require

a distinguishing name; I propose that of *hinnuleum* in reference to the fawn-coloured sporangia; var. *hinnuleum* may be described as follows:—sporangia and lime-knots fawn-coloured; stalks buff, enclosing calcareous deposits.

P. AURISCALPIUM Cooke. On dead wood, Serampore, 1919. The broken remains of pale yellow (possibly bleached) sporangia with yellowish-brown bases and short dark stalks. Recorded from Scotland, France, Germany, Switzerland, Portugal, the Cape, Malaya, and the United States.

P. ÆNEUM R. E. Fries. On the dead pinnæ of a small fern, Serampore, Sept. 1918. The few small scattered brown or iridescent sporangia form inconspicuous objects on the curled fern-pinnæ. This rare species had been recorded only from the West Indies and South America.

P. CINEREUM (Batsch) Pers. On dead leaves, Serampore, Sept. 1915. A widely distributed species.

LEOCARPUS FRAGILIS (Dicks.) Rost. On dead wood, Kotgarh, Oct. 1913. This species is abundant in temperate regions and rare in the tropics. The nearest locality to the present one that it has been found in is the high plateau of East Thibet.

DIDERMA EFFUSUM (Schwein.) Morgan, and D. HEMISPHERICUM (Bull.) Hornem., in great abundance on dead leaves at Serampore, Sept. 1918, packed together in several large boxes. The two species are nearly allied and resemble each other, but the discoid sporangia of *D. hemisphericum* are flatter, and have usually short white stalks.

D. RADIATUM (L.) Morgan. On dead wood, Bim Tal, Oct. 1911, and Kotgarh, Oct. 1912. The few mottled red-brown sporangia have short yellowish-brown slender stalks and pale subglobose or clavate columellæ; the capillitium threads are slender and nearly colourless, the spores are dark, 10 to 12 μ diam. This variable species is fairly common in temperate regions; in Asia the only previous record has been from Japan.

DIACHEA LEUCOPODA (Bull.) Rost. A very large colony on dead ferns, leaves, and twigs, found at Serampore, August 1918; a widely distributed species in both temperate and tropical lands.

DIDYMIUM ANELLUS Morgan. On dead leaves, Serampore, Sept. 1918. A group of typical slender curved or ring-shaped plasmodiocarps; recorded previously from England, Ohio, Colorado, and Ceylon.

D. CLAVUS (Alb. & Schw.) Rabenh., D. SQUAMULOSUM (Alb. & Schw.) Fries, and D. NIGRIPES Fries var. XANTHOPUS were found together on much decayed leaves; they are all abundant and widely-distributed species.

STEMONITIS FERRUGINEA Ehrenb. On dead wood, Tindharia, Oct. 1915. Widely distributed.

S. HERBATICA Peck. A large growth scattered in tufts over dead leaves and twigs, Serampore, Sept. 1914. Widely distributed.

COMATRICHA PULCHELLA (Bab.) Rost. Many small sporangia scattered over dead leaves, Serampore, Sept. 1914. This typical form is abundant in Europe, and has been found in Japan and near Singapore; in the tropics it is usually represented by the more cylindrical var. *gracilis* Lister.

LAMPRODERMA SCINTILLANS (Berk. & Br.) Morgan. On dead leaves, associated with the last species and *Diderma hemisphericum*, Serampore, Sept. 1918. Widely distributed.

CRIBRARIA ARGILLACEA Pers. On coniferous wood, Kotgarh, 1912. Common in the British Isles, Europe, and the United States, recorded also from the Cape, New South Wales, and Japan.

TUBIFERA FERRUGINOSA (L.) Gmel. On dead wood, Kotgarh, Oct. 1912. A small loosely-compacted cluster of iridescent sporangia. This is a widely-distributed species, less common in tropical than in temperate regions.

LYCOGALA EPIDENDRUM (L.) Fries. On dead wood, Serampore, Oct. 1918. One of the most abundant and widely-distributed species.

TRICHIA FAVOGINEA Pers. On dead wood, Kotgarh, Oct. 1912. Handsome clusters of shining yellow cylindrical sporangia; the elaters are narrower than usual, measuring only 5 to 6 μ in diameter; the spores are typical, being reticulated with bands which form a border nearly 2 μ wide. This species has been recorded from temperate regions only.

T. AFFINIS and T. PERSIMILIS Karsten, on dead wood, Kotgarh, Oct. 1913. These closely-allied species merge into one another, and the present gatherings illustrate intermediate forms. All members of this genus are more abundant in temperate than in tropical lands.

T. VARIA Pers. and T. DECIPIENS (Pers.) Macbride. Kotgarh, Oct. 1912. Both are common species except in hot climates.

OLIGONEMA FLAVIDUM Peck. On dead leaves, Serampore, Sept. 1918. This gathering differs from typical strong developments in several respects. The rather dull ochraceous sporangia often form short plasmodiocarps, and are either scattered or in small groups instead of being in dense shining clusters; the sporangium-walls are very pale buff as seen with transmitted light, and are thickened with scattered deposits of granular refuse-matter, instead of showing a perfectly translucent and strong yellow membrane. No capillitium was developed in the sporangia examined; this is often the case in weak forms of this and the allied species *O. nitens* Rost. The spores are typical and are beautifully and regularly reticulated. *O. flavidum* has been recorded from the United States, England, Holstein, Portugal, and Algeria.

HEMITRICHIA CLAVATA (Pers.) Rost., H. VESPARIUM (Batsch) Macbr., and H. SERPULA (Scop.) Rost. were found on dead wood, Kotgarh, Oct. 1912; they are widely distributed species.

ARCYRIA CINEREA (Bull.) Pers. On dead leaves, Serampore, Sept. 1918. Small scattered sporangia on long slender stalks. A widely distributed species.

A. STIPATA (Schwein.) Listn. On dead wood, Kotgarh, Oct. 1912. Rather weathered clusters of dull orange sporangia with fragile capillitium showing characteristic faint spiral markings as well as prominent half-rings. Not a common species; recorded from the United States, Europe (including England), Fiji Islands, and Japan; in India it has been found in Ceylon and Nepaul.

MARGARITA METALLICA (Berk. & Br.) Lister. On dead wood, Kotgarh, Oct. 1912. Two groups of shining golden-bronze almost confluent sporangia, with scanty and very fragile capillitium which has probably become brittle with age. Young sporangia are pearl-grey or pinkish grey, but this colour fades in time to an ochraceous shade. A widely distributed species in temperate regions; recorded also from Malaya.

Although many of the Mycetozoa have a wide range of distribution, certain species and even genera are found to be characteristic of temperate, warm, or cold climates. This is borne out in the present collection; Mrs. Drake's gatherings from the heights of Kotgarh belong to species usually occurring in a more northerly latitude, while those from Serampore are either widely distributed species or have been found more frequently in the tropics.

Since writing these notes, a letter has been received from Mrs. Drake from the Mission College, Serampore, Calcutta. She tells how her interest in Mycetozoa was first aroused fourteen years ago by finding a tuft of *Stemonitis* sporangia, at Landour, N.W. Himalaya; these were pronounced to be "probably a fungus" by a botanical friend. On returning home on furlough interest in the strange objects was revived by her little daughter finding "egg-cups" of *Crateriun* under a hedge. An article in *The Country-side* described what the egg-cups were; a visit to see the exhibits at the British Museum (Nat. Hist.) and a study of the *Guide to British Mycetozoa* published by the Museum gave the impetus to make this valuable collection in fields which had hardly been searched before and have proved to be prolific in these minute and beautiful organisms.

MERISTIC FLORAL VARIATION IN GALIEÆ.—II.

By L. A. M. RILEY, B.A.

A PAPER by the writer on Meristic Floral Variation in *Galieæ* was published in this Journal for 1922 (pp. 230–232), in which were given statistics for seven species of *Galium* and three of *Asperula*. Since then there has been opportunity to examine several other members of the group, viz.: one additional *Galium* and one *Asperula*, two species of *Rubia*, and the monotypic genera *Phuopsis* and *Sherardia*. The figures for these are given on p. 21.

Of the sixteen species examined, eleven exhibit a meristic range of three numbers only, three have a range of four numbers, and only two species exhibit a range of five numbers. As might be expected, the least meristic variation was found in the monotypic genera *Phuopsis* (99·7 % pentamerous) and *Sherardia* (99·8 % tetramerous); but according to Penzig (*Pflanzenteratologie*, ed. 2, ii. 452) *Sherardia* has very frequently trimerous, pentamerous, and hexamerous flowers, so that some strains are evidently much more variable than others. In this connection Mr. Sprague informs me that *Veronica persica*

Percentages of Flowers of different Types.

	Galium Cruciata.	Asperula odorata.	Sherardia arvensis.	Rubia peregrina.	Rubia tinctorum.	Phuopsis stylosa.
2-merous	0·2	...	...	...	...	...
3-merous	5·0	2·0	0·1	...	...	...
4-merous	93·8	97·8	99·8	1·6	13·0	0·1
5-merous	0·9	0·2	0·1	90·5	82·8	99·7
6-merous	0·1	...	...	7·4	4·2	0·2
7-merous	...	...	...	0·5	...	...
	100	100	100	100	100	100

seems to exhibit considerably less meristic variation in Surrey, Middlesex, and Hertfordshire than was observed in Somerset (see Journ. Bot. 1922, 351). Penzig also describes *Galium Aparine*, *G. Mollugo*, and *G. verum* as 3–6-merous; I have myself observed no 6-merous flowers in these species.

The results obtained demonstrate the existence of a much greater amount of meristic variation in *Galieæ* than is indicated in Floras—it is hardly accurate, for example, to describe *Rubia tinctorum* as pentamerous when 13 % of the flowers may be tetramerous and 4 % hexamerous.

A comparison of the figures of the heteromeristic tribe *Galieæ* with corresponding figures for homomeristic families such as *Compositæ* or *Umbelliferæ* should prove interesting. As has been previously indicated (*op. cit.* 231), less meristic variation may be expected in homomeristic groups.

The material of *Phuopsis stylosa* and *Rubia tinctorum* was obtained from plants cultivated in the Royal Botanic Gardens, Kew, the former in June 1923, the latter in August; the material of *Asperula odorata* was collected at Odiham, Hants, in May, that of *Galium Cruciata* at Chenies in June, of *Sherardia arvensis* at Caterham in July 1923, and of *Rubia peregrina* at Colwell Bay, Isle of Wight, in August 1922. It should be added that a thousand flowers of each species were examined.

HIRÆA QUAPARA.

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

IN 1775 Aublet (Hist. i. 464, t. 186) described one of six new *Malpighiaceæ* from French Guiana as *Banisteria quapara*—at that time all fleshy-fruited Malpighiads were referred to *Malpighia* and all dry-fruited ones to *Banisteria*. Adrien de Jussieu transferred it to *Hiræa* in 1840, and replaced the specific name *quapara* by *multiradiata*, doubtless on the ground that *quapara* was a "barbarous

name. Niedenzu based a new section, *Hiræa* sect. *Polyactinia* Ndz. on *H. multiradiata* Juss., distinguished *inter alia* by the many-flowered umbels. *H. multiradiata* now becomes H. QUAPARA under International Rules. It has hitherto been recorded only from French Guiana, but has now turned up in British Honduras (*Peck* 828). The apparent discontinuity in distribution may be due to imperfect exploration of the intervening area—we know practically nothing of the flora of the Maracaibo region, for example.

Hiræa cephalotes Triana et Planch. (Colombia and Ecuador) is very closely allied to *H. quapara*. It has obovate or obovate-elliptic leaves with a relatively narrow base, whereas *H. quapara* has elliptic or ovate-elliptic leaves with a broad base. But *H. quapara* itself exhibits a considerable range of variation in leaf-shape and indumentum. It seems desirable to give definite varietal names for the sake of precision: nevertheless, it is not improbable that two or more "varieties" may eventually be found on a single individual. Some of the *Malpighiaceæ* might almost be described as heterophyllous, so great is the difference between the leaves on different parts of the same plant.

HIRÆA QUAPARA (comb. nov.).—*Banisteria quapara* Aubl. Hist. i. 464, t. 186 (1775). *Hiræa multiradiata* Juss. in Ann. Sc. Nat. sér. 2, xiii. 257 (1840); Juss. Monogr. Malpigh. ii. 321; Sagot in Ann. Sc. Nat. sér. 6, xii. 186; Niedenzu, De genere *Hiræa*, 5.

Folia acuta tantum vel breviter acute cuspidata, subtus dense pubescentia. *Pedunculi* 1·3–2 cm. longi.

HAB. French Guiana: "ad margines pratorum et camporum," *Aublet* (Mus. Brit.). British Honduras, *Peck* 828 (Herb. Kew.).

var. GLABRATA, var. nov.; foliis breviter cuspidatis subtus sparsiuscule appresse pilosis, pedunculis 2–3 cm. longis.

HAB. French Guiana: Karouany, *Sagot* 94 (type in Herb. Kew.; Mus. Brit.).

var. ACUMINATA, var. nov.; foliis acuminatis subtus densiuscule pubescentibus 3–4 cm. longis.

HAB. French Guiana, *Martin* (type in Herb. Kew.; Mus. Brit.), *Martin* 262 (Mus. Brit.), *Mélinon* 383 (Mus. Brit.). Guiana, *Herb. Sims* (Herb. Kew.).

H. CEPHALOTES Triana et Planch. in Ann. Sc. Nat. sér. 4, xviii. 331 (1862); Niedenzu, De genere *Hiræa*, 16 (1906).—*H. Spruceana* Niedenzu, Malpigh. Amer. i. 7 (1912).

HAB. Colombia: province of Pasto, 3300 ft., *Triana*. Ecuador: at the foot of Mt. Chimborazo, 3000 ft., climbing on *Cinchona succirubra*, *Spruce* 6152 (Herb. Kew.).

According to Spruce, the flowers of *H. cephalotes* are first yellow and then red. In 1906 Niedenzu stated that, judging from the description, *H. cephalotes* (Colombia) appeared to be a synonym of *H. multiradiata* (French Guiana). Six years later he re-described it as a new species from Spruce's Ecuadorian material.

SHORT NOTES.

CULTIGENS AND CULTIVARS (see L. H. Bailey in *Science*, n. s. xlvii. 306; *Gentes Herbarum*, fasc. 3, 113; fasc. 4, 150, footnote). "*Cultigen* is a plant, group, or series known only in cultivation and presumably originating under domestication; it has no nativity; used in contrast with *indigen*." "The *cultigen* is a species, or its equivalent, that has appeared under domestication—the plant is cultigenous." "*Cultivar* [is] a botanical variety, or a race subordinate to species, that has originated and persisted under cultivation. It is essentially the equivalent of the botanical *variety* except in respect to its origin." Bailey cites *Zea Mays* as a good example of a cultigen—we know neither its country nor its origin. He considers that even when the parent indigen is known, many of these cultigens have their own entity and by every taxonomic right should be separately recognized, and he accordingly denotes them by binary combinations. Among numerous new cultigens proposed by him are *Vitis Labruscana* for the Labruscan Vineyard Grapes, *Begonia Rex-cultorum* for the cultivated derivatives of *B. Rex*, and *Rubus loganobaccus* for the Loganberry. The usual cultivated "flowering" *Canna* of the present time becomes *Canna generalis*, and the orchid-flowered ones are named *C. orchiodes*. Among new cultivars may be mentioned *Tulipa Gesneriana* var. *Darwinia* for the Darwin Tulips and *Lathyrus odoratus* var. *nanellus* for the dwarf Sweet Pea, as represented particularly in the variety Cupid. On the whole, the adoption of definite specific and varietal combinations for plants which have originated in cultivation may be welcomed. So long as such plants are known merely by vernacular or fancy names, they are apt to remain virtually undescribed. Bailey's promised Manual of Cultivated Plants should form an important contribution to our knowledge of the subject.

The application of the term cultigen calls for criticism. From its derivation it should mean any group arising in cultivation, and the Latin form should be *cultigena* corresponding with *indigena*. But Bailey uses cultigen to denote a group of specific rank, and gives *cultigens* as the Latin equivalent. Surely it would have been better to employ cultigen (*cultigena*) in the general sense of "a group which has arisen in cultivation," and to distinguish cultispecies, cultivars, and cultiforms as subordinate categories. Bailey (Gent. Herb. 8, 127) adopts "new transfer" (*translatio nova*) for what is generally known as "new combination," and "new status" (*status novus*) to indicate a change in rank.—T. A. SPRAGUE.

THE TYPE-SPECIES OF BIGNONIA (see Journ. Bot. 1922, 236, 363; 1923, 191). Dr. N. L. Britton (*Addisonia*, viii. 39, t. 276; Sept. 1923) gives an account of *Campsis radicans* Seem. under the synonym *Bignonia radicans* L. He has apparently overlooked the articles cited above, in which it was demonstrated that the type-species of *Bignonia* L. is *B. capreolata* L. His statement that *Bignonia* Tourn. was first published in 1719 is due to misapprehension; he has evidently referred to the third edition of Tournefort's

Institutiones, whereas the name *Bignonia* was first published in 1694 in the first edition of that work, which was entitled *Élémens de Botanique*. The first description of *Campsis radicans* was not by Cornuti (1635) but by Ferrari (1633). Cornuti named the species *Gelseminum ederaceum Indicum*, not *G. hederaceum*: early authors frequently used the spellings *Edera* and *ederaceus* (see Plin. Hist. Nat. ed. Harduin. iii. 1008).—T. A. SPRAGUE.

BRYA OR ALDINA. The well-known genus *Brya* (*Leguminosæ*) comprises three species: *B. Ebenus* (L.) DC., the West Indian Ebony (Jamaica and Cuba), *B. buxifolia* (Murr.) Urb. (Hispaniola), and *B. nicaraguensis* Oerst. (Nicaragua). The name *Brya* is adopted by Fawcett and Rendle (Fl. Jam. iv. 25; 1920) and by Urban (Symb. Antill. viii. 288; 1920). The fact that under International Rules *Brya* DC. (1825) is a synonym of *Aldina* Adans. (1763) seems to have been overlooked. *Aldina* Adans. Fam. ii. 328 is based on *Brya* P. Browne, Hist. Jam. t. 31. fig. 2. It is valid under International Rules because it is accompanied by a diagnosis, and under the Type-basis Code because it is associated by citation with the binary specific name, *Aspalathus Ebenus* L. (Sp. Pl. ed. 2, 1001; 1763), which is also based on *Brya* P. Browne. The only way of retaining the name *Brya* under International Rules would be to make it a *nomen conservatum*. But is this desirable? The list already includes 458 names of Phanerogamic genera. Is it to be extended indefinitely? "We fail to see what gain can result from the adoption of the Harms list, if it is to be regarded as capable of indefinite extension in the future" (Britten in Journ. Bot. 1907, 26). Obviously such names as *Combretum* should be conserved (see Journ. Bot. 1923, 115). But is it worth while suspending the operation of the Rules in the case of a genus of only three species, even though one of them is of economic importance? *Brya* has stronger claims than some of the Vienna *nomina conservata*, but there is a general feeling that many of the latter were conserved on insufficient grounds. It has seemed desirable to draw attention to the case of *Brya* and *Aldina*, as many similar instances will doubtless come to light when all Adanson's genera have been subjected to scrutiny. Until the question of the conservation of *Brya* has been decided by the next International Congress, the proposal of new combinations under *Aldina* is to be deprecated.—T. A. SPRAGUE.

REVIEWS.

Flora der Schweiz. 1 Teil: Exkursionsflora. Vierte, stark vermehrte Auflage von Prof. Dr. HANS SCHINZ unter Mitwirkung von Prof. Dr. ALBERT THELLUNG. Zurich: Albert Raustein, 1923, pp. 792, 135 fig. in text. 8 francs.

THE fourth edition of this excellent work has been brought up to date with considerable addition and correction. Its aim is to meet the needs both of schools and of persons studying alone, and to provide the means of grasping the natural relationships of the endemic

flora. For this reason the keys are not of the Gremli type, but indicate the whole of the most noteworthy characters of each group, whether family, division of genus, etc., so that the student shall obtain a true conception of the groups and their classification and subdivision, and not merely a knowledge of "spot characters." The characteristics given in the diagnoses have by now been well tested in the field and the necessary corrections so brought to light have been made and ambiguities of expression removed. A list of 72 helpers is given: it seems an astonishing thing that professional botanists in this country study everything but their own flora and cannot provide anything approaching such a piece of work.

Numerous abbreviations are used; without them it would be impossible to cram in such a great amount of information. There is a good glossary of these abbreviations and of technical terms, while a few text-figures are given where they are useful; the latter are quite well done, simple, and clear. Of *Gymnadenia conopea* we read (p. 165) "L. (under strong lens) papillose above." Such notes seem likely to be of help in avoiding misinterpretation.

It is a pity that there is as yet no classification of the categories of variation which would enable groups to be of the same value throughout. Species, subspecies, varieties, etc., admittedly are used differently by different students, but as a rule it is not so much a question of the facts of the case as of the size each person likes to have his "species," etc. To me it seems immaterial whether we call the completely separated groups "species" and the local races with some transition forms "subspecies," or whether we call the latter species if they have some definite distribution, so long as we could all agree to use each term consistently as indicating a definite type of variation. But to leave all the terms undefined is to leave them meaningless. Here *Rubus* has 64 species (81 pages), *Rosa* 21 (6½ pp.), *Hieracium* 34 (16 pp.: the remaining forms being indicated without description as, e.g., "*H. rubriflorum* Zahn=*auratiacum*>*Hoppeanum*"), while *Euphrasia* (proper) has 18 species. In *Onosma* the series *O. helveticum* is named *O. tauricum* Willd. with *O. stellulatum* W. & K. as a synonym, and both of these names belong to species absolutely distinct from any Swiss plant. This happens partly because there is no correlation between the group name and the recognised degree of distinctness between the forms. In this case the authors have followed Braun Blanquet, who clearly had insufficient knowledge of *O. tauricum* and *O. stellulatum*, which do not in any way show transitions to *O. helveticum*. Nor will British botanists agree that there is the same relation between *Sparganium erectum* subspp. *neglectum* and *polyedrum* (i. e., "*ramosum*"), which do not offer transitions, and *S. simplex* type and subsp. *ausitans*, which has nothing but distinctions in leaf to distinguish it. But in general it seems that a considerable degree of uniformity has been obtained. Varieties are not given in this volume: they are reserved for Part II., in which the critical forms are to be fully dealt with.

The following notes on botanical matters may interest British

botanists. Engler's system is followed: it is scarcely necessary to point out that the genera adopted by British botanists are in many cases due to the absence of a really modern flora. It is unfortunate that the conditions under which Babington's *Manual* was reprinted prevented any revision of the limits of genera. The work under notice uses such genera as *Dryopteris*, *Echinodorus* (*Alisma ranunculoides*, etc.), *Atropis* (*Sclerochloa* pars), *Vulpia Trichophorum* (including *Eriophorum alpinum* and *Scirpus cæspitosus*), *Holoschœnus*, *Schœnoplectus* (*Scirpus* pars), *Spirodela* (*Lemna polyrrhiza*), *Isolepis*, *Loroglossum* (*Orchis hircina*), etc.: most of such names, unfamiliar to British botanists, will figure in any really new British handbook. The species in general are of the size known to British students, with few exceptions, such as the *Sparganium* mentioned above. *Rumex sanguineus* L. is made synonymous with *R. nemorosus* Schroder, which it is not. *Polygonum aviculare* remains, without note of Lindman's work on the group. *Arenaria leptoclados* is treated as a subsp. of *A. serpyllifolia*, which seems an unnecessary reduction, and *A. gothica* as a subsp. of *A. ciliata*. *Spergularia atheniensis*, which should be named *S. campestris*, is made a subsp. of *S. rubra*: this genus requires a modern monograph. The name *Delphinium Ajacis* is used in the usual sense, but Linnæus's plants, and references all indicate *D. orientale*, while *D. Ajacis* auct. formed part of *D. Consolida* L. I know no name which can serve for *D. Ajacis* Gay non Linn., and therefore here give it the name D. GAYANUM (nom. nov.), as I have for long sought a correct name for the species. *D. orientale* Gay becomes *D. Ajacis* Linn. (non auct.): a most unfortunate change which will cause trouble but cannot be avoided as the evidence is unshakable. *Ranunculus reptans* L. is made a subsp. of *R. Flammula*: it certainly has no characters but its habit, yet it seems to be quite a distinct plant with a definite distribution. *Ranunculus Aleæ* is made a subsp. of *R. bulbosus*, and *R. Steveni* the only subsp. of *R. acer*. The only Batrachian Ranunculi are *fluitans*, *circinatus*, *ololeucus*, *aquatilis* (= *peltatus*), *Bandotii* (which should be *obtusiflorus* (Gray) Moss), *flaccidus* (= *trichophyllus* Chaix), and *hederaceus*. The name *Adonis annua* is cited as of L. em. Hudson in spite of arguments which have shown that it should be L. em. Mill. The authors' minds do not seem quite open to reason in matters of nomenclature. *Papaver Lecoqii* is made a subsp. of *P. dubium*, which again seems a very unnecessary reduction in view of the complete distinctness of the plants. *Thlaspi silvestre* is placed as a subsp. of *T. alpestre*, while *T. virens* is kept distinct; this is not sound if the plants are the same as the British, which I much doubt. *Barbarea arcuata* is rightly abolished. *Erophila* contains but a single species without subspecies: on this view the genus should be abolished. *Arabis ciliata* (Schleicher), i. e. *A. arcuata* Shuttleworth, is not in evidence, but may be the subsp. *sessilifolia* Gaud. of *A. hirsuta*: in any case the Swiss plant is the original *ciliata* and the Irish requires a new name, A. HIBERNICA mihi, nom. nov. = *A. ciliata* R. Br. quoad plant. hibern., et auct. angl. *Alchemilla vulgaris* L. has subspp. *pratensis* and *alpestris*: these forms

have such remarkable constancy in characters and habitats that they have the nature of true species, although the differences are minute. It is a mistake to think that species should be of the same size. Genera and families are large and small, so are species. It is the relation between the variation and distribution which should determine the rank, and not the degree to which the differentiæ are obvious. If this were realised it might be possible to obtain more agreement as to the rank of forms. The name *Trifolium procumbens* L. is still used for *T. campestre*, although Linnæus almost entirely intended *T. dubium*, not understanding that there was a species between his *T. agrarium* and *T. procumbens*, and thus falling into error in his herbarium. *Lotus tenuis* is placed as a subsp. of *L. corniculatus*. *Geranium purpureum* Vill. (emend.) is placed as a subsp. of *G. Robertianum*, which again seems absolutely without justification. *Linum angustifolium* is placed as a subsp. of *L. usitatissimum*, presumably because the cultivated plant is supposed to have arisen from this species, but suppositions do not justify such a procedure. All the *Callitriches* but *C. hermaphroditica* (= *C. autumnalis*) are placed as subspecies of *C. palustris*. *Viola arvensis* and *V. Kitaibeliana* are made subspp. of *V. tricolor*. *Epilobium Lamyi* placed under *E. tetragonum*. *Apium repens* is kept distinct from *A. nodiflorum*, as is *Galeopsis bifida* from *G. Tetrahit*. Hybrid *Menthæ* are described, although hybrid *Salices* are not. Numerous species of *Alectorolophus* are retained: surely these should be subspp. to be in conformity with *Alchemilla*, *Callitriche*, &c. *Galium spurium* is placed as subsp. of *G. aparine*, as is *G. erectum* of *G. Mollugo*. *Arctium pubens* is retained as distinct from *A. nemorosum*. *Taraxacum officinale* has 12 subspecies.

There is little need to speak of the nomenclature, as the authors have already published notes on the name-changes, and these were reviewed in this Journal for 1922, p. 196. In some cases the authorities for genus-names are given, as, e. g., *Cheiranthus* L. em. R. Br., in others we merely have *Erigeron* L.; but I know from experience how difficult it is to be consistent in the matter. Although the authors consider it advisable to indicate precisely the limits of their "genus," they do not do this for "species," although the cases are quite analogous. They still cite *Viola montana* L., *Elatine Hydropiper* L., *Ranunculus aquatilis* L., etc., although such authorisations are so meaningless that they might as well be omitted. Diphthongs are used in defiance of the Rules. But as there is no agreement concerning the functions and principles of nomenclature, we cannot hope for agreement in the names themselves, and we will not consider the lack of it here. The diagnoses of the groups themselves seem to be good, and that is the principal matter for congratulation.

For the rest, the print, paper, and binding are very pleasing, and misprints are rare. But the thought that continually returns is "What a pity we hav'nt a British Handbook like it!"

A. J. WILLMOTT.

Studies in Fossil Botany. Vol. II. *Spermophyta.* By D. H. Scott. Third Edition. Demy 8vo, pp. 446, 136 illustrations. 21*s.* London: A. & C. Black, 1923.

"The unfolding of life upon the earth, the marvellous story of development and change, of increasing complication and endless variation on the one hand, and on the other the great problem of how the complex organism comes to develop from the minute zygote, can never lose their fascination for the human mind." This statement, made by Mr. A. G. Tansley in his recent address at Liverpool, may be taken to represent the outlook of the average botanist on the study of fossil plants, and may be fitly quoted in reference to the completion of the new third edition of Dr. Scott's studies. The volume before us deals mainly with the ancient seed-plants whose structure is known to us with some considerable degree of completeness. It differs considerably from the previous edition of the work, which has been for the most part re-written, new discoveries have been incorporated and new conclusions have been reached, often radically different from those previously held. The volume is a most important contribution to the story of the development of plant-life.

More than half the book is devoted to the Pteridosperms, the plants of Palæozoic age, which were generally characterised by the possession of fern-like foliage, with true seeds borne on some of the leaves, together with a peculiar vascular structure which suggested to earlier observers the name of Cycadofilices. In this group are several new types of stem, whose structure indicates relationships to the better-known plants such as *Lyginopteris, Medullosa,* etc. The variety of the stems, here described in a brief but interesting manner, indicates clearly that this group of plants was of great importance in all the Palæozoic floras which are known with any degree of completeness. The second great group of palæozoic gymosperms—the Cordaitales—are ably reviewed, and their resemblances to the Pteridosperms on one hand, and also to the more recent Coniferales and Ginkgoales, are brought out. Though the author gives a prominent place to some of the current views of the polyphyletic origin of our great groups, yet a good deal of evidence is brought forward for the monophyletic origin of the gymnosperms. The general considerations of the phylogeny and history of vascular plants are summarised in the last chapter, and a chapter is devoted to the mesozoic gymnosperms. As in previous editions the illustrations form a noteworthy feature. There are 136 admirable figures, which make the argument easy to follow; most of these are drawings or photographs of microscopical preparations, which are very clear and beautiful. Over 50 of the figures are new.

The earlier editions of this work have generally been used by students as text-books, but the greater part of this volume has less of the character of a text-book and more of the nature of an original survey of our knowledge of plant-evolution. New and unpublished work is referred to in several places, such as the researches of Prof. Gordon on *Pitys,* while the results of all important recent work have been considered. The work of the last fourteen years has led the author to make several important changes in his views on phylogeny, the chief one is that we can no longer regard the Cycadeoid Gymnosperms as descended from the true ferns, for both groups may be traced back to very early times and may have descended from a common stock. The general conclusions in the last chapter are all interesting, and tempt the reviewer to engage in a discussion of many points, but he can now only characterise them as a survey of modern views on the descent of plants, which will take an honoured place in botanical literature.

The sections dealing with the mesozoic cycadophyta appear to us to be the least convincing part of the book, not because the descriptions are less lucid or the facts less well presented or illustrated, but because the attempt to interpret the reproductive structures of the Bennettitales in terms of the Angiosperm flower raises such difficulties and demands such large assumptions. Dr. Scott appears to attach more weight to the theoretical conclusions of Dr. Weiland than many other English botanists, and considers that "the evidence for some affinity between the Mesozoic Cycadophyta and the Angiosperms appears strong."

But though the bisporangiate strobilus of the Bennettitales may be compared in general organisation with some Angiosperm flowers, there is a vast difference between even their simpler microsporophylls and the Angiosperm stamens, and it is difficult to see how the mature female strobilus of *Bennettites Gibsonianus* can be described morphologically as a fruit. Similarly, few botanists will go so far as to call the megasporophylls of Cycas *carpels,* and there seem to be no grounds whatever for regarding Cycadeoidea as possessing carpels. The acceptance of Wieland's uncritical morphology in this chapter does not seem to be in keeping with the caution and precision shown throughout the rest of the book.

The criticism of Chapter V. serves to remind us of a further noteworthy point, for this chapter treats of the only large group, to our knowledge, of which Dr. Scott himself has not made large contributions. These studies are not only a masterly survey of the facts of plant-evolution, but a monument of the results of original observation and investigation extending over a considerable number of years. As we pass from chapter to chapter we find that our knowledge of several of the interesting and important plants is due to Dr. Scott or to those whom he has inspired. It is impossible to exaggerate the importance of his contributions to our knowledge of the structure of Palæozoic plants, and, whatever changes may occur in the future in our phylogenetic views, this work will remain as a valuable store-house of facts about the structure of fossil vegetables.

We are informed in the Preface that the Scott collection of fossil slides is now at the British Museum (Natural History) and is open to consultation by students—a fact which deserves the widest advertisement in botanical circles.

H. H. Thomas.

BOOK-NOTES, NEWS, ETC.

At the meeting of the Linnean Society on Nov. 15, a paper on "The Flora of Solomon's Pools" by Miss E. M. Blackwell was read, of which the following is an abstract:—Solomon's Pools lie about six miles south of Jerusalem, 2616 feet above sea-level, in a valley, Wâdy Artâs, which runs east and west between low hills of red-brown ferruginous earth through which limestone bosses project. The pools, three in number, are obviously artificial, and are in fact large open cisterns or reservoirs. The high walls of the pools, at first cut in the hard rock, have been lined at some time with a mortar made of lime and broken red earthenware. On some sides the walls are sheer and precipitous, on others they are terraced, thus affording a platform at various levels. Surface-water drains from the hill-sides, and there are five good sources of water immediately about the pools. The Civil Administration which came into office after the occupation of Jerusalem by the British Forces (1917–18) is thoroughly overhauling the system. The middle and lowest pools have been cleaned and partly repaired, and pumping plants erected. In July 1923, the uppermost pool had already dried up. As the water is constantly evaporating in the hot summer, it is not surprising that analysis shows a high percentage of dissolved solids. The clear water of the lowest and middle pools supported a luxuriant growth of *Chara* spp., *C. connivens* in the lowest and *C. contraria* and *C. fragilis* in the middle pool, forming almost a pure society. In the middle pool there was in addition an aquatic grass growing freely, and a few filamentous algæ, desmids, and diatoms. In the lowest, however, *Potamogeton flabellatus* var. *scoparius* was flowering and fruiting with equal vigour, almost rivalling the *Chara* for dominance. At the deeper end of the lower pool were tufts of *Riella helicophylla*, their spirally coiled thalli floating out into the water in loose rosettes at a considerable depth. Where the floor of the west side of the lowest pool was exposed on account of the slope, the drying mud was covered with a thick carpet of bleached plants of *Chara*, and growing up through it *Typha latifolia*, *Scirpus maritimus*, *Heleocharis palustris*, and *Euphorbia aleppica*. The flora forcibly reminds one of the "slacks" in the Lancashire sand-dunes, having *Chara contraria*, *Typha*, *Scirpus*, and *Heleocharis* in common. The waters in both cases are calcareous, with a high percentage of dissolved solids, especially chlorides and carbonates.

At the meeting of the Linnean Society on 29th November, Mr. C. C. Lacaita read a paper on "The Onosmas of Linnæus and Sibthorpe with a Note on those of Tournefort's Herbarium." He began by pointing out that the generic name *Onosma* had been regarded as feminine by Linnæus, though neuter in Greek; he adopted the latter. He recounted the various species published up to the present time, and was glad to record his almost entire agreement with Jávorka, the Hungarian botanist, in his determination of the available specimens; then followed an enumeration of the Italian forms, from the age of Fabio Colonna to the present day. Finally, he cleared up the

confusion caused by Sir J. E. Smith amongst the Sibthorpian collections. Specimens from the herbaria of Linnæus and of Smith were shown in illustration. Mr. Lacaita's paper in the November number of this Journal may be referred to in this context.

At the same meeting a paper by Dr. C. L. Withycombe, now of Trinidad, was communicated "On the Function of the Bladders in *Utricularia vulgaris* Linn.," of which the following is an abstract:—

The bladders are not passive traps, but capture prey by active movement in response to stimuli. At the lower portion of the somewhat circular opening there is a semicircular collar of parenchymatous cells. Covering this, and actually forming a sharply differentiated zone round the inside lower half of the mouth, is a triple layer of highly specialized cells. The fore end of the valve, which closes the bladder mouth, fits into a slight groove along the margin of this zone, extending to the middle layer. The valve is a continuation of the wall; it is two cells in thickness, and of such shape as to close the mouth completely when its free margin is applied to the collar. It consists of three ill-defined regions; marking the third or marginal flap are four, tapering, bicellular hairs. These hairs are sensory, and on stimulus cause certain motor tissues in their immediate vicinity to contract, and this withdraws the valve margin from its groove. After action the valve always springs back, and its edge is held in the groove. A certain amount of mucus is secreted, apparently by the middle layer of the specialized cells of the collar, and this makes a complete watertight fitting of the valve. The quadrifid hairs lining the bladder constantly absorb the fluid within, whether this is pure water or an infusion of decaying animals, etc. With reduction in volume of the contained water, the bladder must yield to external pressure; therefore the lateral walls bulge inwards exerting some tension, on release springing back to their former position. The hairs continue to absorb until equilibrium is reached between the internal negative pressure and the osmotic tension which can be exerted by the cell contents of the hairs. There is now a considerable tension upon the valve, tending to pull it inwards, but this cannot happen since the cushion of specialized collar cells prevents the free margin of the valve from moving inwards. The valve also is so constructed that it continues to bulge outwardly at its centre, this condition being mechanically more stable than if the valve were plane or concave. Only an upward movement can possibly release the valve from its catch, and this is brought about by touching the sensory hairs. A note was also communicated on the germination of the seeds of *Utricularia vulgaris*. This in its first stages is very similar to that of *Pinguicula vulgaris* and does not show a whorl of filiform leaves in its earliest stages as described by Kamienski.

The *Proceedings of the Linnean Society* from November 1922 to June 1923 (6*s*.) contains, besides the *précis* of the meetings distributed separately to the Fellows, the Presidential Address delivered by Mr. A. Smith Woodward at the Annual Meeting, a long "abstract" of Mr. J. Parkin's paper (read March 15) on "The Strobilus Theory

of Angiospermous Descent," with the discussion which followed and obituary notices of Sir Isaac Bayley Balfour (1853–1922), Dr. William Carruthers (1830–1922), Mr. H. J. Elwes (1846–1923), and others. It would, we think, add greatly to convenience of reference if the contents of the pages, and the date, were indicated at the head of each, especially when, as often happens, several numbers are bound together in one volume.

THE *Bulletin of the Torrey Club* for October contains an important paper by Bessie Goldstein, with plate, on the resting-spores of *Empusa Muscæ*. The author regards these as "chlamydospores, formed under dry conditions after conidial discharge is no longer possible. They are formed most frequently as terminal swellings on short hyphal fragments or tubes, or intercalary in the hyphal filaments, or by apparent budding from hyphal bodies. They are generally rounded cells, with smooth evenly-thickened walls, and contain many nuclei." The number also contains an ecological study of *Cheilanthes gracillima* by F. L. Pickett. In the November number Mr. K. K. Mackenzie continues his "Notes on *Carex*," in the course of which he identifies *C. Goodonowii* Gay with *C. acuta* L., which latter name he retains. On the abandonment by Kükenthal, on the ground of confusion, of *C. muricata* L., Mr. Mackenzie writes: "This German practice of suppressing Linnean names where Linnæus had some mixture is to be most strongly condemned. . . . . The only proper course to pursue is to apply the type method, and, in the present case, that requires the use of the name *C. muricata* L. for *C. echinata* Murr. (*C. Leersii* Willd.; *C. stellulata* Good.)."

THE *Journal of the Department of Agriculture* (Pretoria) must be one of the cheapest periodicals in existence; its price is 5*s*. per annum, single numbers 6*d*. The number for November contains nearly a hundred pages, abundantly illustrated; the "Weed of South Africa" selected for description and illustration is *Opuntia imbricata*, which, although at present not spread to the same extent as *O. aurantiacus*, may prove to be equally dangerous and should be carefully watched. There are also papers of economic importance on olives, fodder, and pasture grasses, and *Nicotiana rustica*. We have also received the first (introductory) part (price 3*d*.) of the *Weeds of South Africa*, in which the useful papers published in the *Journal* by Miss K. A. Lansdell are to be reprinted. It contains a glossary illustrated by 64 excellent figures, and should be exceedingly useful; it is also remarkably cheap.

THE useful *Flora Arabica*, which the Rev. E. Blatter, S.J., is publishing in the *Records of the Botanical Survey of India* (vol. viii.) has now reached its fourth part (*Labiatæ—Ceratophyllaceæ*). The work contains no descriptions, but in every other respect is singularly complete, a very full synonymy being given, with a summary of distribution in and outside Arabia, a list of vernacular names, and references to economic uses.



M.G. & G.R B-W. del. Chara Muscosa, *Groves & Bullock-Webster.* Whittingham & Griggs, Collotype

NOTES ON BRITISH CHAROPHYTA.

By James Groves, F.L.S., and G. R. Bullock-Webster, M.A., F.L.S.

(Plate 570.)

The following notes relate to three Charophytes, one of which seems to us sufficiently distinct to justify its description as a new species, while the other two are treated as new varieties.

The *Charophyta* are an extremely plastic group, and most of the common species are, as regards their vegetative system, subject to much variation, due no doubt, in most cases at any rate, to external causes. Some authors have given distinctive names to an immense number of forms. We have not thought it desirable to follow this plan, and in making use of varietal names in connection with such species we wish it to be understood that we regard them as extremes of variation, between which and the several types there is usually a series of intermediates, and not necessarily as representing divergent races.

Nitella opaca Agardh var. brachyclema (var. nov.). Caulis crassissimus, diametro —→800 μ, internodia prælonga; ramuli breves, crassi, incurvati, dactylis quam radios primarios sæpe longioribus.

A very large distinct-looking plant resembling *N. translucens*, attaining to a metre in height, the internodes often as much as 12 cm. long and the branchlets usually quite short, the upper often very thick and tumid, not much longer than the diameter of the stem, strongly incurved, and giving the appearance of small knots along the branches. It fruits rather sparingly.

This variety presents a marked contrast to the ordinary forms of *N. opaca*, which is characteristically rather a small compact-growing plant. It occurs in fairly deep water in lakes. We have seen specimens from the following localities, and it is probably to be found in similar habitats elsewhere.

Westmoreland:—Grasmere, *T. A. Cotton* (Comm. *A. Bennett*); Easedale Tarn, *H. E. Fox.*

Caithness:—Yarehouse Loch, near Wick, *J. Grant* (Comm. *Beeby*).

Shetland:—Asta Loch, *G. C. Druce.*

Donegal W.:—Kindrum Lough; L. Naglea, *G. R. B.-W.*

Chara muscosa, sp. nov. (Plate 570.)

Sect. Diplostephanæ diplostichæ tylacanthæ monœciæ.

Monœcia. Perminuta (alt. c. 5–7 cm.). Caulis multo ramosus. Cortex regularis, seriebus primariis valde prominentibus; aculei solitarii, bene evoluti. Stipulodia valde evoluta, inæqualia. Verticillorum ramuli 6–7; segmenta 4–5, quorum ultimum solum sæpe ecorticatum est. Oogonium 700–800 μ longum (coronulâ exclusâ), 450–500 μ crassum; coronula magna et patens, cellulis —→225 μ longis. Oospora c. 615–665 μ longa, 340–400 μ crassa. Antheridium diametro 425 μ.

A low tufted plant of moss-like appearance, soft to the touch, usually unincrusted and dark green. Stem 250–375 μ in diameter; the internodes not much exceeding the length of the branchlets;

the cortex regularly diplostichous, the primary rows strongly developed, sometimes almost obscuring the secondary; the spine-cells normally solitary, spreading, elongated (sometimes twice as long as the diameter of the stem), usually tapering from a somewhat broad base, obtuse to subacute. Stipulodes of both series well-developed, irregular, the cells often of unequal length, sometimes as long as the lowest branchlet-segment, similar to the spine-cells. Branchlets incurved, of 4–5 short segments, the ultimate segment very short, and often exceeded by the uppermost bract-cells. Bract-cells at the fertile nodes normally 5, usually all developed, very variable in length; bracteoles long, much exceeding the bract-cells. Oogonia and antheridia solitary, produced at the first and second branchlet-nodes. Oogonium frequently producing a lime-shell; coronula unusually large and conspicuously spreading from its base, measuring as much as 450 μ across its widest splay, the cells roundly-truncate at their base. Oospore black, showing 13–16 fine low ridges; membrane dark red-brown; the outer membrane finely granulated, showing a series of about 24–30 granules between the ridges.

In point of definite characters *C. muscosa* comes nearest to *C. contraria* and *C. baltica*, but presents such marked differences from both that we think it best regarded as a separate species. From *C. contraria* it differs in its moss-like much branched habit, dark green colour, and the uniformly short internodes, recalling in appearance the tufted form of *C. canescens*, the greater development, shape, and persistence of the spine-cells, the more strongly developed stipulodes, the smaller number of branchlet-segments, and the larger coronula, the cells spreading widely from their base. *C. contraria* is almost invariably incrusted, whereas *C. muscosa* has, so far as we have seen, little or no incrustation. From *C. baltica* it differs by its habit, as above, the much weaker and more slender stem, the very large primary cortical cells, the shape of the spine-cells, the less regular stipulodes, the weaker, more slender, and less numerous branchlets, with fewer segments, and the smaller antheridia.

First collected by G. R. B.-W. in July 1917, and subsequently in the same month of 1919 and 1923, on the eastern shore of Lough Mullaghderg, West Donegal, in sandy soil, in about two feet of water, closely associated with *C. aspera* and *C. delicatula*. The distinctive characteristics of the plant have been maintained during several years of cultivation. It is smaller than the usual forms of any other British *Chara*.

CHARA BALTICA Bruzel. var. RIGIDA (var. nov.).

Caulis rigidus, alt. 30–45 cm. gracilis (diam. c. 600–750 μ) fragilissimus. Bulbilli numerosi, multicellulati. Internodia quam ramulos duplo-triplo longiora. Cortex regularis, cellulis serierum primariorum et secundariorum diametro pæne æqualibus; aculei manifeste patentes, caulis diametrum nonnunquam excedentes, versus apicem subacutum nonnihil fastigati. Stipulodia superiora et inferiora bene evoluta, æquabilia. Ramuli plerumque pæne recti, segmentis 6–7, 1–2 superioribus ecorticatis. Bracteæ ad nodos fertiles normaliter 5, bene evolutæ; bracteolæ bracteas anteriores paulum, oogonium multo, superantes. Oogonium c. 1000 μ longum (coronulâ exclusâ) 650 μ latum; coronula c. 200 μ alta, 350 μ lata. Oospora c. 800 μ longa, 500 μ lata, c. 14 liras exhibens. Antheridia diametro c. 600 μ.

This variety is distinguished from the type by its firm neat habit, remarkably rigid brittle stem, patent spine-cells, and straighter branchlets. The large composite bulbils resemble those of the type. Mature fruit is very sparingly produced. The plant occurred freely for a number of years in company with *C. hispida* and *C. aculeolata* (= *C. polyacantha* Braun) in the northern area of Hickling Broad, where it was first found by G. R. B.-W. in 1898.

ORCHIS LATIFOLIA L.: A HISTORICAL STUDY.

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

LINNÆUS's earliest description of *Orchis latifolia* is in *Hortus Cliffortianus*, 1737 (p. 429): it runs:—

"ORCHIS radicibus palmatis bracteis flore longioribus, nectarii labio trifido: cornu germinibus breviore . . . . . Crescit in pratis humidiusculis Belgii, Sueciæ, &c. Variat foliis immaculatis."

It should be noted (1) that the description is based on Belgian and also Swedish plants; (2) that it included both spotted-leaved and unspotted forms; (3) that Linnæus did not regard the presence or absence of leaf-spots as a specific character.

The next record is in Act. Upsal. p. 15 (1740). "Orchis bulbis subpalmatis rectis, nectario cornu conico; labio trilobo integerrimo, bracteis flore longioribus"; he cites Hort. Cliff. 429, "O. palmata palustris latifolia," Bauh. pin. 86, Rudb. Elys. 2, p. 214, f. 12 (which has unspotted leaves) and six other synonyms. He gives several varieties, *e. g.*, "O. palmata pratensis latifolia, longis calcaribus Bauh. pin. 85" (this is figured in *Fl. Danica*, t. 266, and is clearly *incarnata*); "O. palmata sambuci odore," which is *O. sambucina* E.; "O. palmata pratensis latifolia longis calcaribus, flore carneo," the same "flore albo," the same "flore suaverubente cum litoris purpureis Tournef.," all of which suggest *incarnata*; and finally "Palmata serapias palustris, leptophylla, violacea, maculata et non maculata. Bauh. hist. 2, p. 776." This so exactly describes the marsh-loving slender-leaved red-violet *O. Traunsteineri* Saut., whose leaves are sometimes spotted, sometimes not, that there can be little doubt that this was the plant in question. Here again a spotted-leaved plant is mentioned. It is reasonably clear that in Act. upsal. *O. latifolia* included *sambucina*, *incarnata*, and *Traunsteineri*, as well as the spotted and unspotted *latifolia* of Hort. Cliff.

In 1741 Linnæus made his celebrated journey to the island of Oeland; in his journal (usually cited as It. oel.) he tells us that on June 2nd he found three species of *Orchis* at Rella—*O. sambucina*, *O. maculata*, and a third (cited in subsequent works under *O. latifolia*) of which he writes:—"Orchis palmata palustris non maculata

was distinct from *maculata*: for the two outer corolla-leaves are bent back against each other, whereas in *maculata* they stand stretched out in the same plane; the flower-lips are less divided, with the sides less bent back; the stalk is shorter, the spike blunter, and the bracts are longer than the flowers" (translated from the Swedish original, It. oel. p. 48).

Mr. Edwards of the British Museum (Nat. History) visited Rella in June 1922, bringing back specimens of *maculata* and *latifolia* from the locality where Linnæus botanised. This Rella *latifolia* was identified as *O. prætermissa* Druce. I inspected these specimens last October and came to the conclusion that they were not *O. prætermissa* for the following reasons:—1. The flowers are too small. 2. The lips have 1 or 2 coarse teeth on each side. 3. On some lips the characteristic markings of *incarnata* (see Journ. Bot. 1920, t. 556, figs. 2 & 24) were still visible, though they will soon disappear. 4. The leaves of the stoutest specimen resembled those of British *incarnata*, broadest near the base, tapering gradually upwards. The other specimens had narrower leaves, as is the case in some northern forms (hence the name *O. angustifolia* Wimmer, Fl. Siles. p. 251, 1829). Mr. Wilmott has since told me that re-examination of the specimens in conjunction with Dr. Stephenson convinced them both that they were *incarnata*; they resembled the narrow-leaved figure of *O. incarnata* var. *extensa* Hartm. in Reichenbach's Icones, which was taken from a Gothland specimen, and therefore likely to be the same as the Oeland plant. Linnæus did not regard the Rella plant as typical *latifolia*, for he refers to it in MS. as "varietas."

In his Nov. Fl. Suecicæ (Mant. iii. pp. 127–131: 1842) Fries tells us that in the place indicated by Linnæus he collected the three species recorded in It. Oel. 48, and that the "Orchis . . . . non maculata" was *incarnata*: the specimen in his Herb. norm. vii. No. 65, was labelled by him "*O. incarnata* L. Certiss!" According to Mr. Wilmott this exactly matches some of the recent Rella specimens, and was the one relied on by Mr. C. B. Clarke (see Journ. Linn. Soc. (Bot.) xix. 207) for the identification of British *incarnata*. As Fries saw the plants *in situ* in the classical locality, his evidence is of special weight.

O. latifolia next occurs in Linnæus's *Flora Suecica* (1745, p. 161):—"728. O. bulbis subpalmatis rectis, nectarii cornu conico, labio trilobo integerrimo bracteis flore longioribus." He again cites Act. upsal., It. oel., Hort. Cliff., Bauhin, p. 85, Rudb. elys., and Vaill. paris. 152, t. 31. f. 1–5, and gives a var. "β. O. palmata sambuci odore," which is *O. sambucina*.

Vaillant (*Botanicon parisiense*, p. 152) gives some most interesting information. He calls the plant cited above "O. palmata pratensis latifolia longis calcaribus. C. B. Pin. 85," which we have seen, as figured in Fl. dan. 266, is *incarnata*. He says the leaves are pale yellowish green, that the bracts exceed the flowers, and that in May it is the commonest orchid of the meadows; also that the figure given by Tabernmontanus (Eicon. pl. p. 683, 1590) represents the plant well; this has broad-based tapering leaves, and small flowers

peeping out from a cage of long incurved bracts, and is a rough but recognisable representation of some forms of *incarnata*. He also says that he found varieties with flesh-coloured, white, and pleasingly red flowers with purple markings, and that figs. 1–3 are varieties which may often be found on one and the same stem. All these details point to *incarnata*.

Vaillant further found at Porchefontaine, and apparently there only, an "O. palmata" which had some relation to the above, but differed as follows:—(1) It flowers later (June). (2) The flowers are more ample. (3) The bracts do not exceed the flowers. (4) The stem is taller and more slender (often 20–22 mm.). (5) The leaves are longer, not so broad at the base, and of a darker green, although their surface is as it were whitish. Now this really does suggest *prætermissa*, and figs. 14 & 15, Tab. 30, might well pass for that species. If any plant of Vaillant's was *O. prætermissa*, it was certainly this, found June 18th. The contention that Linnæus included *prætermissa* in 728, Fl. Suec. ed. 1, falls to the ground. Had he done so he would have cited Tab. 30, which was never referred to by him at all. Vaillant also says that an "O. palmata pratensis latifolia maculata, calcaribus longis, flore purpureo," which only differs from the above varieties of *incarnata* by the dull purple spots on the leaves, is also very common round Fontainebleau in May. This was undoubtedly *O. latifolia* as now understood, its abundance precluding the idea of hybridity. Vaillant's figures cited by Linnæus thus represent *incarnata* and *latifolia*, but not *prætermissa*.

We next come to Linnæus's *Species plantarum*, 1753, in which (p. 941) our plant first received its specific name:—

"*latifolia*. 11. Orchis bulbis subpalmatis rectis, nectarii cornu conico; labis trilobo lateribus reflexo, bracteis flore longioribus." Here follow the synonyms as in Fl. suec., whilst Fl. sv. 728 and Dalib. paris 274 are also cited. Next come four varieties:—"β. O. palmata palustris latifolio Bauh. pin. 86. γ. O. palmata montana altera Baub. pin. 86. δ. O. palmata sambuci odore Bauh. pin. 86. ε. O. palmata palustris maculata Bauh. pin. 86. Habitat in Europæ partis. ♃. Petala 2 lateralia sursum flexo, tria vero connivantia. Nectarii lobium lateribus reflexum."

In addition to the citation of Act. upsal. and Hort. Cliff., both of which included spotted-leaved plants, we have now for the first time a specified variety with spotted leaves.

Finally comes the second edition of the *Flora Suecica* (1755, p. 312).

"801. Orchis (*latifolia*) bulbis subpalmatis rectis, nectarii cornu conico: labio trilobo lateribus reflexo, bracteis flore longioribus." The synonyms follow as before, with the addition of Spec. plant. 941; the description continues: "Habitat in pratis montosis humidioribus, minus frequens in plerisque regionibus. ♃.

"Radices rectæ, nec multum divaricatæ, inque duos vel tres digitos divisæ. Folia parum maculata, præsertim inferiora. Petala 2 dorsalia patentia margine postico reflexo. Nectarii labium retrorsum complicatum, serratum, obscure trilobum. Floret cum Pæonia flore duplici."

Longer observation and closer study have here enabled Linnæus to be fuller in detail and more exact in description. He omits *sambucina* altogether. "Labio trilobo integerrimo" of edition 1 becomes "labio trilobo lateribus reflexo," and is elucidated further by the phrase "labium retrorsum complicatum, serratum." He no longer gives a specified variety with spotted leaves, but says of the species generally "folia parum maculata præsertim inferiora." Why this sudden change?

The reason appears to be that Linnæus has now split off from his original composite *O. latifolia* two new species—*O. sambucina* and *O. incarnata*; the latter is described as follows:—

"802. Orchis (*incarnata*) bulbis palmatis, nectarii cornu conico: labio obscuro trilobo serrato, petalis dorsalibus reflexis. Orchis palmata lutea, floris labio maculato. Segv. Veron. 3. p. 249, t. 8. f. 5. Habitat in Pratis rarius. Præcedenti [*i. e.*, 801 *latifolia*] simillima, a qua differt: Foliis pallide viridibus immaculatis; nec saturate viridibus maculatis. Caule dimidio breviore. Bracteis vix flore aut germine longioribus. Corollis pallide incarnatis; nec rubris. Petalis 2 dorsalibus totaliter reflexis; nec tantum patulis, nec maculatis: nectarii labium structura convenit." Here the "petala 2 lateralia sursum flexa" of Sp. pl. *O. latifolia* are transferred to *incarnata*, and entirely omitted from 801. *O. latifolia*. The leaves of *incarnata* are light, rather yellowish green, unspotted, while those of *latifolia* are dark green and spotted. Linnæus has transferred all the plants with invariably unspotted leaves to *O. sambucina* and *O. incarnata* respectively, leaving those with normally spotted leaves to *O. latifolia*. But, as in the latter, the leaves are by no means always heavily spotted, but often very slightly so, he says "somewhat spotted, especially the lower ones."

The contention that the plant of It. oel. was not *incarnata*, because it continued to be cited under *latifolia* instead of being transferred to *incarnata*, will not bear examination. If this was not a mere oversight, it only shows that Linnæus did not realise the full scope of his new species. He apparently restricted *incarnata* to plants with pale flesh-coloured flowers, for, though he cites Seguier's yellow-flowered form, he makes no mention of it as a Swedish plant, though it occurs with "straw-coloured ivory flowers" in South Sweden (Rchb. Icon. xiii. 54). Whether Linnæus recognised it or not, the Rella plant was a form of *incarnata*, and the creation of that species absorbed it from *latifolia*. Of Linnæus's original *O. latifolia* the only forms with invariably unspotted leaves were *sambucina* and *incarnata*, and on their segregation nothing was left but plants with normally spotted leaves—i. e., *latifolia*, as generally understood, and *Traunsteineri*, both of which have unspotted leaves.

Mr. Wilmott, in his communication on *O. latifolia* L. to the Linnean Society on Nov. 2, 1922 (see Journ. Bot. 1922, 372), which embodied a large amount of valuable research, was unfortunately misled by the identification of the Rella specimens as *O. prætermissa*; his statements as to *prætermissa* on the Continent were hence made under a misapprehension. Although it is the commonest marsh

orchid with unspotted leaves in Britain, the only evidence as to its presence on the Continent appears to be that of M. Sipkes with reference to Holland (*De Levende Natuur*, June 1921), except perhaps Vaillant's rare Porchefontaine plant, Dr. Keller, who has over a thousand paintings of orchids from various countries in Europe, tells me he only knows of it from Britain and Holland; he suggested that a plant which grows at Lychen in Germany might be *prætermissa*, but specimens sent to me from Lychen by Herr Dageförde, at his request, turned out to be *incarnata*. I have never seen *prætermissa* on the French or Italian Riviera, or in Savoie, Haute Savoie, Switzerland, or Italy.

Mr. Wilmott concludes as follows:—"It seems fairly clear that by *O. latifolia* Linnæus in 1755 understood *O. prætermissa*, perhaps including the hybrid with *maculata*. Certainly he did *not* intend *O. majalis* Rchb." There are two obvious objections to this:

(1) In his earliest description of the species, Linnæus said "variat foliis maculatis et immaculatis." Endeavour is made to eliminate this evidence by the statement "Hort. Cliff. was written before Act. Upsal. . . . Whatever is there indicated is erased by the latter work." Linnæus was of a different opinion; he not only cites Hort. Cliff. under *latifolia* in all the works quoted in this paper, but considered it of sufficient importance to give the diagnosis in full.

(2) The objection that in 1755 Linnæus wrote, not of any specified variety, but of *latifolia* as a species, "folia parum maculata" and (foliis) "saturate viridibus maculatis" is sought to be met by the ingenious suggestion that Linnæus was deceived by disease-spots on his solitary herbarium specimen! This implies that he could not remember from observations in the field whether his *latifolia* was spotted or not, but had to refer to a dried specimen, by which he was led to believe that a really unspotted plant had spotted leaves! It would, however, be impossible for anyone gathering marsh orchids not to have a vivid mental picture of the spotted forms which always arrest attention. There is much less liability to error in the case of spotted leaves, which jump to the eye, than of unspotted ones, for it often happens that plants gathered under the impression that they are unspotted turn out on closer examination to be somewhat spotted. One of Mr. Edwards' Rella specimens had spots, which Mr. Wilmott says are an extraordinary match with the spots on Linnæus' herbarium specimen; these, he states, "are merely pathological, caused by an alteration of the cell-walls in the neighbourhood of the stomata." As stomata are seldom or never found on the upper surface of the leaf (except in water-plants with floating leaves, in which the upper surface *only* is exposed to the air) it appears that the spots on the Linnean specimen were on the *lower* surface of the leaf. As the natural leaf-spots of *latifolia* are on the *upper* surface, it is hard to believe that Linnæus could have been deceived in the manner suggested. The truth is that Linnæus was just as credible a witness when he said that the leaves of *latifolia* are spotted, as when he described the plant of It. oel. 48 as non maculata. He was much too keen an observer to have to refer to dried plants for information as

to conspicuous external characters. In any case the suggestion is pure conjecture, of no value as evidence against the reliability of Linnæus as a witness.

The introduction of the name *O. majalis* Rchb. serves only to confuse the issue. *O. majalis* was not a new species, but merely a new name given to *O. latifolia* L. Wimmer and Grabowski (Fl. Siles. ii. 2, 250, n. 1319 : 1829) write under *O. latifolia* : "Nuperrime [H. G. L.] Reichenbach [Icon. Pl. Crit. vi. 7, n. 771 (sphalm. 770; 1828)] sequentem [*O. angustifolia* (Lois.)] nomine *O. latifoliæ*, hanc novo nomine *O. majalis* proposuit." ("very recently Reichenbach proposed the name *O. latifolia* for the following, and for this the new name *O. majalis*"). The "sequentem" referred to is Wimmer's 1320, *O. angustifolia* Lois., generally cited as *O. angustifolia* Wimm., because Loiseleur only admitted it to varietal rank as *O. latifolia* β *angustifolia*. Wimmer's admirable description shows that this was a narrow-leaved form of *O. incarnata* L. Reichenbach tried to restrict *O. latifolia* L. to plants with unspotted leaves, giving the new name *majalis* to the species with spotted (rarely unspotted) leaves, just as Dr. Druce wished to restrict *O. maculata* L. to *O. elodes* Gr. and to rename typical *maculata* . . . *O. Fuchsii* Druce (see Journ. Bot. 1923, 306). Reichenbach fil. (Ic. Fl. Germ. xiii, 57 : 1851), who had unrivalled opportunities for knowing what his father's *O. majalis* really was, confirms Wimmer's view of the matter, placing *O. majalis* as a synonym under *O. latifolia* "*genuina*" with a mark of certainty. Why then replace *O. latifolia* L. by a dead synonym, disowned by Reichenbach's son, founded on the wrongful transfer of the name *latifolia* to another species in the same genus (*incarnata*).

Mr. Wilmott admits that "the var. ε of Sp. pl. was probably *O. majalis*, for the figure in Rudb. elys. is good *majalis*." Fries identified *O. latifolia* L. with *O. majalis*, saying "*Orchis latifolia* L. . . . in Belgio (ubi *O. majalis* vulgata) a Linnæo primo distincta," but this, Mr. Wilmott states, cannot be taken that *O. majalis* could be *O. latifolia* L. Why not? Linnæus' earliest conception of *O. latifolia* was founded on a Belgian plant, and the probability amounts almost to a certainty that the "variat foliis maculatis et immaculatis" of Hort. Cliff. referred to *majalis*. The only other plant it *could* refer to is *O. Traunsteineri*. The suggestion as to hybrids is insufficient, as they are relatively rare. The admission that var. ε of Sp. pl. was probably *majalis* has been apparently forgotten, as well as the fact that by citing Sp. pl. 942 Linnæus implicitly embodied the var. ε in his *O. latifolia* of Fl. sv. 1755.

To sum up. The *O. latifolia* of Linnæus's early works was a composite species including all palmate marsh orchids known to him, as well as the very different *O. sambucina*. In the 2nd ed. Fl. Suec. 1755, he differentiated *O. sambucina* and *O. incarnata* as separate species, thus eliminating from *O. latifolia* all the forms with invariably unspotted leaves. The segregation of *O. Traunsteineri* Saut. in 1830 (Rchb. Fl. germ. excurs. 140. 18) reduced *O. latifolia* L. to a single unmixed species, normally with spotted leaves, exceptionally unspotted. This is the view held alike by the monographers of the *Orchidaceæ* and the authors of the greater floras.

Up to 1847 the British conception of *O. latifolia* L. had not got beyond that of Linnæus's Sp. Pl., for it embraced all the palmate marsh orchids both spotted and unspotted. In the 2nd. ed. of his Manual (p. 310, 1847) Babington separated *O. incarnata* (including the not yet recognised *O. prætermissa*) from *O. latifolia*, thus eliminating the only element with invariably unspotted leaves, and, logically, leaving to *latifolia* nothing but plants with normally spotted leaves. The British point of view thus came into line with that of Fl. Suec. 2nd ed. 1755. It took us ninety-four years to take the step forward made by Linnæus in two!

The idea that *O. latifolia* L. included only plants with unspotted leaves, and was identical with *O. prætermissa* Druce appears to be unsupported by evidence, and is in direct opposition to the testimony of Linnæus. The suggestion that British *latifolia* is a hybrid between *prætermissa* and *maculata* appears to rest on no surer foundation than the fact that hybrids between these species have sometimes been mistaken for *latifolia*, and the conjecture that the latter is itself the offspring of such parentage. The question was gone into at some length in this Journal for 1920, pp. 286–290.

TAUTONYMS, NOMINA ABORTIVA, AND HOMONYMS.

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

Tautonyms ("duplicating binomials") are binary combinations in which the trivial merely repeats the generic name (Journ. Bot. 1922, 130), e. g. *Alliaria Alliaria*. They are rejected under International Rules, Art. 55, 2°. *Nomina abortiva* are names or combinations which at the date of their publication contravened the International Rules, ed. 2 (1912). They may conflict with the Rules because they were superfluous at the time of publication (Art. 51, 1°), or because the original trivial was not retained on transference to another genus, although no obstacle to its retention existed (Art. 48), or because they duplicated the name of a previously published group which was not at that time regarded as a synonym (Art. 51, 2°). According to the "principle of *nomina abortiva*," combinations based on such names are also invalid. The following are *nomina abortiva* :—*Erysimum lyratum* Gilib., because it was a superfluous name for *E. Barbarea* L.; *Tetragonolobus Scandalida* Scop., because the original trivial of *Lotus siliquosus* L. was not retained on transference to *Tetragonolobus*; and *Astragalus brevianthus* Boiss. (1843), because it duplicated an accepted name, *A. rhizanthus* Royle (1835).

If the same name or combination has been effectively published for two or more groups of the same rank, the later applications of the name or combination are *homonyms*. Thus *Abola* Lindl. 1853 (*Orchidaceæ*) is a homonym of *Abola* Adans. 1763 (*Gramineæ*);

and *Astragalus rhizanthus* Boiss. (1843) is a homonym of *A. rhizanthus* Royle (1835). Under the International Rules homonyms as such are not necessarily rejected. "No one is authorized to reject .... a name (or combination of names) .... because of the existence of an earlier homonym which is universally regarded as nonvalid" (Art. 50). It will be noticed that in the Rules the first application of a name is included under "homonym." It seems desirable for the sake of precision to restrict the use of the term to later applications, as in the American Code (Bull. Torr. Bot. Club, 1907, 174).

Fixity of names and the avoidance of all useless creation of names are among the main objects of the Rules (Art. 4). The rejection of tautonyms and of combinations based on *nomina abortiva* and the conditional acceptance of homonyms have, on the contrary, resulted in a want of fixity and an unnecessary multiplication of names. This may be illustrated by examples taken from the British Flora. The numbers appended to the names indicate that the latter were adopted in the following publications :—

1. Druce in Ann. Scott. Nat. Hist. 1906, 217–229.
2. Britten & Rendle, List of British Seed-plants and Ferns (1907); Journ. Bot. 1907, 99–108.
3. Druce *op. cit.* 1907, 241–244; List of British Plants (1908).
4. Rendle & Britten in Journ. Bot. 1907, 433–445.
5. Schinz & Keller, Fl. Schweiz, ed. 3, i. (1909).
6. Wilmott in Babington Manual, ed. 10 (1922).
7. Schinz & Keller, *op. cit.* ed. 4, i. (1923).

I. *Instability due primarily to rejection of tautonyms (British examples).*

Barbarea Barbarea MacMill.—*B. lyrata* Aschers. 1, 2, 3; *B. vulgaris* R. Br. 4, 5, 6, 7.

Alliaria Alliaria Britton.—*A. alliacea* Britten et Rendle 2; *A. officinalis* Andrz. 4, 5, 6, 7.

Coronopus Coronopus Karst.—*C. procumbens* Gilib. 1, 2, 5, 7; *C. verrucarius* Muschl. et Thell. 3; *C. Ruellii* All. 6.

Petasites Petasites Karst.—*P. ovatus* Hill 2, 3; *P. hybridus* Gaertn. Mey. et Scherb. 4, 5, 6, 7.

Pulicaria Pulicaria Karst.—*P. prostrata* Aschers. 1, 2, 3; *P. vulgaris* Gaertz. 4, 5, 6, 7.

Taraxacum Taraxacum Karst.—*T. officinale* Weber 2, 5, 6, 7; *T. vulgare* Schrank 3.

Menyanthes Nymphoides L.—*Nymphoides orbiculatum* Gilib. 1; *N. peltatum* Britten et Rendle 2, 3.

Corallorrhiza Corallorrhiza Karst.—*C. Neottia* Scop. 1, 2; *C. trifida* Chat. 3, 4, 5, 6, 7.

Polygonatum Polygonatum Jirasek.—*P. odoratum* Druce 1; *P. officinale* All. 2, 4, 5, 7; *P. angulosum* Montandon 3; *P. Sigillum* Druce 3; *P. anceps* Moench. 6.

Phragmites Phragmites Karst.—*P. vulgaris* Druce 1, 3; *P. communis* Trin. 2, 4, 5, 7.

Calamagrostis Calamagrostis Karst.—*C. canescens* Gmel. em. Druce 1, 3, 4, 6; *C. lanceolata* Roth 2, 5, 7.

In the eleven cases cited the rejection of tautonyms has resulted in two, three, or even five names being used for the same species since 1905, and in the creation of five superfluous new combinations. The seven combinations *Barbarea lyrata, Alliaria alliacea, Coronopus verrucarius, Pulicaria prostrata, Taraxacum vulgare, Polygonatum angulosum,* and *Phragmites vulgaris* are invalid because they are based on *nomina abortiva.* According to Schinz and Thellung (Vierteljahrsschr. Nat. Ges. Zürich, liii. 572; 1909), *Calamagrostis canescens* also is based on a *nomen abortivum*; in the opinion of Rendle and Britten, and Wilmott, however, this view is incorrect. How closely the rejection of tautonyms is associated with *nomina abortiva* and consequent instability in nomenclature may also be seen from the list of 25 combinations based on *nomina abortiva* given by Schinz and Thellung (*op. cit.* 513). This includes 8 of those already cited in the British list. Of the remaining 17 instances of variance in nomenclature, all but 4 are the result of the rejection of tautonyms, that is to say 84 per cent. of cases in the list are due to that cause.

As part of the variance in nomenclature in the British examples is due to the absence from the Vienna Rules of any mention of *nomina abortiva,* and as part may be attributed to different interpretations placed on the Rules by the several authors cited, it seems desirable to give instances of name-changes adopted by Schinz and Thellung in a series of papers on the nomenclature of Swiss plants during the period 1906–1921. The Arabic numerals after the names refer to the following publications. Roman numerals indicate the corresponding editions of Schinz & Keller's Flora der Schweiz, ed. I (1900); II (1905); III (1909); IV (1923). In the case of editions II–IV it is the first part (Exkursionsflora) which is cited.

1. Vierteljahrsschr. Nat. Ges. Zürich, li. 210–220, 489–501 (1906).
2. Bull. Herb. Boiss. sér. 2, vii. 97–112, 177–192, 331–346, 387–406, 493–520 (1907).
3. Vierteljahrsschr. Nat. Ges. Zürich, liii. 493–593 (1909).
4. *Op. cit.* lviii. 35–91 (1913).
5. *Op. cit.* lx. 335–365 (1915).
6. *Op. cit.* lxi. 414–430 (1916).
7. *Op. cit.* lxvi. 257–310 (1921).

II. *Instability due primarily to rejection of tautonyms (Swiss examples).*

Eragrostis Eragrostis Karst.—*E. major* Host I; *E. megastachya* Link 1, II; *E. cilianensis* Vignolo-Lutati 2, III, IV.

Dracunculus Dracunculus Voss—*D. vulgaris* Schott I, II, IV; *D. major* Garsault 3, III.

Amelanchier Amelanchier Degen—*A. vulgaris* Moench 1, II; *A. ovalis* Medik. 2, 3, I, III, IV.

Cydonia Cydonia Karst.—*C. vulgaris* Pers. I, II; *C. oblonga* Mill. 2, III; *C. maliformis* Mill. 5, IV.

Helianthemum Helianthemum Karst.—*H. vulgare* Gaertn. I; *H. Chamæcistus* Mill. 1, II, III; *H. nummularium* Mill. 3, IV.

Fumana Fumana Karst.—*F. procumbens* Gren. et Godr. 1, II; *F. vulgaris* Spach 3, III, IV.

Lens Lens Huth.—*L. esculenta* Moench I, II, III; *L. culinaris* Medik. 4, IV.

The rejection of combinations based on *nomina abortiva* was a result—unforeseen by many botanists—of the retro-active character of the International Rules (1905). "Les règles .... ont toujours un caractère rétroactif: les noms ou les formes de nomenclature contraires à une règle ne peuvent être conservées" (Art. 2). "It is much to be regretted that this point .... was not discussed at the [Vienna] Congress" (Rendle and Britten in Journ. Bot. 1907, 433). Janchen (Zur Frage der totgeborenen Namen: Wien, 1909) gave an able—and to me convincing—exposition of the case against the "principle of *nomina abortiva*," which rejects such combinations. He showed that it had introduced unnecessary complications into nomenclature, that it frequently demanded lengthy researches into the history of species, and that even its chief exponents, Schinz and Thellung, found it so difficult of application that they made mistakes in individual cases. Thus in 1907 these authors cited *Anthriscus Scandix* (Scop.) Aschers. and *Stachys danicus* (Mill.) Schinz et Thell. as examples of combinations based on *nomina abortiva*, but in 1909 they admitted that both combinations were valid (*op. cit.* liii. 498, 513). As Janchen put it: "If the highest authorities on botanical nomenclature cannot avoid mistakes in carrying out a principle originated and defended by themselves, how can other botanists who are neither so experienced in nomenclature nor inclined to devote so much time to it succeed in applying the principle?"

The British Museum botanists (Journ. Bot. 1909, 187) urged that it should be made clear by means of illustrative examples that such names as *Cucubalus latifolius* Mill., which was published as a new species, are not *nomina abortiva*. Schinz and Thellung's view (*op. cit.* 496; 1909) that *C. latifolius* is a *nomen abortivum* seems to be due to a misconception of the respective spheres of taxonomy and nomenclature. The delimitation of natural groups belongs to taxonomy; after these groups have been fixed, their names should be settled in accordance with rules of nomenclature. Miller separated *C. latifolius* from *C. Behen* L. as a distinct species. It is now agreed that the two are conspecific. Miller's mistake was a mistake in taxonomy, not in nomenclature. He was fully entitled to give a new name to his supposed new species: in fact, he would have been breaking the rules had he applied the same name to two groups which he treated as distinct.

At the Brussels Congress the "principle of *nomina abortiva*" was definitely incorporated in the Rules by the addition to Art. 56 of a second paragraph and three examples. The first and third examples offer no difficulties. *Linum multiflorum* Lam. (1778) is rejected under Art. 51, 1°, because it was a superfluous name for *L. Radiola* L. (1753). *Polypodium montanum* Vogl. (1781) is rejected under

Art. 51, 2°, because it duplicated the name of the previously published *P. montanum* Lam. (1778), which was not at that date (1781) treated as a synonym, though it was subsequently transferred to *Cystopteris*. The second example given is as follows: "*Peucedanum Silaus* L. (1753) when placed in the genus *Silaus* must be called *Silaus flavescens* Bernh. (1800); the earlier synonym *Seseli selinoides* Jacq. (1762) cannot be considered, as this combination is contrary to Art. 48 of the Rules." Here there seems to be a mistake. Jacquin did *not* transfer *Peucedanum Silaus* to the genus *Seseli*—he described *Seseli selinoides* as a new species without suspecting that it was conspecific with *Peucedanum Silaus* (Schinz et Thell. *op. cit.* 508; Janchen, *op. cit.* 13). Hence Art. 48 is not applicable. The Editorial Committee of the International Rules, ed. 2, apparently accepted Briquet's analysis of the case (Vierteljahrsschr. Nat. Ges. Zürich, liii. 502; 1909) without verification. Schinz and Thellung adopt the view that in order to determine whether a particular name is a *nomen abortivum* or not, we must take into account (1) our present taxonomic views; (2) the nomenclatural situation at the date of publication of the name, according to the International Rules (1905–1910). If this view (which introduces purely taxonomic considerations into nomenclature) is correct, then *Seseli selinoides* is undoubtedly a *nomen abortivum*, but so also is *Cucubalus angustifolius* Mill. (for those who regard it as conspecific with *C. Behen*). Briquet does not accept this view, for he treats *Cucubalus angustifolius* as a valid name, and adopts the combination *Silene angustifolia* (Mill.) Guss. (Prodr. Fl. Corse, i. 543; Oct. 1910). This species (more commonly known as *S. inflata* or *S. Cucubalus*) offers an excellent illustration of the instability of nomenclature caused by the introduction of the principle of *nomina abortiva*, coupled with the conditional acceptance of homonyms. It is not yet decided whether it should be called *S. vulgaris* or *S. angustifolia*.

SILENE LATIFOLIA (Mill. 1768) Britten et Rendle List Brit. Seed-pl. 5 (1907); Druce List Brit. Pl. 10 (1908); non Desf. (1798); *S. venosa* (Gilib. 1781) Aschers.; Hayek Fl. Steierm. i. 337 (1908). *S. vulgaris* (Moench 1794) Garcke; Schinz et Thell. in Vierteljahrsschr. Nat. Ges. Zürich, liii. 496, 576 (1909). *S. angustifolia* (Mill. 1768) Guss. (1827); Briq. Prodr. Fl. Corse, i. 543 (1910); Rendle in Journ. Bot. 1911, 277; non Poir. (1789). *S. Cucubalus* Wibel, 1799; Wilmott in Babington Man. ed. 10, 54 (1922).

The case of *Inula squarrosa* (L.) Bernh. (better known as *I. Conyza* DC.) is another on which experts are disagreed. Schinz and Thellung (1921) maintain that it is valid, because there is nothing to prove than Bernhardi *did not* regard *I. squarrosa* L. as a synonym of *I. spiræifolia* L. Briquet and Cavillier treat it as a *nomen abortivum*, because no evidence has been adduced that any botanist at that time *did* regard *I. squarrosa* L. as an absolute synonym of *I. spiræifolia*. Schinz and Thellung's second contention that even if *I. squarrosa* Bernh. were a *nomen abortivum*, the combination would have to be made again—appears to be well-

founded. A *nomen abortivum* has no status whatsoever in nomenclature: it is treated simply as non-existent. Hence, in 1905, at which date *I. squarrosa* L. was generally regarded as a synonym of *I. spiræifolia*, the existence of the invalid *I. squarrosa* Bernh. formed no obstacle to the valid publication of the same combination by Schinz and Thellung (Schinz & Keller Fl. Schweiz, ed. 2, i. 507). Mr. Wilmott informs me that the combination was published in 1800 by Bernhardi (Syst. Verz. Pfl. Erfurt, 148), a fact which has been generally overlooked.

INULA SQUARROSA (L.) Schinz et Thell. in Schinz & Keller Fl. Schweiz, ed. 2, i. 507 (1905); et in Vierteljahrsschr. Nat. Ges. Zürich, li. 498 (1906); et *op. cit.* lxvi. 306 (1921); Rendle et Britten in Journ. Bot. 1907, 439; Druce List Brit. Pl. 36 (1908); non L. (1753). *Conyza squarrosa* L. Sp. Pl. 861 (1753). *I. vulgaris* (Lam. 1778) Trevisan; Britten et Rendle List Brit. Seed-pl. 15 (1907). *I. Conyza* DC. (1836); Briq. et Cavill. in Burnat Fl. Alp. Marit. vi. 242 (1917); Wilmott in Babington Man. ed. 10, 204 (1922); et in Journ. Bot. 1922, 197.

The conditional acceptance of combinations which are homonyms is a prolific source of name-changes. Two cases may arise: a homonym may be first rejected and then accepted, or *vice versa*. *Chenopodium virgatum* Thunb. (1815) was for many years an insufficiently known species (DC. Prodr. xiii. pars 2, 77; 1849), and was accordingly kept up in the *Index Kewensis*. Hence the homonym *C. virgatum* Ambrosi (1857) could not be used for *Blitum virgatum* L., and the latter was known as *C. foliosum* Aschers. The discovery by Murr (Bull. Herb. Boiss. sér. 2, vii. 178, footnote; 1907) that *C. virgatum* Thunb. was a form of *C. album* L. led immediately to the replacement of *C. foliosum* by *C. virgatum* Ambrosi. Conversely the homonym *Aster salicifolius* Scholler (1787) was used in the third edition of Koch's Synopsis and the first three editions of Schinz and Keller's Flora before it was discovered that it was untenable owing to *A. salicifolius* Lam. (1783) being the accepted name of a North American species. The numbers after the names in the following list are explained on p. 43.

III. *Instability due to conditional acceptance of homonyms (Swiss examples).*

Bromus multiflorus Sm. II, III; *B. grossus* Desf. 4, IV.

Chenopodium foliosum Aschers. I, II; *C. virgatum* Jessen 1, 2, III; *C. virgatum* Ambrosi 5, IV.

Aster salicifolius Scholler I, II, III; *A. salignus* Willd. 4, IV.

Erigeron Schleicheri Gremli I, II, III; *E. mixtus* Arv.-Touv. 2; *E. glandulosus* Hegetschw. 4, IV.

Doronicum scorpioides Willk. et Lange 2, III; *D. grandiflorum* Lam. 4, IV.

The undesirable consequences of the rejection of tautonyms, the adoption of the "principle of *nomina abortiva*," and the conditional acceptance of homonyms are indicated by the fact that, during the period 1906–1923, 25 species have borne 58 different names in the works cited. Had the Vienna Congress reached contrary decisions on these three questions, only 26 names would have been used. The cases of *Silene Cucubalus* and *Inula Conyza*, which have caused so much trouble under the present Rules, would have presented no difficulty. *S. latifolia* (Mill.) and *S. angustifolia* (Mill.) would have been rejected as homonyms, and the species would stand as *S. venosa* (Gilib. 1781) Aschers. Similarly, *Inula squarrosa* (L.) is a homonym, and the name *I. vulgaris* (Lam. 1778) Trevisan would have been adopted, as the trivial antedates *I. Conyza* DC. (1836).

Conclusions.

1. Tautonyms should not be rejected.
2. The "principle of *nomina abortiva*" should be expunged from the Rules.
3. All combinations which are homonyms should be rejected.

IMPERIAL BOTANICAL CONFERENCE.

THE following is the Provisional Programme for the Imperial Botanical Conference to be held at the Imperial College of Science and Technology, South Kensington, on July 7–16:—

1. SYSTEMATIC BOTANY AND ECOLOGY. (*a*) The best means of promoting a complete botanical survey of the different parts of the Empire. (*b*) Correlation of taxonomic work in the Dominions and Colonies with work at home. (*c*) Training in field ecology. (*d*) Outline accounts of vegetation survey in different parts of the Empire.

2. GENETICS. (*a*) The economic possibilities of plant-breeding. (*b*) The value of selection work in the improvement of crop plants.

3. PLANT PHYSIOLOGY. (*a*) Recent work on crop physiology. (*b*) The scientific problems of fruit storage, especially of fruit in transit overseas.

4. PLANT PATHOLOGY. (*a*) Obscure plant diseases of widespread occurrence. (*b*) The relation of genetics to plant pathology.

5. EDUCATION AND RESEARCH. (*a*) The possibility of promoting:—(i) Temporary exchanges of botanical posts in different parts of the Empire. (ii) The interchange of post-graduate students between the overseas and home Universities and Research Institutions. (*b*) The desirability of providing further facilities for botanical research in the tropics and Dominions.

6. (*a*) The paleobotanical resources of the Empire. (*b*) Wood Technology (*e.g.*, Fungal attacks on wood and the preservation of timber). (*c*) Nomenclature (expression of opinion on Rules of Nomenclature). (*d*) Joint Conferences with other bodies (*e.g.*, Legislation *re* plant diseases, especially as regards the control of plant imports).

The last three or four days of the Conference will be devoted to excursions to places and institutions of Botanical interest. The subscription for attending the Conference is one pound, which should be sent to the Secretary, Mr. F. T. Brooks, 31 Tenison Avenue, Cambridge.

NEW SOUTH AFRICAN CAMPANULACEÆ.

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

The following new species and varieties are described from a collection of S. African plants made in June 1923 by Dr. C. E. Moss of Witwatersrand University, and presented to the Botanical Department of the British Museum:—

Roella ciliata L. var. triflora, var. nov. *Suffrutex*; *caule* ramoso piloso; *foliis* lineari-acuminatis erectis apice incurvatis, laciniato dentatis; *floribus* terminalibus solitariis vel ternatis; *calycis* lobis lanceolatis acutis dentatis pilosis; *corolla* variegata, tubo quam lobos calycis vix longiore.

Hab. Klaaver Valley, Cape Peninsula; 7507!

Differs from *R. ciliata* var. *incurva* in the clustered flowers and the hairy calyx.

Roella ericoides, sp. nov. *Suffrutex* parvus; *radice* lignosa prolongata; *caule* ramoso erecto subglabro; *foliis* non fasciculatis, linearibus subulatis acuminatis decurrentibus utrinque glabris, marginibus incurvatis ciliatis integris, ad apicem raro dentatis; *floribus* sessilibus terminalibus, solitariis rarius ternatis; *calycis* lobis erectis subulatis acuminatis ciliatis, ad apicem reflexis et intrinsecus dentatis; *corolla* alba, tubo quam lobos calycis paulo longiore, lobis patentibus ovatis acutis; *capsula* cylindracea subpubescente.

Hab. Klaaver Valley, nr. Simonstown; 7508!

A much-branched dwarf shrub 10–15 cm. high, leaves 3–4 mm. long, calyx lobes 3 mm. long, corolla white, tube 4–5 mm. long, limb 1 cm. across. Quite a distinct species characterised by the bushy ericoid habit and absence of leaf-fascicles.

Lightfootia erecta, sp. nov. *Suffrutex* a basi ramosa, radice lignosa; *ramis* erectis teretibus pubescentibus; *foliis* sessilibus alternatis (raro oppositis vel ternatis) sæpius fasciculatis, incurvatis subulatis acutis remote subdenticulatis, utrinque glabris marginibus ad basim ciliatis; *floribus* axillaribus pedicellatis erectis, in terminale racemo confertis; *pedicellis* pubescentibus quam folia vix longioribus; *calycis* tubo hemisphærico pubescente-piloso, lobis subulatis acutis fere glabris; *corollæ* lobis lanceolatis subacutis patentibus quam lobos calycis duplo longiore.

Hab. Klaaver Valley, Cape Peninsula; 7498!; 7499! is conspecific.

Closely related to *L. longifolia* A. DC., but differs in the shorter, narrower, more spreading, often fasciculate leaves, in the longer pedicels and the more compound raceme.

An undershrub of about 25 cm. high, leaves acicular, generally fascicled, somewhat spreading, about 1 cm. long. Pedicels rather longer than the leaves subtending them. Calyx-lobes 2–3 mm. long, corolla about 6 mm. across, lobes 4–6 mm. long.

Wahlenbergia filicaulis, sp. nov. *Herba* annua (?) glabra ramosa; *radice* prolongata; *ramis* erectis patentibus foliatis filiformibus rigidis, internodii longis nudis; *foliis* senioribus alternatis

secundatis, glaberrimis subulatis acutis, marginibus paulo incurvatis, ad basim minute ciliatis; *foliis* junioribus in axillis fasciculatis; *floribus* breviter pedicellatis in axillis solitariis; *pedicellis* glabris quam folia valde brevioribus; *calycis* tubo elongato, lobis angustatos acutos æquante; *corolla* fere ad mediam divisa, lobis triangularibus acutis; *filamentis* tenuibus non basi expansis; *stigmate* bifido eglanduloso; *capsula* 2-loculare.

Hab. Klaaver Valley, Cape Peninsula; 7503!

A very wiry herb up to 20 cm. high, with very fine almost black branches. Leaves widely spaced, almost 1 cm. long. Pedicels quite short, 2–3 mm. Corolla 3 mm. long and about the same across. Capsule very fine and cylindrical. In the type specimen the flowers at the apices of the branches are swollen and monstrous and have not opened.

Although not previously described, the plant has several times been collected. In Herb. Mus. Brit. there are three specimens: one collected by Fr. Masson at the Cape of Good Hope, the others collected by Wallich in Dec. 1842 on sandy plains near Wynberg. The species is distinguished from all other Wahlenbergias by its characteristic general habit.

Lobelia Mossiana, sp. nov. *Herba* perennis erecta glabra; *caule* crasso anguloso valde striato; *foliis* alternatis, inferis sessilibus lanceolatis acutis, acute serratis, utrinque glabris, superis angustato-linearibus acutis, remote denticulatis, utrinque glabris; *bracteis* subulatis; *floribus* solitariis axillaribus pedicellatis in laxo racemo terminale; *pedicellis* pubescentibus erecto-patentibus quam bracteas paulo brevioribus; *calycis* tubo turbinato pubescente striato, lobis subulatis acutis valde carinatis quam tubum duplo longioribus; *corollæ* tubo quam lobos calycis paulo longiore, extus pubescente; *antheris* dorso glabris, inferis barbatis; *capsula* obconica.

Hab. Pietermaritzburg; 2670!; 516! is conspecific.

An erect herb about 25 cm. high with a long lax terminal raceme. Leaves up to 5 cm. long by 1 cm. broad, the upper leaves narrower. Pedicels glandular-pubescent, 1–1·5 cm. long. Corolla-tube about 6 mm. long, twice as long as the calyx-lobes.

Shows most affinity with *L. Erinus* L. and *L. anceps* Thunb.; it somewhat resembles *L. natalensis* A. DC., but differs in the leaves, hairy pedicels, and calyx, and in the proportions of the floral parts.

Lobelia longiracemosa, sp. nov. *Herba* perennis a basi ramosa; *caulibus* foliatis glabris teretibus angustate alatis; *foliis* membranaceis, inferis longe petiolatis oblanceolatis obtusis, remote patenti-dentatis, ad basim longe cuneatis, utrinque glabris, superis subsessilibus linearibus lanceolatis obtusis, remote patenti-dentatis; *floribus* pedicellatis in terminale longo laxo racemo; *pedicellis* glabris filiformibus quam bracteas subulatas longioribus; *calycis* tubo turbinato quam lobos lineares acutos 3-plo longiore; *corolla* glabra, lobis inferis acutis, lobis superis subulatis, tubo quam lobos calycis multo longiore; *antheris* dorso pilosis, inferis barbatis; *capsula* cylindraceo-turbinata.

Hab. Damp shady spots in the Glen, Montagu; 5386!

An erect or spreading herb up to about 25 cm. high. Inflo-

rescence a very long, rather lax raceme. Lower leaves 3 cm. × 1 cm., upper leaves much narrower. Bracts 5–7 mm. long, pedicels up to 1 cm. long. Calyx-lobes less than 1 mm. Corolla-tube 2–3 mm.

Appears to be most nearly related to *L. anceps* Thunb., from which it differs in the less fleshy, more upright habit, thinner leaves, and long racemes.

LOBELIA ANCEPS Thunb. var. VAGANS, var. nov. *Herba* glabra procumbens; *caule* debilissimo attenuato vix alato; foliis tenuissimis, inferis longe petiolatis oblanceolatis obtusis subdentatis, utrinque glabris, superis linearibus subsessilibus obtusis sub-integris, marginibus ciliatis; *floribus* pedicellatis solitariis in axillis superioribus; *pedicellis* ciliatis.

Hab. Lake side, Cape Peninsula; 2672!

Distinguished from the type by its extremely weak straggling habit and thin attenuated leaves, the lower ones tapering gradually into a long petiole. An unnumbered S. African specimen, in Herb. Mus. Brit., collected by Wallich, seems to be identical.

Lobelia (*Isolobus*) **spathulata**, sp. nov. *Herba* annua procumbens; *ramis* ad summos exceptis glabris, angulatis, marginibus subglandulosis; *foliis* inferis orbiculari-spathulatis serratis, utrinque glabris, superis angustatis obcuneatis serratis; *floribus* solitariis in axillis foliorum, breviter pedicellatis; *pedicellis* sparse glandulosis pilosis, ad basim bi-bracteolatis, quam folia 4–5-plo brevioribus; *calycis* tubo turbinato glanduloso-piloso, pedicellos æquante, lobis angustatis lanceolatis; *corolla* alba, lobis purpurascentibus linearibus subacutis quam lobos calycis duplo longiore.

Hab. Klaaver Valley, nr. Simonstown; *Moss* 7448!

A procumbent annual, glabrous except at the extremities of the branches. Lower leaves almost orbicular narrowed into a long petiole, up to 1 cm. broad, callously dentate. Upper leaves much narrower, wedge-shaped, with few serrations. Pedicels 1–2 mm. long. Calyx-tube 2 mm., lobes rather shorter. Corolla 2–3 mm. long.

Close to *Lobelia* (*Isolobus*) *Echloniana* Sond., but distinguished by the much broader, rather larger leaves, shorter glandular pedicels, and the glandular calyx with lanceolate lobes.

THE VITALITY AND DISTRIBUTION OF SEEDS.

(See Journ. Bot. 1923, 297.)

ATTENTION may be directed to Mr. H. T. Darlington's account (Amer. Journ. Bot. ix. 266–269; May 1922) of Dr. W. J. Beal's seed-viability experiment, which was commenced in the autumn of 1879. Dr. Beal selected fifty freshly-grown seeds from each of twenty different kinds of common plants growing in the vicinity of East Lansing, Michigan. Twenty such sets were prepared with the view of testing them at different times in the future. Each set of seeds was well mixed in moderately moist sand, just as it was taken three feet below the surface, where the land had never been ploughed. The seeds of each set were well mixed with the sand and placed in a

pint bottle, the bottle being filled and left uncorked, and placed with the mouth slanting downwards, so that the water could not accumulate about the seeds. The bottles were buried about 20 inches below the surface of a sandy knoll in a row marked at each end by a boulder, and one bottle has been dug up every five years, and the seeds tested for germination, the last (eighth) test being in the spring of 1920. It is proposed that the interval of testing be now lengthened to ten years, so that the final test may be made in the year 2039, at the expiry of 160 years.

The species selected were the following:—*Brassica nigra*, *Capsella Bursa-pastoris*, *Lepidium virginicum*, *Stellaria media*, *Lychnis Githago*, *Portulaca oleracea*, *Malva rotundifolia*, *Trifolium repens*, *Œnothera biennis*, *Ambrosia artemisiifolia*, *Anthemis Cotula*, *Erechtites hieraciifolia*, *Verbascum Thapsus*, *Plantago major*, *Amarantus retroflexus*, *Polygonum Hydropiper*, *Rumex crispus*, *Euphorbia maculata*, *Bromus secalinus*, and *Setaria glauca*. No seeds of the *Lychnis*, *Trifolium*, *Erechtites*, *Euphorbia*, and *Bromus* have germinated in any of the eight tests. The following germinated in the eighth test, *i.e.* after forty years burial: *Brassica nigra*, *Lepidium virginicum*, *Portulaca oleracea*, *Œnothera biennis*, *Ambrosia artemisiifolia*, *Plantago major*, *Amarantus retroflexus* (which proved to be mainly *A. græcizans*), and *Rumex crispus*. *Lepidium virginicum* is the only species which has an unbroken record of germination. The *Brassica*, *Œnothera*, *Amarantus*, and *Rumex* have each failed once, and the *Portulaca* three times out of eight. The germination of *Ambrosia artemisiifolia*, which failed to germinate in the previous seven tests, and *Plantago major*, which has germinated only once previously, are especially interesting. On the other hand, neither *Capsella Bursa-pastoris* nor *Setaria glauca*, each of which have failed only once previously, germinated in the eighth test.

Those who are interested in the progress of the new flora of Krakatau should refer to "The Flora and the Fauna of the Islands of the Krakatau-group in 1919," by W. Docters van Leeuwen (Ann. Jard. Bot. Buitenzorg, xxxi. 103–140, tt. 19–24; 1921). The author considers that "we are in reason bound to accept Verbeek's and Treub's statements as to the absolute extinction of the entire animal and vegetable life, unless facts of a serious nature should be discovered which would justify doubts as to the reliability of them; and such facts .... have not been found" (*op. c.* 104). "My own list now numbers no less than 272 plants, against 137 in the list of Ernst. .... Of genuine littoral-plants only seven new ones have made their appearance .... Contrarily the number of forest-plants has been greatly added to. I found 68 species [vascular plants only] in all, whereas Ernst mentions 20 species. .... Most noteworthy is the great increase of epiphytes" (*op. c.* 117, 118). "It is surprising to note the entire absence of the *Loranthaceæ*, which are common parasites in Java and Sumatra and elsewhere; which should be accounted for from the absence of the birds that disseminate the *Loranthus* seeds. .... Treub and Penzig found chiefly such plants

as were conveyed by the sea and the winds. Penzig only mentions four species whose seeds were probably conveyed across by birds. .... Plants, whose distribution is undoubtedly effected by birds, were already found by Ernst, and myself also found fairly great numbers of such plants. But still most of the new plants are even now brought by winds and sea" (*l. c.*).

T. A. SPRAGUE.

MR. J. C. SHENSTONE'S interesting contribution recalls an occurrence related to me by the Land-steward on Duncrub Estate, Perthshire, which is perhaps worth recording. In 1896 a considerable area of Scots Pine in the Muir Wood on this Estate was felled, and after the removal of the timber the brushwood etc. was burnt in heaps, as is the general custom preparatory to re-planting. The fires left the usual burnt patches on the ground, 5 or 6 yards in diameter. In the following year, large numbers of seedlings of *Ulex europæus* appeared round the margin of these burnt places, and in the second year after felling the growth of the plant was so dense as to suggest that it had been sown thickly to form a circular belt 8 or 9 inches wide. Since there was no *Ulex* in the wood nor in the immediate neighbourhood, and since it appeared around the burnt patches so plentifully, one inclines to the view that the seeds must have been present in the soil. Conditions allowing of germination seem to have followed the disturbance of the ground, and one wonders, in this instance, how far the temperature factor was involved. No indication can be given of the length of time the seeds had lain dormant, beyond remarking that the timber-trees which were removed were about 70 years old and they had been growing in fairly close canopy.

J. R. MATTHEWS.

NOTES ON COLLECTING ROSES.

BY LIEUT.-COL. A. H. WOLLEY-DOD.

THERE has been a considerable improvement in the specimens of Roses contributed lately to the Exchange Clubs and sent to me for determination by collectors, but not all are quite what they should be. It must be borne in mind that Roses are of a protean nature, and that their leading characteristics are not always obvious on all parts of the bush. A small flowering-shoot with three or four leaves is as a rule useless for naming. An effort should be made to cut specimens which are characteristic of the average of the plant, avoiding abnormal portions, and in these I include the strong shoots of the year which often have abnormally large leaflets and prickles. An average specimen may not be easy to obtain, but, if an ample supply is sent, the average should be apparent. Sufficient to fill the standard size of botanical mounting paper should be the minimum, and if two sheets can be sent, so much the better.

Most Roses are in the best condition for determination from the last week in July till the end of September, and often later so long as the leaves have not fallen. Roses of the sections which erect their petals are best just as the fruit reddens, and in the *Villosæ*, in which the members of the *Omissæ* are chiefly distinguished from those of the *Tomentosæ* by the persistence of the sepals till the fruit is fully ripe, they are best gathered in that condition. The ideal specimen is one which is gathered first in flower, then just as the fruit reddens, and lastly when it is fully ripe; but this is more than one can expect from most collectors, who are not always able to visit the same spot twice, nor to identify the same bush (a very important point) if they do.

Notes on the habit and colouring are useful, if not for the first determination, at least for record and for further study. I have paid little attention to the colour of the petals, since I seldom know this, and believe that it is quite as subject to variation as all the other characteristics, but continental rhodologists give considerable value to this—for instance, I often get plants named *R. dumetorum* "if the petals are pink," but *R. obtusifolia* "if they are white."

For the purpose of recording the distribution collectors should always give Watson's vice-county numbers or at least names, and it is always useful for writing up notes referring to specimens if reference-numbers are given. I have often been puzzled whether to refer two specimens from the same locality and collected at the same date to the same variety, in default of this information. Often what purports to be the same variety is gathered year after year with no reference to former gatherings, so that it is quite possible that they may receive different names of closely allied varieties.

Since I have studied the Roses in Moyle Rogers's collection, I have made several alterations in names and nomenclature, so that many of the names I have given in the past may be in need of revision. I shall be glad to go through any specimens which have been sent to me before if collectors will kindly forward them to me next winter, when I hope my revise will have been completed; but will they please not send more than about 50 specimens at a time?

DR. FORBES'S NEW GUINEA PLANTS.

THE following addenda should be made to the enumeration published as a Supplement to last year's Journal:—

Eupomatia laurina R. Br. (p. 3). Add: Sogere, 2000 ft. 747.

Pygeum Forbesii Koehne (p. 13). The locality for this is Mt. Gawada, 5000 ft.; it is a large tree with yellowish-white flowers.

Under *Rubiaceæ* add: UNCARIA FERREA DC. Sogere, 863.—LASIANTHUS SOGERENSIS Wernh. in Journ. Bot. lvi. 72. Sogere, 3000 ft. 313.—L. CANEPHOROIDES Wernh. *op. cit.* 73. Sogere, 2000 ft. 203.—HYDNOPHYTUM FORBESII Hook. f. in Bot. Mag. sub tab. 7218. Dr. Forbes sent a living plant of this to Kew in 1886, where it flowered three years afterwards. There is a small

fragment in the Kew herbarium. For *Cerbera Odollam* Gaertn. (p. 32) read C. FLORIBUNDA K. Schum. A large tree with white flowers.

Under *Solanaceæ* add: PHYSALIS MINIMA L. Sogere, 2000 ft., 423.

Endiandra papuana Laut. (p. 42). Delete as synonym of *E. Forbesii.*

Antidesma prægrandifolium (p. 46). Add: Sogere, 2000 ft. 250. Tree about 40 ft.; flowers on branches pale yellow.

At end of *Euphorbiaceæ* add:—NEOSCORTECHINIA FORBESII Pax (*Scortechinia Forbesii* Hook. f. in Hook. Ic. Plant. sub tab. 1706). Sogere, 434. A large tree; fruit greyish green; seed bright lake-scarlet.

PRINCIPAL BIBLIOGRAPHY.

1886. Ridley in Journ Bot. xxiv. 353.

1901. Perkins in Pflanzenreich (Monimiaceæ).

For other references before and including 1901, see Schumann and Lauterbach: *Die Flora der Deutschen Schutzgebiete in der Südsee.*

1903. C. De Candolle in Bull. Herb. Boiss. III, ii. 165.

1909–1916. Nova Guinea, Leiden, vols. viii., xii.

1911. S. Moore in Journ. Bot. lii. 289.

1913–1923. C. Lauterbach, *Beiträge zur Flora von Papuasien,* in Engl. Bot. Jahrb. 1913–23.

1918. Wernham in Journ. Bot. lvi. 68.

The following species included in the list were published from collections made since Dr. Forbes's visit to New Guinea (1885–86):—

Saurauja papuana K. Schum. Himantandra Belgraviana Diels. Parabæna myriantha K. Schum. Schuurmansia microcarpa L. Cap. Alsodeia Astrolabes Laut. & K. Schum. Pterocymbium Beccarii K. Schum. Sloanea Nymanni K. Schum.; S. Schumanni Warb. Elæocarpus Muellerianus Schlechter. Aceratium Muellerianum Schlechter. Evodia tetragona K. Schum. Aphanamixis macrocalyx Harms. Polyparanda Hansemanni Engl. Salacicratea papuana Loes. Leea micropus K. Schum. Allophylus micrococcus Radlk. Argyrocalymna arboreum Laut. & Schum. Eugenia arfakensis Gibbs; E. goniocalyx Laut.; E. subalata Ridl.; E. micrandra Ridl.; E. sylvana Ridl. Medinilla triplinervia Cogn. Memecylon conocarpa Laut. & K. Schum. Eschweileria novoguineensis Boerl. Plerandra Stahliana Warb. Mussænda Scratchleyi K. Schum. Psychotria Beccarii K. Schum. Geophila herbacea K. Schum. Scævola Lauterbachiana Krause. Diospyros papuana Valet. Bruinsmia celebica Koord. Voacanga papuana K. Schum. Parsonsia curvisepala K. Schum. Micrechites novo-guineensis K. Schum. Tylophora perlaxa Schlechter. Erycibe Helwigii Prain. Cyrtandra Schraderi K. Schum. Neosepicæa viticoides Diels. Justicia Chalmersii Lindau; J. cardiochlamys Lindau. Graptophyllum Gilligani S. Moore. Calycacanthus Magnusianus K. Schum. Hulemacanthus Whitei S. Moore. Premna nitida K. Schum. Clerodendron utakwense Wernh.; C. Lindawianum Laut. Pisonia Muelleriana Warb. Piper Rodatzii Laut. & K. Schum. Myristica globosa Warb. Litsea papuana K. Schum. Elytranthe longifolia K. Krause. Baccaurea plurilocularis J. J. Sm. Antidesma polyanthum K. Schum. & Laut. Homalanthus brachystachys Pax & K. Hoffm. Laportea mammosinotosa H. Winkl. Engelhardtia lepidota Schlecht. Polypodium glossipes Baker. Chætomitrium elegans Geh.

SHORT NOTE.

RUMEX ELONGATUS × OBTUSIFOLIUS. When collecting some specimens of *Rumex elongatus* Guss. on the river-bank near Kew last July, I met with one plant that had the appearance of a hybrid between that species and *R. obtusifolius.* While it bore the narrow, dull green foliage of *R. elongatus* and was of the same relatively slender habit, its cauline leaves were less flat and less attenuate below, and its somewhat closer panicle showed the very irregular development of the fruiting perianth that is commonly seen in hybrid Docks. The inner perianth-segments were not only irregularly developed, but varied greatly in form, some being of the oval-deltoid, entire outline, with a single narrow tubercle, characteristic of *R. elongatus,* and others of a broad, triangular-cordate shape, with shortly toothed margins, such as is often seen in hybrids of *R. obtusifolius* with *R. crispus.* This plant differed clearly, however, in its much less undulate foliage, due, no doubt, to the influence of *R. elongatus.* It was observed on the river-wall, and not on the tidal mud where *R. elongatus* usually grows. On referring to my herbarium, I find that I collected at Kew in 1918, as *R. elongatus,* what was certainly the same hybrid. There is a note by Mr. C. E. Britton in this Journal, xlix. 99 (1911), on the occurrence of this hybrid between Putney and Barnes.—H. W. PUGSLEY.

REVIEWS.

A Handbook of Coniferæ including Ginkgoaceæ. By W. DALLIMORE, Royal Botanic Gardens, Kew, and A. BRUCE JACKSON, F.L.S. With Drawings by Miss G. LISTER, F.L.S. Demy 8vo, cloth, pp. xii, 570. Price 42 shillings net. London: Edward Arnold & Co., 1923.

THIS handsome volume fully justifies the expectations that had been formed concerning it, and occupies a position which has for some years remained unfilled. The second edition of *Veitch's Manual of Coniferæ* (by A. H. Kent), which appeared in 1900 and was favourably noticed in this Journal for the following year (p. 40), was in some respects more comprehensive, including as it does an account of the morphology and distribution of the family, with biographical notes; the authors of the book under notice—we think wisely—content themselves with such general information as is necessary for purposes of identification. "Conifers are dealt with from the point of view of the gardener, forester, and student rather than the botanist," and the authors "have endeavoured to include all known species"; the list of works consulted in the preparation

of the *Handbook* indicates how greatly the literature relating to *Coniferæ* has increased during the last twenty years, and the text shows how fully the information has been embodied in the volume. Bearing in mind the classes for whom they are especially intended, the descriptions are couched "in as simple language as possible," and this will render it equally acceptable to the large number of folk who, while not belonging to either, will welcome a book of reference which deals in comprehensive fashion with a tribe of plants in which many are interested. For the benefit of these, and perhaps of the student, we are inclined to regret that a reference to the first publication, which is given for more recently described species, is not appended to the name in every instance; it would have taken little room and would, we think, have added to the value of the work.

After a brief introduction and a synopsis of families and tribes, with a key to the genera under cultivation, the book is divided into three parts, devoted respectively to the *Taxaceæ*, *Pinaceæ*, and *Ginkgoaceæ*. The detailed account of each genus is in most cases followed by a key to the species, which (as do the genera in each tribe) stand in alphabetical order; this of course has its conveniences, but we are inclined to think that the better plan would have been to describe them in accordance with affinities, leaving the alphabetical arrangement to be supplied by the index. The evidence of the up-to-date-ness to which we have referred meets us on the second page of the descriptions, where we find the genus *Austrotaxus*, found by Mr. Compton in New Caledonia and described by him as recently as 1922. The number of varieties given is somewhat astonishing: of the common Yew, for example, 39 are enumerated, and these are only "the more important"—several, however, are varieties of varieties. Among these the most interesting are var. *Dovastoni*, "first noticed about 1777, when Mr. John Dovaston, of Westfelton, near Shrewsbury, bought for 6*d*. from a cobbler in the village a young yew"; var. *fastigiata*, the "Irish Yew," originally found near Florence Court, Co. Fermanagh, about 1780; and var. *fructu-luteo* ("Yellow-berried Yew") "first found in the grounds of the Bishop of Kildare at Glasnevin about 1817." An interesting specimen of the common Yew was found by one of the authors in 1921 on the Great Orme's Head. "This originated in a crevice of the rock 9–12 in. deep. On reaching the surface it commenced to spread laterally until in 1921 it measured 3 ft. 7 in. across in the widest part, was quite flat, and barely 4 in. high. A small piece of stem less than half an inch in diameter, cut from the outer edge, had 33 annual rings. There was no other yew near, and the dwarf character appeared to be due to poverty of soil and the shearing effect of wind."

The term "variety" throughout the book is employed in accordance with horticultural use—it is clear that it has no equivalent in botany. Moreover, it is applied in two different senses—thus under *Taxus baccata* we have "var. *adpressa*, Carrière" followed by three "varieties," which are mere forms distinguished, as their names indicate, by colour or habit—*e.g.*, "var. *adpressa aurea*,"—although they stand in the same type as varieties of greater importance; moreover, they are, by their trinominal structure, excluded from botanical

recognition. Omitting these, there are many for which no authority is given—*e.g.*, "var. *aurea*," "var. *Dovastoni*," "var. *elegantissima*"; the preface informs us that the Kew *Hand-list of Coniferæ* has been generally followed, but this, we think, should have been indicated in each case, if the authors did not think it worth while to trace them further back; moreover, the inference that the *Handbook* is intended would not always be a safe one, as we are told that "the names adopted are *chiefly* from that source."

Although the main object of the book is to provide descriptions of trees, a great deal of other information is incidentally supplied—thus in the account of the Larches there is a full description of the insect and vegetable pests by which they are attacked. The common Larch "is the most widely grown and probably the most valuable exotic tree in Britain"; from it come the posts and poles employed by the Post Office, which "last longer than many coniferous woods when placed in the ground in a natural state," though their life is greatly prolonged when they are treated with creosote. The Japanese Larch (*Larix leptolepis*) "has not attained maturity in this country, so it is impossible to say how it will compare with European Larch when grown under similar conditions, but from tests carried out on pit-wood of similar age it appears to be decidedly inferior." The authors do not accept Dr. Henry's conclusion that *L. pendula* "was the result of a chance cross between *L. americana* and *L. europæa*," but maintain it as a species. The Spruces and Pines are also treated with reference to their economic value.

The get-up of the book is in every way excellent; Miss Lister's drawings, to the number of 120, and thirty-one plates, admirably reproduced from photographs, add greatly to its attractiveness; type and paper are good; the volume is carefully (but extravagantly) printed, and there is a very full index. The arrangement, however, might be improved. The right-hand page-headings are almost uniform throughout—"Pinaceæ" occupies pp. 81–541,—whereas the space might profitably have been filled by the name of the genus, or even of the species, treated below. There are pages of varieties—*e.g.*, pp. 64–8, 515–17—where the name of the species does not appear, so that on opening the book at random one does not know to what they belong. The names of species and varieties are in the same fount; those in the keys should be in bolder type and at the end of the line. The comma between the name of the plant and the authority is probably due to the connexion of one of the authors with Kew, where that obsolete practice was until recently maintained. These matters are small but not unimportant, as most detract from the practical usefulness of the book, though they do not impair its value. The authors acknowledge "help in various ways" from the British Museum and Kew; it is to be regretted that the officials at either of those places were not also consulted as to the best mode of presenting information.

We understand that the Royal Horticultural Society has recognised the value of the work by conferring on each of the authors the Veitchian Medal and the sum of £25.

Life Movements of Plants. By Sir JAGADIS CHUNDER BOSE. Transactions Bose Institute. Vols. iii. & iv. Pp. xx+304. Longmans Green & Co., Calcutta, 1923. Price 20*s*.

IN these two parts of the Transactions of the Bose Institute, which are published together, the author continues, with the assistance of various collaborators, his physiological studies, mainly on the electrical reactions of plants. There are in all twenty-two papers, followed by a "general review" of the contents of volumes i. to iv.

The first paper describes further observations on the localisation of the geoperceptive layer by means of the very ingenious electric probe of which a description was given in the second volume of these Transactions. In all the stems examined, this layer, as determined by its electrical response, was found to coincide with the starch sheath. Using the electrical method, the relation between the degree of geotropic excitation and the angle of inclination was studied in the petiole of *Tropæolum* and the stem of *Convolvulus*. The relation was found to follow approximately the same law, but the excitation at 135° instead of being the same as at 45° was found to be about 20 per cent. greater; this difference is explained as due to differences in the sensitiveness of the protoplasm of the two ends of the cells of the starch sheath.

A very interesting paper is that on the critical angle for "geo-electric" excitation—a continuation of Bose's earlier work. It is found that if a stem or petiole is gradually displaced from its normal erect position there is at first no electrical reaction, but this occurs abruptly when a "critical angle" is reached, which varies slightly with different plants but is about 32° C. This observation appears to give strong support to the statolith theory of geotropic response, for the sudden electrical reaction suggests a sudden slipping of the movable starch grains into a new position. If this explanation is correct it is not at all evident why extrapolation backwards of the excitation curve for angles above the cortical angle should cut the abscissa at about 32°. Once the critical angle is passed the excitation should be as great as if the process of excitation were continuous from 0° upwards. Other papers deal with the effect of anæsthetics and of carbon-dioxide on the electrical reactions of plants and with the "death-spasm" of plants. The geotropism of the petiole of *Mimosa* is also studied, and the very interesting observation is made that the reaction of the pulvinus when placed horizontal is determined by the relative position of the four sides. If the normal upper side is directed upwards the leaf remains or becomes horizontal, *i. e.*, it is diageotropic; if the side normally uppermost faces downwards, the the leaf becomes vertical, *i. e.*, is negatively geotropic. When the normal right or left sides are placed upwards, the response is a right-handed or a left-handed torsion. These reactions and also the reactions to light are due to the differential action of the four quadrants (effectors) of the pulvinus.

In Article LXXI. the electrical response of the leaf to light stimulus is studied by a very ingenious method, in which the four

quadrants of a leaf are made to serve as the four arms of a Wheatstone Bridge. The delicacy of this method is such that it will demonstrate the alteration in the resistance of the leaf-tissues exposed to the light of a single spark discharge, the duration of which is only about 1/100,000th of a second. This latest volume is thoroughly characteristic of the author, alike in the employment of experimental methods of very marked ingenuity and in the use of apparatus of great delicacy of his own device; not all the interpretations put forward will commend themselves to plant physiologists in general.

V. H. B.

BOOK-NOTES, NEWS, ETC.

AT the meeting of the Linnean Society on December 13th, Mr. R. D'O. Good gave an account of the Germination of *Hippuris vulgaris*. The various stages in germination were described from seedlings raised from fruits taken from the gizzards of wild duck shot in Scotland. The first stage is the lengthening of the hypocotyl, which pushes the hard plug out of the foramen of the endocarp. The hypocotyl then turns towards the mud, and produces a ring of root hairs near its tip. Beyond these hairs the radicle is developed and grows straight down into the mud. While this is in progress the hypocotyl becomes erect and the cotyledons gradually free themselves from the endocarp which drops clear of the seedling. From this point the vegetative shoot is developed in the cotyledon axil in the normal manner. The function of the ring of root hairs was discussed, and the view put forward that its function is to provide a stable base from which the straightening of the hypocotyl can take place, and to ensure that the growing seedling keeps its green parts above the surface of the mud. The normally delayed germination was also considered and a suggestion made that this is partly due to the mechanical difficulties in the way of immediate germination before the exocarp has decayed. There seems no reason for supposing that passage through the alimentary canal of a bird is a necessary preliminary to germination. Mr. Ridley stated that he had seen Hippuris fruiting in a Kew tank. The fruits were produced in September and floated for some distance in the tank, slowly sinking. Transferred to a tumbler of water, all sank in a week, one or two sinking each day. The importance of the slow sinking of the seeds of aquatics is very great, as by these means they are carried to a sufficient distance and there sink in a suitable spot. Mr. A. J. Wilmott said that he had experience of germination of a seed of Hippuris taken from a thirty year old herbarium specimen, and therefore there are no mechanical difficulties to germination before the exocarp is removed. He suggested that the ring of hairs at the collet enabled the seedling to keep itself vertical on the very soft mud when currents tended to push it over.

AT the meeting of the same Society on Jan. 10, Mr. A. J. Wilmott exhibited specimens of *Myosotis sicula* Guss., dicovered by him

in Jersey in 1922; of *Alchemilla pastoralis* Buser, rediscovered in Teesdale by him last year; of *Alchemilla glomerulans* discovered in the herbarium of Rev. J. Roffey and now presented to the Natural History Museum; of *Pulmonaria* from the New Forest, which he identified with *P. longifolia* (Bast.), a West European species, and not as formerly with *P. azurea* Bess., a species of Middle and Eastern Europe; of the British *Viola* which has been incorrectly named *V. epipsila* Fr., but which may be the Portuguese *V. Juressi* K. Wein; and of *Geranium purpureum* of *English Botany* which he has named *G. Robertianum* var. *Forsteri*. Readers of this Journal will remember and others may like to know that most of the plants exhibited have already formed the subjects of papers by Mr. Wilmott in these pages:—*Myosotis sicula* in 1923, p. 212; *Alchemilla glomerulans* in 1922, p. 163; *Pulmonaria longifolia* in 1917, p. 233; *Geranium purpureum* (*G. Robertianum* var. *Forsteri*) in 1921, p. 93.

THE Journal of the Linnean Society (Bot. xlvi.: no. 309: price 10*s*.) contains the paper "On the Occurrence and Distribution of *Festuca rubra* in Britain," by W. O. Howarth, which was briefly summarised in this Journal for 1923, p. 61. Three species are described: *F. heterophylla* Lam., "generally regarded as having been introduced," on which point J. Bot. 1920, p. 8, may be consulted; *F. rubra* L. emend., of which two subspecies—*genuina*, with numerous forms, and *fallax*—are described; and *F. juncifolia* St. Am. The paper is illustrated by plates of each, from herbarium specimens, and by one showing sections of leaves. Mr. S. L. Grose gives "A Systematic and Ecological Account of a Collection of Blue-green Algæ from Lahore and Simla," with a plate and descriptions of numerous new species.

NEW ZEALAND botany has sustained a serious loss in the death of THOMAS FREDERICK CHEESEMAN, who for more than fifty years has devoted himself to its investigation. Born at Hull in 1846, he went, at the age of eight years, to New Zealand with his parents, where the rest of his life was passed. His interest in natural history obtained for Cheeseman a post in the Auckland Museum, of which he became Curator, a position which he retained until his death on the 15th of October last—a period of nearly fifty years. He published numerous papers from 1872 onwards in the *Transactions of the New Zealand Institute*, and in 1906 issued, under the authority of the N.Z. Government, a *Manual of the New Zealand Flora*—the first complete compendious flora since the publication of Hooker's *Handbook* in 1864: his large and handsome volumes of *Illustrations of the New Zealand Flora* were noticed at some length in this Journal for 1916 (p. 66). Cheeseman became a Fellow of the Linnean Society in 1873; at the annual meeting of the Society in May last the Linnean Gold Medal was conferred upon him "for his labours in New Zealand biology, especially botany."

MYCOLOGISTS will regret to hear that Sir HENRY CUSACK WINGFIELD HAWLEY, Bart., died on Nov. 18th, 1923, after a long illness.

Born in 1876, he succeeded to the baronetcy in 1909 (the mother of the first baronet was aunt to Sir Joseph Banks). Hawley was an all-round naturalist but was principally interested in mycology, being regarded as the British authority on Pyrenomycetes, on a monograph of which he was engaged for many years; unfortunately the manuscript is not sufficiently advanced for publication. After leaving Oxford, Hawley read for the Bar and became a member of the Society of the Inner Temple; he served in France in 1915–19. In manner he was exceedingly quiet and unassuming, but was ever ready to give information to mycologists. His specimens and MSS. have been presented by his widow to the Botanical Department of the British Museum.—J. R.

THE *Botanical Magazine* (cxlix. pt. 1; dated Nov. 26, 1923) contains many plants of special interest. Dr. Stapf, who is responsible for the whole of the number, gives reasons for the restoration of Tenore's genus *Candidea*, hitherto usually placed in the *Stengelia* section of *Vernonia*, and describes a new species, *C. stenostegia*, from Tropical Africa; *Sempervivella* is a new genus, based on *Sempervivum albescens* Edgeworth; *Primula calciphila* Hutchinson, to which reference was made in this Journal for 1923, p. 171, which might have been mentioned, is regarded as very doubtfully distinct from *P. rupestris* I. B. Balf. & Farrer. A very remarkable innovation in nomenclature, which we can hardly think will meet with general acceptance, appears in *Caralluma pseudo-N. E. Brownii*, described by Dinter as *C. pseudo-Nebrownii*; of this Dr. Stapf gives the following explanation:—"I have attempted to assure the correct pronunciation of the compound usually spelt '*Nebrownii*,' namely, *N. E. Brownii*, by treating the first two letters as initials, the species being dedicated to Mr. N. E. Brown, and not to a man of the name Nebrown." We prefer not to comment on what seems to us a revolutionary proceeding, but we are in entire accordance with Dr. Stapf's conclusion:—"It would be altogether better to avoid combinations of that kind." We note, by the way, that Dr. Stapf attributes "C. N. E. Brownii" (i.e., *Nebrownii*) to Dinter and Berger; but Berger is the only authority for the name given in his paper (Notizbl. Bot. Gart. Berlin, iv. p. 249), where the species was first published. The text of Bot. Mag. now contains much botanical and general information, and is much more interesting than it used to be; on the other hand, one wonders whether the often very lengthy Latin descriptions of plants already described might not be abridged, to the saving of space, and indeed to the convenience to the average reader.

WE have lately received a copy of the *Wild Flower Magazine* for Oct.–Nov. 1923, which is described by Dr. Druce as "a pleasing publication of an extremely popular Society which acts as a feeder to more advanced work." The number before us is not devoid of "more advanced work," as it includes the "interim report" of the Exchange Club concerning *Carex microglochin*, to which reference was made in this Journal for 1923, p. 295. The volume for 1922 is

noticed at considerable length in the Report for that year of the B.E.C., whence the above commendation is taken; the Magazine, however, judging from the notice, seems chiefly remarkable for the number of misnomers it contains, to which it seems hardly worth while to have given further publicity; would it not be possible for the editor of the Magazine, Mrs. R. W. Dent, to obtain voucher specimens for the records and submit them to some competent botanist before publication? Dr. Druce, in his notice of the volume, expresses many doubts as to identification; he "would like to see" *Carex alpina* and *Pinguicula alpina* and *Urtica pilulifera* from new localities, and says that *Epilobium alpinum* from Merioneth "cannot be accepted until a specimen is produced"; he has shown so much interest in the Magazine that he would probably act as referee in doubtful cases, which must, we think, be more numerous than the contributors of records suppose. The number before us ends with a note on *Cotoneaster vulgaris*, which suggests that a voucher specimen is desirable; the writer says: "I noticed in Marcea's last year's diary a note of interrogation after *Cotoneaster vulgaris*. We found it on the downs above Ventnor and Bonchurch. My aunts, who are over 80, have known it there all their lives"! What can Bromfield, A. G. More, Townsend, Stratton, and all the other botanists who have visited the island have been about, to have overlooked so interesting a member of the Vectian flora?

A FOUR-PAGE circular issued last November, described as "no. 1" of a new magazine entitled *Werdenda Beitrage zur Pflanzenkunde*, has been followed by the second number (Dec. 20), which contains 14 pages. This is in many respects a curiosity: written entirely in German by Wilhelm Suksdorf, it is devoted to Washington plants, and is published at Bingen in that county. It is the third of a series of papers, the first and second of which appeared respectively in the *Deutschen Bot. Monatschrift* (1898–1901) and in the *Allgemeinen Bot. Zeitschrift* (1906). The most remarkable feature of the contents, which consist almost entirely of new species and varieties, is the absence of any Latin diagnosis; this was also the case with the earlier instalments, and seems to have escaped the notice of the editors of the publications in which these appear. Names thus published are, of course, by the International Code, not entitled to recognition.

THE *American Journal of Botany* for the same month contains the first of a series of "Studies of *Lythrum Salicaria* L.," by A. B. Stout—in this the efficiency of self-pollination is treated at considerable length. The conclusion of the author, based on experiments carried on since 1917, is that "the evidence of wide variation in the degree of self-compatibility is definite. The physiological differentiations of the sex organs are incompletely correlated with the apparent structural adaptations for cross-pollination; they are not fixed, constant, and fully achieved either in expression or in heredity, but are fluctuating and intergrading. They still present opportunity for further selection either toward greater or toward less restriction of fertilisation. The persistence of self-compatibility in various degrees of expression, and the apparent difference in respect to self-compatibility seen among the various forms, present strong evidence that self-compatibility was the antecedent condition in the species out of which the present complex of sex relations is still evolving, just as the sets of styles and stamens of different lengths have been developed and of an original homomorphic species."

THE *Gardeners' Chronicle* for Jan. 5 contains an interesting article by Mr. W. Roberts, to whom we have often been indebted for bibliographical information, on "Dr. John Hall of Maidstone, Botanist and Poet." Hall, "poet and medical writer, was born in 1529 or 1530, became a member of the Worshipful Company of Chirurgeons, and practiced as a surgeon at Maidstone, Kent" (DNB, xxiv. 69). He was the author of numerous works, from one of which, *A Poesie in Forme of a Vision*—reprinted in *The British Biographer*, vol. ii. (1812),—Mr. Roberts extracts a number of verses containing names of plants in use at the period. Hall's portrait, which is reproduced, "appeared at the end of his translation of Lanfranc's *Chirurgia Parva*, dated 1564 and inscribed I. H. *anno ætatis suæ* 35 .... It is particularly interesting to note that he is holding in his right hand a branch of a leguminous plant with seed-pods—possibly the ordinary Sweet Pea. [But according to Aiton the Sweet Pea was not in cultivation in England before 1700.—ED. JOURN. BOT.] With all the early portrait painters these emblems had a distinct personal significance, and in engraving this portrait the intention of the artist was undoubtedly to indicate that Dr. John Hall was a botanist." This "significance" is deduced from the fact that Gerard, Parkinson, and L'Obel "are all shown holding a spray of a plant indicating the nature of their studies"; but surely this was a common feature in the portraits of that period? We fear that Hall's claims to a place in the "long-hoped for new edition" of the *Biographical Index*, the prospect of which is receding, are somewhat slight, but we have entered him as a claimant and may give him a reference.

MR. MILLER CHRISTY contributes to the *New Phytologist* for December (xxii. no. 5) an interesting paper on *Primula vulgaris* var. *caulescens*—a name which, frequently applied to the hybrid *P. veris* × *vulgaris*, rightly belongs to "a variety, not a hybrid, of the common Primrose." "The differences between them, though slight, are, when once recognised, sufficiently marked to enable anyone who has the two plants before him in the fresh state to discriminate between them with little or no difficulty: this cannot be said of them, however, when in the dried state." In the same number Mr. Walter Styles completes his series of papers on "Permeability" with a bibliography in alphabetical order which includes 817 works and occupies 33 pages.

Rhodora for October 1923 contains a paper by Mr. Bayard Long on the "naturalised occurrence" of *Prunus Padus* in numerous stations in the Philadelphia region, where it has been observed for thirty years,

and one on the American variety (var. *americana*) of *Scheuchzeria palustris* by Mr. M. L. Fernald; "a forma europæa differt floribus 3–4 mm. longis; folliculis 7–10 mm. longis rostratis, rostro 0·5–1 longo curvato; seminibus anguste ellipsoideis 4–5 mm. longis atris."

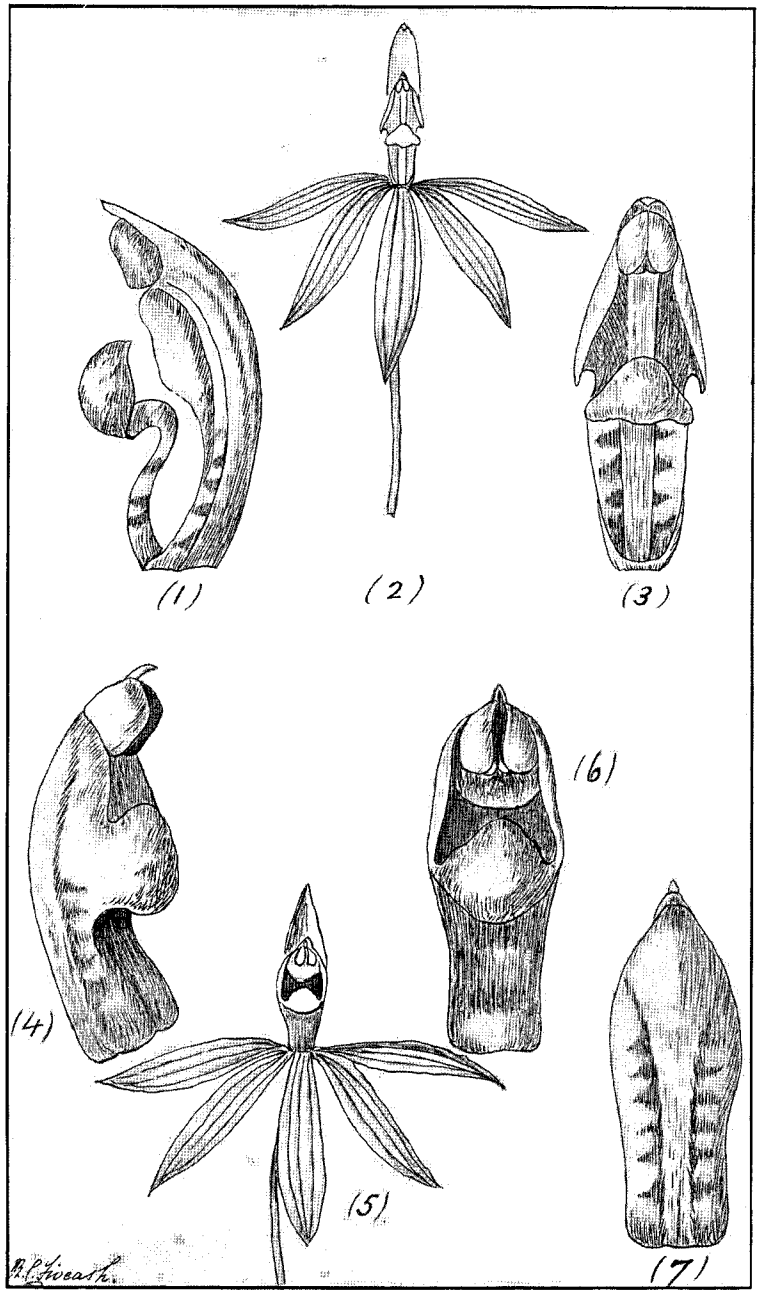
At the meeting of the Botanical Society of Edinburgh on 17th January, Miss Edith Philip Smith gave an account of her anatomical observations relating to the vegetative propagation of *Clematis*, in which she contrasted the ready development of roots on internodal cuttings with the failure, as a rule, of root formation on nodal cuttings. At the same meeting Mr. L. B. Stewart discussed the morphology and vegetative propagation of *Gardenia globosa*, pointing out that two remarkably distinct growth-forms of this plant are obtained according to whether it is propagated from a terminal shoot or from a branch-cutting. On behalf of Mr. Arthur Bennett, a communication dealing with certain critical species and hybrids of *Potamogeton* was submitted, while records of Scottish *Taraxaca* were presented on behalf of Dr. G. C. Druce.

No. 13 (January) of *The Flowering Plants of South Africa* contains plates and descriptions of *Stapelia flavopurpurea* Marloth, *Pachyphodium Saundersii* N. E. Br., *Aloe vexecunda* Pole Evans, *Veltheimia Roodeæ* Phillips, sp. n., *Polyxena ensifolia* Schöut., and and other species of interest: the plates, by S. Gower, are very well executed. The descriptive portion, which is unsigned, is presumably by Dr. Pole Evans, whose name, however, only appears as editor.

The Department of Botany of the British Museum has received from the Hon. Mrs. N. C. Rothschild a number of original water-colour drawings bequeathed by the late N. C. Rothschild. The drawings comprise 121 of the genus *Iris* by F. H. Round, 52 of British Orchids by E. J. Bedford, and 48 British Orchids by J. C. Davy.

At the meeting of the British Mycological Society at University College on Saturday, Jan. 19, Mr. W. J. Dowson described a disease of *Antirrhinum* caused by *Sclerotinia sclerotiorum*, the fungus obtaining entrance through the stigmas; Major K. W. Braid recorded his observations on stag-headed oaks, suggesting that the condition was brought about by *Fistulina hepatica*; Miss G. Lister described a collection of Mycetozoa from Northern India, remarking on points of interest in distribution; Mr. F. Howarth gave an account of the sexuality of *Ustilago*; and Mr. T. A. Sprague spoke on the Principles of Nomenclature. Miss E. M. Wakefield exhibited further specimens of *Engleromyces Goetzii* and Dr. W. Brown cultures and slides of *Nematospora*, which causes cotton-boll disease in Tanganyika territory.

A Misleading Name. A correspondent sends us the following:— "Lack of linguistic knowledge often leads to humorous results. In a recent number of the *Kew Bulletin* a new species is given the name *Orophea salicifolia*. It is conceivable that the author wished to indicate that the leaves were like those of a *Salacia*; what he has actually achieved is to label the unfortunate plant with a name fit for use only in the smoking-room."



Petalochilus calyciformis (figs. 1–3); *P. saccatus* (figs. 4–7).

PETALOCHILUS:

A NEW GENUS OF NEW ZEALAND ORCHIDS.

BY R. S. ROGERS, M.A., M.D.

(PLATE 571.)

Petalochilus, n. gen.

Herbæ terrestres, hirsutæ, tuberibus globulosis parvis, caule simplici 1-foliato. Folium ad basin, lineare. Flores pedicellati, 1 vel 2. Segmenta perianthii subæquilonga, fere similia, angustiuscula; posticum erectum vel leviter incurvum, cetera plana et patentia. *Labellum ceteris segmentis simile* sed breviusculum. Columna elongata, leviter incurva; in parte superiore late alata; inferiore angustę alata. Anthera suberecta, bilocularis, mucronata; pollinia pulverea; caudiculæ nullæ. Stigma sub antheram, concavum.

Species nobis notæ 2, Novæ Zelandiæ incolæ.

Leaf basal, linear. Flowers pedicellated, 1 or 2. Segments of perianth subequal, similar, rather narrow; the dorsal one erect or slightly incurved over the column, the others flat and spreading; labellum similar to the other segments, but slightly shorter. Column elongated, slightly incurved, widely winged above, narrowly below. Anther suberect, 2-celled, mucronate; pollinia powdery; caudicles absent. Stigma concave, just below the anther.

Terrestrial hairy herbs, with small globular tubers.

The outstanding feature of the new genus is, of course, the ancestral form of the labellum.

The excellent vernacular names, *Cup* and *Pouch Orchid*, originally applied by the discoverer, Mr. H. B. Matthews, have been latinised and retained as specific designations for its two representatives.

The plants are endemic to New Zealand, and, so far as is known, are restricted to the neighbourhood of the little town of Kaitaia, situated in the extreme north-east of the Dominion.

The peculiar appendage in the first species is probably staminodial in origin, and occupies the position of stamen a_3 of the inner whorl. In *P. saccatus* the size and shape of the capacious pouch suggest that the wings of the column are not its sole constituents, but that the staminode is also a component part.

Superficially both species bear a striking resemblance to the diminutive orchid *Caladenia minor* Hook. f., which is likewise endemic to the same islands.

The affinities of the new genus are certainly with *Caladenia* rather than with *Thelymitra*, with which it has few features in common beyond the hitherto unique distinction of an undifferentiated labellum. The Apostasieæ, in which, of course, the labellum is also undifferentiated, must be regarded only as doubtful members of the Orchidaceæ. It also approaches very closely to *Glossodia*, especially if it be admitted that the pouch in *P. saccatus* represents a fusion between the wings of the column and the staminode. In the living state, however, there is little that is reminiscent of that genus in which the labellum, although almost quite plain, is nevertheless very dissimilar

in appearance to the petals, and the basal appendage is either bifid or distinctly dual in character.

Mr. Matthews has had these orchids under observation since the year 1912. He says that both species were plentiful, that they seeded freely, and showed practically no variations. On one occasion he collected about 100 specimens of *P. calyciformis* and 70 of *P. saccatus*. In January 1919 he wrote stating that he had recently visited Kaitaia, and found that in all three places where previously he had been accustomed to collect the *Cup-orchid*, the tea-tree (*Leptospermum scoparium*), among which it grew, had been cleared for agricultural purposes. Thus, unless a fresh locality should be discovered, this interesting plant will be no longer available to students of botany.

Column wings open anteriorly, not connate; a linear sigmoid appendage, with a cup-shaped summit, erect against the column...	1. *P. calyciformis.*
Column wings connate anteriorly throughout their entire length, forming a pouch.....	2. *P. saccatus.*

1. P. calyciformis, n. sp.

Gracillima, circiter 7–22 cm. alta. Folium anguste lineare, fere glabrum, circiter 4–15 cm. longum. Caulis gracillimus, hirsutus, infra vel ad medium bractea lineari-lanceolata instructus. Flores 1 vel 2, subvirides, circiter 12–13 mm. in diametro. Ovarium elongatum subvillosum. Segmenta perianthii subacuta, 5-nervosa, circiter 6 mm. longa; labellum ceteris segmentis breviusculum et aliquando latiusculum. Columna circiter 5 mm. longa, in parte superiore late alata. Appendix longiuscula linearis sigmoidea, apice calyculo instructa, ante columnam erecta.

N.Z.: Kaitaia, County Mangonui, *H. B. Matthews*, 27 October–15 Nov., 1916.

A very slender plant, about 7–22 cm. high. Leaf very narrow linear, nearly glabrous, basal, from 4–15 cm. long. Stem very slender, hairy, a loose linear-lanceolate bract at, or a little below, the middle. Flowers greenish, about 12–13 mm. in diameter, usually single, but occasionally 2, the very slender pedicel subtended by a narrow acute bract. Ovary elongated, rather hairy. Segments of the perianth not very acute, pubescent-glandular on the outside, 5-nerved; the dorsal one erect or slightly incurved, the others spreading; about 6 mm. long; the labellar segment a little shorter than the rest and sometimes a little wider. Column about 5 mm. high; winged throughout, rather widely in the upper half, narrowly below. A linear appendage with sigmoid flexure, furnished with a little cup at the apex, erect in front of the column.

2. P. saccatus, n. sp.

Gracillima, circiter 7–14 cm. alta. Folium anguste lineare, fere glabrum, caule subæquilongum. Caulis hirsutus, supra medium bractea acuta instructus. Flos solitarius, carneus, circiter 2 cm. in diametro. Ovarium elongatum, villosum. Segmenta perianthii subacuta, 5-nervosa, circiter 10 mm. longa; labellum breviusculum et aliquando latiusculum. Columna circiter 4·75 mm. longa; alæ antice connatæ, saccum membranaceum formantes.

A very slender species, about 7–14 cm. high. Leaf almost glabrous, narrowly linear, usually about as long as the stem. Stem very slender, hairy, with an acute bract above the middle. Flower pink, solitary, about 2 cm. in diameter, its pedicel subtended by a narrow acute bract. Ovary elongated, rather hairy. Segments of perianth not very acute, the sepals glandular-pubescent on the outside, 5-nerved, a pink stripe down the middle; the dorsal one erect or slightly incurved, the others spreading; about 10 mm. long; the labellar segment a little shorter than the rest and sometimes a little wider. Column about 4·75 mm. high with transverse pink bars; the wings uniting behind the anther, coalescing throughout anteriorly, so as to form a well-marked membranous pouch below the stigma.

N.Z.: Kaitaia, *Mr. H. B. Matthews*, 10–31 October, 1917.

EXPLANATION OF PLATE.

Figs. 1–3 represent *P. calyciformis*; figs. 4–7, *P. saccatus*. Fig. 1. Column from the side, showing appendage. Fig. 2. Front view of the flower. The artist has represented the labellar segment too long. Fig. 3. Column from the front, showing appendage. Fig. 4. Column from side, showing anterior union of the columnar wings. Fig. 5. Front view of flower. The artist has shown the labellar segment too long. Fig. 6. Column from the front, showing the union of the wings to form a pouch. Fig. 7. Column from the back.

Note. All details much enlarged.

THE HEPATICS OF HEREFORDSHIRE.

BY ELEONORA ARMITAGE.

HISTORICAL INTRODUCTION.

VERY little work has been done with Herefordshire hepatics; there is no published list and only a few old records exist. The statement on p. 10 of the *Census Catalogue of British Hepatics* (1913) that there are records in Purchas & Ley's *Flora of Herefordshire* (1889) is erroneous.

The earliest and only printed records I have been able to find are in the work entitled 'Collections towards the History and Antiquities of the County of Hereford,' by John Duncumb, A.M., Hereford, 1804. In vol. i. p. 182, in the General Introduction, are lists of plants; and in one of these—"Plants observed on the eastern border of Herefordshire in the vicinity of the Malvern Hills, communicated by the Rev. Mr. Douglas, late of Whitbourn"—occur the following three species:—"1. *Jungermannia epiphylla* (= *Pellia epiphylla*), Broad-leaved Star Tip; 2. *Jungermannia furcata* (= *Metzgeria furcata*), Broad-shaped Star Tip; 3. *Jungermannia Pinguis* (= *Aneura pinguis*), Jagged Star Tip."

In the seventies and eighties of last century Mr. Burton M. Watkins (1816–92) (cited as "W."), a relieving officer living at Hentland, began a study of local hepatics, and I have lately become possessed of his interleaved copy of Cooke's *British Hepaticæ*, which has given me some old records (quoted as "W., MS."). In the Ley Herbarium at Birmingham University are some packets of Herefordshire hepatics collected about this time by Watkins, Rev. A. Ley (1842–1911, "L."), and Rev. J. F. Crouch (1810?–89, "C.") of Pembridge. The late E. Cleminshaw was kind enough, at my request, to look through these packets, and he and Mr. H. H. Knight verified the names; the list was sent to me in 1914; they are incorporated in the following account and are the earliest records of several species, and I have refound nearly all of them in the old localities.

The Mosses were so fully treated in the *Flora of Herefordshire* that it seemed desirable to fill the blank in the other group of bryophytes, and for this purpose I have perambulated the county for the last ten years or so, visiting all the fourteen botanical districts to make out the county distribution so far as possible, as well as to record the number of species and varieties for census purposes.

I have to thank the Rev. C. H. Binstead (B.) and Mr. Knight (K.) for their help in this way; and am much indebted to Mr. Symers M. Macvicar (M.), Mr. Knight, and W. H. Pearson (1849–1923) for naming doubtful and critical plants for me.

I have also some of the original correspondence between Mr. Watkins and Dr. Benjamin Carrington when the former discovered *Riccia sorocarpa* for Britain in 1872, and the latter eventually identified it, the naming being confirmed by Prof. Lindberg of Helsingfors in 1873. I have also letters written to Watkins in the years 1878 to 1884 by W. H. Pearson, when Watkins was supplying him with specimens of the *Riccia* and also of *R. natans* for his fascicles of exsiccata; these letters are of considerable interest.

Voucher packets of all the hepatics recently collected have been sent to the Moss Exchange Club and are recorded in the Reports up to 1922, and in that of the British Bryological Society for 1923; while my herbarium contains upwards of 1890 voucher specimens.

Climate and Soil.

A mild equable climate is characteristic of Herefordshire; the rainfall, 28–30 inches, is smaller in the south than in any of the surrounding counties, but occasionally reaches 40 inches in the north. The greater part of the county is on Old Red Sandstone rock, the soil being a light loam, becoming clayey in parts. Carboniferous Limestone rocks occur in the extreme south, with Old Red conglomerate; Silurian rocks in the east about Woolhope and Malvern, in the north from Aymestry to the Downton gorge of the Teme, and in the N.W. about Kington. The oak woods on the upper part of the sandstone hills are mostly dry, so that in very many woods visited the yield in records was often extremely small. The central portion of the county is very poor in hepatics, both in quantity and species. The most interesting locality is that of the Wye Gorge at Doward,

with a rich flora on both limestone and conglomerate rocks; the Silurian limestones and shales also yield well, while on the west there is the Black Mountain range, from 1800 to 2100 ft., where moorland and subalpine species occur.

Incidence of Species.

Of the 73 genera of British hepatics, 43, including the more important ones, occur here. Of the 281 species of the Census Catalogue 90 species and 21 varieties and forms, making a total of 111, have been found so far. Many more cannot be expected to grow in this dry, inland, highly cultivated county. The abundance or scarcity of these plants in the fourteen districts may be summarized thus:—

		Species.	Varieties.	Total.
South	1. St. Weonards	37	4	41
	2. Ross	71	13	84
	3. Woolhope	42	5	47
East	4. Ledbury	31	4	35
	5. Bromyard	26	4	30
	6. Frome	27	7	34
Central	7. Hereford	20	3	23
	8. Weobley	29	5	34
North	9. Leominster	25	4	29
	10. Aymestry	35	4	39
	11. Kington	40	6	46
	12. Pembridge	26	5	31
West	13. Golden Valley	31	5	36
	14. Black Mountains	50	11	61

The Ross district has perhaps been the most thoroughly worked and has produced by far the largest number of forms; nearly all being found in the Wye Gorge, and the following species have been found only on the limestone there: *Metzgeria pubescens*, *Haplozia atrovirens* var. *sphærocarpoidea*, *Lophozia badensis*, *Madotheca lævigata*, *Lejeunea cavifolia* var. *heterophylla*, and *Marchesinia Mackaii*; and on the conglomerate, *Lophozia excisa*, *L. attenuata* f. *eflagellis*, *Sphenolobus exsectiformis*, *Harpanthus scutatus*, *Cephalozia bicuspidata* v. *setulosa*, *Bazzania trilobata*, *Lepidozia reptans* vars. *tenera* and *julacea*. In the Black Mountain district there occur only, on the high moorland and in the dingles:—*Aneura pinguis* v. *angustior*, *Pellia Neesiana*, *Haplozia pumila*, *Marsupella aquatica*, *Gymnocolea inflata* and f. *laxa*, *Lophozia bantriensis* and *L. Muelleri*, *Scapania intermedia*, *S. dentata*, and *S. undulata* and *Madotheca rivularis* var. *simplicior*. Probably no other districts will claim a similar distinction, though at present *Aneura sinuata* is only known from dist. 2, *Blasia pusilla* 11, *Fossombronia Wondrac-*

zeki 3 and 13, *Prionolobus Turneri* 3, 4, and 11, *Lophozia bicrenata* 1 and 11, *L. quinquedentata* 11 and 14, *Marsupella emarginata* 2 and 14, *Cephaloziella bifida* 2, *Cololejeunea Rossettiana* 2 and 3, *C. calcarea* 2 and 14.

List of Species.

Sphærocarpus Michelii Bellardi. The early records under this name, when examined in 1916 by Cleminshaw in herb. Ley, proved to belong to the next species, but Mr. Knight has detected the true plant among *texanus* found in Dist. 2 near Foy, 1923, by myself, the first authentic specimen.

S. texanus Aust. Only found in Dist. 2; early records, Peterstow 1862, W., King's Capel 1872, L., Sellack, 1881, W.; and by myself in Walford, Weston-under-Penyard, and Foy.

Riccia bifurca Hoffm. 13. Found only on a damp bank in Whitehouse Wood, 1920.

R. commutata Jack. This rare species, smaller than *R. glauca*, has been found in stubble-fields in three districts: 2. Sellack, first record, 1916, Hentland, King's Capel, Walford; 3. Eccleswall, Adam's Court; 9. Eye; and the var. *acrotricha* Levier in 2. Hentland and 9. Yarpale.

[*R. Warnstorfii* Limpr. is doubtfully distinct from the above; 2. Sellack, 1922.]

R. glauca L. Very common, probably occurs in all districts, recorded from 1, 2, 3, 5, 6, 7, 8, 9, 10, 11. First record, Sellack, L. 1872; 32 records. Var. *subinermis* (Lindb.) Warnst. from 1, 2, 6.

R. sorocarpa Bisch. Equally common with the last, both occurring together in stubble-fields; first recorded for Britain by W. in Dist. 2, Great Doward, in 1872; also found at Sellack, 1879, W., 36 records; is found in Dists. 1, 2, 3, 5, 6, 7, 8, 9, 10, 11.

R. crystallina L. Very rare. 2. On mud by Lough Pool, Sellack, L. 1889, where it is still found.

R. fluitans L. Rare, floating on water in ponds and on mud. 1. Llangarren, L.; 2. Poulstone Pool, first record, L. 1875; Brickkiln Pool, Ross, 1915; 7. Warlow Pool, B. 1914; 13. Pool, Moccas Park, 1916.

Ricciocarpus natans (L.) Corda. Very rare, floating or on mud. 2. Small pool near St. Owen's Cross, Hentland, 1873, W., and L. 1878 (in herb. Ley). I have visited this pool from 1915 onwards many times, at all seasons, and have failed to find a trace of it, nor have I found it elsewhere.

Reboulia hemisphærica Raddi. On rocks, generally damp, sometimes dry, very uncommon. 1. First record, St. Weonards, W. 1870; 2. Huntsham Hill, W. 1878, Little Doward, L. 1901; 3. Mordiford; 14. Rocks by spring, Black Mountains, dry roadside bank, Llanveynoe.

Conocephalum conicum (L.) Dum. Very common, on wet rocks and stream sides, found in all 14 districts, 74 records. First record, Black Mountains, L. 1880.

Lunularia cruciata (L.) Dum. Very common, damp shady banks, stream sides and in gardens, found in every district, but no record earlier than 2. Glewstone, 1913. 48 records.

Marchantia polymorpha L. Uncommon; on garden paths, by streams and hillside rills. First record, 2. Great Doward, W. 1872; other early records, 8. Hampton Court, W., MS.; 10. Eardisland, C. 1878; 12. Downton, L. 1878. Found in 1, 2, 3, 4, 5, 8, 9, 10, 12, 14. 23 records.

Var. *aquatica* Nees. Very rare. 14. Partly submerged in old brickfield, Pontrilas, 1920.

Aneura pinguis (L.) Dum. Swamps and peaty hillsides; very uncommon. 2. First record, Great Doward, W. 1872; small marsh on Doward, 1916; 3. May Hill, K. 1914; calcareous swamp and in sphagnum at Moss Pool, Haugh Wood; near Pentelow Brook; 14. Peaty ground, top of Black Mountains, 2000 ft.; head of Olchon Stream, wet rocks Prill Dingle; rocks near Firs Farm.

Var. *angustior* Hook. 14. Very rare, on swampy ground and in spring, Olchon Head, Black Mountains, 1919.

A. multifida (L.) Dum. Damp woods, very uncommon. Early record, no date, 11. Lyonshall Park, C.; 2. Chase Wood, c. per.; Lodge Grove, Bishopswood; 3. Queen's Wood, Upton Bishop.

A. sinuata (Dicks.) Dum. Very rare. 2. Chase Wood, 1908.

A. major (Lindb.) K. Müll. Rather frequent, on moist soil, found in 7 districts. 2. Chase Wood; Kerne Bridge; Bishops Wood; Oxlade, Howle Hill, Moors Wood, Bolston; 3. West Wood, Fownhope; 5. Damp bank of Sapey Brook, Whitbourne; 8. Moorhouse Coppice, Norton Canon. 10. Wigmore Rolls, 1907, first record; 12. Whitney; 13. Dimseal Wood; Bredwardine; Ewyas Harold Common, c. per.; Snodhill Castle, c. per.

Metzgeria furcata (L.) Dum. Very common on trees, rare on rocks; recorded from every district, usually gemmiferous. First record, 3. Fownhope, L. 1890. 54 records; c. per. 2. Penyard Wood. Rock records: 2. Chase Wood, Old Red Sandstone; Great Doward, Carboniferous Limestone; 3. Adam's Rocks, Backbury, Silurian; 8. Sandstone, Pyon Hill; 14. Old Red Sandstone rock, Blaenau, Black Mountains, B.; rocks, Olchon Brook, rock-ledge, Olchon Dingle.

M. conjugata Lindb. Rare, on shady rocks. First record, 2: Carboniferous limestone, Great Doward, L. 1887. Only found in 4 districts: 1. On Old Red Sandstone, White Rocks, Garway; 2. Huntsham Hill and Doward; 10. Silurian rocks, Downton Gorge; 14. Black Mountains, B. A slender elongated trailing form on the Doward rocks is "probably" var. *elongata* Hooker (M.), and comes better under this species than under *furcata*.

M. pubescens (Schrank) Raddi. Very rare, only found on the Carboniferous limestone of the Wye Gorge. 2. First record, Great Doward, L. 1884; Great Wood, Huntsham Hill.

Pellia epiphylla (L.) Corda. Occasional, on moist banks and wet rocks, found in 1, 2, 3, 6, 8, 9, 10, 11, 12, 13, 14, and probably may be found in all districts, but sparingly. Early record, no date, 12 Pembridge, C. (W., MS.); fruiting: 1. Darren Wood by the Monnow, K. 1915. 2. Doward, L. 1890, Penyard Wood, 1898. 31 records.

P. Neesiana (Gottsche) Limpr. Very rare, 14. Growing among Sphagnum in moorland rills, Cefn Hill, 1400 ft. 1922, first record.

P. Fabbroniana Raddi. Very common, in damp woods, on shady rocks, in springs, and on stream banks. When making a fresh growth in autumn this plant presents a very elegant appearance due to the repeated forking of the thallus, which adds a light green fringe to the darker portion of the frond, Hooker called this *forma furcigera*; found in all districts, 92 records, earliest, 1. St. Weonard's W. 1884; ♂ plants rather uncommon; fruiting: 1. Darren Wood, K. 1915; 3. Mordiford, 1915.

Var. *lorea* Nees. A very distinct plant, growing in densely crowded dark green brittle tufts, on dripping rocks, in stream beds, in springs on moorlands and hillsides, in boggy swamps and calcareous springs; frequent, recorded from 1, 2, 4, 5, 6, 8, 11, 12, 13, 14. 20 records.

Blasia pusilla L. Very rare; moist banks; 11. Wapley Hill, B. 1918.

Fossombronia pusilla (L.) Dum. Very common; on moist soil in woods and in fields; found in all districts except 14, probably occurs in all; 36 records; old records, no date, 2. Ballingham, W., MS.; Sellack, L. 1889; usually fruits abundantly.

F. Wondraczeki (Corda) Dum. Very rare; 3. on clay soil in Mainswood, Putley, B. 1922; 13. Treville Wood, 1923.

Marsupella emarginata (Ehrh.) Dum. Rare; on rocks and moorland soil, only found in 3 districts. 2. on O.R.S. conglomerate rock, Great Doward. 11. Hergest Ridge, 1300 ft., Wapley Hill, 1200 ft. 14. (earliest record, Crib-yr-Garth, 2000 ft., L. 1880), also Red Daren, and Olchon Gully, 1900 ft. Black Mountains; rocks by boundary stream, B.

M. aquatica (Lindenb.) Schiffn. Very rare, subalpine; 14. Only on dripping rocks, head of Olchon stream, 1900 ft. Black Mountains, 1916.

Alicularia scalaris (Schrad.) Corda. Occasional; on dry banks, sandstone rocks, and peaty moorland; found in 2, 3, 4, 8, 9, 10, 11, 14; 24 records, of which a few are enumerated here. 2. Little Doward, on O.R.S. conglomerate, K. 1915 (first record); Penyard Wood, *c. per.*; Dropping-well rocks, Great Doward, Carboniferous limestone. 14. Peaty ground, top of Black Mountains, 2100 ft.; slender form on rock-ledges, Olchon Gully, 1900 ft.

Eucalyx hyalinus (Lyell) Breidl. Uncommon; on moist soil in woods; first record, 2. Ballingham, W. 1873. Found in 7 districts. 1. Mynde Park. 2. Bishopswood. 4. Rough Hill Wood. 8. Church Coppice, Dinmore; Birley Hill. 10. Orleton Common. 13. Timberline Wood. 14. Dinedor Wood; damp rock, Cusop Dingle, B.

Haplozia crenulata (Sm.) Dum. Uncommon; on moist soil. First record, 10, Mary Knowl, W. 1880. Found in 5 districts. 2. Doward, L. 1890; Chase Wood; Huntsham Hill. 3. May Hill, W. 1885. 10. Downton Gorge; High Vinnall, 1000 ft. 11. Nash Wood; Wapley Hill, B. 14. Dinedor Wood; peaty ground, Olchon Valley, 1800 ft.

Var. *gracillima* (Sm.) Heeg. Very common—on moist soil and footpaths—found in every district; first record, 2. Sellack, L. 1874. 61 records; fruiting: 2 Penyard Wood; 3. Haugh Wood.

H. riparia (Tayl.) Dum. Uncommon; damp woods and swampy moorlands; first record, 14. Black Mountains, L. 1893; found in 5 districts. 2. Chase Wood; Huntsham. 3. Fownhope. 10. Mary Knowl Valley. 12. Brilley. 14. Frequent in the Black Mountains to 2100 feet; Olchon Valley; Cusop Dingle; Red Daren; Craswall; large variety, approaching var. *rivularis* Bern. in swamps, Olchon Head.

H. atrovirens (Schleich.) Dum., var. *sphærocarpoidea* (De Not.) Massal. Very rare. 2. Only on wet calcareous rocks at the Dropping Well, Great Doward; first recorded by W. 1883, fruiting 1897.

H. pumila (With.) Dum. Very rare. 14. On damp rocks by a stream under the Black Mountains, B. 1921.

Gymnocolea inflata (Huds.) Dum. Very rare; only on peaty moorland in one district. 14. First record, Hatterel Hill, L. 1890; among Sphagnum, Olchon Valley; top of Black Hill, 2000 ft.; Cefn Hill, 1500 ft., B.

forma *laxa* Nees, peat holes on Black Mountains, 1919.

Lophozia turbinata (Raddi) Steph. Rather frequent, on moist soil, both calcareous and sandy, found in 9 districts. 1, 2, 3, 4, 5, 6, 8, 13, 14. First record, 2. Ballingham Hill, W. 1872; *c. per.* 2. Sellack; Huntsham. 5. Sapey Brook, Whitbourne. 13. Ewyas Harold Common. 14. Wood, Dulas; 30 records.

L. badensis (Gottsche) Schiffn. Rare, on calcareous soil; only occurs in Dist. 2. Limestone cliffs, Doward, H. N. Dixon, 1903, "probably v. *obtusiloba*," M. Quarry N. face of Doward Hill. K. 1915.

L. Muelleri (Nees) Dum. Rare, on wet rocks. Only in 14. Rocks of Olchon brook, B. 1917; tufaceous rock on Olchon by Firs Farm; rock by moorland stream, Black Mountains, B.

L. bantriensis (Hook.) Steph. Very rare, wet rocks, subalpine, only in 14, in Prill Dingle, 1800 ft., Black Mountains, 1919.

L. ventricosa (Dicks.) Dum. Occasional in rocky woods and moorland; found in 5 districts. First record, 2, Hope-Mansel, 1874, W. 2. Chase Wood; Doward; Huntsham; Harechurch; Coppett Hill. 4. Malvern Hills, on eastern and western slopes of Herefordshire Beacon. 10. Shobdon Hill. 11. Wapley Hill; Hergest Ridge. 14. Crib-yr-Garth; Olchon Head; Prill Dingle; top of Black Mountains, 2100 ft.

L. bicrenata (Schmid.) Dum. Very rare; in dry places. 1. Dry bank on Welsh Newton Common, first record, 1920. 11. On dry Silurian soil, Hergest Ridge, 1000 ft., 1922.

L. excisa (Dicks.) Dum. Very rare; on banks. 2. Little Doward, *c. per.*, K. 1915, first record; conglomerate rock, Great Doward. 11. Dry hillside, Hergest Ridge, 1922.

L. quinquedentata (Huds.) Cogn. Rare; moist places, subalpine. 11. Knill Garraway, B.; Wapley Hill; Hergest Ridge. 14. First record, above Black Daren, Black Mountains, 1916; Red Daren, B.; Prill Dingle.

L. attenuata (Mart.) Dum. Rare; only found on O.R.S. conglomerate rock in one district. 2. First record, Hope Mansel, W. 1874; Penyard Hill, L. 1887; Harechurch; Huntsham Hill; Coppett Hill; Great Doward.

f. *eflagellis* Schiffn. On conglomerate rock; Harechurch; Penyard Hill, 1918. In this form the long, narrow, apical innovations which are so conspicuous in the type are absent. Some bryologists are of opinion that *L. Flœrkii*, *L. atlantica*, and *L. attenuata* are all forms of one species; the other two are not found in Herefordshire.

Sphenolobus exsectiformis (Breidl.) Steph. Very rare; only in one spot on conglomerate rock. 2. Great Doward, 1918.

Plagiochila asplenioides (L.) Dum. Very common in woods and on shady banks; found in every district. First record, 2, Great Doward, W. 1874. 74 records.

Var. *minor* Lindenb. Occasional; dry, shady banks; found in all districts. 43 records.

f. *laxa* Matouschek. In damp shady woods and on stream-banks, also on damp rocks, uncommon; found in 8 districts. 2. Huntsham Hill, on limestone, 1915, first record; Doward. 3. Backbury Hill, Silurian rock. 6. Maund Bryan. 10. Downton Gorge, Silurian rock. 11. Wapley Hill, B. 12. Rhydspence; Pentrecoed Dingle. 13. Crizeley Wood; Treville, lime rocks. 14. Graig Wood; Cusop Dingle.

Var. *major* Nees. Very common, habitat as type; found in all districts; 68 records, first record, 2. Sellack, 1891.

f. *subintegerrima* Schiffn. Rare, in deeply shaded woods. 3. Linton Wood, 1923. 11. Wood on Hergest Ridge, 1922. 14. Deep dingle below Cefn Hill, 1922.

Lophocolea bidentata (L.) Dum. Wet, grassy places, frequent, but not nearly so common as *L. cuspidata*; older bryologists did not distinguish between the two species, and called *bidentata* what should be *cuspidata*; found in all districts except 6, 11, 12, and probably occurs in all. First record, 2. Chasewood, 1908. 42 records; not found with perianths.

f. *latifolia* Nees. Rare. 5. Tedney, 1921.

L. cuspidata Limpr. Very common, woods, banks, stumps; recorded from every district; first record, 2. King's Capel, L. 1890. 116 records; fruiting abundantly.

f. *gracilis*, small elegant form. 2. Great Doward; Lodge Grove. 6 Tankard Walls coppice.

L. alata Mitt. Moist shady banks and walls, uncommon, but occurring sparingly in 11 districts, always with perianths. 1. Scudamore's Hill wood; Northgate; Wern-y-coe. 2. King's Capel, 1915; Bishopswood; Great Doward; Bolston. 4. Castle Frome; Hope End; Coneygree Wood, Ledbury; Wellington Heath. 5. Sapey Brook; Badley Wood; Inkstone Bridge. 6. Broadford Coppice. 7. Allensmore. 8. Monkland. 10. Downton Gorge; Limebrook; Mary Knowl Valley. 12. Rhydspence. 13. Bacton. 14. Graig Wood; Cusop Dingle.

L. heterophylla (Schrad.) Dum. Very common, on tree boles in woods, stumps, and rocks; fruiting freely; variable in growth, sometimes very small; found in all districts. First record, 2. Great Doward, W. no date; 80 records.

Chiloscyphus polyanthus (L.) Corda. Swamps and stream-beds, rare; found in 8 districts. 1. Darren Wood by the Monnow, *c.fr.* K. 1915, first record. 4. Tarrington; swamp on Midsummer Hill; Malvern Hills. 5. On tufaceous rocks, Sapey Brook and Whitbourne Brook. 7. Allensmore; Rotherwas Park; Dinedor Camp. 8. Credenhill Park. 11. Swampy meadow, Mahollam; in small stream, Chickward. 12. Stream near Crowther's Pool, B. 14. Springs on Black Mountain; Cwm yr Canddo; stream, Prill Dingle; swamps, Olchon Head; submerged in brook, Cae Thomas.

C. pallescens (Ehrh.) Dum. Very common, on moist floor of woods and banks; recorded from 13 districts. First record, 2. bank of Wye, Caplar, L. 1890; fruiting, 2. Chase Wood, K. 1914. 45 records.

Harpanthus scutatus (Web. et Mohr) Spruce. Very rare, among bryophytes on moist rocks. 2. On conglomerate rock, Penyard Wood, among other hepatics, *Lepidozia*, *Blepharostoma*, and *Cephalozias*, 1915, a few stems only, detected by M.

Cephalozia bicuspidata (L.) Dum. Very common, on moist soil in woods and peaty ground; recorded from every district; first record, 2. Doward, W. 1873; 54 records; fruits freely. A strikingly lax elongated form occurs at base of conglomerate rock. 2. Coppett Hill, 1917.

Var. *setulosa* Spruce, *c. per.* 2. On damp rock, Chase Wood, 1915; very rare.

Var. *conferta* Hüben. On dry sandy ground, uncommon. 8. Dinmore. 13. Crizeley Wood, 1917, first record; St. Margaret's Park. 14. Cusop Dingle.

C. media Lindb. Woods, rocks, and on peat; rare. 2. Chase Wood, 1908, first record; Penyard Wood; Harechurch, on conglomerate rock. 3. Decayed stumps, Mordiford, B. 6. Broadfield Coppice. 10. Downton Gorge; Lingen Vallets; Kinsham. 13. Whitfield.

C. macrostachya Kaal. ? 2. Penyard Wood, with other hepatics, 1915; detected by S. M. M. in a mixed gathering, but named doubtfully, no perianth being present.

Cephaloziella byssacea (Roth) Warnst. Rather uncommon, on damp wood floors and banks, found in 5 districts. 1. Welsh Newton Common. 2. Little Doward, K. 1915, first record; Chasewood, gemmiferous; Howle Green Wood; on conglomerate rocks, Great Doward; Lodge Grove, Bishopswood, a form with numerous gemmæ, on leaves, under-leaves, and stem. 3. Haugh Wood; May Hill. 4. Eastwood. 6. Bodenham.

C. bifida (Schreb.) Schiffn. Very rare, sandy banks. 2. Lodge Grove, 1915, first record; Coppett Hill.

Prionolobus Turneri (Hook.) Schiffn. Very rare, on sandy banks, in shade; found only in 3 localities, in districts widely apart, in E., W., and centre. 3. Haugh wood, on Silurian soil, 1915, first

record. 4. Rough Hill Wood, on Silurian soil, 1917. 11. Shady bank, Titley, Sandstone, 1917.

Calypogeia Trichomanis (L.) Corda. Sandy banks and peaty moorland, very uncommon, only found in 4 districts, and restricted to S. and N.W. 2. Harechurch (on bank with *Schistostega*) L. 1880, first record; Hope Mansel, sandy hole in conglomerate rock; Warm Hill Wood, Hope Mansel. 11. Nash Wood. 12. Among Sphagnum, Crowther's Pool, B. 14. Peaty ground; Olchon Head; boggy swamp above Prill Dingle; in holes in peat, summit of Black Mountains, 2100 ft.

C. fissa (L.) Raddi. Very common in woods everywhere, recorded from all districts; first record, 1. Longgrove, W. 1869. 91 records. This species does not always show the notched leaf-apex, but the under-leaves are different from those of *C. Trichomanis*.

C. arguta Nees et Mont. Almost as common as the last, the two species very frequently growing together; *C. arguta* is especially at home on crumbling sand in holes in shady banks, where its delicate thread-like stems and silvery leaves form a network over the surface; recorded from all districts, 60 records. First record, 1. Darren Wood, K. 1915. 2. Coppett Hill, a tufted green form in a small cave, 1917.

Bazzania trilobata (L.) Gray. Very rare, only found in one district in S.E. 2. Penyard Hill, on conglomerate rock, L. 1887, on same rock, Harechurch Wood, 1916.

Lepidozia reptans (L.) Dum. Uncommon, only found in 4 districts; on Old Red Sandstone, Conglomerate, and Silurian rocks. 2. Chase Wood, L. 1873, first record; Harechurch, L.; Penyard Hill, L.; Great Doward, L.; Knapper's Well, Hope Mansel; Coppett Hill; Huntsham Hill; *c. per.* Chase Wood and Penyard. 10. Downton Gorge; Mary Knowl Valley; Harley's Mountain. 11. Nash Wood; Bradnor Wood; Wapley Hill, B. 14. Rock by stream above Cusop Dingle, B.

Var. *tenera* (Hüben.) Nees. Very rare, only found in one district, creeping among mosses. 2. Purlieu Wood, Hope Mansel, 1916, first record; base of shady rock, Chase Wood; on shady Conglomerate rock, Coppett Hill, Great Doward, Penyard and Huntsham Hills.

Var. *julacea* Nees. Very rare, on more exposed rocks than the last. 2. Chase Wood, 1894, first record; Harechurch; Coppett Hill; Huntsham; *c. per.* Purlieu Wood, Penyard and Chase Woods.

Blepharostoma trichophyllum (L.) Dum. Very rare, only found in 2 districts, S. and W. on damp rocks. 2. Chase Wood, 1914, first record; Penyard Wood. 14. Among mosses, Prill Dingle, 1800 ft.; damp stone in stream-bed above Cusop, B.

Ptilidium ciliare (L.) Hampe. Uncommon, only found in 4 districts, on grassy hills and rocks. 4. Western slopes of Herefordshire Beacon, Malvern Hills. 11. Knill Garraway, B.; Wapley Hill; Hergest Ridge. 12. Among Sphagnum, Crowther's Pool, B. 14. Rare on Black Mountain moorland, on rocks, Crib yr Garth, 1950 ft., 1916, first record.

Trichocolea tomentella (Ehrh.) Dum. Rare, wet banks, only found in 3 districts. 2. Rillside, Lodge Grove, Bishopswood, L. 1886, first record. 3. Haugh Wood, B. 11. Lyonshall Park, C., old record, no date.

Diplophyllum albicans (L.) Dum. Very common, in woods, on rocks and banks; found in every district except 6 and 7, the driest and least wooded parts of the country, 52 records; first record, 2. Doward, 1890, L., fruiting. 2. Chase Wood, Penyard, Doward, &c. Found in the most luxuriant development in the Black Mountains, on wet rocks in the Dingles about 1900 ft.

Scapania compacta (Roth) Dum. On rocks, uncommon; found in 4 districts. [Old record: 7. Breinton, L., W., MS. no date.] 2. Chase Wood, 1908; Little Doward, K.; Lodge Grove; Purlieu Wood; Coppett Hill; Great Doward. 10. Downton Gorge; Harley's Mountain; Shobdon Hill. 11. Knill, B.; Wapley Hill; Hergest Ridge. 14. Olchon Head, B.; Cat's Back, Black Hill.

S. gracilis (Lindb.) Kaal. Very rare, only found in 2 districts, on rocks. 2. Chase Wood, K. 1914; Conglomerate rock, Huntsham Hill. 5. Oaken Coppice, Storridge.

S. nemorosa (L.) Dum. Frequent in woods and on shady rocks; found in 10 districts, 33 records. Early records: 1. Llangarren, W., MS. no date. 2. Harechurch, L. 2. Chase Wood, 1894. *c.fr.* Huntsham Hill, 1915.

S. dentata Dum. Subalpine, in springs on mountains, very rare. 3. Wet ditch on slopes of May Hill, K. 14. Springs on Black Mountains, Olchon Head, 1916, first record; boggy springs above Prill Dingle; swampy moorland above Olchon Head, 2100 ft.

S. intermedia (Husnot) Pears. Very rare, shady mountain rocks. 14. On moist rocks in Prill Dingle, Black Mountains, 1800 ft., 1919, first record.

S. undulata (L.) Dum. Very rare, subalpine. 14. Springs on the Black Mountains, Olchon Head, 1916, first record; on wet rocks in Olchon Gully, 1800 ft. and Prill Dingle; in deep peat-holes on moorland, 2000 ft.; in deep bog-holes on Black Hill, 2000 ft.

S. irrigua (Nees) Dum. Rather frequent, in woods and on hillsides. Found in 10 districts, mostly in the W. 1. Scudamore's Wood; Mynde Hill. 2. Chase Wood; Lodge Grove; Coppett Hill. 3. May Hill, K. 1914, first record. Haugh Wood; West Wood, Fownhope. 4. Tarrington; by spring on W. side of Malvern Hills; 6. Ashperton Park Wood. 10. Downton Gorge; Orleton. 11. Knill, B. 12. In Sphagnum, Crowther's Pool, B. 13. Whitfield; Timberline; St. Margaret's Wood; Ewyas Harold; Cwm Bulug. 14. Dinedor Wood; Dulas; Crib-yr-Garth; Olchon Head; moorland, B.; peaty holes on top of Black Mountains, 2000 ft.

S. curta (Mart.) Dum. In similar habitats to the last, but less frequent; found in 8 districts. 3. Haugh Wood. 4. East Wood, Tarrington, 1915, first record; Wellington Heath. 5. Whitbourne. 6. Bodenham. 9. Oaker's Wood, Yarpole. 10. Lingen Vallets; Harley's Mountain. 11. Hergest Ridge. 13. Whitfield.

Radula complanata (L.) Dum. Common, on trees and sometimes on rocks; found in 11 districts, not in 6, 10, 11; 28 records.

Some early records: 1. Llangarren, W., MS. 2. Hentland, W., MS.; Sellack, A.L. 1874; Doward, L. 1890; Moraston, 1891; Dadnor, 1891. 7. Breinton, L. 1878, on a stone. 14. Red Daren, 1890, L. This plant is usually found both fruiting and gemmiferous.

Madotheca lævigata (Schrad.) Dum. Very rare, only in one district on dry shady rocks. 2. Early record; Great Doward, L. (W., MS.); Coppett Hill, L. 1880; Chase Wood, Huntsham Hill. Found on limestone and conglomerate rock.

M. platyphylla (L.) Dum. Very common, on rocks and banks, both sandstone and limestone; recorded from every district except 7, 56 records. Some early records: 2. Coppett Hill, L. 1886; Little Doward, L. 1890; Great Doward and Huntsham Hill, W., MS. 10. Downton Gorge, L. 1889. 12. Pembridge, C. (W., MS.). A variable plant, sometimes very small, sometimes in luxuriant tufts.

M. rivularis Nees var. *simplicior* (Zett.) K. Müll. Very rare, on wet rocks, only in one spot. 14. In dark glen by a waterfall, near Pentre Higgin, under Cefn Hill, 1922, first record. A slender form with few branches.

Cololejeunea calcarea (Lib.) Schiffn. Very rare, on rocks and mosses. 2. On limestone rock, Great Wood, Huntsham, creeping over *Madotheca* and *Neckera*; *c. per.*; B., 1919, first record. 14. On high rock-ledge, sandstone, Olchon Gully, 1900 ft., Black Mountains, 1919.

Cololejeunea Rossettiana (Massal.) Schiffn. Very rare, on rocks and mosses. 2. Creeping on limestone rock, Great Doward, K. 1913, first record. 3. Shady cleft, Adam's Rocks, Backbury Hill, on Silurian rock and creeping over mosses, very fine fruiting specimens, July, 1916.

Lejeunea cavifolia (Ehr.) Lindb. Occasional, shady rocks and trees in woods; found in 9 districts. 1. Darren Wood, K.; Wern-y-coc Wood. 2. Great Doward, W. 1873, first record; L. 1887; Welsh Bicknor, L. 1886; Huntsham Hill, *c. per.*; Bolston Woods; Coppett Hill. 3. West Wood, Fownhope. 4. Whitman's Hill Wood. 8. Yoke Wood. 10. Near Kinsham, L. 1898; Downton Gorge. 12. Rhydspence Dingle; Pentrecoed Dingle. 13. Treville Wood. 14. Cwm-yr-Canddo, Craswall; Graig Wood; Cusop Dingle; Olchon Head; Cefn Hill; Blaen Olchon, B.

Var. *heterophylla* Carr. Very rare, on shady rocks. 2. On limestone rock, Great Doward, K. 1913, first record; Great Doward, on conglomerate rock.

Marchesinia Mackaii (Hook.) Gray. Very rare. 2. On limestone rocks, Great Doward, K. 1913, first record; limestone, Huntsham Hill.

Frullania Tanarisci (L.) Dum. Uncommon; on rocks and trees; found in 6 districts. 1. White Rocks, Garway, W. 1875, first record. 2. Coppett Hill, L. 1890 (on conglomerate rock); on same rock, Great Doward, also very fine, on limestone rocks and on tree-stumps above Great Quarry, Doward; Huntsham Hill. 6. On tree in wood, Egdon Hill. 10. Downton Gorge. 11. On oaks, Bradnor Wood; oak, Hergest Ridge. 14. Rocks (O.R.S.) Red Daren, Hatterel Hill; also on similar rock, Black Mountains, Olchon Head, Crib-yr-Garth, Prill Dingle, and in tufted form on rock-ledges in Olchon Dingle, 1800–1900 ft.

Frullania dilatata (L.) Dum. Very common, ♀ plants nearly always fruiting; recorded from every district. 97 records—some early records: 1. St. Weonards, W. 1880; Pencoyd, L. 1886. 2. Sellack, L. 1874, first record; Doward, W. 12. Eardisland, L. 1890. Not variable; but green forms found, 1. Northgate. 5. Whitbourne. Very rare on rock, 1. On tombstone, Welsh Newton.

Anthoceros punctatus L. On soil in fields, rare. 1. Ganarew, L. 1884, first record. 2. Sellack. 11. Hergest Ridge, Misses Banks.

A. crispulus (Mont.) Douin. On soil in fields, rare. 1. Tretire. 2. Sellack; King's Capel; Dason; Moraston; Foy; Coppett Hill. 6. Woodhouse, Bodenham, 1916, first record. 11. Hergest Ridge, Misses Banks.

A. lævis L. On soil in fields, rare. 2. Sellack; King's Capel; Coppett Hill; Foy. 3. Adam's Court, Lea. 6. Woodhouse, Bodenham, 1916, first record. 13. Lane Bank, near St. Margaret's, 780 ft. These plants fruit abundantly, the spores are useful in determining the species.

IMPERIAL BOTANICAL CONFERENCE.

Interim Report on Nomenclature.

[The following is the Interim Report drawn up for submission to the Imperial Botanical Conference by the Subcommittee appointed to consider the question of Nomenclature. A draft set of Rules embodying these recommendations has been distributed, but it is thought that the suggestions themselves may interest a wider circle of readers, and they are therefore printed here. The names of the Subcommittee are appended to the Report.—Ed. Journ. Bot.]

1. The primary function of nomenclature is to provide a means of indicating with certainty the identity and precise circumscription of groups.

2. The International Rules of Nomenclature have now been in operation for over eighteen years. In the light of the experience gained during that period, certain alterations in the Rules seem desirable. It is believed that the adoption of these suggested alterations would secure greater certainty in the application of names, while necessitating comparatively little change in actual nomenclature.

3. The Rules are too long and complicated—mainly as a result of their close adherence to the "Lois" of 1867. The average botanist, who is not an expert in nomenclature, finds it difficult to interpret them correctly. They should be abbreviated and simplified.

4. Even experts are not agreed as to the interpretation of some of the Rules. Take, for example, Art. 20 (conserved generic names). Briquet (Prodr. Fl. Corse, i. 529), on the one hand, regards *nomina conservanda* as being conserved against all competing names—hence, in his opinion, *Spergularia* J. et C. Presl (1819) cannot be replaced

by *Alsine* L. (1753). Rendle and Britten (Journ. Bot. 1907, 436), on the other hand, retain the generic name *Alsine* L. in place of *Spergularia*. "It is true that *Spergularia* occurs in the list of names to be retained, ... but it is inserted in that list only with reference to the two genera of Adanson—*Buda* and *Tissa*—and not to the Linnean genus *Alsine*."

5. There is also disagreement as to the practical application of some of the Rules. This is particularly the case with regard to still-born names (*nomina abortiva*). Thus Schinz and Thellung (Vierteljahrsschr. Nat. Ges. Zürich, liii. 576; 1909) consider that *Cucubalus angustifolius* Mill. is a *nomen abortivum*, whereas Briquet (Prodr. Fl. Corse, i. 543; 1910) and Rendle (Journ. Bot. 1911, 277) maintain that it is a valid name. The question is discussed in Journ. Bot., Feb. 1924.

6. A serious defect in the Rules is that they do not secure certainty in the application of names. This is largely due to one of the provisions of Art. 50. "No one is authorised to reject a name (or combination of names) . . . . because of the existence of an earlier homonym which is universally regarded as non-valid." This leads in practice to the use of the same generic name for different genera. A genus which in one decade is universally regarded as congeneric with an older one may be treated by some botanists in the next decade as an independent genus and the "later homonym" will then have to be re-named. On account of the very large number of generic homonyms Art. 50, if unaltered, will inevitably lead to sweeping changes in nomenclature, the avoidance of which was one of the main objects of the Rules.

Under the Rules *Kickxia* Blume (Apocynaceæ) must be replaced by *Kibatalia* G. Don because *Kickxia* Dum. is no longer universally regarded as a synonym of *Linaria* L.; and *Bassia* Koenig (Sapotaceæ) must now be replaced by *Madhuca* Gmel., because *Bassia* All. (Chenopodiaceæ) is no longer treated as a synonym of *Chenolea* Thunb., which as a matter of fact it antedates. Busy taxonomists have no time to devote to investigating the validity of "earlier homonyms." Thus since 1905 King and Gamble have described fourteen new species under *Bassia* Koenig, and Merrill has published eleven new species and combinations under the same generic name. The thirty species known will now have to bear names under *Madhuca* (Macbride in Contrib. Gray Herb. n. s. liii. 16; 1918: Merrill Enum. Philipp. Fl. Pl. iii. 276; 1923), unless *Bassia* Koenig is placed on the list of *nomina conservanda*.

7. The Rules do not give clear guidance as to the correct application of a generic name when a genus is divided. Art. 45 reads as follows:—"When a genus is divided into two or more genera, the name must be kept and given to one of the principal divisions. If a genus contains a section or some other division which, judging by its name or its species, is the type or the origin of the group, the name is reserved for that part of it. If there is no such section or subdivision, but one of the parts detached contains a great many more species than the others, the name is reserved for that part of it."

The citation of *Æsculus* as an example seems to indicate at least partial acceptance of the type-method, but the view has been taken by some botanists that the first sentence of Art. 45 implies that when a generic name cannot be adopted for the division containing the type-species, it must be applied to one of the other divisions. The genus *Erotium* Sw. contained only two species, *E. theæoides* and *E. undulatum*, which are now recognised as belonging to different genera. Fawcett and Rendle (Journ. Bot. 1923, 53) show that *Erotium theæoides* must be regarded as the type-species of *Erotium* Sw., and state that if the name *Erotium* cannot be used for *E. theæoides* it must be applied to the genus typified by *E. undulatum*. Other botanists consider that a generic name should be reserved—whether as an accepted name or as a synonym—for the division containing the type-species.

8. The difficulties mentioned in 4, 5, 6, and 7 may be removed by certain alterations in the Rules—see 9, 10, 11, 12, *infra*.

9. It should be made clear that *nomina conservanda* are conserved as against all competing names.

10. The "principle of nomina abortiva" (by which combinations based on *nomina abortiva* are rejected) should be expunged from the Rules, as it leads to instability of nomenclature and unnecessary multiplication of names (see Journ. Bot., Feb. 1924).

11. All combinations which are homonyms should be rejected. All generic homonyms should be rejected except such as are specially conserved. (The word *homonym* is here used in the sense of a second or later application of a name.)

12. Names should be applied according to the type-method. This will be dealt with in a separate memorandum which is in preparation.

13. The provision for rejecting "duplicating binomials" (*tautonyms*) should be removed from the Rules, as it leads to instability in nomenclature (see Journ. Bot., Feb. 1924, pp. 41–46).

JAMES BRITTEN, J. RAMSBOTTOM,
T. A. SPRAGUE (Convener), E. M. WAKEFIELD, A. J. WILMOTT.

January 8, 1924.

HENRY TUKE MENNELL (1835–1923).

BY the death of H. T. Mennell on December 9, 1923, we lose yet another Quaker naturalist who gained his inspiration and early training at the well-known Friends' School at York which celebrated its centenary last June, where he was the oldest Bootham Scholar alive, having been born at Scarborough in 1835.

For many years Mennell was a prominent and useful member of the Society of Friends (his mother was a Tuke); he took a particular and very practical interest in education, and was successively secretary, chairman, and treasurer of the Friends' Education Committee. Before he left Newcastle in 1861, where incidentally he was Secretary of the Northumberland and Durham Nat. Hist. Soc.,

his collections of English shells and herbarium of British flowering plants were already excellent and fairly complete. However, when the Watson Bot. Exch. Club was started in 1884 he became a member and remained so until 1918. A few notes were contributed by him to the *Journal of Botany* many years ago, but he published little else of botanical interest. As long ago as 1863 he became F.L.S., retiring only in 1923.

Mennell's happy union with Maria B. Newman, daughter of Edward Newman, the entomologist and fern lover and editor of the *Phytologist*, doubtless increased his friendships among naturalists, and more and more his many services to humanity became evident. In 1861 he took over the tea business in London of Tuke & Co., founded in 1725, and Mr. and Mrs. Mennell settled at the Red House, Croydon, where in later years the charm of his beautiful alpine rock-garden was shared with many.

In 1865 Mennell joined the Alpine Club, and many of his early climbs were done with his old schoolfellow the late Dr. R. Spence Watson. It may almost be said that he introduced to English people Fionnay in the beautiful Val de Bagnes, for his later Swiss holidays for fifteen successive years were spent in that district, and he and his family were often accompanied by friends able to join the party. His enthusiasm for the mountains and the flowers was contagious, and he endeared himself to all, and especially to his guides. I was struck by this in August 1904 when I chanced to be at Fionnay. Three years later, in his 73rd year, he made his last ascent of a 12,000 feet peak in the Combin range. During the British Association meeting in Canada in 1884 Mennell and Macoun, head of the Canadian and Geological Survey, were the first white men to penetrate the Yoho Valley, now so famous in the Rockies. Upper Teesdale was one of H. T. M.'s favourite English haunts, and in middle life he visited it repeatedly. Among his life-long friends were the late Alfred Russell Wallace and J. Gilbert Baker.

Mennell's herbarium has been presented to Mr. C. E. Salmon.

H. S. Thompson.

SHORT NOTES.

Crocus vernus All. in Surrey. While walking in the neighbourhood of Malden, Surrey, in March of last year, my attention was drawn to a party of children gathering flowers in a meadow. The flowers were purple crocuses (*C. vernus*), which the children said were "wild" and had been picked regularly every spring. The field is an old pasture where the crocuses have evidently been long naturalised, for they differ considerably from the modern named Dutch forms and closely resemble those naturalised at Colney Hatch, which I found still abundant some twenty years ago (vide *Flora of Middlesex*, p. 274; 1869). The flowers of these plants are much smaller than in the garden forms of *Crocus vernus*, and of a purple ground-colour, more or less marked with whitish stripes. They are rarely wholly purple or with the clear white ground seen in such cultivated kinds as

"Pride of Albion" or "Sir Walter Scott." The plants are no doubt descended from some old cultivated forms, and are reverting towards the wild types of Central Europe, where the crocuses that I have seen have always shown relatively small and dull-coloured flowers. In the grass-plot of my garden, where I have grown *Crocus vernus* for about 25 years, I find that my original named varieties tend to die out, and natural hybrids spring up, generally with smaller flowers of intermediate colouring, which in time will presumably effect further crossing and gradually degenerate to the form noticed at Malden and in Middlesex.—H. W. Pugsley.

Silene latifolia (p. 45). By a typographical error, for which I am in no way responsible, *Silene latifolia* appeared in small capitals, as though it were an accepted name, instead of in italics. As I stated (*l. c.*), the choice lies between *S. vulgaris* and *S. angustifolia*.—T. A. Sprague.

REVIEWS.

L. H. Bailey. *Quidam Rubi Cultorum* (being Part V. of Gentes Herbarum, Ithaca, N.Y., Nov. 1923).

Some four decades ago, a ribald generation of Oxford undergraduates, assisted, perhaps prompted, by resident younger graduates, used to say of a certain famous personage that he was appointed Professor of Greek in the University of Oxford because he knew a little Latin. And the Editor of this Journal, acting on a kindred principle, asks me to write something about a work on cultivated American Rubi because, forsooth, I know a little about the wild brambles of England; for if I know anything about the cultivated English forms, my knowledge is, as Bailey would say, wholly pomological.

This paper is one of a series of "occasional papers on the kinds of plants"; it has 7 pages of introductory remarks, and 55 of a list of Rubi cultivated in America with index ("finding-list of Latin names"). It is bound in a paper cover, and so far does not promise to hold together long; but it is admirably arranged, printed in good type on good paper, and beautifully illustrated with photographs, largely of mounted specimens.

We are not here presented with a Handbook of Cultivated Rubi, or of the Rubi of North America; for many forms are enumerated which lack a description. We have rather an attempt to survey the present state of the study and to indicate the lines on which it may in future be most profitably pursued. The author regards himself as only a middle link in a chain—beginning with Blanchard (ob. 1922)—just as Rogers did; Rogers always looked on his work as a starting-point for that of others, and would not at all resent his name and his results being "lost" in years to come. This attitude is the true answer to the foolish question once put to me, Will his work stand? Of course it will, in the shape of further work built upon it and

called probably by someone else's name. If it were to stand in the sense of being final, that could only mean that it had led to a *cul-de-sac*, and nothing more could be done with it. That is just what any genuinely scientific mind like Bailey's would pray to be delivered from. He does not aim to produce finality or completeness but to clear the ground and to provide material which others can use after him. Botany gains this way, though botanists may miss the entertainment which a certain class of dispute provides to onlookers.

The list of 55 pp. contains frequent discussions of the origin of forms which are chiefly interesting to gardeners, professional and amateur. Typical of these is the statement of the problem raised by the Loganberry (p. 155). These pages also reveal several interesting facts, as for example the large number of countries in both hemispheres which have been laid under contribution for forms ornamental or useful. The Rubus cult, moreover, like many still more eccentric cults, appears to have attained far larger dimensions in America than in England. There is a good story, solemnly printed for true, about the Mammoth Blackberry and its cane 149 feet long, covering a wall 40 feet long and 6–8 feet wide, and producing fruit 2½ inches long, and yielding a weight of fruit which "is not now capable of calculation." The Achilles-heel is there all right, though; for the Mammoth "is utterly insipid in short-cake."

Many forms are grown simply for beauty. From this point of view, the worst of a bramble is that, late in the season, it becomes untidy to the eye. True, it displays beautiful foliage for some months, and in full flower is often very handsome and indeed critically distinctive; a mass of *R. calvatus* on Witley Common, *R. latifolius* in Merioneth, *R. incurvatus* in Oxfordshire, *R. macrothyrsus* at Portmadoc, or a good luxuriant show of *R. leucostachys* anywhere, is a beautiful sight. But as it decays, a bramble is more repellent to the eye than most flowers; though *R. rusticanus* in full fruit in October is a lovely thing. No doubt, however, where the cultivation of brambles is seriously undertaken, this drawback is put right by the pruning-knife.

The few pages of introduction are to us in England far more entertaining than the rest of the papor. To a field-worker, perhaps the most appealing point all through is the passage on p. 143 about the collecting and marshalling of material for the study of a critical genus. A wealth of sad experience lies behind these sentences:—"Much of the difficulty in identifying the species of *Rubus* is due to our methods of collecting and to the consequent random material in the herbaria. We take a piece in one place or colony and then other fragments in other places; when these are brought together they may seem to represent different species, whereas all the forms might have been found in the same patch or colony if it had been properly collected."

That is very near the conclusion to which a more limited experience leads me. I have, for example, been Rubus-hunting (with W. C. Barton) of late in N. Wales, and found in large quantities over the Portmadoc and Dolgelley neighbourhood three constant

forms which are difficult to place. In my herbarium I have about a third of Rogers's Rubus herbarium, selected by myself through the kindness of his son; and there I find one solitary specimen of each of these three forms, collected by Rogers or sent to him by the collector; and each *seeming* to be a solitary aberrant form of some species found elsewhere in normal shape. Rogers consequently placed these isolated gatherings respectively under *mollissimus*, *Lettii*, and *podophyllus*, but in all cases with strong reservations; and no doubt with the material at his command it was the only thing to do. But I am persuaded that if he had seen the results of our 1922–3 gatherings, spread over 2, 3, or 4 counties, he would have separated the forms from their named allies and consented to fresh names and descriptions. For with a very large series of this "*Lettii*" before us, we find it fits equally well, and equally badly, *chrysoxylon*, *Lettii*, *curvidens*, *podophyllus*, and perhaps one or two others of our named forms. This means that it is a distinct local form, as good as a dozen others in our list; but systematic and extensive collecting, with careful annotation, was necessary to reveal the fact; that is the point, large gatherings over a definite area. Then at once follows the question, how to treat a series of such closely allied and graduated forms, which not seldom occupy definite areas adjacent to each other: for example, the form above referred to is "bounded by" *chrysoxylon* on the N., *curvidens* on the S., *Lettii* on the W., in Ireland. Bailey would apparently desire to regard them all as varying aspects of one species, and to a less degree Focke would do the same. But the botanist with true imagination has yet to arise who can see through the maze of forms—which behave just like a tangle of interlacing circles—and invent the ideal treatment. Sudre, with all his merits, has not accomplished this. *Subtilitas naturæ subtilitatem sensus et intellectus superat.*

And so he finishes in words that cover with a wide sweep much of our scientific literature:—"We are to recognise two kinds of species making in *Rubus*. One is the process of breaking up the different species after a country is thoroughly collected. The other is the adding of new species when a country is being explored. In North America, the *Rubus* flora is not yet collected." Neither is it in England, save in patches, chiefly those personally worked by Rogers and his closest collaborators. And to do what is really desirable, it is necessary to amass and arrange an enormous herbarium, too large for any private house, and requiring Government housing accommodation.

Is there not another difficulty which complicates these considerations? Visiting sometimes identical bushes in succeeding years, I am beginning to suspect that forms are actually changing from year to year. It would be a very interesting experiment to collect the same form in one neighbourhood for, say, ten years in succession, keeping characteristic specimens of each year, with careful notes as to slight changes in stem, leaf clothing, and the like. Cultivation would also serve to test the behaviour of the individual. My belief is that *Rubus* is, even in this way, a rapidly developing genus, and that variations are often due to an inherent fluidity which arises from

some unknown source entirely independent of "crossing"; and that such fluidity frequently finds largely increased scope in new surroundings.

It is thus a courageous undertaking of Bailey's to try to get behind the history of *Rubus* cultivation. As he says, the records of horticulturists are neither full nor pointed enough from the scientific point of view to enable us to come to real conclusions; for there has been no systematic amassing of relevant herbarium material in the past. Scientists and horticulturists have indeed much to learn from each other, and jointly may be expected to produce great results. But the attempt to collaborate has hardly yet begun. Results therefore must at present be largely guesswork.

Bailey seems to have arrived at a pretty clear notion of the meaning of "species." I wish I had! But he does say useful things about it; one is that sterile offspring can no longer be taken as evidence for "specific" difference between parents. Lidforss found that in *Rubus* it frequently happened that the more he crossed forms, the more fertile they became. And, of course, "intermediateness" is no "proof of double parentage," even though hybrids are often intermediate in character.

H. J. RIDDELSDELL.

Flora of Santa Catalina Island (*California*). By CHARLES FREDERICK MILLSPAUGH and LAWRENCE WILLIAM NUTTALL (*Field Collaborator*). Pp. 413, 14 plates, map. Field Museum of Natural History Publication 212. Botanical Series, Vol. V. Chicago, January 1923.

THE island of Santa Catalina lies 28 miles off the coast of Southern California at San Pedro, the port of Los Angelos; it is 22 miles long and varies in width from 3 to 8 miles; its total area is 48,438 acres. This we learn from the Preface, from which we extract the following:—

"The island is specially interesting to the botanist because its Flora comprises a greater number of endemic species than any equal area of the Californian mainland. The strongly-marked character of several of these has given rise to various theories as to their origin and the geologic status of the island itself. . . . It is imperative that the Flora be recorded in detail before the advancing activities of Man shall have modified too greatly its original characters. The wide ranging of large flocks of sheep; the introduction and increase of wild goats; the turning of various springs and canyon streams into conduits supplying Avalon [the shipping harbour of the island]; building and road-construction are elements working rapid changes in the natural features of the island."

The summary of the plants composing the Flora shows a total of 459 genera containing 882 species; of these, half are Spermatophytes, the remainder Thallophytes, chiefly fungi and lichens; it would, we think, have been useful if the number of endemics had been indicated. Before coming to the Flora proper, however, we have an introduction containing a detailed account of the principal collecting-stations

which extends over eighteen pages, and a very full list of collectors, even those who have noted only one or two plants being mentioned; it would have added to the usefulness of the list if the dates of deceased collectors had been added. "The pioneer botanical collector of the island" (Feb. 1847) was Dr. William Gambel; "while his plants are supposed to be deposited in the herb. Phila. Acad. Sci. [in whose Journal (i. 1848) they are published], yet the best and fullest series (like those of Thomas Nuttall, who named them) is in herb. Durand, British Museum, London." There is evidently some mistake here; the herbarium of Elias Durand (1794–1873), who is intended, is in the Paris Museum; see Harshberger, *Botanists of Philadelphia*, 1899 (p. 177), wherein will also be found a biography of Gambel (1821–1849) and a full account, with portrait, of Thomas Nuttall (1786–1859), who employed Gambel in his early days as an assistant in his journeys. Nuttall's herbarium, it may be noted, was purchased by the British Museum in the year following his death; it contained about 5000 species, but Gambel's plants do not appear to be among them. Of the plants collected in Santa Catalina, "the herbarium of the Field Museum of Natural History contains the largest aggregation—over 3500 sheets."

The Spermatophytes, with which the following remarks are principally concerned, are fully described, the main groups being provided with a clavis to the genera and to the species. Mr. Millspaugh (whose death we regret to see recently recorded) is mainly responsible for the work and for the description of the new species; the help is acknowledged of P. C. Standley (*Chenopodiaceæ*), A. S. Hitchcock (*Poaceæ*), and W. Trelease (*Quercus*), and in Thallophytes of various writers, the principal being W. R. Maxon (Filicales), R. S. Williams (Mosses), A. W. Evans (Hepatics), G. K. Merrill (Lichens), and C. E. Fairman (Fungi); of the last many new species are described and a "host index" is appended.

Turning over the pages, we note one or two points of interest to British botanists. Some of our plants appear under unfamiliar names: *Polypogon littoralis* Sm. becomes *P. lutosus* (Poir.) Hitchc.; *Gastridium lendigerum* Gaud. (1828) is replaced by *G. ventricosum* (Gouan) Schinz & Thell.; *Lepturus incurvatus* is placed in *Pholiurus* and becomes *P. incurvatus* (L.) Hitchc.; the memory of an old controversy is raised by the retention of *Tissa* for *Spergularia*. The genus *Leptilon* Raf. is revived, and *Erigeron canadense* becomes "*L. canadense* (L.) Britton, Brit. & Br. Ill. Fl. 3: 391)"—to this method of citation we think objection may rightly be taken: the authorship of the *Illustrated Flora* is attributed on its title-page to Britton and Brown; and although it is stated in the Introduction (i. 5) that "the execution [of the Flora] is *mainly* the work of Dr. Britton," it was "supervised throughout" by Judge Brown, nor in any case can we go beyond the title-page for authorship. This view has been generally accepted in the case of the *Hortus Kewensis*, the species in which are cited as of Aiton, though he certainly did not describe them (see *History of Aiton's 'Hortus Kewensis,'* Journ. Bot. 1912, Suppl. iii.).

Erodium cicutarium is common in the island, where it is known as "Filaree"—"a corruption of the Spanish name *Alfilerilla*: it is asserted that some years ago a Mexican sheep-herder, knowing the value of this plant as fodder, was wont to carry a quantity of the seed with him on his rides about the island and sow it broadcast in all new localities he visited." A number of European plants are already well established, some of them escaped from gardens—e. g., *Reseda odorata*, *Koniga* (printed "*Konigia* Adans.," but Adanson wrote "Konig"—it may be noted that his names beginning with K are all indexed under C) *maritima*, and the Peruvian *Tropæolum majus*; Watercress (for which Linnæus's name *Sisymbrium Nasturtium-aquaticum* is retained) is "established in perpetual streamlets"; *Marrubium vulgare*, first noticed in 1896, is "prevalent on dry hillsides"; certain weeds—e.g., *Sonchus oleraceus* and *S. asper*—are established, but *Plantago major* finds no place. Occasionally introductions are admitted on apparently slight grounds; thus *Chrysanthemum coronarium* occurred only once, in a grain-field. Among the numerous new species, the most striking appears to be *Eschscholtzia Wrigleyana*, of which a coloured plate is given; this, which is near *E. crocea*, is based upon "two young plants, not found later." The other illustrations of plants, save for an excellent plate of *Desmatodon Hendersoni*, are not very illuminative.

Considerable typographical prominence is given to the local names, some of which are interesting—*e. g.*, "Baobab" (*Ribes viburnifolium*, which "covers the steep walls of one canyon to the height of a hundred feet and extends in a mass for a quarter of a mile"); "White Lilac" (*Ceanothus*); "Mulefat" (*Baccharis viminea*); "Kisses" (*Calandrinia*); Nigger Head (*Coreopsis gigantea*)—"a species almost entirely insular, becoming rare where cattle or sheep are pastured"); "Douglass" (*Atriplex semibaccata*, "an Australian plant much relished by sheep"); "Miner's Lettuce" (*Claytonia perfoliata*). There is a commendable absence of manufactured names, though the new *Eschscholtzia*, of which only two plants were found, is christened "Wrigley's Poppy."

The nomenclature is presumably in accordance with the American Code, but the practice of employing trinominals for varieties—"*Stipa lepida Andersoni* (Vasey) Hitchc."—seems to us objectionable, and to append Gray's name to such a construction—"*Solanum Xanti Wallacei* Gray" (p. 217), Proc. Am. Acad. ii. 90, 1876 (p. 217)—is not only inaccurate but anachronistic.

There is an admirable—we are glad to note that there is only *one*!—index, in which new names are in black type and synonyms in italics; its only defect is in the failure to repeat the generic name at the head of each column. A more serious omission, to which we have often called attention, is the neglect to utilise the headings of the pages, which stand throughout—on the left hand, "Field Museum of Natural History—Botany, vol. v," on the right, "Flora of Santa Catalina Island, Millspaugh and Nuttall": these, each repeated more than two hundred times, are as monotonous as they are useless. In typography and general get-up, the volume is admirably produced.

The Flora and Folk-lore of Shakespeare. By F. G. Savage. Illustrated. 8vo, cloth, pp. 420, price 7*s.* 6*d.* net. London: Burrow & Co., 1923.

This attractive volume, the notice of which has been too long delayed, is the outcome of "a series of 155 articles which appeared in the Stratford-upon-Avon Herald during 1909–16"; these have been carefully revised and considerably enlarged. Their origin explains the prominence of matters of purely local interest, such as references to the flora of the district and persons and places connected therewith, and also the considerable diffuseness and discursiveness of some of the chapters, which however do not detract from its interest to the general reader. It probably also accounts for the fact that no system has been followed in arranging the chapters, which we think for purposes of reference would have been more conveniently placed under the names of the plants in alphabetical sequence. The title is perhaps a little misleading; the Folk-lore of Shakespeare is a very large subject, and the author has done well to confine himself to that portion of it which is connected with plants.

Considerable attention has been devoted to local names, some of which—*e. g.*, "drum-sticks" for *Poterium Sanguisorba*—we have not met with before. The identification of these is often to some extent a matter of speculation, but the author has sometimes overlooked important sources of definite information; for example, the late Nathaniel Colgan established beyond doubt that the plant usually known in Ireland as "Shamrock"—the discussion of which under "Clover" is an example of the discursiveness to which we have referred—is *Trifolium minus*, but this is not among the claimants of the name mentioned in the text. Shakespeare's "Long Purples," again, the identity of which the author thinks "it is impossible to decide with any degree of certainty," is from the context quite clearly *Orchis mascula*. Some names are included on somewhat insufficient grounds—*e. g.*, "Peach," though "the poet nowhere refers to the peach-tree," but alludes to the colour; and the "Dog-berry"—it is thought Dogberry took his name from the fruit of the Dogwood. The pleasant fiction that connects Linnæus with the Furze, which has been finally disposed of by Dr. Daydon Jackson, finds place, qualified, however, by the useful prefix "It is said."

The volume is, on the whole, carefully printed; a long paragraph under "Lark-heels" (p. 98) clearly belongs elsewhere, and "*Carlycanthus Americanus*" (p. 230) should be *Calycanthus floridus*. There are no useful headings to the pages—the title of the book is continued throughout. The two indexes—that of "Shakespearean names" is disfigured by ugly black type giving unnecessary information—should have been united; the "general index" is by no means adequate. The volume would have been more useful bibliographically had the author given us a list of previous books on Shakespeare's plants: he quotes "Ellacombe" and "Grindon," but gives no information about their works. All the same, he has given us an interesting volume, the result of much reading and research.

Practical Bacteriology for Chemical Students. By DAVID ELLIS, Ph.D., D.Sc., F.R.S.E. Longmans Green & Co., 1923. 8vo, pp. 136; 55 figs. in text. 4*s.* net.

BACTERIA are so universal and bacteriology has so many practical applications that the output of books on the subject is not surprising. The majority of medical works are concerned with medical pathology, and it is not everyone interested in the science who can acquire portions of the appropriately affected host. Further, many do not desire to approach the subject from that angle, but from the point where their own special subject is infringed on or overlapped; but it is necessary for most applied chemists to have a knowledge of bacteria and moulds. The present work is based on the exercises in the author's classes in preparation for the degree of Applied Chemistry in Glasgow University and the diploma of the Royal Technical College. The first five chapters treat of ordinary bacteriological technique: the other chapters deal with reserve food material; anærobic bacteria; soil, hay, and air bacteria; examination of drinking water; sewage examination; yeasts; and moulds. The book does not provide very exciting reading, but the instructions for the carrying out of the various operations seem to be quite clear and many useful hints are given for the avoidance of pitfalls. Students working through the course would have sufficient knowledge of bacteriological technique to be confident in tackling ordinary problems. The chapter on moulds is, as usual in such works, quite insufficient to serve any useful purpose.

J. R.

Diseases of Glasshouse Plants. By W. F. BEWLEY, D.Sc. London: Ernest Benns, Ltd., 1923, 8vo, 208 pp., 16 plates. 12*s.* 6*d.* net.

DR. W. F. BEWLEY, Director of the Experimental and Research Station at Cheshunt, is well known for his researches on the diseases of glasshouse plants, particularly the tomato. In the present work he has summarised his results, and rounded off the account by descriptions of diseases affecting the inhabitants of glasshouses in general. The descriptions are as a rule somewhat meagre and hardly add to the value of the book. The first two chapters on hygienic conditions of glasshouses in relation to health and disease in plants and on diseased conditions of plants due to environmental factors—light, heat, humidity, soil, etc.—show a clear insight into matters of importance to the practical grower, and suggestions are made as to the manner in which certain deleterious effects can be prevented or eliminated. The next three chapters deal with Diseases due to Fungi—Root Diseases, Bulb Diseases, and Stem, Leaf, and Fruit Diseases. These are for the most part excellent, but it would perhaps have been better to have treated a species such as *Phytophthora parasitica* in one chapter rather than partly under "Damping Off," "Foot Rot," and "Buckeye Rot." A chapter is devoted to Diseases due to Bacteria and one to Mosaic Diseases; the last two chapters are headed "General Reflections and Considerations on Disease Treatment," and

deal with such matters as different methods of soil and water sterilization, spraying and dusting, resistant varieties, and so on. The last paragraph of this section is worth reproducing: "Finally, a word to pathologists and students of disease problems, the outcome of much experience in commercial nurseries. First learn to grow your plants so that they may pass the most critical examination for health, quality, and productiveness by practical commercial growers, and then experiment upon the healthy plant. It is useless to base detailed knowledge of any disease or the method of its control on experiments conducted on half-starved, physiologically weak plants grown in tiny pots." This requires no commentary, except perhaps that the word *experiment* has been and is still the most misused word in science.

A list of Tomato diseases in this country is given as an appendix and a "selected bibliography." The index is full but very uneven. The printing is good, and there are sixteen excellent plates, but there is a great waste of space in some of them. There are a considerable number of text-figures, but these are not as a whole good, being often very diagrammatic and in some cases more conventional than accurate. Proof-reading has not been very carefully done, and the small initial letter to the generic names (pp. 9 & 10) should not have been passed. In spite of these minor blemishes the work is one which will no doubt fulfil its purpose:—"to bring before growers of glasshouse plants the fundamental principles of disease control, in the hope that it may be of some assistance to them in the course of their business." It is written to that end, but it will also prove of value and interest to that rapidly-growing school of plant pathologists who are dealing with problems in the same enlightened spirit which characterizes the work of Dr. Bewley.

J. R.

BOOK-NOTES, NEWS, ETC.

AT the meeting of the Linnean Society on Jan. 24, Mr. F. Howarth read a paper on "The Sexuality of *Ustilago*." After outlining the life-histories met with in this genus of smut fungi, he summarised the results obtained by Kniep and others in following out the fate of the four sporidia produced on the germination of the chlamydospore. His own results with *Ustilago Hordei* and *U. Avenæ* also show that the sporidia can be divided into two groups; the sporidia of one group will not conjugate among themselves, but will readily do so with those of the other group. Both strains, so far as we can ascertain, are absolutely identical morphologically, but differ physiologically, the difference revealing itself in the capacity to conjugate. There is no conjugation in the absence of oxygen. It occurs best on a ventral or slightly alkaline medium; beyond a small range on the acid or alkaline side it is inhibited.

AT the meeting of the same Society on February 7, Mr. E. J. Collins read a paper on Sex-Conditions in *Silene nutans* Linn. He stated that from the recorded facts of sex distribution, *S. nutans* may be described as a tricecious species. Two plants and seed of *S. nutans*

var. *Smithianus* were received from Mr. C. E. Salmon in 1917; it was hoped that by raising seedlings of this form, light would be thrown upon the relationship between hermaphroditism and dicœcism and the question of sex determination in flowering plants generally. Upon flowering in 1918, one of the above plants proved to be female and one hermaphrodite, but it must be stated that the female plant threw a few hermaphrodite flowers in the following year and subsequently became wholly hermaphrodite. Seedlings of varied parentage have now been raised and their sex condition recorded. In each individual progeny, hermaphrodite plants, plants of mixed sex, *i. e.*, bearing ♀ and ☿ flowers together with flowers with a reduced number of stamens, and plants ostensibly female were noted. The ostensibly ♀ plants were divided into two groups, (*a*) those incapable of producing seed, neuters, and (*b*) those producing seed. The female condition of the plants in the latter group may continue for one, two, or three years, and possibly a few will remain outstanding as female seed-bearing plants, but soon or late maleness appears to break out in varying degree and finally the hermaphroditic condition may be reached. No definite change in the reverse direction has been noticed. Plants of mixed sex may show a bias either towards hermaphroditism or femaleness during the season. The bias may undergo reversal between the flowering axes of the different order of branching, thus giving different sex phases with time and growth. In all 1139 plants have been raised grouped as follows: Hermaphrodite, 480; mixed, 307 plus 136*; female seeding, (*a*) outstanding female 14, (*b*) with some degree of maleness ultimately recorded, 136*; female-neuters, 202. The possible origin of the neuter type and the general bearing of the facts upon the question of sex determination were dealt with.

At the same meeting Prof. Teïzo Niwa gave an account of the forms cultivated in Japan from the original types of *Chrysanthemum indicum* L. and *C. sinense* Sabine. He said that among the many species of *Chrysanthemum* which are wild in Japan, there are two which approach nearest to the cultivated Chrysanthemum, namely, *C. indicum* and *C. sinense*. In the Tokyo *Botanical Magazine* for 1909, Mr. Makino described a wild specimen as *C. sinense*, but this differed from the true plant; for the plant so widely cultivated the name *C. sinense* Sabine var. *hortensis* Makino has been employed. In Japan there are over fourteen sections of the species, that is, garden not botanical varieties; they transmit their characters very rarely by seed. Garden classification depends upon the flower, but also in some degree upon the leaf. The aim of the communication, which was illustrated by a large series of photographs, was to show how cultivation and artificial selection through many generations have affected the type. Mr. H. W. Pugsley exhibited specimens of an undescribed *Statice* from Pembrokeshire, which he proposed to name *S. transwalliana* in allusion to the district where it occurs; of this we hope to publish in due course a figure and description.

On the same occasion Mr. T. A. Sprague exhibited a seedling of *Galium Aparine* with three branches in the axil of each cotyledon.

Accessory buds are characteristic of many Leguminosæ, Rosaceæ, Cornaceæ, Caprifoliaceæ, Rubiaceæ, and Oleaceæ, usually on the adult plant; they seem to occur less frequently in the axils of the cotyledons. In the case of *G. Aparine*, however, the reverse is the case. Like *Stellaria media*, *G. Aparine* exhibits *anisoclady*—unequal development of the (usually solitary) axillary branches of the leaves of each pair. Owing to the leaves arising from the angles of the stem, and the axillary branches arising from the faces, the successive branches in the axil of the same cotyledon or ordinary leaf arise alternately to right and left, branches 3 and 4 arising below 1 and 2 respectively. For some unexplained reason the primary branches in the axils of the cotyledons and the strong branch of the node above appear to be constantly on the same side of the stem.

At the meeting of the Botanical Society of Edinburgh on 21st February, Mr. J. Montague Drummond delivered a lecture on Crop-breeding in Scotland, in which he indicated some of the points of contact between the practical art of crop-breeding and the pure science of Botany. Special attention was drawn to problems relating to the taxonomy of crop-plants and to the bearing of the pure line concept on the significance of species and micro-species. The evidences of particulate inheritance provided by Mendelian segregation were also discussed, and, finally, plant physiologists were invited to consider the great possibilities of investigation of phenomena such as self-sterility, incompatibility in crossing, and the general physiology and ecology of fertilisation. At the same meeting Miss E. M. Henderson described the nodal anatomy of *Sargentodoxa cuneata*; Miss M. B. Knagg recorded her observations on the structure of the leaf of *Begonia fuchsioides*, and Mr. J. A. Alexander submitted an account of the flora of Mt. Ritigala.

The *Journal of the Royal Horticultural Society* for January (vol. xlix. part 1) contains another of Mr. Miller Christy's papers on *Primula*: the subject of the present instalment is "The Garden Polyanthus: its Origin and History." Mr. Christy deals with characteristic fulness with the literary history of the plant, which he fails to find in any of the earlier herbalists, none of whom "up to about the middle of the seventeenth century was acquainted with the plant we now know as the 'Garden Polyanthus.'" Mr. Christy discusses at considerable length the origin of the plant, and concludes by saying that "Whatever its precise ancestry may be, it is of English (or at any rate British) origin, having been evolved solely by the cultural skill of British horticulturists." The part also contains an account, with illustrations, by Mr. G. Forrest, of his "Exploration of N.W. Yunnan and S.E. Tibet, 1921–22," and an interesting biography, accompanied by an excellent portrait, of the late H. J. Elwes by his friend Sir Herbert Maxwell. Mr. Chittenden describes some of the new and noteworthy plants in the Society's Gardens, including *Spenceria ramalana*, a Tibetan plant described and figured by Trimen in this Journal for 1879, and introduced to cultivation by Mr. Forrest in connexion with his 1917–19 expedition.

THE *Transactions and Proceedings of the Torquay Natural History Society* for 1922–23 contains a paper by Miss C. E. Larter on "Some Features of Plant Distribution in Devon." "More than geological formation, the elevation and exposure of tracts of country and nearness to the sea have apparently to do with the distribution of vegetation. . . . Plants like *Chrysanthemum segetum* L., that cannot live on limestone, are naturally limited in range; whereas, lime-loving plants, like *Cichorium Intybus* L., *Inula squarrosa* Bernh., and *Clematis Vitalba* L., are found in all of the eight botanical districts, but the latter does not grow in North Devon in anything like the luxuriance it displays in the south. *Iris fœtidissima* L., too, so plentiful around Torquay, is absent in quantity in North Devon. *Phyllitis Scolopendrium* Newm., at home on sandstone, is found in all the districts. High and exposed situations contain (but only as very rare plants) *Vaccinium Vitis-Idæa* L. in South Devon, and *Empetrum nigrum* L. in both North and South Devon. *Sibthorpia europæa* L. and *Melittis Melissophyllum* L., the latter a specially Devon plant, are widely distributed." The eight botanical districts into which the county is divided are then passed in review, the more remarkable plants of each being cited.

THE *Bulletin de la Société Botanique de Belgique*, vol. lvi. fasc. i., contains a portrait, biography, and bibliography of the late Élie Marchal (1839–1923) by E. de Wildeman; papers by J. Terby on "Un Cas de caryocinèse irregulière dans le rhizome de *Butomus umbellatus*" and "L'Origine de blépharoplaste chez les *Plasmodiophora Brassicæ*; by M. Beeli on "Champignons nouveaux recoltés 1915 à 1923," with 3 plates of new species; and by V. Vandendries "Sur la sexualité des Basidiomycetes." The *Bulletin de Jardin Botanique de l'Etat*, Bruxelles, vol. viii. fasc. 2, is mainly the work of Dr. de Wildeman, who, besides notes on two new species of *Musa* from Ruanda and on *Strephonema Gilleti* (sp. n., with plate), publishes, in conjunction with Mr. E. G. Baker, numerous new species from Congo of *Crotalaria* and *Indigofera*. Vol. ix. fasc. i. contains, besides the memoir of Élie Marchal already mentioned, notes by Dr. de Wildeman on the African species of *Grumilea*, including descriptions of many novelties and observations on myrmecophilous species.

THE *Journal of the Department of Agriculture* (Pretoria) in its January number continues the papers by Miss K. A. Lansdell on the "Weeds of South Africa," which we have more than once commended. "Cocklebur and Burweed"—the former applied to various species of *Xanthium* (*X. Strumarium*, *X. occidentale*, *X. italicum*), the latter to *X. spinosum*—are fully described and illustrated, the species being shown in various stages of development from the germination of the seed.

Contributions from the United States National Herbarium (vol. xxiii. pt. 3; 1923) contains the third instalment of Mr. Paul C. Standley's important work on the *Trees and Shrubs of Mexico*, which "treats the families *Oxalidaceæ* to *Tumeraceæ*, both inclusive. Several of the largest and most important groups of Mexican trees are included, such as the *Meliaceæ*, which contains the true Mahoganies of the genus *Swietenia*; the *Euphorbiaceæ*, *Malvaceæ*, and *Sterculiaceæ*, among whose representatives is the cacao, *Theobroma Cacao*, perhaps the most important economically of the native Mexican trees. The accounts of the *Meliaceæ* and *Polygalaceæ* have been furnished by Dr. S. F. Blake." We avail ourselves of this prefatory note by Mr. F. V. Coville, Curator of the U.S. National Herbarium, because every pains seems to have been taken to prevent the ready consultation of the book. The sheets are fastened into the cover in a way which makes it practically impossible to open the volume, the pages of which are uncut and contain no information at their heads, so that only those who are compelled to use the book are likely to wrestle with the structural difficulties it presents. This is the more unfortunate because the work evidently contains matter of the highest importance and interest and a large number of new species—with, it would appear from an early page (53), which is easily accessible, a considerable reduction of forms which have been described as such: under *Ptelea trifoliata* are lumped eight species of E. L. Greene, one of Rose, and two of Greene and Rose. The date of issue is not given, though that of the two previous parts is supplied.

THE *Journal of the Arnold Arboretum* for October last (iv. no. 4) contains "Notes on Hybrid *Berberis* and some other garden forms," including a very full bibliography of *B. vulgaris*, of which numerous forms are described; an elaborate study of "The Hortensias" (*Hydrangea macrophylla* DC., *H. hortensis* Sm., and *H. serrata* DC.); and a continuation of A. Rehder's "new species, varieties, and combinations from the Arnold Arboretum."

WE are indebted to the Institute of Medical Botany, Brighton, for a little book entitled *Herbs for Health and Healing*, which has been considerately "compiled and arranged as a family Vade-mecum." It would appear from the contents that the Institute supplies packets of herbs at prices varying from 1*s.* to 2*s.* 6*d.* post free, and dealing with almost every ill to which flesh is heir; a more or less full description of each is given, but, save in one or two cases, the special herbs relied on are not specified, their names being given in a general list at the end, arranged under "barks, beans, berries and corns," etc. "The World's Knowledge of Herbs, also the Herbs themselves," have been "collated"; "those of Indian origin are in daily use by the 'Kavee Rajes' and 'Vails,' who are the Herbal Specialists of India," and the authority for the others is equally convincing. The names themselves are largely unfamiliar, or appear in forms to which we are not accustomed: thus the "Berries and Corns" consist of "Anamirtha, Arrahcattle, Baytree, Viburium, Juniper, Pimento, Kuber Sheenee, Calxfallah, Anameritta, Kakmarie, Rhamus, Cratægus, Vanilla Pods, Lonicera, Xylostein, Sumach, Lycuim, Horsegramme." There is a long chapter "On Fumatory Treatment"; "The Leaves of Bickra-es-sambar"—of which no synonym is given—"were in vogue

as a fumatory in the times of Arphrexad the ancestor of Abraham in the days when he dwelt in Shumar of the Accadians"; unfortunately "our crop of this was totally destroyed by the disastrous earthquake in Japan," and the preparations will not be obtainable until June. A list of vegetable seeds for sowing gives a practical touch to the booklet.

In his additions to the Flora published in Trans. Royal Soc. South Australia, xlvii. (1923), Mr. J. M. Black figures a new *Centrolepis* (*C. Murrayi*) and describes new species of *Kochia*, *Calandrinia*, *Hutchinsia*, *Indigofera*, and *Pultenæa*—the last, placed by Bentham under *P. villifera* as var. (?) *australis*, is raised to specific rank at *P. trinervis*.

We learn from the Annual Report of the Southwick Horticultural Society, as reported in the *Gardeners' Chronicle* for Jan. 26, that, "in making application for exemption from the entertainment tax, the officials claimed that the wild flower collections of local school children and exhibits of children's knitting were 'entertainments' within the meaning of the Act, and notice has been served upon the Committee that if these two items form part of next year's flower show they will be liable to entertainment tax!"

The *Garden* for Feb. 16 contains a beautifully illustrated account of Mr. F. J. Hanbury's rock garden at Brockhurst, East Grinstead. The accompanying notes on the garden, by Mr. Hanbury, contain, besides a general sketch of its contents, interesting particulars about some of the individual species: e.g. "*Sempervivum soboliferum*, which was given me fifty years ago by the elder Fries while on a visit to Upsala, was taken from a clump on Linnæus's garden wall, where it is known to have been planted by Linnæus himself, and it thus supplies a living link with the great botanist."

The British Museum (Nat. Hist.) will shortly publish new and revised editions of Mr. Lister's *Monograph of Mycetozoa* and of Miss Lorrain Smith's *British Lichens* (part ii.).

Mr. E. G. Baker's long connexion with the British Museum ended on February 9th with the completion of his sixtieth year; the occasion was made by his colleagues the opportunity for presenting him with a token of their esteem.

Owing to a misunderstanding, the new *Campanulaceæ* described by Mr. Good in the February number (pp. 48–50) were stated to have been collected by Dr. Moss in June 1923; they were, in fact, collected at various dates during the past five years. An apology is due to our correspondent who sent us the note with which the number concludes, and who naturally inquires why the name *salicifolia* should suggest "use only in the smoking-room." As printed in the *Bulletin* and quite clearly written in the note, the name was "*salacifolia*"; it was the printer (perhaps shocked by the suggestion) who altered it, but the Editor is, of course, responsible for passing it in proof, and regrets that the attempt to enliven the pages of the Journal has so signally failed.

THE ORIGIN OF CONSTANT SPECIES.

By Ernst Almquist,
Professor Emeritus, Stockholm.

In this paper I propose to sketch briefly the nature of wild plants and the discoveries and actual theories concerning the breeding of species, and to illustrate the question with concrete examples, if possible from my own experience. The paper is a continuation of "Linnean Species in Our Days" (Journ. Bot. 1922, pp. 292–6).

The Nature of existing Plants.

Among wild plants we find a great many units that are well limited by Nature and that keep their characters in cultivation. We find also an immense number of smaller units, alike constant and often grouped together into collective species. These groups constitute the species and "varietates constantes" of Linné. Jordan emphasizes that the small units are the true species. According to Johannsen, it is already admitted that the small species "must be the units of systematic natural history" (Textbook, 1913, p. 7).

The species of Linné and of Jordan are both natural and not at all arbitrary. Nevertheless, I will try to show in this paper that the small species themselves are of very different value, and are not comparable with the large species, which latter are also of very different relative value.

Then we have groups of ever-varying fertile hybrids. These constitute perhaps a whole genus, *e.g.*, the Salices, or are confined to some collective species. Many are bred by occasional crosses. The perennial hybrids are able to survive a long time; the annual often soon disappear. I think that the continually varying [segregating] hybrids are most common among perennials, especially among dicœcious and moncœcious plants.

Then the sterile hybrids must be discussed. The annual forms disappear after completing their growth, and do not constitute a species. Many perennial forms propagate very well vegetatively and keep their habitat for a long time, some probably for centuries. I refer to the sterile Calamagrostides which take an important place in floras. Some are obviously hybrid, e. g., *C. silvatica* × *C. epigeios*. I have observed such a strain growing copiously at the same spot for twenty-five years. A great multitude of wild plants produce seeds or spores abundantly in spite of the lost sexuality. Some are heterozygous, some homozygous; all keep constant, if mutation does not intervene.

While Jordan's work, and especially his remarkable review of 1873, has been almost inaccessible for general study, I must mention some of his discoveries. He writes in his review as follows (Aug. Chevalier, *Revue de Botanique appliquée*, 1923, p. 464):—

"Indépendamment du fait de l'existence en société des espèces similaires, il en est un autre qu'il importe de faire remarquer ici, c'est que ces espèces n'ont aucune tendance à s'hybridiser entre elles

spontanément .... Les produits d'hybridité, quand ils sont fertiles, étant caractérisés par une variabilité indéfinie, il devient facile d'opérer, dans les cultures, le triage des sujets qui sont issus de l'hybridité. Il suffit, pour cela, de semer des graines de diverses sortes de plantes" etc. "Si .... le semis offre un mélange de formes, on pourra en conclure infalliblement que les graines proviennent d'un sujet hybride; tandis que, dans le cas contraire, le semis se montrant parfaitement pur, on sera sûr d'avoir obtenu une véritable espèce. Ce triage pourra se faire, avec une entière certitude, dès la première ou la seconde année du semis."

Jordan's experience is quite plain. Very similar strains do not cross spontaneously. This rule prevails, in fact, among the northern strains of *Capsella Bursa-pastoris*. On the other hand, several southern Capsellas frequently produced in my cultures hybrids of northern strains. That in Nature the small species do not commonly cross spontaneously is what I call *Jordan's theory*. As an illustration, I will enumerate some collective species in which he found several small constant strains: *Papaver dubium, Fragaria collina, Sedum Telephium, Asclepias Vincetoxicum, Crocus bulbocodium, Ornithogalum umbellatum, Stellaria media, Prunus spinosa, Sempervivum tectorum, Succisa pratensis, Artemisia campestris, Betonica officinalis, Tulipa silvestris, Allium oleraceum* (Breviar. plant. nov. 1866–1868). I think many of Jordan's constant species are allogamous.

Linné, Jordan, De Vries, all diligent cultivators, agree as to the constancy of the wild plants. The efforts in our days to explain the breeding of their species must be unsuccessful until they start from the real nature of existing plants. Illusions on this matter have already spoilt much work.

The Breeding of Existing Plants.

First we must mention *Linné's theory*. Nature proceeds from simple to complex (simplicibus ad composita). Originally only one plant existed in every natural family; the further development continues through crosses. Thus genera are bred, then species, and lastly constant varieties—"Geneticas has [plantas] miscuit natura, unde tot *species* congeneres, quot hodie existunt; species has miscuit casus, unde totidem quot passim occurrunt *varietates*" (Gen. plantarum, 1764). According to De Vries, this theory has much influenced the views current in later times. A. P. de Candolle, for instance, declares: "L'idée de considérer les variétés comme des hybrides me paraît presque démontrée (Mutat. theorie, ii. p. 485).

Mendel verified Linné's theory. He discovered that new constant forms are bred by crosses in two ways. Among self-impregnating plants, segregation will produce heterozygotes, but also a fixed number of constant forms. When the different genes of the parents are *n*, $2n$ signifies the number of constant forms. Thus when the parents possess 3 different genes, 8 constant forms are bred; after withdrawing the 2 originals we find 6 new constant forms. The Mendelian Law also applies to allogamous plants if sufficiently

isolated. The second way Mendel found among the Hieracia; the crosses did not cause segregation; constancy appeared immediately. The third way is mutation or single variation. The mutation by loss (negative variation) is confirmed by experience; we may thus explain the loss of chlorophyll and of sexuality among higher plants.

Some authors report a positive variation, that is, mutation to higher qualities. These observations, as far as I know, are not verified. To this day we know only one way for reaching higher qualities, through crosses. An individual widely surpasses his relatives when he has received high qualities from both parents; in this way the great man is bred. A valuable quality of one parent may also be eliminated by segregation. Thus science has discovered ways both for progressive and for regressive development.

The theory of Alfred Ernst regards apogamy as being due to crossing. He suggests that apogamous plants are able to produce new constant forms by mutation and thus constitute the centre of many small species, as in the genera *Hieracium, Alchemilla, Taraxacum*. He also points out the possibility for asexual forms to regain sexuality (Bastard. als Ursache d. Apogamie, 1918).

Crosses seem to be Nature's chief means for change and development. At first a multitude of different forms appears; most of them vary immensely; nevertheless, the result is constancy. Darwin's law tends in this direction. The new-bred hybrids die gradually; the strongest, in many groups only the constant form, remain. In cultivation, however, selection prevails; man endeavours to exclude Darwin's law and the forces of Nature in order to save useful strains for himself.

Experience of New Species.

I have studied *Capsella Heegeri*, which was found in Landau in 1897. It is not fitted to struggle for existence and soon disappears. I have cultivated the same strain for twenty years, it always produces a few *C. Bursa-pastoris*, scarcely 1 : 100. In 1900 Solons-Laubach stated that solitary *C. Bursa-pastoris* always appeared in the most careful cultures, and suggested that they were spontaneous (Botan. Zeit. 1900, p. 167).

The foreign forms in my cultures do not belong to the Swedish flora; they segregate often 1 : 15, *i. e.*, one *C. Heegeri* of 15. All are similar to strains from the Rhine: *C. lata, C. Origo, C. turoniensis*. It is possible that *C. Heegeri* was originally a hybrid, perhaps *C. lata* × *C. turoniensis*, and that it segregates continually in small numbers. It will be necessary to investigate diligently all individuals of *C. Bursa-pastoris* that appear in cultures of *C. Heegeri*. *Œnothera Lamarckiana* has grown freely in my garden since 1912. At first it apparently segregated, and I found some plants of *nanella* and other remarkable forms. It is scarcely probable that continually segregating strains often grow naturally among wild allogamous plants. It is true that Jordan's cultures do not decide this question in cases where only a few novelties are produced; but in Nature the species meet on the same spot by thousands, and we very often find

only constant forms. *Œ. Lamarckiana* and *C. Heegeri* are new products; the wild plants very old.

In regions where related allogamous strains meet, hybrids will be bred, and also when new forms are imported. Most hybrids disappear; the surviving forms are commonly perennial, often constant; I will illustrate this by some examples.

Geum rivale grows abundantly on damp meadows, *G. urbanum* in dry thickets. Where they meet, hybrids of different kinds appear. I have seen a beautiful abundant strain with great yellow flowers on the same spot for thirty years. A similar strain that I cultivated for some years is fertile and seems to be constant; it grew together with several different hybrids of the above-named species. Concerning *G. rivale* × *G. urbanum* it is probable that we meet with hybrids both from new and older crosses, and also with constant forms. The same seems to hold good with *Lychnis diurna* × *L. vespertina.*

In 1911 Gerbault found in Sarthe (France) one individual of a new *Viola, V. eburnea*, pale, perennial, fertile, and constant in cultivation. It contained several genes both of *V. adorata* and of *V. hirta*, both of which grew in the neighbourhood. On the same spot he found also different strains of the same origin, probably some of the species described by Jordan. Gerbault assumes that the new species is bred by the above-named Linnean species directly, or by older hybrids of the same two species (Bull. Soc. d'Agricult. Sci. Arts Sarthe, 1915). The albinism probably affords evidence that this plant was a rather new product.

The present Distribution of *Capsella Bursa-pastoris.*

Capsella Bursa-pastoris grows abundantly in temperate regions, and we are able to distinguish several hundred constant varieties. In the high north it grows near human dwellings only, but is often absent. In Mediterranean countries the Capsellas are tolerably common, and here some strains cross spontaneously; but the number of individuals and of different forms is fewer than near the Rhine and in Middle and Southern Sweden.

In the glacial period the *Capsella* scarcely found a suitable habitat in the icy countries; it has been brought to us since that time by immigration. Different strains have doubtless been imported from different neighbouring countries.

My studies prove that very many strains are confined to a certain district; in other districts I sometimes found forms similar but not quite the same. These strains without spreading were probably bred where they grow now, and where, owing to their suitable environment, the competitors died out. In fact, I found it rather difficult to transplant the local forms; they thrive in cultivation, but usually disappear without protection (see Journ. Bot. 1922, p. 296).

The Swedish strains do not cross simultaneously, the breeding of new forms has probably stopped. All the indigenous strains seem to be constant. In my cultures the Mediterranean species often produce hybrids with the northern. Perhaps some of them will continue to

exist; every year I see such forms in my garden. Several subalpine strains grow at a lower temperature, and come to blossom and fruit more speedily than our common forms. This adaptation may be explained by the effect of environment on the original hybrids; the present forms were able to survive the cold climate. In Southern Sweden the difference between the inland and the shore species is rather striking. On the shores many strains are highly reduced; they are apetalous or prostrate, the forms of capsules and leaves are less marked. Many other plants change in a corresponding manner on the same shores. In cultivation I found all these reduced Capsellas constant; some of them I have observed for a long time and through many generations. Without doubt Darwin's law has operated effectively here, perhaps together with mutation by loss.

I suppose that at first the immigration caused a large production of varying hybrids; gradually the number diminished and the existing constant strains persisted in the habitat. We are able to guess fairly well whence our Capsellas originate. Only few Swedish strains are to be met with on the European continent, but many remarkable characters are identical or very similar. Capsules with concave or oblique margins belong chiefly to the Mediterranean countries, but are also common in Siberia and not rare in northern and southern Sweden. Plants with lunulate leaves are found in Western Europe as far as southern Sweden. *Capsella rubella* represents the forms here indicated both in capsules and leaves; its probable offspring is still common in Belgium and the Netherlands. Broad convex capsules and entire leaves are widely spread in western Europe, e. g., *C. Bursa-pastoris sinuosa* and *C. robusta.* Apparently identical *C. robusta* is to be found in Stockholm, Bremen, Ghent, Grenoble.

From the two groups—concave or convex capsules and pinnatifid to lunular or entire leaves—we are able to construct most of our Capsellas.

Species of Linné and Jordan.

It is well known that Linné described many collective species with numerous subspecies or constant varieties. Gradually the floras have promoted most of them to species, e. g., the strains of *Primula veris, Fumaria bulbosa, Serapias Helleborine, Ophrys insectifera, Prunella vulgaris.* The limits of small and collective species were never obviously marked and have often been changed, not always consistently.

We assume that generally Jordan's species differ in few genes, the Linnean in more. In some cases we are able to point out that the Linnean have bred the small species, in other cases perhaps *vice versâ.*

Many Linnean species are as real and concrete as Jordan's units. It would be a great mistake to deny the reality of a species when it possesses subspecies or hybrids. Thus *Verbascum nigrum* often lives solitary and is constant, but in some districts we meet with new forms. It is erroneous to think that the nature of a solitary species will be changed when subspecies or hybrids have been discovered in

any place; *Geranium bohemicum* has remained the same real unit even since 1910, when *G. deprehensum* was discovered; they grow together on burnt spots without crossing. Linné's description agrees only with *G. bohemicum*.

A great many Linnean species are real units, but at the same time they may also be regarded as collective. On the other hand, some of his species, e. g., *Primula veris* in Sp. Plantarum, are only collective. Linné never described any particular form of *Draba verna* or of *Capsella Bursa-pastoris*. Both are collective species well defined by Nature.

Nature's work is very complicated and ought not to be treated with more uniformity than Nature herself shows. Linné was reserved on the species among *Salix*, *Rosa*, and the Fungi (Journ. Bot. 1922, p. 292). We are not yet able to define species everywhere, plainly because they do not exist in all groups.

C. Bursa-pastoris apetala was described by Opiz as a real constant form. The name then became generalised, although the apetalous types are very different. In fact, each belongs to a special strain from which it scarcely differs in other characters. A general name is useless. Linné emphasizes that selected characters do not determine genera or species; on the contrary, a study of the natural groups will reveal the characters.

NOTES ON PEMBROKESHIRE PLANTS.

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

The following notes are the result of observations made during a short holiday at Tenby, extending from the end of last August to the middle of September. Although the season was advanced a number of interesting plants were met with, several of which do not appear to have been previously recorded for Pembrokeshire. The county was first systematically explored for flowering plants by Babington, who published a list of about 550 species in this Journal in 1863. Further papers on the flora of the county by various botanists have subsequently appeared in the Journal in 1867, 1884, 1901, 1903, 1905 and 1919, but, owing to its remoteness, several parts of the coast, and especially the islands, have never yet been thoroughly examined. From the occurrence of *Rumex maximus*, *Cyperus longus* and *Carex punctata* it may be expected that other southern species may yet be found, such perhaps as *Lotus hispidus* or *Scrophularia Scorodonia*, which grow on the opposite coast of Devon. Mr. J. E. Arnett, of Tenby, is now compiling the material for a complete Flora of the county.

Records that are believed to be new for the vice-county (45) are distinguished by an asterisk. *Gentiana uliginosa* Willd. and a new endemic *Statice* will be treated in separate papers.

Thalictrum minus L. The plant of Tenby Burrows, which grows on the outcropping limestone rock and not on the sand, is the common British form of *T. minus*. I did not see *T. dunense* Dum., which is recorded in this Journal, lvii. 348.

Papaver Rhœas L. v. *Pryorii* Druce. Manorbier. I did not notice this variety elsewhere although the type was frequent.

Fumaria capreolata L. v. *Babingtonii* Pugsl. Cultivated ground, Penally.—*F. Borœi* Jord. Cultivated ground, Penally.—*F. Bastardii* Bor. Railway bank at Tenby. Penally. Caldey Island. Lamphey.

Arabis ciliata R. Br. I looked for this plant with Mr. Arnett about Lydstep, but without success. *A. hirsuta*, out of flower, was seen along the railway-bank between Tenby and Penally, on rocks at Giltar, and on the abbey ruins at Lamphey.

Brassica nigra Koch. Tenby Quarries. Pembroke.

Coronopus didymus Sm. Quays at Saundersfoot.

Cakile maritima Scop. Saundersfoot. Caldey Island.

Viola palustris L. The form with more or less hirsute petioles and somewhat pointed leaves that has been referred to *V. epipsila* Ledeb. in a bog at Rosebush.—*V. ericetorum* Schrad. Tenby Sandhills.

Sagina maritima Don. South Cliff and Castle Hill, Tenby (a weak, dwarf form).—*S. subulata* Presl. Cliff near Manorbier.—*S. nodosa* Fenzl. Tenby Marsh (Mr. Arnett).

Spergularia rupestris Lebel. Caldey Island.

Hypericum Androsæmum L. Cliff at Freshwater East.—*H. pulchrum* L. Precelly Mountain.—*H. montanum* L. Cliff at Freshwater East.

Lavatera arborea L. Shore at Saundersfoot.

Malva moschata L. Lydstep Haven.

Linum angustifolium Huds. Near the Railway, Tenby.

Erodium maritimum L'Hérit. Cliffs at Lydstep and Skrinkle Bay.

Trifolium fragiferum L. Tenby Marshes.

Lathyrus sylvestris L. Caldey Island.

Prunus Cerasus L. Near Trevayne.

Potentilla procumbens Sibth. Lanes near Lamphey.

Agrimonia odorata Mill. Near Trevayne.

Rosa spinosissima L. This rose, which is remarkably common on the Tenby and Penally Sandhills and extends thence to the sand-crowned summit of Giltar Head, is curiously absent from the opposite island of Caldey, although precisely similar habitats exist there. Its range on the mainland has apparently extended with the increase of the sandhills.

Epilobium obscurum Schreb. Precelly Mountain.

Œnothera biennis L. Sandhills N. of Saundersfoot.

**Bryonia dioica* Jacq. Caldey Island.

Eryngium maritimum L. Caldey Island.

Carum verticillatum Koch. Trevayne. Pointed out to me by Mr. Arnett.

Sium erectum Huds. Stream at Manorbier.

Daucus Carota L. Forms of this were noticed in different spots on the coast but *D. gummifer* Lam. was not seen.

Rubia peregrina L. Above Waterlynch. Caldey Island.

Asperula cynanchica L. Tenby Sandhills.

Aster salignus Willd. Naturalised by the railway at Penally.—*A. Tripolium* L. Cliffs near Manorbier.

Inula crithmoides L. Still on South Cliff, Tenby.

Matricaria inodora L. v. *salina* Wallr. Saundersfoot Harbour; Caldey Island; Cliffs at Manorbier; probably general along the coast.

Serratula tinctoria L. Caldey Island.

Hieracium Schmidtii Tausch v. *eustomon* Lint. On rocks about the Tenby Sandhills. Giltar. This plant very closely resembles the North Devon variety *devoniense* F. J. Hanb., which I have collected in various spots from Porlock to Ilfracombe. I can see no difference in the average breadth of the phyllaries, which in both varieties bear many black-based but relatively few glandular hairs. The Tenby form does not appear to produce the long, upward-curved teeth to the leaves which are often so noticeable in luxuriant individuals in North Devon.—*H. umbellatum* L. The only aphyllopodous hawkweed observed in South Pembrokeshire. On the Tenby Sandhills it is much dwarfed—frequently one-headed and only three inches high.

Wahlenbergia hederacea Reichb. Bog at Rosebush: probably frequent in North Pembrokeshire.

Samolus Valerandi L. Cliffs near Manorbier.

Erythræa Centaurium Pers. v. *capitata* Koch. Giltar Cliffs. Common on Cliffs near Skrinkle Bay. *E. Centaurium* is erroneously shown as an annual by Hooker and Babington, but appears correctly as a biennial in Rouy's Fl. de France. At Skrinkle great numbers of seedling rosettes that will bloom next summer were conspicuous among the flowering-plants. *E. pulchella* is, I think, always annual.

**Gentiana baltica* Murbeck. Very sparingly in a rough cliff pasture near Saundersfoot. Apparently identical with the form occurring in similar spots in North Devon.

Cynoglossum officinale L. Caldey Island.

Myosotis palustris Hill. Tenby Marsh. Without personal authority in Top. Bot.

Convolvulus Soldanella L. Sandhills N. of Saundersfoot. Caldey Island. Freshwater East.

Veronica Anagallis-aquatica L. Freshwater East.

Euphrasia nemorosa Mart. Abundant on Tenby Sandhills, generally with large corollas but styles not exserted (I did not see *E. borealis* in this locality). Caldey Island (a dwarf, condensed form).—*E. gracilis* Fr. Precelly Mountain.—*E. occidentalis* Wettst. Caldey Island. Miss Parkinson, 1919.—*E. Rostkoviana* Hayne. Cliff between Saundersfoot and Monkstone. A slender form with small foliage and flowers that occurs also in other Welsh counties and is not very different from the Exmoor plant formerly referred in error to *E. fennica* Kihl.

Melampyrum pratense L. Road Wood, Saundersfoot. The pale-flowered type; which is less common, I think, in Welsh woods than var. *hians* Druce.

Mentha sativa L. v. *rivalis* Wats. Cultivated ground, Giltar.

Melissa officinalis L. Naturalised in a hedgebank at Saundersfoot.

Marrubium vulgare L. Caldey Island.

Stachys palustris L. Cultivated ground at Lamphey, with dull red flowers but otherwise showing no signs of hybridity.

Verbena officinalis L. Penally.

Scleranthus annuus L. Cultivated fields near Lydstep.

Atriplex Babingtonii Woods v. *virescens* Lge. Caldey Island. Shore at Manorbier. Probably common round the coast.—**A. laciniata* L. Shore at Manorbier, sparingly.

Salicornia ramosissima Woods. Pembroke Creek.

**Rumex maximus* Schreb. Stream at Manorbier.

Euphorbia portlandica L. Giltar Head. Caldey Island.—*E. Paralias* L. Caldey Island.

Humulus Lupulus L., ♀. Sandhills N. of Saundersfoot.

Quercus sessiliflora Salisb. Road Wood, Saundersfoot, but not certainly indigenous. Probably also in other stations.

Spiranthes autumnalis Rich. Caldey Island.

Juncus obtusiflorus Ehrh. Penally Marsh.

**Typha angustifolia* L. Pond near railway at Whitland.

Triglochin maritimum L. Saundersfoot Harbour. Tenby Marshes.

Cyperus longus L. Penally Marsh, two considerable patches. In Top. Bot. this species is recorded for Pembroke from "Babington Cat.," but I do not see it in his list, and the only previous record for the county appears to be that of Lightfoot (near St. David's) in 1773.

Scirpus maritimus L. Tenby Marshes.

Carex vulpina L. Tenby Marshes. Manorbier.—*C. punctata* Gaud. Coast N. of Tenby. Caldey Island.

Polypodium vulgare L. v. *cambricum* Willd. Near Lamphey.

Lycopodium Selago L. Precelly Mountain (scarce).

In addition to the above-mentioned plants, the following commoner species were noticed during an afternoon's walk on Caldey Island, viz.:—*Cochlearia officinalis* L., *C. danica* L., *Hypericum tetrapterum* Fr., *Anthyllis Vulneraria* L., *Lotus uliginosus* Schk., *Poterium Sanguisorba* L., *Cotyledon Umbilicus-Veneris* L., *Crithmum maritimum* L., *Leontodon hirtus* L., *Scrophularia nodosa* L., *Stachys sylvatica* L., *Athyrium Filix-fœmina* Roth, *Phyllitis Scolopendrium* Newm., *Polystichum angulare* Presl, *Lastrea dilatata* Presl and *Polypodium vulgare* L.

NOTES ON MEXICAN TILIACEÆ.

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

Standley's *Trees and Shrubs of Mexico*, of which three parts have now appeared (Contrib. U.S. Nat. Herb. xxiii.; 1920–23) is the most important publication on the Mexican flora since the *Biologia Centrali-Americana*. As might be expected considering the scope of the work, the species recognized are for the most part rather comprehensive. Much of the work does not call for special comment, but the account of the *Tiliaceæ*, which is not altogether satisfactory, suggests the following remarks:—

Belotia A. Rich.; Sprague in Kew Bull. 1921, 270–278; Standley *l. c.* 737.

Standley has apparently overlooked my revision of the genus. He recognizes only two Mexican species, "*B. grewiæfolia* A. Rich.," which is actually *B. mexicana* K. Schum., and "*B. mexicana* K. Schum.," which is *B. insignis* Baill. The following species are known from Mexico:—

1. B. insignis Baill. in Adansonia x. 182 (1872); Hemsl. Biol. i. 137; Sprague *l. c.* 274.—*B. mexicana* Standley *l. c.*, non K. Schum.

2. B. grandifolia Sprague *l. c.* 275.

Known only from Zacuapan, Vera Cruz.

3. B. mexicana (DC.) K. Schum. excl. syn. *B. grewiæfolia*; Hochr. in Ann. Conserv. & Jard. Bot. Genève, xviii–xix. 90, excl. eodem syn.; Sprague *l. c.*—*Grewia mexicnna* DC. Prodr. i. 510 (1824). *B. Galeottii* Turcz. in Bull. Soc. Nat. Mosc. 1846, ii. 504. *B. grewiæfolia* Standley *l. c.* non A. Rich.

4. B. tabascana Sprague *l. c.* 278.

A native of Tabasco. Vernacular name "Palincano."

Heliocarpus L.; E. E. Wats. in Bull. Torr. Bot. Club, 1923, l. 109–128; Standley, *l. c.* 738–741.

For convenience of reference, the species which call for notice are numbered according to Standley.

2. *H. tomentosa* Turcz.; E. E. Wats. *l. c.* 123; Standley *l. c.* 740=H. americanus L. (*vide* Journ. Bot. 1923, 255).

3. *H. tigrinus* Hochr. in Ann. Conserv. & Jard. Bot. Genève, xviii.–xix. 123 (1914); Standley *l. c.* 740.

Evidently not a *Heliocarpus*, but a *Triumfetta*, as has been pointed out by E. E. Watson *l. c.* 114, in obs.

4. *H. glabrescens* Hochr. *l. c.* 122; Standley *l. c.*=H. mexicanus Sprague in Kew Bull. 1921, 272, et *l. c.* 1923, 349 (*Adenodiscus mexicanus* Turcz.).

Standley (*l. c.* 745) includes the same species in *Triumfetta* as *T. mexicana* Turcz. As I have already pointed out (*l. c.* 1921, 272), *Adenodiscus mexicanus* Turcz. and *Heliocarpus glabrescens* Hochr. were both based on Galeotti no. 4154.

8. H. terebinthinaceus (DC.) Hochr. *l. c.* 125; E. E. Wats. *l. c.* 121; Standley *l. c.* 740.

Standley cites *H. lævis* Rose as a synonym of *H. terebinthinaceus*, but E. E. Watson reduces it to *H. polyandrus*. I can express no opinion, as neither *H. lævis* nor *H. terebinthinaceus* is represented in the Kew Herbarium or British Museum.

12. H. reticulatus Rose; E. E. Wats. *l. c.* 120; Standley *l. c.* 741.

Both E. E. Watson and Standley reduce *H. microcarpus* Rose to *H. reticulatus*. As pointed out in Kew Bull. 1923, 349, the two species differ notably in the fruit.

H. viridis E. E. Wats. *l. c.*

Known only from Sonora, where it was collected by Rose, Standley, and Russell. Omitted by Standley.

Triumfetta L.; Standley *l. c.* 741–746.

Standley describes the spines of the fruits in *Triumfetta* as being uncinate at the apex. This is the case in some species, but in others the spines are terminated by straight spinules which are inserted at an angle with the body of the spine (Series *Geniculatæ* Sprague et Hutch. in Journ. Linn. Soc., Bot. xxxix. 240; 1909). The numbers prefixed to the species dealt with below are those of Standley's enumeration.

9. *T. polyandra* Standley *l. c.* 744, vix DC.=T. insignis S. Wats.

De Candolle (Prodr. i. 508) described *T. polyandra* as follows:—"*T. polyandra* (fl. mex. ic. ined.) foliis ovatis subcordatis *acuminatis* pilosiusculis serratis, ealycibus *glabris* apiculatis, fructibus longe echinatis, setis pilosis; flores magni flavi; genitalia stipite crasso insidentia; fructus 5-loculares; priori [*T. grandiflorœ* Vahl] affinis." [The italics are mine.]

Hochreutiner (Ann. Conserv. & Jard. Bot. Genève, xviii.–xix. 110; 1914) considered that the type of *T. polyandra* DC. was t. 117 of Mociño and Sessé's Icones Ineditæ, which is named "*T. polyandria*" in De Candolle's handwriting. This has acute, non-acuminate leaves, according to Hochreutiner, whereas De Candolle described the leaves of *T. polyandra* as acuminate. De Candolle also described the calyx as glabrous, but Hochreutiner identified a specimen with tomentose flower-buds, collected by Langlassé (no. 365 bis) in Michoacan or Guerrero, with t. 117, and redescribed the species from Langlassé's material. Hochreutiner stated that *T. polyandra* was related, not to *T. grandiflora*, as stated by De Candolle, but to *T. insignis* S. Wats.

Standley reduces *T. insignis* to *T. polyandra* without giving any reason. Whether this reduction is based on comparison of Hochreutiner's redescription of *T. polyandra* and *T. insignis*, or on examination of a duplicate specimen of Langlassé no. 365 bis, does not appear. It seems highly undesirable to replace the unambiguous name *T. insignis* S. Wats. by the problematic *T. polyandra* DC., the original description of which is irreconcilable with *T. insignis*.

14. *T. mexicana* Turcz.; Standley *l. c.* 745=Heliocarpus mexicanus (Turcz.) Sprague (*H. glabrescens* Hochr.).

T. ORIZABÆ Turcz. in Bull. Soc. Nat. Mosc. 1859, i. 261; Standley *l. c.* 746, "doubtful species."

Based on Botteri no. 771 from Orizaba. It is evidently very closely allied to *T. dumetorum* Schlecht. (*T. Botteriana* Turcz.). The latter has the lower surface of the leaves clothed with stellate hairs, whereas *T. orizabæ* has simple and stellate hairs intermixed on the lower surface. I suspect that *T. dumetorum* and *T. orizabæ* will eventually prove to be forms of one species. They seem to grow together, as both are represented under Botteri no. 772 (Herb. Kew.).

T. PANICULATA Hook. et Arn. Bot. Beech. Voy. 279 (1836–1840); Standley *l. c.*, "doubtful species."

The type-specimen in the Kew Herbarium consists of a large infructescence and some crumpled portions of leaves. The long petioles and the indumentum of the leaves suggest *T. grandiflora* Vahl (*T. longicuspis* Turcz.), but the fruits are smaller and have fewer spines.

T. SANCTÆ-LUCIÆ Sprague in Kew Bull. 1923, 114.

A very distinct species collected by Seemann at Santa Lucia in Sinaloa. Omitted by Standley.

REPRODUCTIVE MECHANISM IN LAND FLORA.

I. SEX-THEORY.

BY A. H. CHURCH, M.A.

THE expression *Land Flora* crystallized by Professor Bower[1] serves admirably to indicate the relation of ordinary vegetation to the earth's surface, as opposed to the older Algal life of the water, from which flowering plants must have at some time arisen. Beyond the mere somatic life of the individual organism the chief attraction has always centred in the mechanism by which the various surviving races of plants are successfully maintained in the event of the inevitable death of the individuals. In this way distinct plant-forms, of which the contemporaneous representatives are visualized as species and genera, acquire a racial entity which we ourselves as somewhat complicated personalities tend to overlook. It is not too much to say that—at any rate, so far as plants are concerned—the race is still dominant over the individual personalities; and the latter play but a very subordinate part in the general scheme, and are very generally ignored. The species and not the individuals are the units of biological consideration. Thus the mechanism of racial continuity, conventionally known as reproduction, from the inevitable animal bias of human understandings, remains a fundamental problem of organic life; as the mystery ever grows as to how new organisms come into being, and what relation they may bear to the parental and antecedent forms.

Few, even of those to whom flowers are something more than mere decorative objects, to be cultivated, gathered, or thrown away at the merest whim of mankind, appreciate the enormous range of

[1] Bower (1908), *Origin of a Land Flora.*

biological history that has gone to the making of the simplest blossom,—the almost indefinite ages that it has taken to evolve its present form, extending far beyond the first production of the land flora of the world surface, to remote ages of marine existence, back to the plankton epoch from which its developmental progress may be traced in phases of ever-increasing complexity and refinement, as new problems of racial maintenance are introduced by a changing environment, and have to be solved under penalty of extinction. It is again often difficult to realize that for many thousands of years the human race has lived in daily association with flowers, without the slightest idea of what they were for. The functions of fruit and seed-formation appeared obvious enough to fruit-eating humanity; but the flower (*flos*) was regarded as a casual glorification of the crowning effort of the plant in bearing fruit. To an early forest people the flower was probably merely a pretty thing which served as the criterion of all primitive ideas of the combination of form, texture, colour, and fragrance in an object satisfying some vague æsthetic perception, since associated with the promise of future gratification. Hence flowers were appropriated by the sexes as decorative material; a function they perform to the present day to many whose knowledge of the meaning of floral structure is no deeper. Strictly speaking, the flower is primarily a mechanism to subserve cross-pollination; any beauty of form, colour, texture, or fragrance it may possess is entirely due to the response of the plant to the selective action of certain classes of insect. Only in quite recent times has human intelligence and interference sought to improve on or hasten the age-long progression of such natural causes by artificial selection. Even a reasonable recognition of the essential meaning and function of the floral parts and details has been attained only within the last hundred years.

It is true that artificial pollination of the Date-Palm is represented on Assyrian monuments, and that caprification of the Fig is probably as ancient as any Mediterranean people, while similar references occur in Chinese literature; but as these processes were concerned with methods of horticulture or of peasant cultivators, and did not refer to coloured flowers of any special decorative value, the proceedings were regarded more from the standpoint of magic rites[1]. All this time the view of more cultured philosophy was admirably expressed from the standpoint of an agricultural people, by noting that in the plant the seed (*semen*) was not transferred to another body for its early growth[2]. It is only after the lapse of many centuries that any definite ideas begin to emerge as to any precise

[1] Traces of such an attitude persist to the present day. A well-known Oxford horticulturist, only recently deceased, stated that when as a young man he went to hybridize flowers in the greenhouse, his aged and pious father remained outside the door, trembling for his eternal welfare in being thus associated with the black art. Yet other people step in where angels fear to tread, and the pollination of flowers is now considered a suitable subject to be taught to little girls at school.

[2] *Genesis* i. 11.

function of the floral parts. Obviously there could be little advance beyond the horizon of Theophrastus (300 B.C.) until these small members could be examined under a lens: hence it is interesting to find Nehemiah Grew [1], in the seventeenth century, first discussing the subject from the standpoint of microscopic anatomy. Grew drew a striking analogy between the reproductive organs of animals and plants, and figures pollen-grains of various flowers as the Sperme, an idea which dates to Pliny. Though no experimental proof was forthcoming, there is sufficient evidence that such views were fully recognized at the time, and that such morphological deductions appeared wholly convincing. Experimental verification of the general facts of pollination was given by Camerarius [2] (1694), and many observers were henceforward actively concerned with the study of such sexual processes [3]. The mutual relations of stamens and stigmas had been fully established before they were taken up and popularized by Linnæus in his Sexual System of Classification (1735), thus emphasizing the supreme importance of the process of fertilization in the life of the plant, on lines very comparable with those of the animal kingdom.

All such early theory was, in fact, read in from animal experience, and owed much of its success to a pornographic taint residual in many minds. Even the original presentation of the subject by Linnæus would be now regarded as unnecessarily coarse, though wrapped in metaphorical Latin phraseology [4]. Considering the number of terms borrowed at times from animal anatomy, and still in use [5], we may be thankful that more have not been retained; though at present it seems hopeless to expect to see them altogether eliminated. Having been introduced into the science from a misconception of the facts of the case, they cannot be regarded as an aid to the dissemination of strict truth, however long they may linger as poetical phraseology or interesting links with the past [6].

Beyond emphasizing this crude anthropomorphic interpretation of the sex relations of stamens and ovary, however, the Linnæan system left all other features of floral construction and mechanism as vague as before. According to the Linnæan aphorism still "Flos est plantarum gaudium" [7], and a new way of approaching the subject required to be found. This was given at first by the inverted method of looking among lower 'Cryptogams' for the hidden homologues of

[1] Grew (1682), *Anatomy of Plants*, p. 172, tab. 58, 63.
[2] Sachs, *History of Botany*, Eng. Trans. (1890), p. 387.
[3] Patrick Blair (1720), *Botanick Essays*, ii., 'The Generation of Plants,' gives a vivid account of the views of his time, including an English translation of the objectionable 'Ode to Camerarius.' His essay is remarkable for the final elimination of what may be termed the agricultural conception of fertilization. For survival of this mental attitude of the seventeenth century into the nineteenth, *cf.* Tennyson, 'Talking Oak,' verse 46.
[4] Linnæus (1735), *Systema Naturæ*: *cf.* Monoclinia, 'Mariti et Uxores uno eodemque Thalamo gaudent.'
[5] Ovary, placenta, chalaza, cotyledons.
[6] Hermaphrodite, gynœcium, Phanerogam.
[7] Linnæus (1735), *Systema Naturæ*.

the stamens and ovaries of flowers (*cf.* Moss 'flowers,' and the reproductive organs of *Chara*). But, in so doing, the true sexual cells were found—at first the motile antherozoids [1], obviously comparable with the flagellated sperm animalculæ of animals described by Leuwenhoek, and later the oospheres of algæ as *Vaucheria*, and the oosphere of the Moss [2]. The decisive observations of Thuret (1854) on the fertilization of the oospheres of *Fucus*, followed by those of Pringsheim on *Œdogonium* (1855), finally demonstrated the essential fact of the sexual process as being the intimate *fusion* of two gamete cells; though so far only as expressed in plasmogamy. But while the details of fertilization were more clearly established for Mosses and Ferns by Hofmeister (1851), and the cases of the Gymnosperm and Angiosperm were indicated as clearly homologous [3], the story of the Flowering Plant still remained vague and obscure. It is difficult to realize that to Sachs, writing in 1875 [4], as also in the first edition of his classical text-book [5], the fertilization of the Angiosperm oosphere by a fluid excreted from the pollen-tube was still considered probable—a standpoint really little further advanced than that of Grew and the despised Blair in 1720. Further details of fertilization in the Flowering Plant were given by Strasburger (1877) [6], and the more precise fusion of the essential male and female nuclei in 1884 [7].

With such demonstration of essential *Karyogamy*, fertilization enters on its more modern phase. The cytoplasm recedes into insignificance, as the essential nuclear constitution of the antherozoid comes to be more definitely recognized, together with the interpretation of the plasma of the oosphere as passive moribund somatic material to be rejuvenated by the new combined nuclear control. With fertilization established at its proper value and cytological detail, another quite distinct category of reproductive cells comes into increasing prominence. In demonstrating the nature of the sexual phases of Bryophyta and Pteridophyta (1851) Hofmeister [8] was also expressing the remarkable *asexuality* of the spore-stages of these plants, as also that of the corresponding pollen of Phanerogams. In establishing the relation of the plant producing the sexual organs to the individual bearing only 'spores,' the so-called "alternation of generations" was brought to light, as indicating a feature in the life cycle of land-flora apparently unknown in the animal kingdom, and for some reason or other the peculiar property of autotrophic land-plants. Hofmeister himself (1851) [9] expressed this association of a decreasing

[1] Moss antherozoid, Unger (1834); Fern antherozoids, Suminski (1848).
[2] The oosphere of the Moss, Valentine (1833), Trans. Linn. Soc. xvii. p. 465.
[3] Hofmeister (1851), Eng. Trans., Ray. Soc. (1862), p. 439.
[4] Sachs, *History of Botany*, Eng. Trans. p. 444.
[5] Sachs (1874) *Textbook of Botany*, Eng. Trans. (1875), p. 510. Goebel, Eng. Trans. (1887) p. 301.
[6] Strasburger (1877), Befruchtung und Zelltheilung: (1879) Die Angiospermen und die Gymnospermen.
[7] *Cf.* Wilson, 1899 edit. *The Cell*, p. 182.
[8] Hofmeister, Eng. Trans. (1862), Ray Soc. p. 434.
[9] Hofmeister, *loc. cit.* p. 439.

and decadent 'gametophyte' with an increasingly efficient 'sporophyte,' in a series of types from the alga *Chara* to the Angiosperm, entirely as an academic view of plant-progression. With subsequent introduction of ideas of evolution, this became interpreted very naturally as a definite expression of the consequence of the emergence of plants from the water to the land, and the view has been embroidered by many observers. In recent times it has been stated most elaborately and definitely by Professor Bower, to be interpreted as the expression of the intercalation of an asexual spore-producing stage in the life-cycle, correlated with the progressive attainment of the land-habit, and based on reproductive necessities, though pursuing a method of progressive sterilization of reproductive tracts [1]. In view of the enormous amount of new subaerial problems which would have to be solved in the evolution of an entirely new land-structure, this interpretation also remains very vague, and also largely academic. But for the fifty years, from 1850–1900, the examination and discovery of such complex life-cycles, and the record of every available detail bearing on such a standpoint in all types of Bryophyta, Pteridophyta, as also Fungi and Algæ, may be said to have largely dominated botanical research and teaching. Sexual mechanisms were emphasized at the expense of somatic organization and biology; sexual and asexual theories afforded the basis of phylogenetic speculation, and reproductive relations were pressed into the service of classification [2] as if they were the only thing that mattered. An outsider might gather from textbooks [3] that phenomena of reproduction were studied almost morbidly for their own sake, and were still unduly exaggerated as the climax of plant-attainment, and not as a means to an end. Reproductive processes, it is true, are now recognized as being often more conservative in the retention of ancestral methods, since the plant must have learnt to live before it can reproduce. Hence often, though not necessarily so, they may afford a better clue to remote history than does a somatic mechanism which directly feels the strain of changing environment; but they are at best only a part of a wider complex organization. In fact, the progression of the land-plant is in itself a parable, and with the diminution of the older sexual phases of the water, increased significance attaches to the mechanism of 'asexual' spore-production.

[1] Bower (1908), *Origin of a Land Flora*, p. 82.

[2] *Cf.* Brefeldian classification of Fungi; the rise of the group Archegoniatæ.

[3] Sachs, *Textbook* (1875), commences the discussion of both the Moss (p. 296) and the Fern (p. 335) with an account of their sexual stages. Goebel (Outlines of Classification, Eng. Trans. 1887) goes one better, and also gives priority to the sexual stages of Phanerogams (p. 299): even sporophylls and spores are described as male and female.

(To be continued.)

THYMUS TENUIFOLIUS Miller.

By A. J. Wilmott, B.A., F.L.S.

Thymus tenuifolius Miller, Gard. Dict. ed. 8, no. 2 (1768), is described as "foliis lineari-lanceolatis incanis, floribus verticillato-spicatis. *Thyme with linear, spear-shaped, hoary leaves, and flowers growing in whorled spikes.* Thymus vulgaris, folio tenuiore C. B. P. 219. *Common Thyme with narrow leaves.* . . . . . The second sort has shorter stalks [than *T. vulgaris*], the leaves are longer, narrower, and end in sharper points than the first [*T. vulgaris*], and the whole plant is hoary. The flowers grow in long whorled spikes, and are larger than those of the common Thyme."

There is no specimen in Herb. Miller (Herb. Mus. Brit.) representing this name, wherefore Bentham's use of it (Labiat. Suppl. 728) for a diagnosis based solely (so far as he indicates) on specimens originating "in Hispania australi Pavon! prope Cadix Picard! (h. s. sp. comm. a cl. Lambert)" seems unjustifiable in view of the fact that in his diagnosis he states that the leaves are "viridibus, glabris, vel vix subtus tenuiter cano-pubescentibus." Bentham's plants have been referred to *T. Zygis* L. by Boissier (1839–45: Voy. Esp. 487–8 & Suppl. 728), whence Miller's name has sometimes been applied to *T. Zygis*.

But it is clear that the plant generally understood at the time of Linnæus and Miller as being *T. vulgaris, folio tenuiore* of C. Bauhin's Pinax is nothing but ordinary *T. vulgaris* L. Linnæus himself (Sp. Pl. 591) cites it under his *T. vulgaris*, making Bauhin's *T. vulgaris folio latiore* a var. β. But Linnæus clearly separates *T. Zygis* from them both. Miller made the var. β of Linnæus his *T. vulgaris* and separated the "*folio tenuiore*" as *T. tenuifolius*. But the specimens in Herb. Sloane show that the "Common Thyme" was regarded as the *T. vulgaris, folio tenuiore* of C. B. P. Specimens under this name are in Herb. Sloane 12, f. 92, from Uvedale's garden at Hampton Court; 167, f. 385, Herb. Uvedale; 320, f. 193, Herb. Boerhaave. Similar specimens occur in Herb. Sloane under the name of *T. vulgaris* or of *T. durius*, which names are in Ray Hist. 521 regarded as being equivalent to *T. vulgaris tenuiore folio* of C. B. P.; Ray doubts if the "*folio latiore*" of C. B. differs from the "*folio tenuiore*," remarking "alii non distinguerunt." Herb. Sloane bears out this last remark, for the only specimen under the name *T. vulgaris folio latiore* is in H. S. 83, f. 87 (Herb. Plukenet) with the synonym "*durius* Dod.": this specimen does not differ from those in Herb. Sloane as "*folio tenuiore*" and all are ordinary *T. vulgaris* Linn., which varies a little in the breadth of the leaves but scarcely sufficiently to make varieties on that basis; probably the leaf breadth is dependent upon the conditions of growth. There is a specimen of *T. vulgaris* in Herb. Miller which apparently formed part of Herb. Houston, having been gathered in Hort. Lugd. (*cf.* Journ. Bot. lxi. 136, 1923). This is *T. vulgaris* with slightly broad leaves, *i. e.* leaves two to two and a half times as long as broad. Whether the true *T. vulgaris* of Miller, which really referred to a plant cultivated in

the Chelsea Physic Garden, had any broader leaves I cannot say, since I have been unable to trace a specimen of the *T. vulgaris folio latiore* of that garden; but fortunately there is in Herb. Mus. Brit. a specimen from Chelsea garden labelled "Thymus vulgaris . . . Lin: Sp: Plant: 825.2.0. Thymus vulgaris folio tenuiore Bauh: pin: 219. 1771." It is not likely that the plant in the garden under the Bauhinian name was different in 1771 from the one there in 1768, wherefore this specimen may be regarded as topotype (probably from the same roots as Miller investigated) of *T. tenuifolius* Miller. It is ordinary *T. vulgaris*, having leaves when mature about two and a half times as broad as long, and leaves on the new shoots about three and a half times, rarely to four times. Since this is probably the only specimen of its kind in existence, *i. e.* indicating the *T. vulgaris folio tenuiore* of Chelsea Garden about 1768, I regard it as the *neotype* of *T. tenuifolius*, the Miller name becoming a synonym of *T. vulgaris* L.

GREENLAND BOTANY.

We are indebted to Dr. C. H. Ostenfeld for three admirably printed papers (in English) from the report of the II Thule Expedition to the north coast of Greenland in 1916–18 (reprinted from the *Meddelelser om Grønland*, vol. lxiv. (1923)).

No. 9 contains a general account of the plants of the North Coast, based on the collections of the late Dr. Thorild Wulff, the naturalist in charge, of whose death during the expedition a touching account is given. A note in this Journal for 1896 (p. 240) records the visit of Dr. Wulff, then "an enthusiastic young Swedish botanist," to this country in 1894; he published in *Botaniska Notiser* an account of his visit to the Isle of Wight, in the course of which he described and gave names to some of the dwarf forms well known to those familiar with the Freshwater downs—*Scabiosa Columbaria* f. *nana*, *Carlina vulgaris* f. *humillima*—"a most distinguished variety"—and *Campanula rotundifolia* f. *pygmæa*; another was identified by Wulff with a previously described plant—*Pimpinella Saxifraga* f. *arenaria* N. Bryhn. Of these he sent specimens to the Editor of this Journal, which, with the letter that accompanied them, are in the Department of Botany.

The paper, which is very comprehensive, begins with a list of the 70 species of flowering plants and ferns, with notes on each and a table showing their local distribution. There is a figure of a large tuft of *Minuartia Rossii* (R. Br.) Graeb., which "is evidently easily propagated by loosing of small pieces of the shoots. The same kind of propagation probably holds good for the f. *pulvinatum* of *Cerastium alpinum*. Both plants grow on clayey soil which at times is covered by water from streams and rivulets, and the water acts as spreading agent." Much material of *Taraxacum* was collected by Wulff; after careful comparison with authentic specimens, Dr. Ostenfeld finds four

species present in the collection; these are figured on plate i. Following the enumeration come "Notes on the Vegetation and its Conditions of Life," in which are included the "External Factors of Importance"—Light, Heat, Precipitation (Rainfall) and Evaporation, Movements of the Air, Snow-cover and Snow-melting, and Soil—"Some Biological Features of the Plants," and "Vegetation Formations." On all these points Wulff's diaries yield abundant material, and, although we may agree with Dr. Ostenfeld in regretting that Wulff was not able to make use of it, one can but compliment him on the admirable way in which he has performed his task. Four other plates, two botanical and two topographical, are given, besides that of *Taraxacum* already mentioned.

No. 5 is devoted to "Critical Notes on the Taxonomy and Nomenclature of some Flowering Plants of Northern Greenland"—by Dr. Ostenfeld—notes so careful and elaborate that it would be impossible to summarise them; we must therefore content ourselves with calling the attention of specialists to the principal genera and species considered. Among the former, *Deschampsia*, *Dryas*, *Poa*, and *Draba* hold a prominent place; individual species are *Melandrium pauciflorum* nov. comb. (*Lychnis* Ledeb.), *Minuartia rubella* Graebn. (*Alsine* Wahlenb.), *Potentilla Pedersenii* nov. comb.—the last=*P. subquinata* var. *Pedersenii* Rydb., here raised to specific rank—and *Braya Thorild-Wulffii*, sp. n. Some of the species were established by Robert Brown, and it would be interesting to have the result of comparison with the authentic material in the National Herbarium; we note, however, that that Herbarium contains no specimens of *Platypetalum dubium* R. Br., regarded as possibly identical with *B. Thorild-Wulffii*. Three excellent plates represent respectively *Deschampsia arctica*, *Melandrium pauciflorum*, and *Braya Thorild-Wulffii*.

Nos. 6–7 contain a list of flowering plants and ferns from Wolstenholme Sound (ca. 76° 30′ N. lat.) drawn from the lists of various collectors beginning with L. M. Erichsen in 1903; and two lists from Inglefield Gulf and Inglefield Land (77° 28′ and 79° 10′ N. lat.).

In addition to the above, Dr. Ostenfeld sends us "A List of Arctic Caryophyllacæ, with some synonyms" (1920), reprinted from the *Meddelelser*, vol. xxxvii.; some new combinations under *Minuartia*, caused by the substitution of that name for *Alsine* (see Hiern in Journ. Bot. 1899, 320), should be noted.

A NEW PYRENACANTHA FROM NATAL.

By J. Thode,
Government Herbarium, Durban, Natal.

Pyrenacantha cordata Thode, sp. n.

Frutex scandens, 5–20 pedalis et ultra. Truncus 4–5 cm. diametiens, lenticellato-scaber, cinereus. Rami et ramuli volubiles, primum retrorso-hispidi, deinde glabrescentes, lenticellis albidis scabri, cinerei. Folia alterna, petiolata, rotundata, basi cordata, apice acuminata vel obtusa, nonnunquam retusa vel fere reniformia, reti-

culato-nervosa, margine nervorum apicibus prominentibus crenato-dentata, angulata, demum subintegra, hispido-ciliata, superne viridia, hispido-pilosa, subtus nervis principalibus incrassatis costata, pallidiora, hispidula, membranacea, 4–10 cm. longa, 6–9 cm. lata. Petioli teretes, hispido-pilosi vel fere glabrescentes, 3–5 cm. longi. Flores axillares, pedunculati vel subsessiles, tetrameri, monœci vel dicœci. ♂: Pedunculi elongati, simplices (rarissime furcati), racemosi, multiflori, pilosi, 4–10 cm. longi. Flores breviter pedicellati, pedicellis unifloris, basi vel apice bracteolatis. Bracteolæ lineares, recurvatæ, pilosæ, pedicellis duplo longiores, 2–3 mm. longæ. Calyx campanulatus, ad basin fere quadrifidus, nonnunquam quinquefidus, tubo brevissimo, segmentis oblongo-lanceolatis, obtusis, externe pilosis, interne subglabris, viridibus, 2–3 mm. longis. Petala nulla. Stamina 4, inter calycis segmenta inserta, filamentis 1–2 mm. longis, antheris simplicibus, oblongis, acuminatis, glabris, albidis, æquilongis. ♀: Flores singuli, subsessiles vel brevissime pedunculati, pedunculis bifloris, bracteolatis. Bracteolæ et calyx ut in floribus masculis. Staminodia 4, staminibus florum masculorum similia. Ovarium superius, oblongum, apice attenuatum, obtusum, setosum, 2–3 mm. longum. Stylus nullus. Stigma brevissimum, fimbriatum. Pyrena amygdaliformis, compressa, lignea, setosa, apice angustata, stigmate coronata 10–12 × 2–5 mm., 1–2 locularis, interne verrucosa. Semen 1 vel 2, lanceolatum, pilosum, 6 mm. longum.

Habitat. In bush at Kafir Drift, Utrecht Division, Natal. Alt. ca. 1300 m. Flowering in August, September. *Collector*, J. Thode.

A large scandent shrub resembling *Trimeria alnifolia* in habitat, and sometimes found twining around that species, scabrous to the touch and unpleasantly scented.

Specimens have been sent to the British Museum Herbarium.

SHORT NOTES.

Clavator Reid & Groves. In the *Proceedings of the Royal Society*, B, lxxxix. (1916), in a "Preliminary Report on the Purbeck Characeæ," the late Clement Reid and the present writer described and figured, pp. 253–5, t. 8, a new genus of fossil Charophytes, *Clavator*, but did not give any specific name. It was intended that this paper should be followed up by a much fuller report describing all the remains found, but the untimely death of Mr. Reid interrupted the work. I hope to be able to resume the investigation before long, but in the meanwhile, with intent to insure the validity of the generic name, I publish the specific name **Clavator Reidii** to apply to the remains described and figured in the place indicated, the diagnosis of the genus applying also to the species. I am taking this action in view of the proposal to add to the International Rules for Botanical Nomenclature a fresh rule to invalidate a generic name unless associated with some specific name, though in my opinion such a rule would in the case of fossil organisms at any rate be inconvenient, besides being illogical. To my thinking, it should not be allowable

to set aside a name applied to a group of any rank, provided such group is characterised, as in the present case, in such a manner that its identity cannot be misunderstood. This modern cult of the "type" fetish seems calculated to lead to endless contention, witness the case of *Orchis latifolia* Linn. I have much pleasure in dedicating the species of *Clavator* to my much-esteemed friend, to whose acumen and resourcefulness the elucidation of the remains was largely due. The specimens figured (*l. c.*) are deposited in the Department of Geology of the British Museum.—James Groves.

Nymphoides nymphæoides. The undesirable practice of "representing botanical authors as saying what they did not say" is so trenchantly condemned by the New York botanists (Barnhart in Journ. Bot. 1922, 262) that it is amusing to find a choice example in Britton and Brown's *Illustrated Flora*, ed. 2, iii. 19 (1913). It is as follows:—

Nymphoides nymphæoides (L.) Britton.

Menyanthes nymphæoides L. Sp. Pl. 145. 1753.

Limnanthemum nymphæoides Hoffm. & Link, Fl. Port. i. 344. 1809.

Neither Linné nor Hoffmannsegg & Link employed the trivial name *nymphæoides* for the species in question. The former published the species as *Menyanthes Nymphoides*, the latter as *Limnanthemum nymphoides*. Linné used the generic name *Nymphoides* Tourn. (Inst. 153, t. 67) as a trivial: he had previously cited *Nymphoides aquis innatans* Tourn. as a synonym of *Menyanthes foliis orbiculatis corollis margine laceris* Hort. Cliff. 53, on which *M. Nymphoides* was based.

The derivation of *Nymphoides* is given by Tournefort: "*Nymphoides* dicitur quasi planta ad *Nymphæam*: toto enim habitu & crescendi modo eam repræsentat; sed maxime differt floris, fructus & seminis structura." If Dr. Britton thinks it desirable to alter *Nymphoides* Tourn., when used as a trivial by Linné, to *nymphæoides*, why does he not alter it when used as a generic name by Hill? But surely it would be better to spell the name *Nymphoides* in both cases, as originally published: "Reformers are apt to cast names into too rigid moulds, forgetting the flexibility of classical orthography" (Barnhart, *op. cit.* 261). T. A. Sprague.

Mimulus moschatus scentless. In the *Gardeners' Chronicle* for Feb. 9, Mr. E. M. Holmes has an interesting summary of what has been written concerning the "Loss of Fragrance in the Musk Plant," which has lately attracted so much attention and had been dealt with at some length by Mr. R. W. Ascroft, of the Royal Horticultural Society, in the *Morning Post* for Jan. 8. Various theories to account for the absence are suggested by both writers: Mr. Ascroft quotes Mr. J. L. North, of the Royal Botanic Society, for the view "that the whole of the stock of *Mimulus moschatus* was derived from a single plant, and that this was a scented mutation"—a suggestion favoured by Mr. Holmes; this however, having reference to the fact that Douglas, whose specimens we have, obviously named

the plant on account of its odour, seems to me improbable. Seventy years ago, the "old pensioners" at Chelsea Hospital had little gardens wherein they grew flowers for nosegays which they sold to visitors for a few pence, and also small pots of "musk" that were sold at 6*d.* each and were very popular; in those days and until comparatively recently—Mr. Holmes says "the date of the loss of odour is subsequent to 1883, although records of diminished fragrance had been noticed somewhat earlier"—the plant, which was always a popular cottage-window flower, was always fragrant. At present the scented form is very rare: Mr. Ascroft knows of only two instances, and Mr. Holmes only one; the former writes: "A Scotch nurseryman has just sent me some roots and cuttings of musk from plants, which he tells me have been in his family since Lord Nelson's time. His grandmother, who is ninety-three, is still alive and knows the musk well. She says it is only on certain days and when the weather is warm that one can detect the fragrance." A note in *The Garden* for Sept. 6, 1919 (cited in this Journal for October, p. 285), mentions a fine plant at Feltham, Middlesex, "which was very strongly scented; it came from a small nurseryman in the neighbourhood, who at the time said it was not scented, but it certainly became so afterwards. From this it would seem that the scent appears and disappears in the same plant"—a fact which I have not seen elsewhere noted. Mr. Holmes's note that "the seedsmen of Los Angeles (*sic*) obtained the seed of the scented plant from Europe" (Journ. Bot. 1923, 176, where I regret to say Los Angelos is also misspelt) is followed (*l. c.*) by a suggestion that "the continued in-breeding of the plant under foreign conditions has resulted in suppressing entirely the character of scent."—JAMES BRITTEN.

PEONY. In the list of "New Spellings" recommended by the Society for Pure English, I was surprised to find "peony" as a substitute for "pæony." I could not remember to have seen the latter in use and the suggestion seemed unnecessary, but to my surprise I find it in current gardening papers: *e. g.* the *Gardeners' Chronicle* for Feb. 9—and that in its ugliest form—"Paeony," "Paeonies." I do not know when this monstrosity made its appearance, but as Gerard, Parkinson, Miller, and most writers have been content with "peony," which moreover has the sanction of the *Oxford Dictionary*, it seems difficult to justify so ugly an innovation.—JAMES BRITTEN.

THE HORNBEAM IN BRITAIN. The following is a summary of Mr. Miller Christy's paper on this subject in the *Journal of Ecology*, to which reference is made on p. 128. Mr. Christy points out that the tree presents several features which are unique among our commoner British forest trees; it is the only one, except the Beech, which has a markedly-restricted distribution in Britain, and, owing to persistent mutilation, a fine, wild-grown, mature example scarcely exists. After showing that its range on the Continent is essentially Central European, extending from Western France nearly, or quite, to the Ural Mountains, and from the south of Sweden to the north of Italy, Mr. Christy proceeds to trace, as far as possible, its natural range in Britain. That it is truly indigenous here is proved by the fact that its nuts have been found in four deposits of Pleistocene Age, all not far from our east coast, and other remains of it in three deposits of the Roman Period—two of these lie slightly to the west of its known range to-day, though this does not necessarily prove its range in Britain to have been formerly wider than now. To trace its natural range is a task of very great difficulty, for the tree has been planted extensively and grows freely far outside its natural range, even as far north as Sutherlandshire. As a result of much correspondence and personal enquiry, and of careful consideration of the evidence afforded by all the leading local floras, Mr. Christy reaches the conclusion that the Hornbeam, as a native tree, is confined to the south-eastern counties—little more than the Thames Valley, in fact,—though with possible extensions south-westward into Hampshire and north-westward towards Warwickshire and Worcestershire. Its range thus covers about 8500 square miles—approximately one-sixth of England. Small outliers round Bristol and on the opposite side of the Severn, in Monmouthshire, are due, Mr. Christy thinks, to introduction by human agency. He then discusses the natural features and peculiarities of the tree—its soil-preferences, its associates in woodland, the remarkable fluting of its stem and branches, its system of fruiting, its elegant cupules, its stature, its parasites, and so forth. He closes with a consideration of the Hornbeam from the economic point of view, pointing out that, though its wood is harder and whiter than that of any other British tree—almost hornlike, in fact,—it is useless for most industrial purposes, owing to the natural distortions of the tree and its very irregular grain, although it is valuable for making small objects and parts of many small domestic and other machines. Its chief industrial use in the past has been for making ox-yokes, for which it has been used regularly since very ancient times. The chief value of its wood is, however, domestic; it is unrivalled as firewood, for which it has long been used very extensively. As a result, practically all trees, both in woodland and hedge-row are mutilated by being periodically coppiced or pollarded, so that a naturally-grown tree scarcely exists.

REVIEWS.

Menzies' Journal of Vancouver's Voyage, April to October, 1792. Edited, with Botanical and Ethnological Notes, by C. F. NEWCOMBE, M.D., and a Biographical Note by J. FORSYTH. Archives of British Columbia, Memoir No. V, King's Printer, Victoria, B.C., 1923. 8vo, pp. xx, 171, 17 pl. Price 5 dollars.

THIS is the hitherto unpublished and most recent addition to the series of journals of voyages and travels which, although primarily of geographical importance, have added materially to our knowledge of the ethnology and natural productions of the regions visited. The most important of these was, of course, the *Journal of Sir Joseph*

Banks during Cook's First Voyage (1768–71), edited by Sir Joseph Hooker, and published in 1896; this had been preceded by Cook's own Journal, edited by Captain J. W. L. Wharton, published in 1913, which contains little of botanical interest. In 1914 the Journal kept by David Douglas in North America (1823–27) was published by the R. Horticultural Soc. (*cfr.* J. Bot. 1915, 93), and in 1921 the log-books of Captain Bligh's Second Voyage to the South Sea (1791–93) were edited by Mrs. Charles Marriott (*cfr.* J. Bot. 1922, 22). It may be hoped that some day Banks's Journal of his "Voyage to Newfoundland and Labrador" in 1766 (see Journ. Bot. 1904, 84, 352; 1905, 248) may see the light; some account of the plants collected during that voyage and of the drawings made from them by Ehret will be found at the first of the above references.

Of Archibald Menzies' *Journal of Vancouver's Voyage*, preserved in the British Museum (Addl. MS. 32641), the portion relating to his visits to Hawaii (1792–94) was edited by Mr. W. F. Wilson of Honolulu, and published there in 1920, under the title *Hawaii Nei* 128 *Years Ago*. The volume before us, to which Mr. J. Forsyth prefixes a biographical note, contains only that portion which relates to Vancouver (April–Oct. 1792) Island and Puget Sound; it includes as an Appendix a list of the plants collected by Menzies on the north-west coast of America, to which reference will be made later; before discussing it, however, something may be said as to Menzies' relations with Banks, in whose herbarium many of the plants are preserved and through whose interest Menzies was appointed to the voyage with which his name is associated.

Menzies was formally introduced to Banks in a letter dated Aug. 22, 1786, by Dr. John Hope (1725–86), then Professor of Botany at Edinburgh, whose lectures he had attended. Hope "enabled him to pass through the academical studies necessary for his education as a surgeon" (Proc. Linn. Soc. i. 139), and, although it does not appear that Menzies graduated at the University, he obtained a post in the Royal Navy and served for some years on the Halifax Station at Halifax, Nova Scotia; here, to quote Hope's letter, "he paid unremitting attention to his favourite study, botany, and through the indulgence of the Commander-in-Chief had good opportunities afforded him." That Menzies was in communication with Banks before Hope's introduction is evident from his letter to Banks dated May 30, 1784, written from Halifax; of this and of others to be referred to there are copies in the transcript of the Banksian Correspondence in the Department of Botany. With this he sent a small parcel of seeds collected near New York and in the West Indian islands—"where I found the plants in a state for examination I have subjoined their Linnean names"—and promised another parcel (Banks Corr. iv. 29).

Menzies arrived in England in August 1786, and, apparently through Banks's influence, was appointed Surgeon to the *Prince of Wales*—"a private adventurer, now fitting out at Deptford to go round the world." From the ship, then stationed at St. Jago, Menzies wrote to Banks (Nov. 16) expressing his thanks and assuring

him that he will "lose no opportunity in collecting whatever is new, rare or useful in any branch of natural history." During his brief stay in England he had visited Banks's herbarium, where Dryander (whom he thanks "for his civility and indefatigable zeal") had shown him Banks's Australian collections; and went to Kew, where Aiton "received [him] with all his usual hospitality and friendship" and showed him "many rare and curious plants," some of them raised from the seeds which Menzies had sent (Banks Corr. v. 113). On Feb. 11, 1787, he writes from Staten Island, where he had been stationed for about a fortnight, that he was sending to Banks young plants of *Wintera aromatica*—"at present in flower, [which] every where it grows loads the circumambient air with a most pleasing aromatic odor" (*sic*); and announces that, "notwithstanding the severity of the weather in this wild and inhospitable clime," he had had "several pleasing excursions," which enabled him "to examine and collect many rare and curious plants, some of which were not described even in the 14th edition of the Linnean system" (v. 129). Of these and others collected in the following year, he sent more than a hundred specimens to Banks, carefully localised and dated and as far as was possible identified, with occasional notes as to habitat and, in one or two cases, MS. descriptions.

The letter dated July 14, 1789 (vi. 181), announcing Menzies' "arrival in the British Channel, after a tedious voyage round the Globe of near three years" is given by Mr. Forsyth (p. viii); on Oct. 9 of the same year (vi. 238) he announces to Banks his appointment to the Vancouver expedition; for this Banks's formal instructions as to collecting—similar to those sent to other collectors—are summarised by Mr. Forsyth, and are given in full in Banks Corr. vii. 197.

During the voyage of the *Discovery*, Menzies wrote long letters to Banks (Corr. viii. 142–155, Jan. 1793; ix. 105–108, Oct. 1794; 210–213, April 1795; 288–291, Sept. 1795), summarising the events of the preceding months; these, however, are, of course, for the most part, more fully set forth in the instalment of the Journal under notice (April–Oct. 1792), and in that of the three visits to the Sandwich Islands (1792–94) by Mr. Wilson, already referred to. The last letter cited contains Menzies' account of his treatment by Vancouver, to which Mr. Forsyth refers on p. x, and of which some account will be found in Edward Smith's *Life of Sir Joseph Banks* (p. 144). A letter to Dryander announcing the arrival of the *Discovery* at Deptford on Oct. 2 suggests that Banks had lately treated him with coolness, and that the Vancouver episode may have been, at any rate in part, responsible for this; Banks, however, as shown by his letter to Menzies of Aug. 10, 1791 (quoted by Mr. Forsyth), had himself been apprehensive as to the treatment Menzies might receive, judging from "his conduct toward me, which was not such as I am used to receive from persons in his position."

It is interesting to note that at Nootka Menzies met with Sessé and Mociño—the name is spelt "Mozino" both by Menzies and his editor: he writes, "There were two Botanists attached to the

Spanish Squadron who visited the Coast this Summer; one of them [Sessé] had been in the *Aranzaza* to the Northward and had made a considerable Collection of Plants from the different places they touched at, the other whose name was Don José Mozino remained at Nootka with Sr Quadra, together with an excellent draughtsman Sr Escheverea [Echeverria] a native of Mexico, who as a Natural History Painter had great merit. These told me that they were part of a Society of Naturalists who were employed of late years in examining Mexico & New Spain for the purpose of collecting Materials for a Flora Mexicana which they said would soon be published, & with the assistance of so good an Artist it must be a valuable acquisition." There is a marginal reference to the "Appendix" [Preface, p. xix], where it is stated that "most of [Mozino's] drawings were lost: copies, however, were made at Geneva of many of them." The history of these is given by Alphonse de Candolle in the notice prefixed to the "Calques de Dessins" distributed by him in 1874; and a paper by Dr. José Ramirez (An. Ist. Med. Nac. vi. 66–84) (Mexico, 1903) contains a list of ninety unpublished plates with Mociño and Sessé names and identifications which he had seen in Madrid in 1898.

The Appendix contains a list, alphabetically arranged, of "plants collected by A. Menzies on the North-west coast of America," carefully compiled by the editor from the various works in which Menzies' plants are taken up, with marginal references to each and occasional notes; names in English belonging to allied species are added in many cases, with results not only misleading, but in many cases absurd. Thus the plant referred doubtfully by Hooker (Fl. Bor. Amer. i. 320) to *Chrysanthemum* as *C. nanum* is named "Ox-eye Daisy"; this, which Dr. Newcombe says is "not recognised by recent writers," is correctly identified in *Index Kewensis* with *Blennosperma californicum* Torr. & Gray—a plant that bears not even a slight resemblance to *Chrysanthemum Leucanthemum*, to which "Ox-eye Daisy" belongs. It would, we think, have been well to have added some more definite information as to Menzies' actual specimens, other than the general reference (p. xx) to their existence at the British Museum and at Kew; a small number of his plants are in the General Herbarium of the Edinburgh Botanic Garden, to which his own collection, consisting chiefly of *Cyperaceæ*, *Gramineæ*, and Cryptogams, was bequeathed; another small collection, presented by Menzies' representatives to New College, Edinburgh, was transferred to the Department of Botany in 1885 (see Journ. Bot. 1886, 101).

On glancing through the list, certain points of interest present themselves, one or two of which may be indicated. Thus of the two species of *Caltha*—*C. biflora* DC. and *C. leptosepala* DC.—Menzies' specimens in Herb. Banks are the types, cited as such in Syst. i. 310 (1818) and bearing the names in A. P. De Candolle's hand. These were written during his visit in the early part of 1816 to Banks's herbarium, then preserved in what he describes as "cette belle bibliothéque de Soho-Square qui est comme la capitale des sciences naturelles"; we have in the Department three long letters to Brown in

which De Candolle discusses points relating to *Ranunculaceæ* and *Dilleniaceæ*, on which he was then engaged. Mr. Sprague tells me that specimens of *C. leptosepala* from Menzies—bearing the same MS. name as do those in the National Herbarium but with a note "floribus cœruleis" on one, in Hooker's hand—are at Kew from Hooker's herbarium; the larger figure in Hook. Fl. Bor. Amer. (t. x.) is taken from the specimen mentioned. Of *Vaccinium obtusum*, "unknown to Hooker," the specimen, without flowers or fruit, on which Pursh (Fl. Am. Sept. 290) based his description, is referred by J. J. Bennett in Herb. Banks—probably correctly—to *V. parvifolium*. *Calypso bulbosa*, entered as "*Cypripedium bulbosum* of Menz. MS." was described under the latter name by Linnæus (Sp. Pl. 951); Menzies had previously sent this to Banks from Nova Scotia, and, in the letter of Nov. 16, 1786, already quoted, expresses himself as "happy in adding even one plant to your valuable collection." The names attached by Menzies were often unpublished ones of his own and are occasionally entered in his Journal; thus *Claytonia furcata* (p. 23) corresponds with the small form of *C. spathulata* Dougl., figured and described in Hook. Fl. Bor. Amer. i. 226, t. lxxiv., which, however, is very different in appearance from the specimens from Douglas's herbarium, named by himself, in Herb. Mus. Brit. Mr. T. Howell in his "Rearrangement of American Portulaceæ" (*Erythea*, i., 29–41) transfers a number of species of *Claytonia*, including *C. perfoliata* to *Montia*. The identity of *Chrysanthemum nanum* Hook. with *Blennosperma californicum* T. & G. has already been noted.

Other points suggest themselves for comment; but this notice is already too long, though not longer than the interest of the volume (which is admirably produced) deserves. Its usefulness is increased by a good index of persons, places, and plants; its attractiveness by reproductions from various publications of six of Menzies' drawings, with portraits of himself (from Eddis's painting in the Linnean Society) and his wife, autograph letters, and pictures of places associated with his early life.

JAMES BRITTEN.

First Book of Grasses. The Structure of Grasses explained for Beginners. By AGNES CHASE, Assistant Agrostologist, U.S. Department of Agriculture. 8vo, pp. xiii, 121. The Macmillan Co., New York, 1922. Price 6*s*.

WE congratulate Mrs. Chase on the achievement of her object in preparing this little handbook, namely to give to amateurs such an understanding of the structure of grasses as will enable them to use manuals of botany and other technical works, to the end that the grasses native in the United States may become better known. The difficulty experienced by beginners is the understanding of the spikelet, upon the varying details of which our systems of classifications are based. In a series of chapters, illustrated by clear semidiagrammatic sketches, the author describes the details of the various

types of spikelets met with in the grasses of the United States flora, and by following the careful explanation the student should have no difficulty in dissecting and making out for himself their structure. A diagrammatic summary of the primary characters of the tribes at the end of the book will enable him to assign any particular grass to the group recognised in the American floras. Our own flora is somewhat less varied, but the student of British grasses will find the book helpful, though a few of the names will be strange, as the nomenclature conforms to the American code. The first lesson contains a brief general account of the vegetative structure and a comparison of the grass spikelet and flower with a complete typical flower, but no details are given as to form and structure or anatomy of the stem and leaf, nor is the ecological side mentioned. These are outside the scope of Mrs. Chase's purpose, and for students of British grasses her primer might be regarded as supplementing the admirable account of the family given by the late Marshall Ward in his small handbook on grasses published by the Cambridge Press.

A. B. R.

Botany, a Junior Book for Schools. By R. H. Yapp, M.A., Mason Professor of Botany in the University of Birmingham. 8vo, pp. xi, 199, 159 text-figures. University Press, Cambridge, 1923. Price 3*s.* 6*d.*

In order to second the efforts of teachers to help their pupils to acquire correct habits of study—that is, of patient and accurate observation and of clear and logical interpretation and correlation of the facts observed—Professor Yapp has kept before him three chief aims in writing this book: (1) By employing as far as possible the inductive method, to make facts lead up to and illustrate principles. (2) To maintain a logical sequence in the arrangement of the subject-matter. (3) To make accuracy and thoroughness the key-note of the book, so far as the limits of space allowed. The practical examination in the first chapter of specimens of groundsel, sycamore, and cocks-foot illustrates the general plan of structure of a plant, and a general idea of flower, fruit, and seed is gained from observation of other examples in the two succeeding chapters. The more detailed study of the flowering plant is introduced with the germination of the seed and an experimental study of the conditions necessary, and the various functions of the plant growth, absorption from the soil, transpiration and its regulation, assimilation, movement and respiration are examined in association with the form and general structure of the plant organ concerned. Some chapters on "the different forms of plants" and "how plants pass the winter" contain useful suggestions for out-of-doors practical elementary work, which may be considerably amplified by an intelligent teacher. The flower with its pollination, and the fruit and seed and their distribution, are the subjects of later chapters, and a final chapter on the relationships of flowering plants gives the characters of twelve of the commoner families. The figures, which are all original, are numerous and good.

Elementary teachers will find the book very helpful. On a point of accuracy, we note that Prof. Yapp uses the name Virginian Creeper for the wall-climber generally known as *Ampelopsis Veitchii.* This is a native of Japan and a recent introduction as compared with the old original Virginia Creeper (*A. quinquefolia*) from America.

A. B. R.

The Study of Nature with Children. By M. G. Carter, B.Sc. (Lond.). Cr. 8vo, cloth, pp. vi, 184. Methuen. Price 3*s.* 6*d.*

The intention of this little volume is excellent, and the introductory matter useful, though we do not think the pulling of flowers to pieces for examination deserves the condemnation heaped upon it, nor that it "revolts thoughtful children." The Second Section, headed "Groupings of Apparatus and Material for Nature Study," is divided into 16 sections alphabetically arranged, so that the botanical portion, with which alone we are concerned, occurs at separated intervals, under "Bulbs," "Fungi," "Germination," "Plants (General)," "Weeds"—the pages, in accordance with the ignorant and perverse fashion which mars the usefulness of more important books, are headed throughout "Apparatus and Material," "Calendar," and "Appendix," thus affording no useful information as to what stands below them. For some reason which we do not understand, special prominence is given to fungi, which occupy 13 pages as opposed to 6 for "plants (general)"; "their collection and identification is (*sic*) a suitable work for schools." They are distinguished by odd pseudo-English names: *e. g.*, "The Deer" (*Pluteus cervinus*), "Rhubarb-Stem" (*Gomphidius viscidus*), and "Poison Pie" (*Hebeloma crustuliniforme*"; "*Cantherellus*" and "*Chanterelle*" stand everywhere thus.

There is an elaborate calendar, not devoid of misprints, of which we confess we do not see the use; it was surely hardly necessary to indicate that groundsel and chickweed blossom every month, except, apparently in October, for which they are not mentioned; here, again, fungi occupy a disproportionate amount of space, sometimes more than half a page, and the "English" names *en bloc* have an odd appearance. The Appendix contains what seem to be helpful "schemes of work in nature study" and a fairly useful bibliography with odd comments: *e. g.*, of Bentham and Hooker's *British Flora*, of which we understand a new edition is in preparation. We are told that "the second volume is pictures only, and is not necessary to the identification of plants, but enthusiastic students of flora sometimes find it interesting to colour the pictures from specimens. A book for those who take identification seriously as a hobby." The title-page is disfigured in the manner almost peculiar, we are glad to say, to Messrs. Methuen, by an ugly and badly imposed rubber stamp.

BOOK-NOTES, NEWS, ETC.

THE Preliminary Programme of the Imperial Botanical Conference, which will take place at the Imperial College of Science, July 7–16, gives particulars of the discussions to be held. In *Systematic Botany and Ecology* the discussion on "The best means of promoting a complete Botanical Survey of the Empire" will be opened by the Director of Kew; that on "Correlation of Taxonomic Work in the Dominions and Colonies with Work at Home" will be initiated by Mr. J. Burtt Davy; and an extended discussion on "Vegetation Survey in different Parts of the Empire, and Training in Field Ecology" will be opened by Mr. A. G. Tansley. In *Genetics* there will be discussions on "The Economic Possibilities of Plant Breeding" and on "The Value of Selection Work in the Improvement of Crop Plants," initiated by Prof. R. H. Biffen and Prof. Percival respectively. In *Plant Pathology* there will be discussions on "The Bud-rot of Palms," opened by Dr. Butler; on "The Relation of Plant Pathology to Genetics," opened by Mr. F. T. Brooks; on "The Relation of Forest Pathology to Silviculture," opened by Dr. Borthwick; and on "Fungal Attacks on Timber," opened by Prof. Groom. Under the heading of *Education and Research* a discussion will be initiated by Prof. J. B. Farmer on the possibility of promoting an interchange of staff between the overseas and home Botanical Institutions, and on the desirability of providing further facilities for botanical research in the tropics and Dominions. The Report of the Subcommittee which has been considering the Rules of Nomenclature will be discussed. Towards the end of the Conference excursions will be made to various places of interest. Fuller particulars may be obtained from the Hon. Secretary, Mr. F. T. Brooks, 31 Tenison Avenue, Cambridge.

AT the meeting of the Linnean Society on Feb. 21, Dr. J. M. Dalziel gave a lecture on West African Vegetation, illustrated by about 80 lantern-slides. He began by describing the creeks in the delta of the River Niger and the mangroves and other vegetation on their banks, the moist climate, and heavy rains; he proceeded up the country, with views of the forests with their open ways between the trees, the river in flood, the fall of standards undermined by the floods, sometimes, as shown, forming a bridge across a stream or blocking traffic on a motor road, next passing further inland, with the park-like appearance of the highlands with scattered trees. The more noteworthy of the trees, as the *Bombax*, and *Butyrospermum* yielding shea butter much used in the preparation of cheap chocolates, were shown; a view of mimosa-scrub of *Acacia albida*, with its camels, showed the influence of the Saharan element in the flora. In the discussion which followed Dr. Rendle referred to certain specimens of bulbous plants occurring in collections, and inquired how these escaped destruction in the grass fires. Dr. Dalziel replied that many bulbs escaped the ravages of the grass fires by being several inches below the surface; that others grew amongst scattered tufts of grass, as *Panicum stagninum*, thus avoiding great heat.

AT the meeting of the Linnean Society on March 6, Dr. E. J. Salisbury gave an account of the International Phytogeographical

Society's visit to Switzerland during the summer of 1923, in which Great Britain and Ireland were represented by Dr. Lloyd Praeger, Prof. Yapp, and the speaker. The address was illustrated by an extensive series of lantern-slides. Miss Helena Bandulska gave a paper "On the Cuticles of some Recent and Fossil Fagaceæ," the first part of which dealt with evidence for the inclusion of the fossil *Dicotylophyllum Stopesii* Bandulska in the genus *Nothofagus* Blume. The evidence is based on a study of the external characters and the cuticular structure of recent *Nothofagus* leaves. The second half of the paper described the external form and cuticular structure of various recent species of *Fagus* and recorded a fossil *Fagus* with cuticle preserved from the Eocene of Bournemouth. Both *Fagus* and *Nothofagus* cuticles have isodiametric stomata whose average diameters are in close agreement. They are usually in definite groups. The stomata vary much in size—those of *Nothofagus* have strongly cuticularized poral rims, accompanied frequently by cuticular thickenings at the junctions of the guard cells, and by a horizontal strip of cutin at the poles of their long axes so that a dagger-like appearance is presented. In *Fagus*, all the cutinizations are less obvious, and generally only the poral rim is well cutinized. The epidermal cells of both genera may be sinuate or straight, or one surface only may be sinuate. It may be said that the cuticles of *Nothofagus* and *Fagus* form a continuous series. *D. Stopesii* shows agreement in external form with several species of *Nothofagus*, and its cuticular measurements and structure are those of a *Nothofagus*. It should therefore be called *Nothofagus Stopesii*. The external form and cuticular structure of the fossil named *Fagus hournensis* indicate its close connection with *Fagus*, and while its external form resembles *Fagus sylvatica*, it is in all probability specifically distinct, occupying an intermediate position between *F. sylvatica* and *F. ferruginea*.

MONSIEUR H. CORREVON, of Floraire, Chêne-Bourg, Geneva, has just brought out a second edition of his *Album des Orchidées d'Europe*, published a quarter of a century ago and out of print since 1905. There are interesting chapters on the biology, geographical distribution, and culture of European orchids, and the descriptions are short and clear. The 66 coloured plates are well reproduced, each representing a species, with enlarged single flowers and anatomical details, rendering identification easy. All the British orchids are illustrated (42) except such critical species as *O. elodes* (*O. ericetorum* Linton), *O. prætermissa* Druce, *O. purpurella* Steph., and *Epipactis leptochila* Godf. Most of the figures are slightly larger than life, except the six new plates, which have been reduced from the original drawings and are rather less than life-size. Hybrids are omitted, but one has been inadvertently figured in pl. 33, fig. 1, which is clearly *Ophrys apifera* × *arachnites*. This useful work is wonderfully cheap at the modest price of 25 francs Swiss.

THE *Orchid Review* for March contains an interesting paper by Mr. Henry Mousley, of Ottawa, on *Spiranthes Romanzoffiana*, his experience with which differs considerably from that of Drummond with the Cork plant in 1810 and that of Col. Godfery as recorded in

the *Review* for 1922, pp. 261–4. The paper is chiefly concerned with the tubers, of which five figures are given.

The Essex Naturalist (xx. part 5) contains the conclusion of Mr. Boulger's account of Richard Warner, with other notes on that Essex worthy, and a paper by Mr. Miller Christy on the remarkable decrease of *Polypodium vulgare* in Essex, the cause of which he is "at a loss to explain."

In the *Bulletin of the Torrey Club* for January, Dr. Britton continues his "Studies of West Indian Plants," describing new species from Cuba, Hispaniola, Trinidad (with a new genus of Melastomaceæ—*Necramium*) and Porto Rico. A specific name of somewhat remarkable construction—*Leoclemerocana*—commemorates the collectors, Messrs. Leon, Clement, and Roca; Dr. Rydberg continues his "Notes on *Fabaceæ*" (*Homalobus, Kentrophyta*); Miss A. M. Johnson writes on "The Mid-styled form of *Piaropus paniculatus*."

The *Kew Bulletin* (1924, n. 1) contains the first portion of "Materials for a Flora of British Honduras," by Messrs. A. Sprague and L. A. M. Riley; it comprises a sketch of the vegetation and a note on the (very few) collectors, and the beginning of a list (extravagantly printed) which includes new species of *Hypericum*, *Vismia*, and *Sloanea*. Mr. Sprague also contributes an identification of the localities included in "Humboldt and Bonpland's Mexican Itinerary," which should be of great value to students of the Mexican flora. A list of additions to the Herbarium during 1923 is given.

The contents of the *Journal of Ecology* for January are mainly botanical. Mr. W. T. Saxton writes on "Phases of Vegetation under Monsoon Conditions"; Miss Katherine Warrington on "The Influence of Manuring on the Weed Flora of Arable Land"; Mr. Miller Christy has an exhaustive paper on "The Hornbeam (*Carpinus Betulus*) in Britain," of which a summary will be found on p. 188.

To the *Gardeners' Chronicle* of Feb. 23 and March 1 Dr. Druce contributes notes from the correspondence, a portion of which has come into his possession, of William Baxter (1787–1871), Curator of the Oxford Botanic Garden and author of *British Phœnogamous Botany* of which a very full account by Dr. A. H. Church appeared in this Journal for 1922, pp. 58–63. There are interesting extracts from Joseph Sabine (1770–1837), who was Secretary of the Horticultural Society from 1816 to 1830, Sir Joseph Paxton (1803–1865), and Andrew Bloxam (1801–1878); those from J. S. Henslow and Lindley—the latter a mere request for the loan of a specimen—seem hardly worth printing.

Newspaper Botany. "Mitcham Hall is a magnificent estate, one of its features being a tree which is believed to be of the same species as that associated with Calvary. Only two of these trees exist in this country, the other being in Wales."—*Evening Standard*, March 7.

Corrections. In the paper on *Orchis latifolia* (pp. 35–41), l. 5 from top, for "foliis immaculatis" read "foliis maculatis et immaculatis"; p. 38, l. 7 from bottom, for "have unspotted leaves" read "sometimes have unspotted leaves."

A NEW STATICE IN BRITAIN.

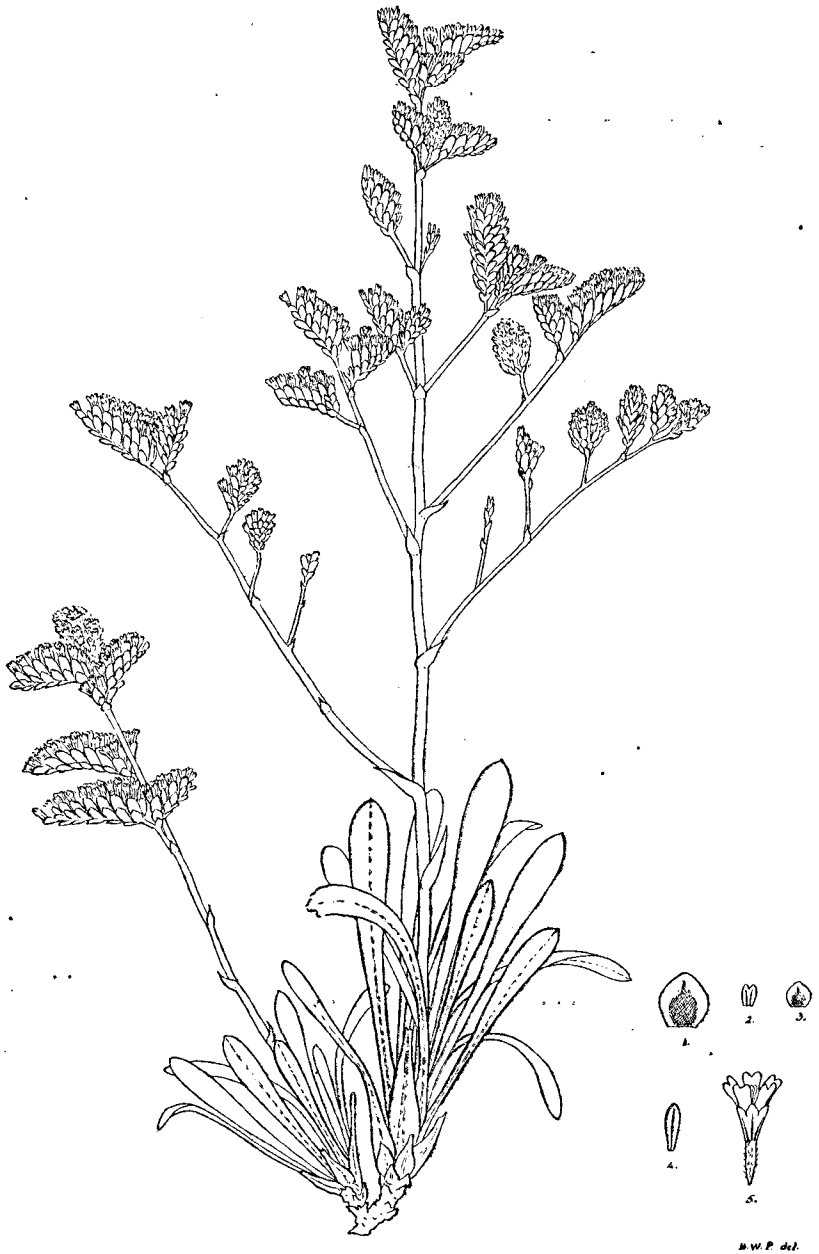
By H. W. Pugsley, B.A., F.L.S.

At the end of last August, on a day's excursion from Tenby, I noticed on a steep sea-cliff a *Statice* which at first I took for *S. binervosa* G. E. Smith, but which seemed to me peculiar from its narrow leaves and very small flowers. I therefore cut two specimens for comparison with the *S. binervosa* growing on the South Cliff at Tenby, and on my return found that I had indeed brought back a different plant. A little later I revisited the locality to obtain more specimens, and then saw that ordinary *S. binervosa* grew sparingly with the stranger. The two plants in life looked perfectly distinct, *S. binervosa* being on an average nearly twice as tall as the other, with relatively broad, obovate leaves and circular corollas about $\frac{1}{3}''$ in diameter, while the dwarfer new form showed linear-oblong leaves and stellate corollas only $\frac{1}{6}''$ across.

The original description of *S. binervosa* (G. E. Smith, Eng. Bot. Suppl. 2663 (1831)) is illustrated by a plate to which a good dissection of the flower, apparently drawn from fresh material, is added. This shows a violet-blue corolla, with the limb of the petals broadly obovate, slightly retuse, and contiguous or a little imbricated. The corollas of the Tenby and other Pembrokeshire *S. binervosa* that I examined match that of this plate, and after looking through numerous *exsiccata* from various localities, among which a pressed corolla is here and there visible, I conclude that the plate correctly depicts the normal corolla of the species. According to Syme it is nearly as large as in *S. Limonium*, of which Hooker says "corolla $\frac{1}{3}''$." In recent works I find no mention made of the corolla of *S. binervosa*.

In contrast to this the corolla of the new plant in all the individuals seen was quite uniform and only half as large as in *S. binervosa*, being about $\frac{1}{6}''$ in diameter, with the limb of the similarly coloured petals oblong, emarginate and not contiguous, so that the flower appeared more or less stellate.

The foliage of *S. binervosa* is stated by Mr. C. E. Salmon (Journ. Bot. xli. 71 (1903)) to be "remarkably variable in size and shape, from narrowly lanceolate-obovate to broadly obovate-spathulate . . . . acute or obtuse . . . . apiculate or not . . . . petioles longer or shorter than blades." An examination of the material at Kew and Herb. Mus. Brit. reveals considerable variation, but in every form there is a distinct narrowing of the lamina at some point below the apex, giving rise to an apparent petiole, although in a strict sense the leaves of these plants are not petiolate. The greatest breadth of the lamina seems to range from 4 mm. to 25 mm., while below it usually contracts to a false petiole only 2–3 mm. wide. The narrow, oblanceolate-spathulate leaves of the Wigton plant referred by Mr. Salmon to *S. binervosa* v. *humilis* (Journ. Bot. xlv. 25 (1907)) are likewise characterised by a clear contraction below, which imparts a long-petioled aspect.



Statice transwalliana, sp. nov. (natural size).

Dissections: 1. Inner bract. 2. Middle bract. 3. Outer bract. 4. Lower bracteole. 5. Detached flower. (All ×2.)

The leaves of the new form, on the other hand, are so little dilated towards the apex and so little contracted below that they cannot possibly be regarded as petiolate. The greatest breadth above is rarely more than double the least below, and in this way they differ essentially from the leaves of aggregate *S. binervosa*. Furthermore, the leaf-apex of the new plant seems to be always minutely and obscurely mucronulate. In *S. binervosa* the mucro may be absent, but when present it is quite distinct and often nearly 2 mm. long. The hyaline margin is also more marked in the new form.

The scape and branching of the inflorescence in the Pembrokeshire plant are quite distinct from that of typical *S. binervosa*, with its compound panicle of erect branches and rather lax spikes, but they do not differ greatly from some of the stouter forms, with spreading branches and closer spikes, that have been referred to var. *intermedia* Syme. The spikes, however, are shorter than in any form of *S. binervosa*, and usually spreading or arcuate-recurved. They are also denser, the two rows of spikelets being closely compressed. The spikelets and flowers are smaller than those of *S. binervosa* in all their parts, and the three bracts, though bearing nearly the same proportions, are relatively broader and more obtuse.

The new plant is thus readily distinguishable from *S. binervosa* in several features, although it evidently belongs to the same division of the genus (Sect. *Limonium* ser. *Densifloræ* Boissier, ap. DC. Prodr. xii. 613).

Of the other British species falling within this group, *S. recurva* C. E. Salmon, of which I have seen no living examples and only limited herbarium material, shows a resemblance to the new plant by its dwarf habit and dense spikes, but its leaves, while narrow, are more petiolate, its scape is asperous and much stouter, its spikes are longer and spikelets larger, with relatively larger and distinctly imbricated outer bracts. I can find no information respecting the corolla of this plant except that Mr. Salmon's plate (Journ. Bot. tab. 449) shows it in the spikes with distant lobes unlike the flowers of *S. binervosa*, and I understand from Mr. Salmon that its petals are actually narrower.

S. lychnidifolia Gir., represented in the Channel Islands, is a relatively coarse plant with large broad leaves and dense panicles of curved spikes.

Among other Continental species I can trace nothing that matches the new plant, which is rendered very distinct in its series by its narrow foliage. *S. Dodartii* Gir., which is very like *S. binervosa* v. *intermedia*, and—to judge from a French example at Kew—has a similar large corolla, differs greatly in its broadly spathulate and obtuse foliage. In its habit and inflorescence the Mediterranean *S. Girardiana* Guss. resembles the Pembroke form, but its scape is very much slenderer, and its obovate, obtuse leaves altogether different. *S. Duriæi* Gir., which grows in Western Algeria, is described as having "oblong-lanceolate, sessile leaves, attenuate below," and thus recalls the new plant. But the material in Herb. Mus. Brit. shows obviously broader and more obovate foliage, and its contracted panicle

of spikelets with large, rotundate, imbricated outer bracts is quite distinct.

The Pembrokeshire plant appears therefore to be undescribed, and its status demands consideration. The generic section *Limonium* is a polymorphic one that has been rather finely divided into numerous species based on characters taken mostly from the form of the leaves, the inflorescence, the spikelets and bracts, the calyx and occasionally the corolla, the fruiting organs apparently not affording any diagnostic features. In his account of the section Boissier (*l. c.*) remarks that it embraces several European species difficult to separate and often not offering positive characters; and he comments on the necessity of examining living material to determine especially the form and colour of the corolla, &c. The lack of information then existing seems still in evidence, and is probably, at least in part, the cause of the conflicting views of recent authors. While Mr. Salmon (Journ. Bot. xli. 67) separates as *S. recurva*, a distinct endemic species, the Portland plant previously referred to *S. Dodartii* Gir., and apparently regards *S. Dodartii* as a French form of similar rank, Rouy (Fl. Fr. x. 155) treats both of these plants as French and sinks them as varieties under *S. binervosa*. At the same time he maintains *S. lychnidifolia* Gir., *S. Willdenowii* Poir., *S. Girardiana* Guss. and *S. ovalifolia* Poir. as distinct species of the series. I am at present unable to see any sufficiently valid specific characters in *S. Dodartii*, which however is also kept distinct by Willkomm and Lange, as well as by Boissier, but the features of *S. recurva* pointed out by Mr. Salmon seems to me, upon examination of limited material, to warrant specific distinction as much as those of the other recognised members of the group; and its remarkably restricted distribution is not unparalleled in the case of some Mediterranean species of the genus. The Wigton plant, which is well represented at Kew, also appears quite distinct.

The new plant now brought to notice differs from all the other species of the series in the form of its narrow leaves—and this seems an important point in *Statice*. Its scape, spikes and spikelets may perhaps be regarded as a modification of those seen in *S. binervosa* or *S. recurva* although they present several small differences. But the corolla again is essentially and, so far as is known, constantly different from that of *S. binervosa*, which approaches the new plant most nearly in most other respects. Unless polymorphism of this organ exists in this genus—and of this I can find no evidence—this is a second important peculiarity. The combination of these leaf and corolla characters renders the plant a very distinct one, and I think that, like *S. recurva*, it should be held specifically separate from *S. binervosa* and from the other members of the group. In its restricted geographical range it naturally recalls *S. recurva*, but it may be found to extend to various localities in Pembrokeshire and possibly into the adjoining counties. It grows on rocky sea-cliffs where it is only partially accessible, and comparatively few botanists have explored the district where I noticed it. And further, if seen in company with *S. binervosa*, it may be mistaken for poor material of

that species, as in fact was one example in Herb. Mus. Brit., collected by Trimen, and a second at Kew collected by Bentham. While this paper has been held over for printing I have received a specimen from Miss Ida Roper from a second Pembrokeshire station.

It is therefore proposed to treat this plant as a new species, *Statice transwalliana*, the name alluding to the district where it grows—the site of the old English colony in Pembrokeshire, formerly known as Anglia Trans Walliana, or Little England beyond Wales.

The description &c. are as follows :—

Statice transwalliana, sp. nov. (sect. *Limonium* ser. *Densifloræ*).

Exsicc. Herb. Pugsley, nos. 406, 407 and 408; Bentham, Tenby, 1856, in Hb. Kew (ut *S. spathulata*); Trimen, Pembroke, 1867, in Hb. Mus. Brit. (ut *S. occidentalis*).

Herba glabra, relative *nana*. *Folia* multa, plana, marginibus usque ad basin distincte hyalinis paulo tenuia, *anguste oblanceolata vel lineari-oblonga*, superne parum dilatata et inferne sensim minimeque attenuata, vulgo 25–45 mm. longa et ad partem latissimam 3–5 mm. lata (raro 55 mm. longa, 6 mm. lata) inferne circiter ad 2 mm. angustata; omnia obtusa, *minute mucronulata* et obscure 1-nervata. Scapus 8–15 (rarius ad 30) cm. altus, robustiusculus, sursum haud attenuatus, levis, in plantis validis ramis inferioribus longis strictis erecto-patentibus e basi ramosus, in plantis parvis solum dimidio superiore ramis brevibus præditus; rami steriles sæpissime nulli. Ramuli pauci, in scaporum majorum ramis inferioribus solis videndi. Squamæ scapi triangulares, subamplexicaules, haud foliaceæ, inferiores 8 mm. longæ longe acuminatæ, superiores latæ acutæ nonnunquam 1 mm. longæ. *Spicæ ±patentes vel arcuato-recurvatæ, breves*, valde *densifloræ*, sæpius subsessiles, in plantis validis scapi ramorumque apice approximatæ. *Spiculæ* relative *parvæ*, 1–4-floræ, bracteis exterioribus spicularum in eadem serie contiguarum sæpe paulo imbricatis distiche compressæ. Bractea exterior 1–1·5 (raro 2) mm. longa ac lata, subrotundo-ovata, subacuta, superne brunneo-tincta et late membranaceo-marginata. Bractea media parva, 1–1·25 (raro 1·75) mm. longa, oblonga, inæqualiter emarginata, membranacea, 2-nervata. *Bractea interior* 3·25–4 mm. longa, late ovalis, obtusa, superne brunneo-tincta et late membranaceo-marginata, *bracteâ exteriore plus duplo longior*. Bracteolæ 0–3, anguste oblongæ, obtusæ, membranaceæ, infima maxima 2–3 mm. longa. Calycis 5–5·5 mm. longi limbus scariosus, valde nervatus, dentibus altis triangularibus obtusis vel subacutis paulo dilatatus; tubus limbum subæquans, parce pilis appressis hirsutus. *Corolla* violacea, *minima* circa 4 mm. lata, *in petala remota, angusta*, oblonga, emarginata *fissa*. Antheræ oblongæ, vix 1 mm. longæ. Fructus circa 2·5 mm. longus, anguste oblongus, semen 1·5 mm. longum, leve, rubicundum includens.

Scopulos maritimos in comitatu Pembroke Angliæ habitat ubi mensibus Julio, Augusto et Septembri floret.

Plant glabrous, relatively *dwarf*. *Leaves* numerous, flat, rather thin with distinct hyaline margins extending to the base, *narrowly*

oblanceolate or linear-oblong, little dilated above and very gradually and slightly contracted below, usually 25–45 mm. long and 3–5 mm. broad at the widest part (occasionally 55 mm. long and 6 mm. broad), narrowing below to about 2 mm.; all obtuse, *minutely mucronulate* and obscurely 1-veined. Scape 8–15 (more rarely to 30) cm. high, rather stout and not tapering upwards, smooth, in strong plants branched from the base with the lower branches long, strict, and erect-spreading, in small plants with short branches in the upper half only; barren branches generally absent. Branchlets few, present only on the lower branches of large scapes. Scales of the scape triangular, subamplexicaul, not foliaceous; the lower long-acuminate and 8 mm. long, the upper broad, acute, sometimes only 1 mm. *Spikes ±spreading or arcuate-recurved, short* and very *dense-flowered*, mostly subsessile, in strong plants crowded at the end of the scape and branches. *Spikelets small*, 1–4-flowered, closely compressed in two ranks with outer bracts often slightly imbricated. Outer bract 1–1·5 (rarely 2) mm. long and about equally broad, subrotund-ovate, subacute, tinted with brown above and with broad membranous margin. Middle bract small, 1–1·25 (rarely 1·75) mm. long, oblong, unequally emarginate, membranous, 2-veined. *Inner bract* 3·25–4 mm. long, broadly oval, obtuse, tinted with brown above and with broad membranous margin, *more than twice as long as the outer bract*. Bracteoles 0–3, narrowly oblong, obtuse, membranous, the lowest and largest 2–3 mm. long. Calyx 5–5·5 mm. long; limb scarious, strongly nerved, somewhat dilated upwards with deep, obtuse or subacute, triangular teeth; tube subequalling limb, with scattered appressed hairs. *Corolla* violet-blue, *very small*, about 4 mm. broad, *cut into distant, narrow*, oblong, emarginate *petals*. Anthers oblong, less than 1 mm. long. Fruit about 2·5 mm. long, narrowly oblong, with smooth reddish seed 1·5 mm. in length.

PLANTS FROM JEBEL MARRA, DARFUR.

By Cecil Norman, F.L.S.

In February 1921 Mr. L. V. Lester-Garland published in this Journal (vol. lix. p. 48) a preliminary list of plants collected by Admiral (then Captain) H. Lynes on the volcanic *massif* of Jebel Marra, Darfur. Admiral Lynes has since spent over a year in Central Darfur, including two periods of roughly 3 months each on Jebel Marra itself, viz., Feb.–May 1921 and Dec. 1921–Feb. 1922. Only the Jebel Marra plants are dealt with in this paper.

As regards the second period, it is to be noted that the intention was to proceed to the *massif* as soon as the rains ceased in October, when the full benefit of the wet weather would have been obtained, but owing to political disturbances the start had to be delayed for six weeks, and Admiral Lynes states that by then many of the plants had passed the flowering stage, and considers that many were overlooked by him. It is to be remembered that his primary object was the collecting of birds, as on the former expedition.

In all 132 species of plants were collected, but in view of the facts above stated, it is not to be supposed that the list of the plants of Jebel Marra is yet complete. Mr. Lester-Garland's remarks as to the composite nature of the flora are borne out by the present Collection, the preponderating elements consisting of Abyssinian and wide-spread tropical African species.

Five species are herein described as new, but they all belong to large, widely-spread, and very variable genera, and are in all cases more or less nearly allied to well-known species. Indeed, there seems to be less peculiarity about the flora than might have been expected, and so far nothing very remarkable has been revealed.

Our thanks are due to Mr. and Mrs. A. F. Broun, to whom the plants were in the first instance submitted.

The following list as to the great majority of species is identical with the one drawn up by them. For notes on the physical geography of Central Darfur and Jebel Marra, Mr. Lester-Garland's paper should be consulted. The specimens are in the British Museum Herbarium:—

Nephrodium Gueintzianum Hieron. 191. *N. Thalypteris* var. *squamulosum* Stœmpel. 6.—*Pteris flabellata* Thunb. 195. *P. aquilina* L. 186.—*P. longifolia* L. 194.—*Dryopteris Schimperianum* Hochst. 187.—*Asplenium præmorsum* Sw. 189, 190.—*Cystopteris fragilis* Bernh. 192.

Potamogeton pusillus L. 7.—*Ottelia lancifolia* A. Rich. 76.—*Danthonia* sp. 44.—*Pennisetum unisetum* Bth. 184.—*Echinochloa pyramidalis* High. & Chap. 176.—*Heteropogon contortus* Beauv. 177.—*Themeda triandra* Forsk. 178.—*Andropogon linearis* Stapf. 179. *A. Gayanus* var. *kordofanus* Stapf? 182.—*Hyparrhenia pseudo-cymbaria* Stapf. 180–1.—*Diectomis fastigiata* Kunth. 185.

Cyperus difformis L. 101.—*Scirpus corymbosus* Rottb. 174.

Lemna paucicostata Hegelm. 46.

Asparagus africanus Lam. 21.—*Allium alibile* A. Rich? 37 e.—*Salix Safsaf* Forsk. 162.

Ficus palmata Forsk. 41. *F. ingentoides* Hutch. 161.

Parietaria debilis Forst. 192 (in part.).

Loranthus globifera A. Rich. 71; var. *salicifolia* Sprague? 72.

Polygonum barbatum L. 29. *P. glabrum* Willd. 96. *P. senegalense* Meisn. 63.—*Rumex abyssinicus* Jacq. 64, 157. *R. nepalensis* Spreng. 158.

Chenopodium fœtidum Schrad. 37 d, 65. *C. murale* L. 156.

Achyranthes aspera L. 62.

Boerhaavia plumbaginea Cav. 155.

Silene Lynesii Norman, sp. nov. 105 *b*.

Herba perennis, pilis glandulosis omnino vestita; *caulibus* erectis, vel sub-erectis, junioribus angulatis; *foliis* late linearibus, vel anguste oblanceolatis, obtusis, sessilibus; *floribus* ebracteatis longe

pedunculatis, solitariis axillaribus vel terminalibus; *calyce* longe cylindrico, 10-nervato, fructifero clavato basi truncato; lobis marginibus hyalinis, obtusiusculis; *petalis* rubris longe exsertis, limbo patente profunde inciso; *capsula* ellipsoidea; *seminibus* parvis subreniformibus margine sulcato, facie depressa.

Niuraya, Jebel Marra, 6500 ft. "Common from 9000 ft. to 6000 ft. (or lower?). Sticky pink flower, fades on pressing."

Principal measurements: *leaves* up to 3·5 cm. l.; *peduncle* ±2·5 cm.; *calyx tube* ±2·5 cm.; *calyx teeth* ±3 mm.

Allied to *S. macrosolen* Steud. and *S. villosa* Forsk., but distinguished from the former as being without the conspicuous bracts halfway up the peduncle and by its broader leaves; from the latter by the strongly-veined calyx tube.

Silene macrosolen Steud. 106 *a* & *b*. 8300 ft.—*Cerastium vulgatum* L. 84. 8600 ft.—*Alsine Schimperi* Hochst. 54. 9500 ft. "to highest altitudes."—*Cometes abyssinica* R. Br. 10. 6500 ft.

Ranunculus pinnatus Poir. 17, 101. 4000 ft. *R. multifidus* Forsk.? 85.—*Clematis simensis* Fres. 48, 102. 8400–9500 ft.—*Nigella sativa* L. 30.

Mærua angolensis DC. 103.

Nasturtium sp. 33.

Tillæa pentandra Royle. 110, 111.—*Cotyledon Umbilicus* L. 109. 9600 ft.

Dalbergia melanoxylon G. & P. 125.—*Desmodium scalpe* DC. 124. 7300 ft.—*Vigna incana* Taub. 100. 3600 ft.—*Indigofera alternans* DC. 72. 5000 ft. (The occurrence of this S. African species is noteworthy: also occurs in Angola.) *I. arrecta* Hochst. 121. 7300 ft.

Crotalaria Lynesii Bak. fil et Martin, sp. nov. 120 *b*.

Suffrutex erectus; caulibus albo-pubescentibus; foliis trifoliolatis, petiolis longis, pubescentibus; foliolis subsessilibus, utrinque velutinis nervis prominentibus anguste ellipticis apice obtusis; *floribus* dense racemosis, pedicellis velutinis; *calyce* velutino dentibus linearis acutissimis, dente infimo quam ceteris longiore; *vexillo* glabro in sicco viridi-luteo purpureo-striato, obovato; *carina* glabra dorso rotundata; *alis* glabris aureis; *ovario* velutino oblongo-oviforme; *stylo* elongato curvato; legumine pubescente ±8-spermo, breviter stipitato.

"Jebel Marra Highlands, 8000 ft. A frequent bush, downwards chiefly from 6500 ft."

Principal measurements: *petioles* 15–20 mm. l.; *terminal leaflet* 25–35 mm.; *lateral* 18–20 mm.; *calyx tube* ±4 mm.; *lowest tooth* ±6 mm.; *vexillum* with claw 13–14 mm.; *carina* 14–16 mm.; *wings* ±10 mm.; *pod* 20–25 mm.

Belongs to the section *Eucrotalaria*, subsection *Mediocrifloræ*.

Noticeable on account of its dense racemes, the carina rounded on the back ±15 mm. long, its distinctly striated standard with deep orange ground and purple lines.

Closely allied to *C. argyræa* Welw. and *C. usaramoensis* Bak. fil.

Helminthocarpum abyssinicum A. Rich. 119. 8600 ft.—*Biserrula leiocarpa* Hochst. 123. 6500 ft.—*Lotus corniculatus* L. 13, 83. A form with small and few flowers, 6500 ft.

Rhynchosia Lynesii Bak. fil. et Martin. 87 *a*.

Suffrutex; *caulibus* sub-volubilibus incano-tomentosis; *foliis* alternis trifoliolatis; *foliolis* anguste oblongis nervis prominentibus utrinque valde incano-tomentosis, foliolo terminali breviter petiolato, lateralibus subsessilibus; *floribus* 1–3 luteis, pedunculis quam foliis brevioribus; *calyce* hirto lobis superioribus ±connatis, dentibus acutis quam tubo brevioribus; *vexillo* glabro auriculato; *ovario* biovulato sericeo-hirto, *stylo* superne curvato, imberbe; *legumine* ±2-spermo apice mucronulato.

Jebel Marra, below Q.R. camp, 6500 ft. "A little wiry yellow pea: small bushy shrub. Probably an upper and higher mid-zone plant."

Principal measurements: *petioles* 8–10·mm. l.; *terminal leaflet* 18–20 mm.; *petiolule* ±2 mm.; *lateral* 13–15 mm. *Calyx* ±5 mm. *Vexillum* ±7 mm.; *carina* ±8 mm.; *pod* ±18 mm.

Closely allied to *R. totta* DC. and *R. puberula* Harvey, but is very much more tomentose than these two species. Allied also to *R. venulosa* Schwf., but differs by its shorter calyx, more prominent nerves, and dense white pubescence.

Mundulia suberosa Bth. 87 *c*, 97.—*Dichrostachys nutans* Bth. 77.

Erodium glaucophyllum Ait. 86. 9000 ft. (a doubtful determination: appears to be a depauperate form of this Egyptian species).—*Monsonia senegalensis* Guill. & Perr. 108. 3600–5000 ft.—*Oxalis corniculata* L. 37 *g*.

Polygala abyssinica R. Br. 69, 92, 104. 9500 ft.

Euphorbia nubica N. E. Br. 160. 7500 ft.

Rhus villosa Linn. f. 60, 87 *a*, 98 *ab*. 6000–7000 ft.

Grewia flavescens Juss. 81.—*Dombeya multiflora* v. *vestita* K. Schum. 107.

Hypericum perforatum L. 25 *a* & *b*. 9300 ft. and below.

Woodfordia floribunda Salisb. 28.

Lasiosiphon Kraussii Meisn. 52, 70.

Combretum holosericeum Sond. 112. 8000 ft. and below.

Eugenia guineensis Hiern. 8, 68, 112. 5500 ft.

Fœniculum vulgare Gaertn. 31, 50.—*Sium angustifolium* L. 32, 34, 115. 6500 ft.—*Diplolophium africanum* Turcz. 113. 8000 ft.—*Anethum graveolens* L.? 114.—*Ferula communis* L.? 118.—*Coriandrum sativum* L. 5, 116, 117.

Blæria spicata Hochst. 56. 9300 ft.

Olea chrysophylla Lam. 82. 8200–10,000 ft.—*O. europæa* L. var. *nubica* Schwf. 57. 9700 ft.

Swertia abyssinica Hochst. 129. 9000 ft.

Asclepias Phillipsiæ N. E. Br. 53. 7500 ft.

Astrochlæna Stuhlmanni Hall f. 130. 5200 ft.—*Cuscuta* sp. 131, 147.

Cordia abyssinica R. Br. 67.—*Trichodesma africanum* R. Br. 133.—*Arnebia hispidissima* DC. 91. 8700 ft.

Clerodendron cordifolium A. Rich. 1. 6000 ft.

Lavandula pubescens Dene. 151. 8500 ft.—*Mentha silvestris* L. 27.—*Micromeria biflora* Bth. 51, 54, etc. 6000–7000 ft.—*Nepeta ballotæfolia* Hochst. 152, 153. 9500 ft.—*Otostegia scariosa* Bth. 88. 6000–7000 ft.—*Coleus dissitiflorus* Gürke. 4*b*.

Coleus darfurensis R. Good., sp. nov. 4*c*.

Herba alta perennis; *caule* erecto tetragono ramoso pilis glanduliferis pubescente; *foliis* inferis petiolatis, superis subsessilibus, ovato-rhomboideis ±longe acutis ad basim vix cuneatis, crenato-serratis supra glanduloso-hispidis, subtus glandulis nigris copiosis et breve griseo-pubescentibus dense intectis; *racemis* terminalibus; *verticillastris* confertis; *cymis* longe pedunculatis, 5–7 floribus; *bracteis* late ovatis irregulariter serratis deciduis, pedicellis pilis purpureis glanduliferis intectis; *calyce* striato extus purpureis pilis brevissimis puberulo, post anthesin valde accrescente; *dente* superiore late ovato acuto marginibus paullo decurentibus, dentibus lateralibus brevibus, ovatis, obtusis, dente superiore multo brevioribus; dentibus infimis subulatis rigidis, fere ad apicem connatis quam dentem superiorem paullo brevioribus; *corolla* cæruleo-violacea extus piloso pubescente nigris glandulisque adspersis; tubo tenue quam calyce longiore.

Jebel Marra, 8200 ft. "A lovely bed of these beautiful flowers around a wet spring on the hillside." Principal measurements: *total height* 3 ft.; *petioles* of lower leaves 2·5–4 cm.; *leaves* up to 6·5 × 4 cm.; *verticillasters* 1–1·5 cm. apart; *ripe calyx* ±·6 mm. l.; *corolla* ±1·2 cm.

Closely allied to *C. shirensis* Gürke and *C. dissitiflorus* Gürke, and should probably be placed between them. The hairiness of the plant, the inflorescence and the leaf-shape are all intermediate between these two.

Solanum nigrum L. 37, 132, 134.

Linaria ægyptiaca Dum. 54*d*. 8200–9500 ft.—*L. Elatine* L. var. *villosa* Boiss. 336, 401.—*L. somalensis* Vatke. 139*a* & *b*. Differs from Hildebrandt (Somali-land, 1409, on which Vatke founded the species) as represented in Herb. Mus. Brit. in the broadly hastate basal leaves and in the longer petioles, but such characters are very variable in the *Elatinoides* series to which all the tropical African species belong, and there seems no reason for regarding these specimens as other than forms of *L. somalensis* Vatke (R. Good).—*Verbascum Ternacha* Hochst. 20. 7400 ft.—*Antirrhinum Orontium* L. 135.—*Sopubia ramosa* Hochst. 138. 6500 ft.—*Mimulus gracilis* R. Br. 141. 5200 ft.—*Alectra communis* Hemsl. 137. 8300 ft.—*Veronica Anagallis* L. 15, 136. A form with short broad leaves.—*Buchnera hispida* Ham. 140. 6800 ft.

Stereospermum Kunthianum Cham. 5200 ft.

Hypoestes Forskalii R. Br. 2.—*Ruellia patula* Jacq.? 142.—*Lepidagathis scariosa* Nees. 143. 3300 feet.

Anthospermum pachyrhizum Hiern. 8000 ft. and upwards.—*Pavetta gardeniæfolia* Hochst. 128.—*Galium rotundifolium* L. 124. 9200 ft. *Galium* sp. 125.

Campanula rigidipila Steud. & Hochst. 54, 93. 8700 ft.

Lobelia trierarchi R. Good, sp. nov. 126. Herba perennis? glabra, basi excepto; *ramulis* tenuibus subangularibus; *foliis infimis* subsessilibus linearibus obtusis remote calloseque dentatis, supra pilis glanduliferis exigue præditis; *foliis superis* breviter petiolatis anguste linearibus obtusis vix dentatis utrinque glabris; *bracteis* subulatis integris quam pedicellis multo brevioribus; floribus longe pedicellatis in racemo terminale laxo; *calyce* turbinato quam lobos subulatos multo breviore; *corolla* punicea glabra, tubo quam lobos calycis triplo longiore, lobis superis subulatis; staminibus tubum corollæ æquantibus; *antheris superis* dorso pilis glanduliferis præditis, *antheris inferis* barbatis; capsula obconica cylindracea quam lobos calycis 2–3-plo longiore.

Mid Robo, 9000 ft. "Moist shady spot."

Principal measurements: *total height* ±25 cm.; *leaves* ±3 × ·5 cm.; *pedicels* 5–15 mm.; *calyx lobes* ±2 mm.; *corolla* ±6 mm.

Apparently closely allied to *L. erinus* L., agreeing in habit and the hairs on the backs of the anthers; it differs in the narrow basal leaves with few hairs, and in the colour and proportions of the flowers.

Pulicaria vulgaris DC. 18, 22. *P. undulata* DC. 171.—*Achyrocline glumacea* O. & H. 169. "High zone."—*Phagnalon scalarum* Schwf. 170. 9300 ft.—*Blumea lacera* DC. 3, 18.—*Conyza stricta* Willd. 173. 8000 ft.—*Crepis Rueppellii* Sch. & Bip. 19, 55, 165.—*Crassocephalum vitellinum* S. Moore. 168. "High zone."—*Lactuca rariflora* Fresen. 24, 164. 8000 ft.—*Picridium tingitanum* Desf. 59 *a*, *b*. 6400 ft.—*Guizotia Schultzii* Hochst. 172. 9300 ft.—*Bidens pilosa* L. 23.

REPRODUCTIVE MECHANISM IN LAND FLORA.

I. Sex Theory (*concluded*).

By A. H. Church, M.A.

Once fertilization had been reduced to a question of nuclear fusion, further advance rapidly followed the detailed cytological examination of nuclei—more particularly in animal somata, in which these structures are often much larger and more clearly differentiated in construction than they are in plants. The nuclear chromatin was resolved into *chromosomes*, and the individuality of these units was clearly demonstrated (Van Beneden, 1883, *Ascaris*) [1]. To this was added the recognition of their specific constancy in number, as presenting in normal mitosis of cell-division an equational division. A curious 'heterotype' division in the production of animal gametes was distinguished by Flemming (1887), with the added information that after such a heterotype division the number of chromosomes on the mitotic spindle was diminished one half. Hence this stage came

[1] *Cf.* the historical record of these years in Wilson (1896), *The Cell in Development and Inheritance*, pp. 296, 206 (2nd Edit. 1899).

to be distinguished as a 'reducing-division' (Van Beneden), but is now preferably termed *meiosis* (Farmer and Moore, 1905). In the animal kingdom this process was naturally interpreted as implying a certain preparation for the subsequent sexual fusion, which would by the union of two such 'half-nuclei' again make good the somatic number of the new zygote. This interpretation has long held the field, though to a botanist it seems curious to see such meiotic phenomena in animal tissues still termed 'maturation-divisions'[1].

Corresponding examination of plant-material showed that a condition of meiosis, identical in all elaborated mechanism (synapsis, synizesis, diakinesis, bivalent chromosomes) also held good for the flowering plant[2]; a similar reduction to the haploid condition being found in the dividing mother-cells of the pollen-tetrads, and in the embryosac of the ovule—that is to say in the 'maturation' not of gametes, but in that of the asexual spores of the subaerial sporophyte. The counting of chromosomes in other types of Land Flora[3] enabled Strasberger (1894)[4] to formulate the sweeping generalization that all sporophytes were diploid in nuclear organization, and all gametophytes haploid. Conversely, the nuclear change was the causal factor which determined the somatic distinction of the two alternating generations of the land plant; so that the life-cycle was to be punctuated by the two processes of karyogamy and meiosis, rather than by the actual 'germination' of the new individual. Otherwise the full significance of these phenomena remained vague and even more mysterious. The sexual fusion was still regarded as all important, and karyogamy the climax of the individual life. The possible benefit of karyogamy was interpreted solely in terms of the possible gain of experience from blended lines of descent, both to the stabilization of the species and the personal benefit of the individual; but why the mechanism of nuclear behaviour in active divisions should be so meticulously curious remained a puzzle[5].

The explanation of meiosis came from an unexpected quarter, and the close of the nineteenth century marks the turning-point of a new phase. In 1900 Mendel's work on Hybridity was recovered, and his 'Law of Gametic Segregation,' deduced entirely form experimental observations, became generally familiar—*e.g.*, that a gamete (now known to be a nucleus) carries but one parental component for each structural 'factor.' The conclusion that a diploid zygote must contain sets in duplicate, one derived from each parent, is obvious; and the fact that a reducing division to a haploid state precedes animal fertilization immediately suggested that these haploid gametes had been so produced for this reason—meiosis being the actually visible

[1] Wilson (1899), *loc. cit.* p. 262; Doncaster (1920), Cytology, p. 78; Morgan (1922), 'ripening of the germ-cells.'

[2] Guignard (1891), Ann. Sci. Nat. p. 174.

[3] Overton (1893) for *Ceratozamia*; Dixon (1892) for *Pinus*; Humphrey for *Osmunda*; Farmer for *Pallavicinia* (1894).

[4] Strasburger (1894), *Annals of Botany*, p. 281.

[5] *Cf.* Wilson (1899), *loc. cit.* p. 287.

expression of the segregation in terms of material chromatin-substance. Many people toyed with the idea; the thing was to find what constituted a satisfactory proof[1]. Cytological evidence of such separation of distinctive chromosomes has been forthcoming, particularly in the gametogenesis of Insects, and the full proof lies in the complex experimental work of Morgan and his associates on the *Drosophila* fly[2]. No reasonable doubt now exists that this is the final solution. Further experimental work follows even the actual position of material factor-controls (genes) in the individual chromosomes, and the remarkable mechanistic changes in the latter preliminary to segregation[3].

The general result is that *Meiosis* increases in significance, as providing after all the essential key to the reproductive story, to which karyogamy is but the introductory step. It is clear that meiosis cannot ensue unless karyogamy has taken place; but, conversely, if there be no karyogamy there is no meiotic segregation; and this holds both ontogenetically and phylogenetically. Karyogamy may affect the life-experience of the new diploid individual, but meiosis produces new individuals, with a nuclear organization to a certain extent different from that of one another, as also from that of the parent organism. It is essentially a racial rather than a personal function[4]. The fact that such factorial determinants,

[1] Bateson (1904), Brit. Assoc. Report, p. 582; The first clear statement by Sutton (1902).

[2] Morgan (1922), Proc. Royal Soc. p. 197.

[3] In order that they may be segregated on the spindle mechanism, the corresponding chromosomes of the paternal and maternal inheritance must associate in pairs (synizesis). Further details are required as to the how, when, and why of the 'pairing,' the means by which they move or are moved and find their mate, their mode of nutrition and growth. The problem of pairing and segregation may be simply illustrated by taking, say, two shillings, two florins, two half-crowns, two pennies, and two half-pennies to express 5 P and 5 M chromosomes of unequal value and possibly form-details in a diploid (10) nucleus,—putting them in a purse to indicate karyogamy, and emptying this on a table, then arranging the coins so that the fingers of two hands may *simultaneously* withdraw or segregate a similar set of the 5 coins in the manner of a meiotic spindle-mechanism. It will be found impossible to do this unless the units are first 'paired.' But whether the members of each pair lie end to end, or side by side, or slightly overlap, is immaterial so long as the tractor mechanism can be properly applied. Hypotheses of conjugation, mutual influence, or exchange of chromatin appear as relics of an older sex theory demanding some sort of fusion or chemical action. Pairing is not required before the nucleus is ready for segregation, and hence may be optional in the zygote or somatic nuclei. Chromosomes appear as soft masses based on a skeletal framework of denser colloid suspended in a less dense colloidal medium; so that the possibility in such a mechanism of error, variation, or failure in the process would appear to be considerable (*cf.* 'crossing over'); but the wastage of gametes and younger stages is always on a liberal scale in Nature, far beyond that of experimental work.

[4] The possible chances of new combinations of chromosomes with their linked factors is 2^n, where n is the haploid number, implying as many gametes carrying a slightly different inheritance.

expressed as material particles in the minute chromosomes of a plant or animal reduced to minimum equipment, must begin to approach the limitations of even molecular dimensions [1], affords an interesting view of the possible limitation of the bulk-relations of both plant and animal forms on the world's surface; as also that progressive refinement and specialization of the genes in the chromosomes may have been tending to reduce their mass in higher organism with its multitudinous linked factorial complexes [2]. It also indicates the vast difference between such intimate racial mechanism and the grosser activities of somatic differentiation, and the mechanism of material transfer in space, to which human conceptions of sex were first applied.

The special interest of the reproductive mechanism of the higher vegetation of the land lies in the fact that their meiotic exchanges are wholly restricted to the land-form (sporophyte), while karyogamy is relegated to the archaic and increasingly depauperated gametophyte individuals [3]; while a clear distinction must be drawn between such racial mechanism and wholly subsidiary and secondary details of sex characteristics in the older sense of the word. The progressive land-form of the alternation has secured the more important part of the nuclear cycle. In this respect meiosis no longer appears convincing as a mere preliminary stage in the elaboration of gametes; it is the central feature of all racial evolution and progression. The reason why the cytological cycle of the higher plant should be so strikingly different from that of the higher animal remains to be explored. But clearly it is not likely to be explained by reading the story of the animal into that of the plant. The anthropomorphic method is again a useless survival. Putting wholly on one side the case of the highly complex heterotrophic and wholly secondary 'animal,' one must trace from the beginning the story of the simplest autotrophic plant-organizations.

[1] Morgan (1922), *loc. cit.* p. 196.

[2] *Drosophila* as a mediocre fly is estimated at some 2000 genes, collected in 4 unequal chromosomes (haploid number). The common Fern (*Nephrodium*) has 72 chromosomes (haploid). The mitotic spindles of Diatoms and Peridines may show a large and still indefinite number. In such unicellular organisms the chromosomes may well act as genes (cf. *Surirella*, 64, Peridines to 200).

[3] Such 'depauperation' is merely a morphological conception. In higher plants the gametophytes are wholly parasitic and supplied with high-grade food, so that a soma becomes unnecessary. The small output of reproductive cells is again an expression of reproductive efficiency, as problems of wastage have been solved.

SUPERFLUOUS NOMINA CONSERVANDA.

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

The list of *nomina conservanda* adopted by the Vienna Congress (1905) was prepared by Dr. Harms in 1904. It does not seem to have occurred to anyone that a list of exceptions to Rules, drawn up before the Rules themselves had been fixed, might possibly require revision. At all events, the list was not revised, and it includes numerous *nomina conservanda* which are wholly superfluous, since they would in any case be adopted under the International Rules. This is due to the fact that, for one reason or another, the corresponding *nomina rejicienda* are invalid.

Dr. Rendle (Journ. Bot. 1912, 129) has pointed out that Patrick Browne's genera were not effectively published in his *Civil and Natural History of Jamaica*, since Browne's descriptions are of species only (Art. 38). Consequently nine *nomina conservanda* which appear in the list solely on account of earlier names given by Browne are superfluous. Some of the American genera published in Loefling's *Iter* (1758) are invalid for the same reason. Thus Loefling (*op. cit.* 183) gave descriptions of three species of *Calceolaria* Loefl. but no generic diagnosis. Hence *Hybanthus* is the accepted name for the genus in question under the Rules, and it need not have been placed on the list of *nomina conservanda*. In other cases, however, Loefling added generic descriptions, as in *Diodioides* (*op. cit.* 201, as a synonym of *Spermacoce*).

Some of the *nomina conservanda* are superfluous because the corresponding *nomina rejicienda* were published in synonymy (Art. 38), or as subgenera or sections (Art. 49). In other cases the *nomina rejicienda* are invalid because they duplicate accepted names (Art. 51, 2°), because they were published not as *generic* but as *vernacular* names, or because they were merely proposed tentatively by authors who did not themselves adopt them, which is equivalent to "citation in synonymy or incidental mention" (Art. 37, 38; Journ. Bot. 1922, 137, 262). In the case of *Vernonia* Schreb. the "corresponding" *nomen rejiciendum, Behen* Hill, is not even congeneric, but is a synonym of *Centaurea* L., being based primarily on *C. Behen* L.; and *Crassocephalum* Moench. is no longer regarded as being congeneric with *Gynura* Cass.

I append a list of thirty-two superfluous *nomina conservanda* arranged according to the causes of invalidity of the corresponding *nomina rejicienda*. Some of the *nomina conservanda* appear twice; thus *Lachnanthes* is inserted in table I. with reference to the synonym *Gyrotheca*, and in table IV. in respect of *Heritiera*. Each genus is prefixed by the running number given in Dalla Torre & Harms, *Genera Siphonogamarum*. Further superfluous names will doubtless come to light in the future.

I. Nomina rejicienda *unaccompanied by generic descriptions.*

739. PHILODENDRON Schott (1829).—*Baursea* Hoffmgg. (1824).
1161. LACHNANTHES Ell. (1816).—*Gyrotheca* Salisb. (1812).
1292. ELEUTHERINE Herb. (1843).—*Galatea* Salisb. (1812).
1410. PLATANTHERA L. C. Rich. (1818).—*Lysias* Salisb. (1812).
1490. SPIRANTHES L. C. Rich. (1818).—*Ibidium* Salisb. (1812).
1971. CECROPIA L. (1759).—*Coilotapalus* P. Br. (1756).
2717. XYLOPIA L. (1759).—*Xylopicrum* P. Br. (1756).
3276. WEINMANNIA L. (1759).—*Windmannia* P. Br. (1756).
3877. MUCUNA Adans. (1763).—*Zoophthalmum* et *Stizolobium* P. Br. (1756).
4264. TRIGONIASTRUM Miq. (1860).—*Isopteris* Wall. (1832).
4297. SECURINEGA Comm. ex Juss. (1789).—*Acidoton* P. Br. (1756).
4472. OMPHALEA L. (1759).—*Omphalandria* P. Br. (1756).
5271. HYBANTHUS Jacq. (1760).—*Calceolaria* Loefl. (1758).
5338. LÆTIA Loefl. ex L. (1759).—*Thamnia* P. Br. (1756). *Guidonia* P. Br. (1756); Loefl. Iter, 190 (1758).
7534. STEMODIA L. (1759).—*Stemodiacra* P. Br. (1756).
8399. PSYCHOTRIA L. (1759).—*Myrstiphyllum* et *Psychotrophum* P. Br. (1756).

II. Nomina rejicienda *published in synonymy.*

492. RHYNCHOSPORA Vahl (1806).—*Triodon* L. C. Rich. (1805).
924. HETERANTHERA Ruiz et Pav. (1794).—*Phrynium* Loefl. (1758).
1697. ERIA Lindl. (Aug. 1825).—*Pinalia* Buch.-Ham. (Feb. 1825).
4195. TRICHILIA L. (1759).—*Halesia* Loefl. (1758).
6513. HALENIA Borkh. (1796).—*Tetragonanthus* S. G. Gmel. (1769).

III. Nomina rejicienda *published as subgenera or sections.*

471. FIMBRISTYLIS Vahl (1806).—*Iria* L. C. Rich. (1805), subgen.
739. PHILODENDRON Schott (1829).—*Baursea* Hoffmgg. ex Reichb. (1828), subgen.
2202. FAGOPYRUM Moench (1794).—*Helxine* L. (1753), sect.

IV. Nomina rejicienda *duplicating accepted names.*

1161. LACHNANTHES Ell. (1816).—*Heritiera* J. F. Gmel. (1791), non Ait. (1789).
1587. STELIS Swartz (1799).—*Humboltia* [sic] Ruiz et Pav. (1794), non *Humboldtia* Vahl (1794), quæ nomen prius est (teste Swartz in Schrad. Journ. ii. 240; 1799).

2775. LAURELIA Juss. (1809).—*Pavonia* Ruiz et Pav. (1794), non Cav. (1786).
8716. SCÆVOLA L. (1771).—*Lobelia* Adans. (1763), non L. (1753).

V. Nomina rejicienda *not generic but merely vernacular names.*

670. DESMONCUS Mart. (1824).—*Atitara* Marcgr. ex Juss. (1804).
4137. PROTIUM Burm. f. (1768).—*Tingulonga* Rumph. (1755).

VI. Nomen rejiciendum *suggested but not adopted by the author who published it.*

1490. SPIRANTHES L. C. Rich. (1818).—*Gyrostachis* Pers. (1807).
Persoon merely threw out a suggestion that the three species *Neottia spiralis*, *N. æstivalis*, and *N. tortilis* might represent a new genus (*Gyrostachis*), but he himself retained them in *Neottia.*

VII. Nomina rejicienda *not congeneric.*

8751. VERNONIA Schreb. (1791).—*Behen* Hill (1762).
9405. GYNURA Cass. (1825).—*Crassocephalum* Moench (1794), quod vel genus proprium (S. Moore in Journ. Bot. 1912, 209) vel *Senecionis* subgenus (subgen. *Gynuropsis* Muschler in Engl. Jahrb. xliii. 21, 26, 38; 1909) est.

VIII. Nomen rejiciendum *composed of two unhyphened names* (Art. 54, 3°).

60. CYMODOCEA Konig (1805).—*Phucagrostis major* Cavolini (1792).
Græbner (Engl. Pflanzenr. Potamoget. 147; 1907) cites "*Phucagrostis major* Cavol." as a generic name. Even if Kuntze (Rev. Gen. i. 744) was correct in his contention that the generic name was *Phucagrostis*, the name is invalid, since in that case the description is not generic but specific.

IX. Nomen rejiciendum *rejected under Art.* 46.

3518. HUMBOLDTIA Vahl (1794).—*Batschia* Vahl (1794).
Batschia Vahl, Symb. iii. 39, and *Humboldtia* Vahl, *op. cit.* 106, were published simultaneously. Vahl deliberately replaced *Batschia* by *Humboldtia* in his Corrigenda and Addenda, and his choice cannot be modified by subsequent authors.

FERNS GROWN UNDER BOTTLES.

By Charles E. Benham.

The fact that ferns are apt to appear within a bottle, the mouth of which has been planted an inch or two almost anywhere in garden soil, has been verified by so many people that it has become quite familiar. The apparently obvious explanation is that the very minute spores of ferns are practically omnipresent, but lack appropriate conditions for development except when thus ensured protection, together with the warm and moist environment provided for by the extemporized glass-house of a bottle. There are, however, difficulties in regarding this as a full and complete solution of the problem—at any rate, unless microscopic examination of garden-soil reveals the actual presence of the spores in sufficient abundance to account for successful germination in any chosen square inch. At the same time it must be frankly admitted that it is not easy at first sight to suggest any alternative to the universal hypothesis that the bottle-grown ferns must be derived from wind-wafted spores, yet it does not quite follow that because an alternative explanation is not easily arrived at none exists.

Be that as it may, the phenomenon—if such a term be permissible—of the appearance of ferns in inverted bottles is sufficiently curious to demand a little closer examination by botanists than it has at present received. An example in the town of Colchester is particularly striking, not only because of the large scale on which it was carried out, but also because the county of Essex is by no means a fern country, and in recent generations is even less so than ever.

Some years ago in Colchester an Italian restaurant-keeper, who had an extensive garden at the back of his premises at the top of the High Street, conceived the idea, through some perversion of æsthetic taste, of "ornamenting" his flower-beds by placing his empty Chianti bottles as a bordering. Over a thousand of these were planted, mouth downwards, in rows, as a substitute for box-edging along the sides of each garden-path. To his surprise, as time went on he found a fern springing up in almost every one of the bottles. The ferns were of great variety, and here and there a violet or some other wild flower would appear. The property has now changed hands, but the bottles have remained, and there is scarcely one in which there is not a fern that has developed so profusely that its fronds are literally packed into the small space available for their growth, so that it would be impossible to remove the ferns without breaking the bottles—a course which I am personally of opinion the time has now come to adopt in the interests of both art and horticulture.

After inspecting this unique fernery in the year 1922, and finding on enquiry that the garden in question has never been previously used for fern-culture, I made the experiment with an inverted bottle in my own garden, choosing an uncultivated spot beneath some lime and chestnut trees. In about 12 months a spleenwort duly appeared in the bottle, and, before it had grown to such dimensions as to imperil its removal, I transplanted it and kept it under a bell-glass, where it has now grown to good proportions, putting forth many fronds.

There have never been any spleenworts previously in the garden for at least twenty years past, before which it was a potato-patch.

In a small front garden in a street in the east of Colchester I recently saw two inverted glass vessels which had similarly conjured up ferns from the soil. A well-known resident at Harwich more than 40 years ago used to produce ferns grown under similar circumstances (under glass ginger-beer bottles), and any horticulturist could no doubt supplement these examples with plenty of others of the same sort.

The bottle is not an essential, for I observed the other day at the railway viaduct which spans the Colne near Colchester that one of the long stone ledges that terminate the arched portion of the piers was adorned from end to end with a row of hart's-tongue ferns, a species by no means plentiful in this district. The ledge is high up and faces west, and is therefore exposed to the winds that prevail most of the year—a fact which would seem to fit in with wind-borne spores.

Everyone knows how frequently polypodiums and other ferns are to be seen peeping out from crevices in the sides of little-used country wells and in similar places, where wind-wafting seems the natural explanation.

Thinking that still better success might attend experiment if the chances of germination were increased, I tried last year the test of taking a handful of garden surface-soil, placing it in a pail of water, stirring it repeatedly, and finally planting the floating scum on sterilised soil under a glass jar as covering; the spores being light would naturally tend to be among the scum, and the chances of obtaining ferns would obviously be greatly increased by adopting this method, instead of relying upon the selected single inch covered by a bottle-mouth. The conjecture seems to be justified, for as the result a large group of fern-prothalli has appeared; but time is still required for the development of fronds. It may be mentioned that a good deal of moss also put in an appearance, as might be expected.

With regard to the causes of the appearance of ferns under such circumstances as those mentioned above, I must leave it to botanists who have made more careful investigation of the subject to say whether the wind-wafting explanation is entirely sufficient to account for all the facts observed. Have they by microscopic examination ever discovered in ordinary garden-soil the presence of spores in anything like the abundance which would be implied by the effects so constantly met with? If not, are they prepared to explain the disguise which renders the spores unidentifiable? Is it proved beyond all question that in no case can a portion of a spore germinate under appropriate conditions? If not, is it too fanciful to conjecture that the vital principle may even reside in some particle of a spore which itself is ultra-microscopic? One knows what the text-books teach, but one also remembers that it was not long ago that the text-books laid it down as an unimpeachable canon that atoms were indivisible. The phenomena of radic-activity have shown us how Nature brushes aside the dicta of text-books; and a question arises as to whether it may not be that in the origins of organic life itself we are too much bound by academic dicta in the province of biology, as we were in that of chemistry before the research work of recent years made us reconsider some of the doctrines we had held to be unimpugnable.

SHORT NOTES.

AUDIBLE SPORE-DISCHARGE BY GEOPYXIS COCCINEA. This fungus, collected in Leckwith woods, has been exhibited regularly in the National Museum of Wales, Cardiff, during the past two months (Jan.–March 1920). A glass dish has been kept inverted over the specimens in order to preserve their freshness. The phenomenon of puffing or simultaneous bursting of the asci has several times been observed on removing the cover. On one occasion recently the cloud of spores was observed as usual, and its formation was accompanied by a sound resembling that of effervescence. De Bary (quoted by Buller in *Researches on Fungi*, i. 258) is said to have observed audible spore-discharge in an ascomycete, but no other observation of the kind seems to have been recorded.—H. A. HYDE.

[Mr. Ramsbottom directs our attention to a note by Dr. R. E. Stone, of Ontario, "upon the audibility of Spore Discharge in *Helvella elastica*" (Trans. Brit. Mycol. Soc. vi. 294), and to a similar occurrence in *Otidea leporina* recorded by R. B. Johnstone (*op. cit.* vii. 86.—ED. JOURN. BOT.]

GARCINIA CORYMBOSA. *Garcinia*? *corymbosa* Wall. Cat. n. 4859, from Silhet, was not accounted for in Fl. Brit. Ind. nor in DC., Monogr. Phan., and appeared as an unreduced species in Ind. Kew. Choisy (Descr. Gutt. Ind. 38) suggested that it might belong to the *Hippocrateaceæ*, and Guillaumin (Ann. Mus. Col. Marseille, sér. 2, ix. 101) actually identified it with *Discostigma corymbosum* Panch. et Seb., which is a native of New Caledonia! The type-specimen in Wallich's Herbarium, however, is undoubtedly a *Viburnum*, and is named *V. odoratissimum* Ker by T. Anderson, but in my opinion is not conspecific with the plant represented in Bot. Reg. t. 456, though closely allied. I suspect that it may be an undescribed species, but cannot afford the time to revise *V. odoratissimum* and its allies. Inspection of the material in the Kew Herbarium suggests that more than one species was included under *V. odoratissimum* by C. B. Clarke in Fl. Brit. Ind. iii. 7.

A second *Garcinia corymbosa* was published in Journ. Linn. Soc. Bot. xlv. 273 (1921), as a new combination for *Discostigma corymbosum*, as follows: "*Garcinia corymbosa* Sebert & Pancher (sub *Discostigma*)." Such a mode of citation is apt to mislead the unwary, and to disguise the fact that a new combination is being proposed.—T. A. SPRAGUE.

OBITUARY NOTICES.

THE *Times* of Jan. 28 announced the death in Paris of MARCUS MANUEL HARTOG (whom it somewhat oddly describes as "the authority on natural history"), who was born in London, Aug. 19, 1851. He was educated at University College, London, and Trinity College, Cambridge, where he graduated M.A. in 1874, taking a first class in the Natural Science Tripos. In the same year Hartog went to Ceylon as assistant to Thwaites, where he made a special study of the floral structure of the *Sapotaceæ*; on his return to Europe in 1877 he pursued the subject at Kew, the British Museum, and Paris, embodying the results in a paper in this Journal for 1878 (pp. 65, 145). Hartog then became demonstrator and lecturer on Natural History at the Owen's College, Manchester; in 1882 he proceeded to Queen's (later University) College, Cork, where he successively held the appointments of Professor of Natural History and of Zoology; he vacated the post in 1921, when he was made Emeritus Professor. Hartog was a man of varied interests; his publications include papers on zoology and general biological science, notably one on "Some Problems of Reproduction" in the *Quarterly Journal of Microscopical Science* for 1891, and one on the Irish Dialect of English. He published important papers on the *Saprolegniaceæ* in Trans. Royal Irish Academy in 1895 and in the *Annals of Botany* at various dates, and while at Cambridge translated from the French of H. Baillon *The Natural History of Plants.*

ROBERT PACE BROTHERSTON, who has been for many years well known to readers of the *Gardeners' Chronicle* by name or initials, was born at Ednam, Berwickshire, on Feb. 7, 1848. After occupying various gardening posts in England and Scotland, he became in 1874 head gardener to the Earl of Haddington at Tyninghame, East Lothian—a post which he held until his retirement towards the end of last year. Chiefly self-educated, Brotherston had a good acquaintance with Latin and French and some knowledge of Greek; he possessed a large and valuable collection of books, chiefly connected with gardening and botany, which were sold at Sotheby's at the end of last month. Although not a botanist, Brotherston was keenly interested in wild flowers and plant-lore, and paid special attention to vernacular plant-names, of which he had a large collection. His communications to the *Gardeners' Chronicle* extended for a long period up to his death—and indeed after, for an article on *The Florist* appeared in the issue of Jan. 26; this was the last of many interesting papers dealing with the history of early horticultural literature, of which Brotherston had an extensive and accurate knowledge. Unfortunately it will not be easy to trace these, for the index to the *Chronicle*, over-elaborate in some respects, does not include the names of contributors. Besides numerous papers of the kind indicated, Brotherston was author of an attractive little volume—*The Book of Cut Flowers*—which appeared in 1906. Prizes had been offered by the Royal Caledonian Horticultural Society for the best essays on the employment of plants for decorative purposes, with a view to the production of a manual on the subject: the first prize was obtained by Brotherston, and this book—which is interesting and practical and has an excellent index and a useful bibliography—was the outcome. A notice of Brotherston, accompanied by a portrait, appeared in the *Gardeners' Chronicle* of September 1, 1923, on the occasion of his retirement from active work; this was republished in the issue for January 5, after his death, which occurred on December 21st at Old Scone, Perth, at the house of his son-in-law.

We note with regret the announcement of the death, at Copenhagen, on April 21, of Professor Eugene Warming in his 83rd year (he was born Nov. 3, 1841). Warming was Professor of Botany at the Copenhagen University from 1885–1911, and previously at the University of Stockholm from 1882 to 1885. His work covered a wide area; he had visited and studied the vegetation of tropical South America as well as the Arctic flora in Greenland and Northern Norway. His earlier work was on morphology and anatomy—mention may be made of his classic investigations on the *Podostemaceæ*; but he is better known to modern students from his work on plant geography and œcology. He was a pioneer in this branch, and his book on *Œcology of Plants* (1895), which was later published in English, is a well-known text-book, as is also the English translation of his *Systematic Botany*. He was elected a foreign member of the Linnean Society in 1888, and had received other honours from his botanical colleagues at home and abroad.

We also have to regret the death, in his 86th year, of Professor Otto Nordstedt, which occurred at Lund on the 6th of February; we hope to publish a fuller notice at an early date.

REVIEWS.

James William Helenus Trail: a Memorial Volume. Aberdeen; printed for the Subscribers at the Aberdeen University Press. 8vo, cloth, pp. 331, 3 plates, map.

Shortly before the death of the late Professor Trail in September 1919, a number of his old students proposed to present him with his portrait, "to mark their appreciation of his long and distinguished connexion with the University of Aberdeen, which he had then served for over forty years, and their personal indebtedness to his person and character." This proposal was replaced by a scheme for a a memorial carried out by a large and representative committee; this took the double form of a mural tablet, which has found place in the new Department of Botany, and of the Memorial Volume now before us, which suitably has for its frontispiece a picture of the tablet. The execution of this was entrusted to Miss Alice B. Woodward; it contains a portrait-head, with accessories indicating or suggesting various subjects connected with the Professor's career; "The head is surrounded by a wreath of oak leaves, acorns, and galls, the galls of Scotland having proved a favourite object of [his] studies. The decorative panel represents a dragon-fly and a water-spider, representative of his zoological interests, and a bladder-wort, representative of his work on the Scottish Flora. The water-spider was the object of one of his earliest, the bladder-wort of one of his last, contributions to biological literature. The whole is flanked by two Brazilian palms, the family which was the subject of his first important scientific work after his return from the Amazon."

The tablet bears the suitable inscription: "He knew and loved the realm of living nature and inspired successive generations of students with his desire for deeper knowledge."

The contents of the volume consist of a biographical sketch, a chronological bibliography, and a Flora of the City Parish of Aberdeen. Upon the last, of which a detailed notice by Mr. J. R. Matthews is appended, Trail had been engaged for many years. The MS. of the systematic portion, which had been prepared for the Aberdeen Natural History Society, was complete; the introductory portion was contained in four unfinished MSS. which it was found possible to bring into a connected account. It may be hoped that arrangements have been made for the issue in separate form of this important contribution to Scottish botany.

The Biographical Sketch, which is accompanied by an excellent portrait, taken in 1903, owes much of its interest to the fragment of an autobiography, extending to about 1870; this has been brought down by his widow to the date of his death. The sketch of Trail's life by Sir David Prain, published in this Journal for 1919 (pp. 318–21) may be referred to for a general estimate of his work; the Memorial Volume, of course, contains many details, both as to his earlier life and his professional career, which could find no place in a brief biography.

The bibliography is unusually full, including, besides his important papers, syllabuses of lectures, reports of various kinds, the short notes contributed by Trail to the *Annals of Scottish Natural History*, which he edited from its beginning in 1892 to its close in 1921; there are also references to books in which he collaborated or wherein his help is acknowledged, and to papers in which plants collected by him are described, or contained descriptions of plants named in compliment to him. Among his contributions, biographies are very numerous; we note by the way that those of F. Buchanan White (Journ. Bot. 1895, 49) and H. M. Drummond-Hay (*op. cit.* 1896, 132) find no place, but this may be because these botanists were more fully treated in the *Annals*, as duly indicated.

Ed. Journ. Bot.

Flora of the City Parish of Aberdeen.

(Memorial Volume, pp. 57–326.)

Among the older generation of teaching botanists the field-excursion was one of the chief instruments whereby students were brought into touch with the life-story of the common plants of their own district. Prof. Trail, as many know, either as former students or as readers of his Presidential Address to the Botanical Section of the British Association Meeting, 1910, on the Study of the British Flora (reprinted in this Journal, 1910, pp. 241–250), was an ardent exponent of the study of plants in their natural surroundings, and in these days, when so much botanical teaching has to be done in the laboratory, it is refreshing to turn to the pages of the volume before us—to be taken out of doors, as it were, to learn so much that is

interesting about the coming and going of plants in a small area which Prof. Trail had studied with the minutest care for a period of fifty years. For the Flora of the City Parish of Aberdeen is more than a mere list of plants and localities; it is, rather, the story of the changes which the flora of that area has undergone in so far as these could be ascertained from early records and by comparison with existing conditions beyond the city's limits.

In the introductory pages, a description of the changes in the topography of the parish forms an interesting historical account (pp. 57–81); in this we are told that the ground on which the city has grown was formerly rough, and until about 1750 Gordon's description, written in 1661, was still accurate: "After you pas a myll without the towne the countrey is barran lyke, the hills craigy, the plains full of marreshes and mosses, the feildes are covered with heather or peeble stons, the corne feildes mixt with thes bot few." During the last 150 years, however, these conditions have become greatly modified. Cultivation of the ground surrounding the old town, the growth of the town itself, the draining of lochs and marshes, the making of roads and railways, are but a few of the works of man which have profoundly altered the general aspect of a native vegetation. The changes brought about in the indigenous flora are described (pp. 81–90), and to the author's own knowledge, numerous moor and marsh plants, such as *Erica cinerea*, *Pinguicula vulgaris*, *Pedicularis palustris*, *Empetrum nigrum*, *Narthecium Ossifragum*, and others, had disappeared within the parish since 1869, the year he began to trace the changes he describes.

But if native species were lost to the parish, the altered conditions favoured many which are followers of man. The account of the Alien Flora (pp. 90–98) forms not the least interesting reading in the volume, since it gives the matured views of a close observer on the status of many species commonly admitted as native in other quarters of Britain. The local conditions have been carefully analysed, and distinctions are drawn between denizens and sub-denizens, colonists and sub-colonists and different kinds of casuals, according to their probable mode of origin. It is the inclusion of a very large number of aliens—immigrants to the district—that provides the most noteworthy feature in the systematic record of the flora following the introduction. This record (pp. 99–326) includes well over 1000 names, of which about half are the names of native species, while the remainder are the names of aliens. In no small number of families—Papaveraceæ, Cruciferæ, Leguminosæ, Umbelliferæ, Compositæ, Chenopodiaceæ, Gramineæ, and others—the number of aliens recorded well exceeds the number of native species admitted. It is not often in a British Flora that a place is given to the Grape Vine, the Orange, the Potato, or the Tomato. Such "rubbish-heap" botany is usually and rightly excluded from most published lists, yet in Prof. Trail's volume it is the observations on these casuals of town-refuse that are often most interesting and instructive. So far north as Aberdeen, *Lycopersicum esculentum* growing on rubbish-heaps will ripen its fruits in favourable years, but the seeds do not mature

to reproduce the species. *Galiusoga parviflora*, which spreads so rapidly over parts of England, appeared in Aberdeen in 1893. The arrival of *Matricaria suaveolens* in the north-east of Scotland more than 20 years ago is described (p. 197), while the establishment of *Elymus arenarius* (probably not native in this part of Scotland) is related on pp. 318–320. But space forbids any further reference to detail.

The inclusion of so many aliens can only be understood and appreciated by keeping in mind the very special aim of the author, which was to provide a full and definite record which might be helpful to others in future years in measuring the extent and rate of further changes, whether in the reduction of species or in the arrival of new immigrants.

A word of praise is due to the various members of the Committee entrusted with the publication of the volume for the obvious care that has been taken in the preparation of the work for the press. The subordination of the alien species by printing their names in small italics in contrast to the heavy type used for the names of indigenous species is a pleasing feature in the arrangement of the systematic record. An index to generic names completes what is in some ways a rather unique Flora.

J. R. MATTHEWS.

The Flower-Seeker: a Simple Guide to the Identification of Wild Flowers. By FORSTER ROBSON. With 16 plates and numerous illustrations, pp. viii, 184. Cassell & Co. 3*s.* 6*d.* n.

WITHOUT going so far as to endorse the statement of the publishers that by the help of this little book "any flower met with may readily be identified," we admit that it is the best of the little "keys to wild-flower knowledge" that have hitherto been provided. The method is not altogether new, and is open to the usual (and inevitable) objections; the plants are arranged according to the localities in which they are supposed to grow and the seasons—in this case only spring and summer—in which they flower; this would be all very well if they would behave themselves in accordance with the limits laid down, but they don't! We open at p. 12 and find *Salvia Verbenaca* placed as a "spring flower" of "mountains, hills, and chalk downs," yet we last saw it (in June) by the Thames at Hampton Court and by the roadsides at Dorchester, Oxon. Colour forms a secondary ground of classification, and here again we should have not looked for *Scutellaria minor* under "purple," though "sometimes pink" is added later. As a whole, however, both habitats and colours are carefully done, and convey the impression that the author knows plants and their ways.

After the keys, in which terms are used for inflorescences that are explained with the aid of illustrations, come brief popular descriptions commendably free from inaccuracies—we should not have described the petals of *Saxifraga granulata* as pointed (pp. 61, 64),

and *Trifolium hybridum* is not "a pink variety" of *T. repens* (pp. 66). But the book as a whole is very carefuly done, and the typographical arrangement is excellent; there are half-tone illustrations (from photographs) of varying merit—"Rough Chervil" represents *Anthriscus sylvestris* rather than *Chærophyllum temulum*. The only defect of the volume is in the page-headings; the title of the book and that alone appears throughout, so that when you open it you do not know whether you are in fields or in woods, in marshes or on mountains. It is strange that publishers of Messrs. Cassells' experience should overlook an important detail of this kind.

Discours de la Nature de l'Air; *De la Vegetation des Plantes*. By EDME MARIOTTE; pp. xiii, 118, Paris, 1922. Gautier-Villars et Cie. 3 fr.

Two classical essays by Mariotte, published in 1679, as a small volume which must now be somewhat rare, have a special value. The first contains a statement of Boyles's Law, while the second bears much the same relation to Plant Physiology as does the English work of Nehemiah Grew (1682) to Plant Anatomy. In the volume of 1679 the 'Premier Essay de la Vegetation des Plantes' precedes the one on Air, and begins in the form of a letter to M. Lautin, a parliamentarian of Burgundy, thus suggesting that Mariotte wrote it in response to some demand for his views. The text has been critically analysed and abstracted by Sachs, at some length, in his *History of Botany*, and in this form is generally accessible to English readers (Eng. Trans. 1890, pp. 461–470). It presents a vivid picture of the chemical and physical ideas of this time, the age of Newton, Malpighi, Grew, and Camerarius. Mariotte displays the acumen of a modern scientist, though handicapped by lack of detailed information as to the structure of the plant. The present volume is a reprint of these two essays in a handy form, which should be welcome to all physiologists interested in the history of their science.

A. H. C.

BOOK-NOTES, NEWS, ETC.

AT the meeting of the Linnean Society on 20th March, Professor Teïzo Niwa exhibited trees dwarfed by Japanese methods and read the following explanation:—For decoration both herbs and trees are grown in Japan in pots. The trees may be arranged for (1) foliage, (2) for flowers, and (3) for fruit. These products are usually proportionate to the size of the trees. They are grown from seed or by grafting, or from native places, but conifers are not easy to graft, and are usually taken from wild specimens or seed. *Prunus Mume*, very popular as a flowering tree for the New Year, is usually grafted. In some cases the specimens are cut down like Chrysanthemums. When well-shaped branches occur, they are often layered, and when

rooted the branch is severed and potted. Pine-trees are kept in a dry and barren soil; during the first few years plants subjected to the dwarfing treatment retain the normal size of their leaves, then they diminish to the dwarf size. Certain plants produce both flower- and leaf-buds for the following year, such as *Prunus yedoënsis* which blooms in April at Tokyo, followed by leaves; by May or June the rudiments of flowers and leaves are already formed for the next year, and by forcing they may be made to flower in January, or even with difficulty by the previous November. Before forcing, if the leaves have not naturally fallen, the specimens are enclosed in an ice-chamber to act as in artificial winter, after which they are gradually brought into heat and light. After flowering it is usually planted out, to restore its strength, and feed well; later potted in barren soil to induce the production of flower-buds. As a rule, dwarf plants must have a naturally dwarf character, but one of the cherries, *Malus floribunda* Sieb., is not a true dwarf, but is kept small by pruning. Long experience is needed in dwarf production, especially when applied to the tiny gardens so much esteemed in Japan. The chief plants grown as dwarfs may be set out as: *Chamæcyparis obtusa* Sieb. et Zucc., several varieties, *Juniperus chinensis* L., *Cryptomeria japonica* Don., *Pinus densiflora* Sieb. et Zucc., *P. parviflora* Sieb. et Zucc., *P. Thunbergii* Parl., *Acer palmatum* Thunb., *Malus floribunda* Sieb., *Prunus yedoënsis* Mast., *P. Mume* Sieb. et Zucc., *Hamamelis japonica* Sieb. et Zucc., not to specify those grown for fruits.

AT the meeting of the same Society on April 3, Mr. W. O. Howarth read a paper on "The Occurrence and Distribution of *Festuca ovina* L., sensu ampliss. Hack. in Britain." The forms of *F. ovina* L. recognised by collectors in the various herbaria in Britain are described under the species: (1) *F. capillata* Lam. and var. *hirtula*; (2) *F. ovina* L. and vars. *hispidula* and *firmula*; (3) *F. supina* Schur.; (4) *Festuca* nom. nov. (a species for which a new name has been necessitated as a result of the recognition of *F. duriuscula* L. as a form of *F. rubra* L., sens. ampliss. Hack.); (5) *F. glauca* Lam. and var. *cæsia*. (1) (2) and (3) are narrow-leaved forms, the diameter not more than 0·5–0·6 mm. In (1) the transverse section of the lamina is rounded, subepidermal sclerenchyma continuous, 5 vascular bundles; in (2) it is more keeled, discontinuous sclerenchyma, 5 v.bs.; in (3) as 1 but 7 v.bs. The leaf-sheaths of (1) and (2) are split at the base; of (3) entire in the lower third or fourth part. In (1) the ligule auricles are prominent and prolonged slightly upwards; in (2) scarcely prominent; in (3) finely or coarsely ciliate. In (1) the panicle is narrow, spikelets campact and small, glumes at most sharply pointed. In (2) it is more open especially at anthesis, with spikelets larger, and glumes with distinct awns more than 1 mm. long. The larger-leaved forms (4) and (5) are easy to distinguish by the absence in (4), the presence in (5) of a waxy bloom on the leaves and spikelets. *F. capillata* occurs from existing records in seventeen of Watson's vice-counties, mainly in the more mountainous regions of N. Wales and the Pennines, scattered throughout the southern counties. *F. ovina* is much more widely distributed

and occurs on both calcareous and siliceous soils, on the former, however, forming much more extensive tracts of grassland. *F. supina* appears, so far at any rate, to be absent from England, and its variety *vivipara* occurs only sparingly. *F. glauca* is only known under cultivation, but its var. *cæsia* occurs in a few localities, notably in the Bristol area, around Bury St. Edmunds (Smith's original find) and in Notts. Vivipary is common in all the above forms except perhaps *F. glauca*. The viviparous *F. supina* is certainly a distinct race, true to this character under cultivation. It may prove that there is still another pure race as suggested by Jenkin (Aberystwyth), but viviparous states of the other species can be recognized, and are probably brought about by conditions affecting the growth of the panicle during the early stages of its development, such as extreme humidity associated possibly with lower temperatures or drought.

At the meeting of the British Mycological Society on March 15th, Miss E. J. Welsford gave an account of the diseases of Cloves in Zanzibar; the disease known as "sudden death" appears to be due to a fungus attacking the roots. Miss M. Brett described the relative abundance of sclerotia and conidia in a species of *Aspergillus* (*Sterigmatocystis*) when grown on various media. Dr. J. Peklo summarised the results of the investigations of Satava and Kruis on the life-history of Yeasts: according to these workers endospores on germination give rise to colonies of small cells (reduced forms) quite different from the normal form of the yeast; the normal form arises from the fusion of two endospores or their derivatives. Mr. A. D. Cotton gave an outline of the main results obtained in the Plant Disease Survey of the Ministry of Agriculture during the last seven years. Mr. E. Clement described his cultures of Orchids obtained without the aid of the fungus extracted from the roots, and exhibited culture tubes and pots of *Odontoglossum* and *Cattleya*.

On April 9 the first expedition organized by the Scientific Expeditionary Research Association left Dartmouth for the South Pacific on the S.Y. 'St. George,' Commander David Blair, R.N.R. The 'St. George,' which is a schooner of 1100 tons with auxiliary steam-power, will call at Madeira and Trinidad and, passing through the Panama Canal, stop for one day each at Malpelo and Gorgona, arriving about May 26 at Albemarle Island (Galapagos), where a week's stay will be made. Easter Island will next be visited (June 14), and—should it be necessary to coal at Valparaiso—either Juan Fernandez or Masafuera. After returning to Easter Island to pick up the shore party, the vessel will next visit Pitcairn Island, where nine days will be spent about the end of July, Mangareva and Rapa (2 weeks each in Aug.), the Australs (3 weeks in Sept.), Cook Islands (12 days in Oct.), Tahiti (8 days), Fakarava (17 days, Oct.–Nov.), and the Marquesas (3 weeks, Nov.–Dec.). On the voyage home a stay of a few days will be made at Cocos Island. The estimated duration of the voyage is 10–11 months, of which nearly half will be spent in port. The scientific staff comprises eight members, the botanist being Mr. L. A. M. Riley, B.A. The first set of botanical specimens is destined for the Kew Herbarium, and the second for the British Museum.

To the *Botany of Iceland*, edited by L. Kolderup Rosenvinge and the late E. Warming (Copenhagen—vol. ii. part 7, pp. 251–324, 17 figs., 1923), has been added a section on the *Freshwater Cyanophyceæ of Iceland* by Johs. Boye Petersen, containing an account of all that is known about its blue-green algæ. So long ago as 1861, Dr. Lauder Lindsay made a careful search of literature and published a *Flora of Iceland*, in which he recorded seven species of *Cyanophyceæ*. Until recently not much advance has been made; the present work contains 119 species. The author discusses the characters which are of chief importance in the classification of this group—the shape of the apex of the trichome, the presence or absence of a calyptra, the reaction of the sheaths when chlor-zinc-iodide is applied, the untrustworthiness of trichome-thickness and of pigmentary colours. He prefers to work on living material, failing which he finds dried specimens to be much more satisfactory than those preserved in alcohol or formalin; the latter has a harmful effect upon the cell-contents. Critical notes are appended to the species; six novelties are described, and information is given as to the occurrence of the plants in relation to the hot springs of the island.—A. G.

Dr. Wainio, who has changed the spelling of his name to Vainio, has been long recognized as a leading expert on tropical lichens. Among his more recent studies has been the determination of Philippine lichens entrusted to him by the American botanists in these Islands. Two American collectors, W. A. Setchell and H. E. Parks, have sent him lately a series of lichens from the Island of Tahiti, and the results of his work are now published (Univ. Calif. Pub. Bot. xii. n. 1, pp. 1–16, 1924). A comparatively short list, it is of great importance, a large proportion of the species being new, as were those of the Philippine Islands; most of them are corticolous. Our knowledge of lichens from the far East is all too scanty, and we welcome heartily this addition to the Flora. *Exsiccati* have been issued of the Philippine lichens, and it may be hoped that the Tahiti plants will also thus be made available for students.—A. L. S.

In the *Annales de Parasitologie humaine et comparée* for October last, MM. Ota and Langeron have a paper on "Nouvelle classification des Dermatophytes," in which, after discussing the systematic position of these fungi, the various morphological characters displayed by different species are considered. A new subfamily of the Conidiosporaceæ of Vuillemin is erected for their reception, and, by having regard to the presence or absence of various peculiar "accessory reproductive organs" which complicate matters in this group, the authors contrive to emend the genera *Trichophyton* Malm. and *Evidermophyton* Lang, and propose *Sabouraudites* (with *Aleurocloster*, *Closteramma* and *Aleuramma* as subgenera), *Bodinia*, and *Grubygella* as new genera; *Endodermophyton* Cast. is not emended. A new genus of Gymnoascaceæ, *Ateleothylax*, is also diagnosed. The authors say truly that "en réalité, actuellement, la diagnose des genres des champignons dermatophytes est très vague, car elle n'est pas basée sur la méthode botanique." Doubtless this contribu-

tion adds much to our knowledge, but it would be difficult to uphold the proposed classification as a natural one. No details of culture are given, though the fungi must be grown in culture in order to study them. In the methods of culture adopted (? Sabouraud's medium) certain structures are present in some of the fungi and absent from others; genera proposed on this basis seem rather more artificial than usual.—J. R.

THE *Bulletin de la Société Botanique de France* for Nov.–Dec. 1923 (issued Feb. 28) contains notes on Corsican plants by M. Aylies, in which *Roripa silvestris*, *Gagea pratensis*, and *Gymnadenia albida* are added to the flora of the island; Paul Dop concludes his study of *Premna*, describing a new species (*P. Thorelii*) and reducing (as *P. humilis*) Merrill's genus *Pygmæopremna*; Bouly de Lesdain continues his Lichenological Notes; Aimée Camus writes on her genus *Digastrium*, based on *Ischæmum fragile* R. Br. and only collected by Banks and Solander; A. Chevalier discusses "L'origine géographique et les migrations des Bruyères"; F. Gagnepain continues his descriptions of Euphorbiaceæ (*Acalypha*, *Excœcaria*, and *Gelonium*); J. Pavillard writes on *Peridineæ*; A. Guillemin on the *Styracacæ* of Eastern Asia; M. Mascré discusses "Les cellules à anthocyane des pétales d'*Anagallis*" and P. Dangeard "Le Cytoplasme dans l'albumen du Ricin"; G. Deflandre has a "Flore algologique de Haute-Savoie"; M. Gandoger writes on *Strychnaceæ* and *Restiaceæ* with reference to Herb. Sonder, which he possesses: R. Henry publishes additions to the Moss-flora of the Vosges; and A. Davy de Virville discusses the occurrence of *Dumortiera irrigua* at Bagnères-de-Bigorre.

Malpighia (fasc. ix–xii) is throughout the work of the editor, Prof. Buscalioni, either individually or in combination, as indeed is (save for one paper) the volume of which it is the concluding part. It is mainly occupied by a continuation of the "Studio monografico sulle Specie americane del Gen. *Saurauia* Willd.," in which G. Muscatello coöperates; in conjunction with G. Roccella the Professor writes on "Le emissione di ossigeno attivo da alcuni organi delle piante"; and he himself is responsible for "Frammenti di Storia della botanica contemporanea italiana," which is entirely concerned with Prof. Pirotta. The part containing the above-named fascicles, which reached us towards the end of March, is dated 1923; it concludes volume xxix., which ends in the middle of a sentence; there is a title-page for the volume, bearing the same date, but fasc. i–iv are dated 1921, fasc. v–viii, 1922. The monograph of *Saurauia*, which began in vol. xxiv. (dated 1911) and is still in course of publication, is remarkable for the length of its descriptions and of the period of its continuance; up to the present 61 species have been described, many of which are new; of these no Latin diagnoses are provided, so that they are not entitled to recognition. It will in any case be somewhat difficult to ascertain the exact date of their publication, as the individual parts bear no definite dates and the indication of the year is not always to be relied on.

IN *Rhodora* (January) K. M. Wiegand makes "Some Changes in Nomenclature," one of which affects a British species. He names as "*Agrostis tenuis* Sibth. forma *aristata* (Parnell) forma nov." the "*A. vulgaris aristata* Parnell, Grass. Scot. 34 (1842)"; adding "Until it is decided whether *A. capillaris* L. is *A. vulgaris* With. as held by Hitchcock and Schinz, or some other species as held by several botanists, including Piper, we may follow Piper in using the next oldest name that applies unquestionably to *A. vulgaris*, namely *A. tenuis* Sibth. This name antedates *A. vulgaris* With. by two years." O. A. Farwell discusses "The correct name for Spearmint," which, in accordance with general use, he decides to be *Mentha viridis* L.

THE *Nuovo Giornale Botanico Italiano*, dated January (xxxi. no. 1), contains a paper by Dr. Zenari on the systematy of *Sonchus oleraceus* L. em. and *S. asper* Hill. He apparently regards these as aggregate species, the former containing *S. ciliatus*, *S. lacerus*, and *S. subbipinnatifidus*; the latter *S. runcinatus*, *S. spinosus*, *S. viridis*—a new form—and *S. decipiens*. In the "ciclo" of *S. asper*, *S. spinosus* bears the same relation to *S. runcinatus* as *S. lacerus* does to *S. ciliatus* in the "ciclo" of *S. oleraceus*. Mr. Lacaita continues his studies of *Onosma*, and Dr. Passerini writes on the action of the powder of *Pyrethrum cinerariifolium* Trev., on insects and arthropods. The *Bullettino* of the same Society for February (March 5) contains descriptions by Dr. Chiovenda of new Angolan plants collected in Angola by Dr. Mazzocchi-Alemanni; two new genera—*Angoseselli* (Umbelliferæ Seselineæ) and *Otocephalus* (Rubiaceæ Anthospermeæ)—are included. R. Ciperri begins a series of studies of Ustilagineæ, mainly occupied with the genus *Entyloma*.

THE *Orchid Review* (April) contains a note by Colonel Godfery on *Cephalanthera Schulzei*, a natural hybrid between *C. ensifolia* and *C. grandiflora* (*pallens*), which might occur in England in any locality where the two species grow together. The description and figure are from Bull. Soc. Bot. France, 1923, where the plant is described by Mdlle Camus.

IN his *Marine Algæ from Easter Island* (C. Skottsberg: Nat. Hist. of Juan Fernandez and Easter Island—Uppsala, vol. ii. pp. 247–309, 50 figs., 1924) Dr. F. Börgesen provides us with a valuable account of the tidal algæ of a lonely and surf-beaten island in the Pacific Ocean. Sixty-eight species are recorded, many of which grow epiphytically on larger algæ. The character of the flora is subtropical and shows a remarkable correspondence with that of the West Indies. Seventeen new species are described; the figures which illustrate the text are very helpful.—A. G.

THE *Kew Bulletin* No. 2 (April) contains a continuation of Mr. Hutchinson's "Contributions towards a Phylogenetic Classification of Flowering Plants," in which the genera of Gymnosperms are treated; "Notes on Tasmanian Hepatics," by the late W. H. Pearson, with figures and descriptions of new species; and a note on the "simple triplet microscope" with which Ralfs carried out the work

for his British *Desmidiaceæ*, which was specially made for Borrer; by him it had been presented to Ralfs, who in turn gave it to E. D. Marquand, whose son has given it to Kew. It will be remembered that Robert Brown's simple microscope is in the National Herbarium.

Dr. Druce has distributed as an "interim report" of the Botanical Exchange Club (pp. 2, 1*s*., Buncle, Arbroath) a description of *Rumex arifolius* All., new to Britain, which was found by him on Lochnagar, at the altitude of 2000 ft.

We learn that Prof. F. E. Fritsch has undertaken to rewrite the the late G. S. West's *Treatise on the British Freshwater Algæ*, published in 1904 by the Cambridge University Press, which has long been out of print.

Messrs. C. T. White and W. D. Francis publish in Proc. R. Soc. Queensland (xxx. no. 5; Dec. 21, 1923) a second instalment of "Contributions to the Queensland Flora." Numerous new species are described and figured, including a new genus of *Proteaceæ*—*Placospermum*—which constitutes a new tribe of the subfamily *Grevilleoideæ*.

In the *Gardeners' Chronicle* for March 29, Dr. Kraenzlin figures and deseribes a new genus—*Lothiania*—based upon *Masdevallia mordax* Rchb. f., and named in honour of "the Marquis of Lothian who provided the means for Miss Florence Woolward's well-known monograph of *Masdevallia*."

The *Bulletin of the Torrey Bot. Club* for February contains a paper (with figures) on "Internal Sori of *Puccinia Sorghi*," by Mabel A. Rice; "New Species of *Uredineæ*," by J. C. Arthur; "Fossil Fruits from the Eastern Andes of Colombia" (with figures), by E. W. Berry.

"Blighted!" Such is the heading under which the *Evening Standard* (April 3) publishes the following depressing account: "Ten square miles without a wild flower. Such is the melancholy state of the Black Country district of Rowley Regis, seven miles from Birmingham. Flowers abound in Haden Hill Park, and in private gardens. A lad who picked flowers in the park for purposes of botany at school told Rowley Regis Urban Council the sad fact, and several members of the council agreed with him. His 'crime' was forgiven, but teachers are to be warned not to ask pupils to bring flowers to school. A councillor suggested the use of artificial blooms." The touch of humour which is seldom absent from the saddest things is present in the councillor's suggestion that "artificial blooms" would be suitable "for purposes of botany"; it was somewhere in the Midlands that a councillor objected on the ground of extravagance to the purchase of four gondolas for the lake in the newly-formed park: "Get a pair," he said, "and allow Nature to take her course."

NEW TROPICAL AFRICAN LENTIBULARIACEÆ.

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

The following new species are described from specimens collected in Angola by Mr. J. Gossweiler and now in the Herbarium of the British Museum (Natural History).

Utricularia bracteata, sp. nov.

Herba amphibia glabra; *foliis* ante anthesin evanidis ignotis; *stolonibus* paucis e basi scapi ortis; *scapo* erecto glabro tenuiter filiforme terete; *bracteis* aliquanto supra medium applicatis, supra lineari-acutis, infra leviter truncatis; *bracteolis* lanceolatis; *pedicellis* erectis vix longioribus quam bracteæ; *floribus* 2–3, in racemo brevissimo terminale confertis; *calycis* lobis inter se subæqualibus obtusis late ovatis, basi imbricatis; *corolla* flava, labio superiore anguste oblongo, basi ampliato, quam lobus superus calycis multo longiore, labio inferiore rotundato integro calcari parallelo, palato valde elevato labio inferiori parallelo, calcare cite ad angulum rectum projecto basi latissimo et prominente angulato, lobum inferum corollæ æquante; *filamentis* fere rectis vix crassis; *loculis* antherarum distinctis; *stigmate* subsessile; *capsula* ovoidea lobis calycis accrescentibus subæquante.

Hab. Ganguellos, Angola. "Amphibious, in moist meadows in sparsely green spots in company with small Eriocaulaceæ, not frequent, only seen at Dongo near R. Cuebe, flower yellow." No. 13; 11, 12, 18, 34 are conspecific and from the same region.

Scapes 12–20 cem., bracts 2–2·5 mm. long, corolla 7–9 mm. long, calyx-lobes (during flowering) 2·5–3 mm. long, slightly accrescent in fruit.

This species is of interest because it shows close affinity with the little-known Australian species *U. Baueri* R. Br. It differs, however, in the length and shape of the spur, the horizontal upper lip, and the colour of the flower. Both belong to the small group of species in which the bracts are attached near the middle.

U. bifidocalcar, sp. nov.

Herba aquatica glabra; *stolonibus* filiformibus simplicibus; *foliis* omnibus similibus ad unum segmentum reductis sæpius ampulliferis; *ampullis* longe pedicellatis lentiformibus ore obliquo, labiis cucullum brevem formantibus, antennis parum ramosis; *scapo* breve erecto filiforme; *bracteis* minutis lanceolatis; *bracteolis* 0; *floribus* terminalibus solitariis; *calycis* lobis subæqualibus oblongis rotundatis inferiore paullum longiore; *corolla* aureo-flava, lobo superiore erecto obtuso ad basin valde lato, plano triangulato quam lobum superiorem calycis longiore, lobo inferiore brevi late triangulato subacuto, palato minute papilloso valde prominente bigibbo, calcare ad basin lato, fere recto labio inferiore corollæ parallelo, ad apicem minute bifida; *filamentis* incurvatis supra valde expansis; *loculis* antherarum distinctis; *ovario* subgloboso; *stigmate* parum pedunculato; *capsula* ignota.

Hab. Angola. "Aquatic, flowers golden yellow, Micango-Kuhiriri." J. Gossweiler 15 *b*.

Scape 5 ccm., bladders of moderate size 1–1·5 mm. in diam. Corolla 1 cm. long, upper lip 5 mm. long, calyx-lobes 1·5–2 mm. long.

Only one specimen collected. The affinity of this species appears to be with *U. odontosepala* Stapf, but it is at once distinguished from this plant by the entire calyx-lobes.

U. triloba, sp. nov.

Herba glabra; *foliis* ante anthesin evanidis ignotis; *stolonibus* ramosis tenuissimis; *ampullis* minutissimis sparsis longe pedicellatis, ore obliquo, labio superiore cucullum latum formante ad angulos ambos antennis ramulosis præditis; *scapo* filiforme erecto; *bracteis* ad medium affixis, supra late lanceolatis; *bracteolis* 0; *floribus* 1–4, longe pedicellatis in racemo terminale breve confertis, pedicellis erectis; *calycis* lobis late obtusis ovatis prominenter venosis superiore paullo longiore et ad basin leviter gibboso; *corolla* aureo-flava, labio superiore erecto suborbiculare quam lobus superius calycis multo longiore, labio inferiore trilobo lobis ovatis obtusis, palato minute papilloso pubescente valde elevato, labio superiore corollæ parallelo, calcare quam lobus inferius multo breviore, ad apicem tricuspidato, externe glanduloso; *filamentis* crassis erectis supra valde expansis; *loculis* antherarum confluentibus; *stigmate* subsessile.

Hab. Angola. "Submerged aquatic cæspitose, flower golden yellow. R. Campulua-Evito." J. Gossweiler 22.

A single specimen only. Scape 25 ccm., pedicels 5–10 mm. long, corolla 6 mm. long, spur 3–4 mm. long, calyx-lobes 1 mm. Lower flowers 1·5 ccm. apart, bladders (as seen) very minute, less than ·5 mm. in diam.

A very distinct species not very close to any previously described species and belonging to the little group characterised by having the bracts attached somewhere near the middle.

U. falcata, sp. nov.

Herba aquatica glabra; *stolonibus* a basi scapi tenuibus ramosissimis, bifariatim ramulosis ramulis simplicibus sæpe ampulliferis; *ampullis* parvis, breve pedicellatis sublenticularibus, ore ad pedicellem approximato, labio superiore leviter cucullato, antennis parvis vel obsoletis; *scapo* glabro erecto filiforme; *bracteis* oblongis subacutis, ad basin affixis; *bracteolis* 2; *floribus* 1–4, longe pedicellatis in racemo terminale confertis; *calycis* lobis subæqualibus ovatis paullo accrescentibus, inferiore breviore obtuso, superiore longiore acuto; *corolla* aureo-flava, labio superiore erecto ovato rotundato basin versus angustato quam lobus superius calycis longiore, labio inferiore angustato rotundato integro, palato leviter elevato labio superiori parallelo, calcare retro directo pedicello parallelo, labium inferus subæquante ad apicem leviter curvato; *filamentis* brevibus rectis vix crassis; *loculis* antherarum subdistinctis; *stigmate* subsessile; *ovario* ovoideo.

Hab. Angola. "Aquatic, flowers golden-yellow, Mirango-Kuhiriri." J. Gossweiler 15; 1 *a*, 27 are conspecific.

Scape 10–12 ccm., ramuli of the stolons about 1 mm. long, diameter of bladders about the same, pedicels 5–7 mm., calyx-lobes 2·5–3 mm., corolla 6–7 mm. long, lower lip and spur about equal, 5 mm.

This species has no very close relations among the African Utricularias, but it is very similar to the Asiatic *U. bifida* L. This latter is, however, a terrestrial form and no bladders have been described. There are also slight differences in the flowers of *U. falcata*, which justifies its description as a separate species. Unfortunately no fruiting-material is available. In fruit *U. bifida* is characterised by recurved pedicels and accrescent calyx-lobes. The name "falcata" indicates the characteristic profile of the flower.

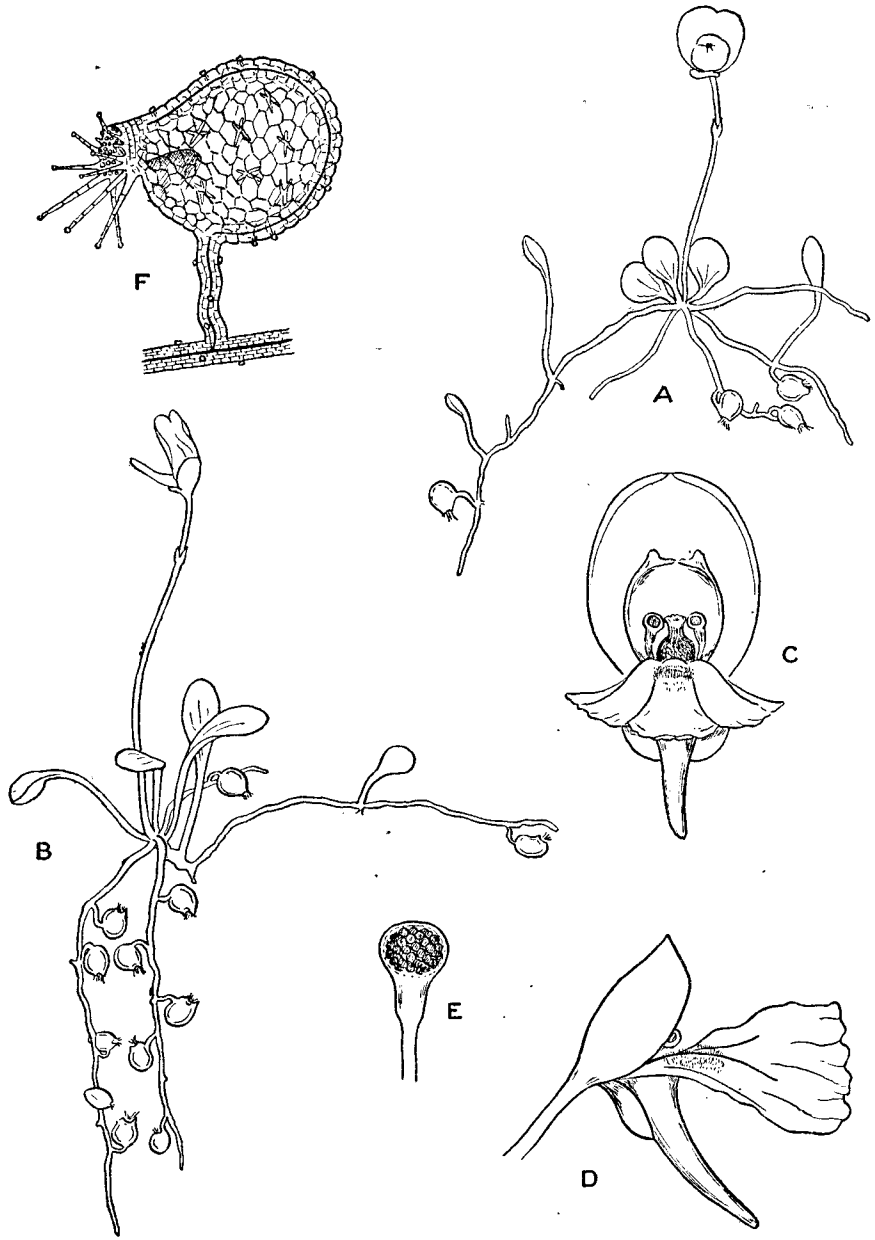
U. Philetas, sp. nov. (See figure, p. 164.)

Herba minutissima amphibia stolonifera; *foliis* 3–4 a basi scapi vel secus stolones sparsis, spathulatis rotundatis integris, basi cuneatis anguste crassiusculis, supra viridibus, infra sine colore; *stolonibus* tenuibus simplicibus; *ampullis* paucis secus stolones sparsis, lenticularibus, longe pedicellatis ore obliquo, labio superiore cucullum conspicuum formante et antennis glandulosis multicellularibus prædito, labio inferiore obsoleto; *scapo* erecto filiforme tenuissimo; *bracteis* ad basin pedicellarum minutissimis lanceolatis basifixis; *floribus* sæpius solitariis, rarius 2–3, terminalibus pedicellis brevibus; *calycis* lobis imparibus, lobo superiore in fructu valde accrescente latissime rotundato subtruncato lobo inferiore multo minore; *corollæ* colore ignota, labio superiore ovato-acuto ad apicem profunde emarginato, quam lobus superius calycis dimidio breviore, labio inferiore latissimo patente leviter 3–5 fido, palato paullo elevato gibboso, calcare fere recto tenue acuto labium inferus æquante; *filamentis* rectis supra paullo tumidis; *antheris* minutis unilocularibus; *granis* pollinis paucis globosis; *stigmate* breviter pedicellato; *capsula* oblato-globosa.

Hab. Angola. "Unique." "Regio Duque de Braganza, loco Rianzondo Waterfalls, proximum flumen Luala. Altitude 900 m." J. Gossweiler, no number.

An extremely minute amphibious herb with scapes from 9–25 mm. long. The average plant has a single flowered scape of about 12 mm. long. Pedicel 2–3 mm., lower corolla lip and spur about 2 mm. long, stamens minute, ·5 mm. long. Leaves, including the petiole, 3–5 mm. long by 2 mm. broad. Bladders ·5–·7 mm. in diam., upper calyx-lobe, in fruit, 2 mm. long and broad.

A plentiful supply of this plant was sent home, in spirit, by the collector. Closely associated with it were a moss and a species of *Nostoc* which formed small spherical colonies round the stolons. Ripe seeds appear to be rare. The chief interest of this plant lies in its small size. In this respect it is most nearly approached by the recently described *U. Lilliput* Pellegrin from Tonkin, but this species loses its leaves before flowering, and the average plant of *U. Philetas* is probably smaller. In habit *U. Philetas* closely resembles *U. eburnea* R. E. Fr., from N.E. Rhodesia, but this species is 15 ccm. high. The name Philetas is that of a classical poet-philosopher who is said to have been so tiny that he wore weighted boots to prevent the wind blowing him away.



R.D'O. G. del.

UTRICULARIA PHILETAS, sp. nov.

A and B. Complete plants, ×4·5. C. Flower from front, ×16.
D. Flower, side view, ×16. E. Anther, ×40.
F. Bladder, ×24.

U. magnavesica, sp. nov.

Herba aquatica glābra; *stolonibus* paucis e basi scapi ortis teretibus parum crassis; *foliis* ramosissimis, segmentis setosis rigidis divaricatis; *ampullis* magnis breviter pedicellatis lenticularibus, ore obliquo lato, labiis vestibulum breve formantibus, antennis parvis integris ciliatis; *scapo* valde filiforme terete tortilo, basi bracteis 2 parvulis prædita exempta ebracteata; *floribus* terminalibus solitariis vel 2–3, longe pedicellatis; *pedicellis* in fructu supra tumidis; *calycis* lobis subæqualibus ovatis subacutis; *corolla* extus purpureo-flava, intus aureo-flava, labio superiore suborbiculare obtuso quam lobus superius calycis longiore, labio inferiore latissimo rotundato integro calcari parallelo, minute papilloso, calcare breve lato fere recto obtuso quam labium inferum breviore; *filamentis* incurvatis supra expansis; *loculis* antherarum confluentibus; *stigmate* stipitato; *capsula* anguste ovoidea quam lobi calycis multo longiore; *semina* plana angulata, late alata.

Hab. Angola. "Cæspitose aquatic, scapes ascending, frequently twining on neighbouring grasses, flowers large purplish-yellow externally, golden-yellow inside. Along the R. Tusija, confluent of the R. Cuito." J. Gossweiler 16; 14, 20 *b*, 38 are all conspecific.

Scapes twining 8–15 ccm., leaves about 5 mm. long and 6 mm. apart, bladders very large up to 5 mm. in diam. Pedicels 15–20 mm. long, calyx-lobes 1–2 mm. Corolla 6–7 mm. long, upper lip 2–4 mm. long.

A very distinct species with unusually large bladders. Its affinities are with *U. reflexa* Oliv. and with *U. exoleta* R. Br., which it resembles in the ring of stolons at the base of the scape.

Genlisea angolensis, sp. nov.

Herba amphibia; *scapo* erecto terete crasso glabro; *bracteis* fertilibus paucis triangulatis; *foliis* a basi scapi confertis, tenuissimis glaberrimis anguste spathulatis cuneatis petiolatis, valde reticulate venosis; *utriculis* cylindraceis magnis, ovoideis, tubo longo præditis; *floribus* longe pedicellatis in racemo terminale laxo confertis; *pedicellis* in fructu erectis glabris filiformibus; *calycis* lobis subæqualibus lanceolatis acutis basi gibbosis, extus minute puberulis; *corolla* (non visa) violacea; *capsula* globosa, pilis brevissimis glandulosis copiose prædita.

Hab. Angola. "Leaves green, submerged, corolla violet. Skirting the marshes of the Cuiriri R. near Muene Chipipa, March 1906." J. Gossweiler 2841. The same collector's 3588 from Kuartiri and 43 without definite locality are conspecific.

Scape 50–60 ccm., 2 mm. in diam. below, leaves up to 6–8 ccm. long including the petiole and 1 cm. broad. Utricles 1 cm. long by 3 mm. in diam., tube some 3–4 ccm. long, arms about the same length. Pedicels up to 4 ccm. in fruit, capsule 3–4 mm. in diam., calyx-lobes 1–2 mm. long.

This species differs from *G. africana* Oliver, to which it is closely related in the much larger and narrower leaves, glabrous scapes, and puberulous calyx-segments.

THE TYPE SPECIMEN.

By A. S. Hitchcock

(U.S. Department of Agriculture).

The Description controls the Selection of a Type Specimen.

European botanists who are not accustomed to use the type method in the application of names have in some cases received the impression that this method places the emphasis on the specimen rather than upon the description. On the contrary, the specimen or specimens cited with the original description are used to interpret the description. Normally a single specimen cited is to be taken as the type, but should an error be demonstrated the description prevails. This is set forth in the Type-basis Code of Botanical Nomenclature recently formulated by the Committee on Nomenclature of the Botanical Society of America (*Science*, n.s. 53 : 312–314, 1921). Under Section 2, Article 3, occurs the following paragraph: "1. The type specimen interprets the description and fixes the application of the name, hence, primarily the description controls the selection of the type." In the following case illustrating this point, the single cited specimen is not the type since it disagrees with the description and an error can be domonstrated.

Arundinella Palmeri Vasey ined.; Beal, Grasses N. Amer. 2; 76, 1896. The only specimen mentioned is, "Mexico, Palmer, 12." A figure (no. 20, A, a) accompanies the description. An examination of Palmer's no. 12 (from Jalisco, Mexico, in 1886) shows that it does not agree with the description. Among other things, for example, the awn is hooked and not twisted, while the description calls for an awn twisted below as in the figure. Such a marked discrepancy indicates an error of some sort. In order to discover what it was and to determine, if possible, the actual type (the specimen from which the description was drawn), the specimens of Professor Beal's herbarium in the herbarium of the Michigan Agricultural College were examined. Among these was a specimen, sent by Vasey to Beal, which bore the name *Arundinella Palmeri* Vasey in Dr. Vasey's handwriting, and again in Professor Beal's hand. This agrees with the description and illustration of *A. Palmeri* and hence is the type, though it is not the number cited. This specimen is Palmer's no. 526, from Jalisco, Mexico, in 1886, not Palmer's no. 12 from the same place. Palmer 526 (the type of *A. Palmeri*) and Pringle 1746 (which is also *A. Palmeri*) are cited by Beal under *Arundinella pallida*. Palmer's no. 12, which is *A. Berteroana* (Schult.) Hitchc. & Chase, is not represented in Beal's herbarium.

This case is presented in the hope that it may serve to dispel the idea that selecting types is merely a mechanical process, and to show that typification belongs to the realm of taxonomy.

THE VEGETATION OF STEEP HOLM.

By R. C. McLean, D.Sc., F.L.S., University College, Cardiff, and H. A. Hyde, B.A., National Museum of Wales, Cardiff.

The little limestone island of Steep Holm in the Bristol Channel has been visited from time to time by many naturalists and has been known for more than a century as the home of several interesting plants, but we cannot find that any general account of its vegetation has ever been published. Opportunities of a visit do not often present themselves, but in June of last year we were able to accompany a party of the Cardiff Naturalists' Society on a day's excursion to the island, under very favourable conditions. The following notes are the product of that reconnaissance.

Turner, "the father of English botany," in his famous *Herbal* (1562) speaks of plants growing "in a certain island between the far parts of Somerset and Wales"—probably Steep Holm, as *Smyrnium* is mentioned; Lobel certainly visited the island in 1581 (Parkinson, Theat. Bot. p. 1015) but the only plant he recorded was "Blitum fruticosum maritimum" which is usually identified with *Suæda fruticosa*, though this plant does not now occur and it seems very improbable that it did in Lobel's time. *S. fruticosa* occurs at Penarth, and Storrie (*op. cit.*) recorded it also from Steep Holm, but this we regard as an error, probably due to confusion with a stout form of *S. maritima*. The only botanist known to have visited Steep Holm during the seventeenth century was Ray's correspondent, Newton (c. 1688), but a certain amount of information as to the plants existing earlier can be gathered from the "Account Book" mentioned below. We have been unable to discover any record of visits by botanists during the succeeding century until 1773 when Mr. (later Sir) Joseph Banks, accompanied by the Rev. John Lightfoot, made a careful examination of the flora at the outset of a tour through Wales. A full account of their results is given in Bæstrom's (*errore* Solander's) transcription of Lightfoot's *Journal of a Botanical Excursion in Wales*, published in this Journal for 1905 (pp. 297–306) by the Rev. H. J. Riddelsdell. Almost all the outstanding features of the present flora are alluded to in the Journal. The famous Peony, however, was not discovered until 1803, while the Rev. T. Butler visited the island in or before 1845 and procured the first known specimen of the Plantain peculiar to the island. In 1877 a small party of the Cardiff Naturalists' Society stayed overnight at the inn then existing: an account of their visit (Storrie, Trans. Cardiff Nat. Soc. ix. p. 53) mentions the names of twenty species of plants observed. The same Society paid another visit (this time in greater numbers) in 1883 and a list of 149 species resulted (*tom. cit.* p. 89). In 1891 *The Flora of Steep Holmes* received more extended treatment in a paper by the Rev. R. P. Murray (Journ. Bot. 1891, 269), while a few additions were made by the Bristol Naturalists' Society in 1915 (Proc. Bristol Nat. Soc. 4th series, iv. 143).

The island is of carboniferous limestone, part of one of the folds to which the Channel owes its existence, and is plainly associated

geologically with the similar fold of Brean Down on the Somerset coast, from which it is three miles distant. It is about 24 acres in extent, nearly flat on the top, at a height of about 230 ft., and precipitous all round. The northern cliffs are, however, much more precipitous than those on the south side, where landing is practicable. The shape is oblong, about 2½ times as long as broad, with the narrow ends facing east and west. The west end is more or less unscalable, but at the east end there is a small beach of shingle, with a projecting spit running out some two hundred yards. This is the principal landing place, from which a path runs zig-zag up the cliff, past the ruined inn, to the plateau on top and thence round the island. The island was anciently inhabited by monks and in 1867 was fortified, the guns, batteries, and living quarters still remaining just as they were when abandoned in 1902. It has since been farmed, but this has also been abandoned; the island has been for many years without regular inhabitants, and its buildings are now ruinous. It is the property of J. Sleeman, Esq., to whom we were indebted for the necessary permission to land.

The vegetation of Steep Holm differs very considerably from that of the limestone uplands on either side of the Channel, apart altogether from the occurrence there of peculiar constituent species.

On the south side, the island presents from sea to summit a very broken and steep slope of rock and rocky talus which is almost entirely covered by a rather open and highly peculiar association which is dominated by *Iris fœtidissima* and *Smyrnium Olusatrum* (the latter freely rusted by *Puccinia Smyrnii* in both æcidial and teleutospore stages). Co-dominant with these are *Ligustrum vulgare* and *Rubus rusticanus*, while *Teucrium Scorodonia* is everywhere abundant. *Conium maculatum* also occurs in local patches. This is a remarkable collocation of species to cover such an extensive area. There are not many accessory species associated with the above, and such as occur are typical dry-soil species, for the most part equally at home on sand or limestone; the chief being:—

Geranium molle.
Geranium Robertianum var. *maritimum.*
Erodium cicutarium.
Lotus corniculatus.
Sedum acre.
Sherardia arvensis.
Filago germanica.
Senecio Jacobæa.
Anagallis arvensis.
Blackstonia perfoliata.
Cynoglossum officinale.
Festuca rigida.

When Banks and Lightfoot visited the island in 1773 they recorded this *Smyrnium-Iris* association as covering the whole top of the island. Since then culture has done away with it on the top of the plateau, and its place has been taken by a rough grassland, containing a good many weeds of cultivation. Here we find large patches of *Nepeta hederacea* and *Sedum acre* dominating considerable areas, while the general *Festuca* turf which otherwise covers the thin reddish drift-soil contains also:—

Ranunculus bulbosus et spp.
Vicia angustifolia.
Vicia lathyroides.
Primula veris.
Scrophularia nodosa.
Scilla non-scripta.
Agrostis sp.
Briza media.
Poa annua.
Poa pratensis.
Festuca duriuscula.
Bromus erectus.
Bromus mollis.
Lolium perenne.

A somewhat similar association may be seen on the drift-soil on the north side of the Brean Down. The northern and western sides of the island possess steep cliff-slopes and rocky ledges with abundant species. The chief grasses are:—

Avena pubescens.
Avena pratensis (near *longifolia*).
Festuca duriuscula.
Festuca ovina.
Brachypodium sylvaticum.

There are also frequent thickets of *Rubus*, almost entirely *R. rusticanus*, the common limestone bramble, together with *Iris fœtidissima* and an abundance of very robust *Brassica campestris* (*B. Rutabaga*), which can easily be seen from a passing vessel. This plant is very glaucous and probably gave rise to previous reports of the occurrence of *B. oleracea*. We did not see the latter species, nor did White and Murray in 1891; while in White's *Bristol Flora* Mr. Stuart Thompson's authority is quoted for the assignment to *B. campestris* of specimens labelled with the habit of *B. oleracea* in Herb. Clark, which were brought from the island about 1840. It seems therefore improbable that true *B. oleracea* occurs there. Bird manuring is heavy on these cliff slopes, which may account for the presence there, and there only, of a few ruderal species such as *Bellis perennis*.

The turf contains abundant associated Bryophyta, chiefly a few species of liverworts, of which a collection was made, and most of the saxicolous lichens were collected on this side. Here also is the habitat for the peculiar *Plantago Coronopus*, var. *Sabrinæ*, about which we have more to say below.

The cliff at the east end is not perpendicular in its upper parts, but slopes down at a practicable angle to the verge of a precipice some fifty to seventy feet high which fringes the small landing beach.

Here on this slope we find again the *Smyrnium-Iris-Ligustrum* association, but one part of the slope is covered by an even more curious grouping of *Allium Ampeloprasum*, *Ribes Grossularia*, *Hedera Helix*, *Primula veris*, *Ligustrum vulgare*, and *Phyllitis Scolopendrium*.

The following plants deserve special comment:—

Plantago Coronopus var. *Sabrinæ* (Cardew and Baker in Rep. (1911) Bot. Exch. Club, 1912, p. 28). This is the only peculiar plant on the island the status of which is unquestionable. The late F. N. Williams believed it to be identical with *P. Serraria* L., an Adriatic species (see Prodr. Flor. Brit. p. 364), but our re-examination of the floral structure confirms the opinion of the above-mentioned authors that Williams's view cannot be upheld. Seed has been secured and will be cultivated in Cardiff.

Allium Ampeloprasum. This species is dominant over about a quarter of an acre at the east side of the island. It is supposed by many to be a relic of early cultivation. In order to test this hypothesis the late John Storrie of Cardiff cultivated the plant in his garden for four generations and recorded that it showed no tendency to approach *A. Porrum* and remained totally unfit for food (Storrie, *Cardiff Flora*, p. 84). It was announced by James Newton to Ray and included in his *Historia* (ii. 1125; 1688) and *Synopsis* (1690, p. 165)—"In insula *Holms* dicta . . . copiose provenientem observavit *D. Newton*." It had been previously recorded however in the "Account Book of the Manor of Norton Beauchamp" c. 1625 as mentioned by Mr. J. W. White in the *Bristol Flora*. Even at that time it must have been abundant, as it was alleged to give the local rabbits such a flavour that they were uneatable. Notwithstanding rabbit browsage however, it has well maintained itself and shows no signs of approaching extinction.

Antirrhinum majus. Murray 1891 list. Also occurs, perfectly established, on Brean Down, with pink and white flowers.

Coriandrum sativum. *Fide* T. B. Flower in 1887 (quoted by Murray, 1891).

Euphorbia Lathyris. Apparently of irregular appearance. It was recorded with certainty from the south side as late as 1910 (specimen in Herb. Univ. Coll. Cardiff), but we failed to find it. Banks found only one specimen (Journ. Bot. 1905, 300). This may have been introduced, as often elsewhere, as a condiment, but the seeds were also formerly used as a narcotic and to stupefy fish, though this could hardly be done in the open sea.

Hyoscyamus niger. Scarce. Possibly a relic of monkish pharmacy.

Pæonia mascula Miller (*P. corallina* Retz). There is now (1923) a good patch, apparently better than in 1883 to judge by the contemporary illustration given in Trans. Cardiff Nat. Soc. vol. xv. In June all the plants were in full fruit and one in late flower. One cannot say how many individuals are concerned as the growth in the patch, or rather the two adjacent patches, is dense, but the whole area is roughly 5–6 square yards, on the very edge of the precipice. The island now being deserted, further interference will be very limited in amount, and the species is more likely to suffer from plant competition than from man. It is surrounded by a dense growth of *Smyrnium*, *Chrysanthemum Leucanthemum* and *Rubus rusticanus*, the last being the most dangerous aggressor to the Peony on its precarious perch. Another plant was noticed near one of the ruined buildings, presumably a transplantation. There are records of other sporadic individuals having from time to time appeared, but none were seen. The Peony was not seen by either Newton in the 17th century or Banks and Lightfoot in the 18th, though both saw the *Allium*. It was discovered c. 1803 by F. P. Wright of Hinton Blewett in Somersetshire, and first recorded in Turner and Dillwyn's *Botanists' Guide* (ii. p. 523) in 1805; a figure was published by Smith in *English Botany* (t. 1513) later in the same year; in 1834

the plant was nearly eradicated by destructive visitors from the British Association meeting at Bristol (Cybele Brit. vol. i. p. 99). Wright originally described it as "abundant in rocky clefts"; this has usually been regarded as implying a former wider distribution on the island. This however is incompatible with the silence of Banks and Lightfoot, who made a pretty thorough inspection of the island in 1773. We are inclined to think that Wright only implied that the plant was abundant in the clefts *in which it occurred* (a description which is still accurate) without any necessary implication of widespread distribution, and that the probability is that it has for long, if not always, been confined to the corner of the island in which it now occurs. If this be a correct idea, it would make the nativity of the species more probable, inasmuch as the spot can never, from the nature of the ground, have been close to any building or cultivation. Further, it is in accordance with the statement made to Wright and quoted in *English Botany* to the effect that the plant had been gathered on Steep Holm 60 or 70 years before 1803, *i. e.* 30 or 40 years before the visit of Banks and Lightfoot.

The following is a list of plants so far recorded from the island by various observers. For the identification of the cryptogams and the remarks thereon we are indebted to the kindness of Dr. W. Watson of Taunton ("a" appended to some names = abundant):—

Clematis Vitalba
Anemone nemorosa
Ranunculus acris
,, repens
,, bulbosus
,, Ficaria
Pæonia mascula
Papaver dubium
Fumaria capreolata
,, officinalis
Cheiranthus Cheiri
Barbarea vulgaris
Erophila verna
Cochlearia officinalis
,, danica
Sisymbrium Thalianum
,, officinale
Brassica oleracea
,, Rutabaga
,, Rapa *a.* sativa
,, arvensis
Diplotaxis muralis
Capsella Bursa-pastoris
Coronopus procumbens
Lepidium campestre
Cakile maritimus
Reseda Luteola
Viola sylvestris
Polygala vulgaris
Silene Cucubalus
,, maritima
Lychnis alba
,, dioica
Cerastium tetrandrum
,, pumilum
,, semidecandrum
,, viscosum
,, vulgatum
Stellaria nemorum
,, media
Arenaria serpyllifolia
Sagina apetala
,, procumbens
Spergula arvensis
Hypericum pulchrum
,, montanum
Lavatera arborea
Malva sylvestris
Geranium molle
,, dissectum
,, Robertianum v. maritimum
Erodium cicutarium
,, maritimum

Acer Pseudo-platanus
Genista anglica (error?)
Ononis repens
Medicago lupulina
Trifolium pratense
,, repens
,, procumbens
,, dubium
Anthyllis Vulneraria
Lotus corniculatus
,, uliginosus
Vicia hirsuta
,, tetrasperma
,, sativa
,, lathyroides
Rubus rusticanus
,, pyramidalis
Fragaria vesca
Rosa Eglanteria
,, dumalis
Cratægus Oxyacantha
Saxifraga tridactylites
Ribes Grossularia
Cotyledon Umbilicus-Veneris
Sedum Telephium
,, acre
Sanicula europæa
Conium maculatum
Smyrnium Olusatrum
Carum Petroselinum
Pimpinella Saxifraga
Anthriscus sylvestris
Fœniculum vulgare
Crithmum maritimum
Peucedanum sativum
Heracleum Sphondylium
Coriandrum sativum
Hedera Helix
Sambucus nigra
Rubia peregrina
Galium Cruciata
,, verum
,, Mollugo
,, Aparine
Sherardia arvensis
Kentranthus ruber
Dipsacus sylvestris
Bellis perennis
Filago germanica
Inula squarrosa
Inula crithmoides
Chrysanthemum segetum
,, Leucanthemum
Tussilago Farfara
Senecio vulgaris
,, viscosus
,, Jacobæa
Carlina vulgaris
Carduus nutans
,, crispus c. acanthoides
Cnicus lanceolatus
,, acaulis
,, arvensis
Centaurea nigra
Picris echioides
Hieracium Pilosella
,, murorum
Hypochœris radicata
Leontodon hispidum
,, autumnale
Taraxacum officinale
,, erythrospermum
Sonchus oleraceus
Campanula latifolia (error?)
,, rotundifolia
Limonium vulgare
,, binervosum
Statice maritima
Primula vulgaris
,, veris
Anagallis arvensis
,, cærulea
Ligustrum vulgare
Blackstonia perfoliata
Cynoglossum officinale
Myosotis arvensis
,, collina
,, versicolor
Hyoscyamus niger
Verbascum Thapsus
Antirrhinum majus
Scrophularia nodosa
Digitalis purpurea
Veronica agrestis
,, Buxbaumii
,, arvensis
,, serpyllifolia
,, Chamædrys
Euphrasia officinalis
Bartsia Odontites

Verbena officinalis
Thymus Serpyllum
Calamintha montana
Nepeta hederacea
Marrubium vulgare
Lamium amplexicaule
,, maculatum
Ballota nigra
Teucrium Scorodonia
Plantago media
,, lanceolata
,, maritima
,, Coronopus var. Sabrinæ
Chenopodium album
,, rubrum
Beta maritima
Atriplex patula c. angustifolia
,, Babingtonii
Suæda fruticosa (error).
,, maritima
Salsola Kali
Polygonum aviculare
Rumex crispus
,, Acetosa
,, Acetosella
Euphorbia Lathyris
Mercurialis perennis
Urtica dioica
,, urens
Parietaria ramiflora
Orchis mascula
Ophrys apifera
Iris fœtidissima
Allium Ampeloprasum
Scilla non-scripta
Arum maculatum var. immaculatum
Anthoxanthum odoratum
Agrostis canina
,, alba
Aira caryophyllea
Trisetum flavescens
Avena pubescens
,, pratensis c. longifolia
Arrhenatherum elatius
Dactylis glomerata b. congesta
Briza media
Poa annua
,, pratensis b. subcærulea
Festuca rigida
,, rottboellioides
,, ovina and d. duriuscula
,, rubra and h. fallax
,, pratensis × Lolium perenne
Bromus erectus
,, sterilis
,, hordeaceus
Brachypodium sylvaticum
Lolium perenne
Hordeum nodosum
,, murinum
Asplenium Adiantum-nigrum
,, marinum
,, Trichomanes
,, Ruta-muraria
Ceterach officinarum
Phyllitis Scolopendrium
Polypodium vulgare

Mosses.

Barbula convoluta (a).
Tortula intermedia (a).
Bryum Donianum.
Camptothecium sericeum.
,, lutescens.
Eurhynchium circinatum (a).
,, tenellum.
Hypnum cupressiforme v. tectorum (a)
,, cuspidatum.
,, Schreberi.

Liverworts.

Madotheca platyphylla (a).
Metzgeria furcata (a).
Frullaria tamarisci (a).

Lichens.

Physcia tenella (a).
,, pulverulenta.
Xanthoria parietina (a).
Placodium callopismum and var. plicatum (a).
Callopisma citrinum.
,, pyraceum.
,, ochraceum.
,, calvum (a).
,, ferrugineum var. festivum.
Lecanora galactina (a).
Lecania prosechiza (occurs on coast near Minehead).
,, erysibe.
Bacidia muscorum.
Bilimbia mesoidea (not previously recorded for Somerset).
Placynthium nigrum (a).
Verrucaria integra (a).
,, rupestris.
Cladonia pyxidata (a) and var. pocillum (a).
,, rangiformis (a), form foliosa.
,, furcata var. pinnata.

It will be noted that the total number of flowering plants and ferns (220) is considerably in excess of the estimate (150) made in Murray's paper (1891) and quoted by H. S. Thompson (Flora of Steart Island, J. Bot. 1924, p. 1). In view of the fact that Steep Holm is fairly isolated and an ancient island, a percentage analysis of the phanerogamic flora, as compared with that of the Somerset mainland, may be of interest. In Table I. approximate percentages are worked out only for those families having ten or more representatives on Steep Holm; the figures for Somerset are derived from R. P. Murray's county flora (1896).

TABLE I.

Percentage analyses of Phanerogamic flora of Steep Holm compared with that of Somersetshire, and percentages of Somerset plants of various families which occur also on Steep Holm:—

	Steep Holm.		Somersetshire.		Family Ratio.
	No. of species. n.	Per cent. $\frac{n}{213}\times100$.	No. of species. n'.	Per cent. $\frac{n'}{1034}\times100$.	$\frac{n}{n'}\times100$.
Cruciferæ	17	7·9	44	4·2	38·6
Caryophyllaceæ .	15	7·1	40	3·9	37·5
Leguminosæ	14	6·6	56	5·4	25·0
Umbelliferæ	11	5·1	44	4·2	25·0
Compositæ.....	27	12·7	84	8·1	32·1
Scrophulariaceæ .	11	5·1	30	2·9	36·7
Gramineæ	23	10·8	81	7·8	28·4
Other families ...	95	44·7	655	63·5	14·5
Totals ...	213	100·0	1034	100·0	(20·6)

The families named in Table I. form a far greater proportion of the flora of the island than that of the mainland. The reasons for this are not clear, but it is probably not without significance that 85 per cent. of the Steep Holm composites have pappose fruits, a distinctly higher proportion than that for Somerset as a whole (Table II.). Water carriage suggests itself as one means whereby the island has been stocked with plants. However, an analysis of the Steep Holm flora for seed-buoyancy, based on the observations of Guppy (*Plant Dispersal*, 1906) and Lloyd Praeger (Proc. Roy. Dublin Soc. 1913) shows that of 167 species for which observations have been recorded, only 11 (or less than 7 per cent.) have "seeds" which float for a week or longer, whereas of the 900 British species tested by the two workers mentioned 133 (or nearly 15 per cent.) were "floaters."

TABLE II.

Compositæ with and without pappose fruits on Steep Holm, and in Somerset generally.

	Steep Holm.		Somerset.		Ratio.
	No. of species. c.	Per cent. $\frac{c}{27}\times100$.	No of species. c'.	Per cent. $\frac{c'}{84}\times100$.	$\frac{c}{c'}\times100$.
With pappose fruits.	23	85·2	61	72·6	37·7
Without pappose fruits	4	14·8	23	27·4	17·3
Totals	27	100·0	84	100·0	(32·1)

THE BRITISH DACTYLORCHIDS.

By M. J. Godfery, T. Stephenson, and T. A. Stephenson.

The comparative table of Dactylorchids here submitted (pp. 176–177) has been prepared in collaboration in answer to suggestions. It seemed preferable to attempt a table of this sort rather than a "Key," in using which one mistake might lead to others. It should be remembered that in so variable a group of plants specimens may be found which will exactly agree with no standard description.

As regards habitat, *O. incarnata* is found in the wettest situations, often in standing water, and likes damp shore-sands. The other Marsh Orchids are found in any sort of damp open ground, in damp pastures and fens. *O. prætermissa* and *O. latifolia* may also be found exceptionally in very dry situations. *O. maculata* appears to

Species.	Tubers.	Stem.	Leaves.	Bracts.	Flower-Colour.	Sepals.	Spur.	Lip-form.	Lip-markings.	Seeds.	General Habit.
1. *O. incarnata* L.	Palmate, divaricate, often very long and narrow.	Very hollow, walls usually thin.	Erect, broadest near base, tapering gradually, fleshy, keeled, mostly cucullate, often yellowish, always unspotted, upper reaching or exceeding spike. Sometimes less keeled and more spreading (in sand).	Long, lowest often broad, elbowed below, longer than fl.	Flesh-pink, rose-pink, purple, maroon, pale straw-yellow, or dead white.	Sometimes spotted within in all varieties. Rather stout, erect, reflexed.	Very stout, short, slightly curved and conical, wide-mouthed.	Oblong or obovate, as long or longer than broad, side-lobes reflexed (less in white form), crenulate, centre-lobe small, rarely long-pointed.	A pair of narrow rhomboidal loops, enclosing lines and spots of bright rose or crimson, often faint, broken or absent, rarely all fine dots.	Short, apex flattened, cells of testa small.	Strict, stout, with narrow, often cylindrical spike, conspicuous bracts, small fls.
v. *pulchella* Druce	.....	.....	.....	.....	Bright purple.	.....	.....	.....	Markings heavy, bright crimson.		
2. *O. præstermissa* Druce.	Palmate, segments thick, long-tailed.	More or less hollow, or rarely solid.	Firm, oblong-lanceolate, spreading, broadest in middle, always unspotted.	Lowest very broad and long varying to narrow, lower lip exceeding fls.	Deep magenta to bright or pale purple or pale pinkish lilac, very rarely white.	Stout, obliquely erect or horizontal, not reflexed.	Stout, rather variable, longer than preceding.	Elliptical, broader than long, side-lobes rounded, not reflexed, centre-lobe rounded.	Fine dots and streaks, radiating fan-wise, usually without symmetrical lines.	Longer and narrower than (1), apex rounded, slightly curved, cells of testa longer than in (1) and (3).	Tall, robust, with well-furnished spike of large flat fls.
v. *macrantha* Sipkes.	.....	.....	.....	.....	.....	.....	.....	Centre-lobe long-pointed.			
v. *pulchella* Druce	.....	.....	.....	.....	Rich bright purple, a few duller.	.....	.....	Side-lobes often strongly crenulate.	Heavy lines and blotches of deeper purple.		
3. *O. purpurella* Stephenson.	Palmate, often very divaricate, long-tapering.	More than half solid.	Like preceding, but with small, regular, dark-brown spots, mostly towards apex, some unspotted.	Lowest rather broad, longer than fl.	Rich vivid purple.	Stout, erect.	Very stout, very like (1).	Broader than long, diamond-shaped or elliptical, side-lobes crenulate, not reflexed, centre-lobe small or quite obscure (only evident when dried).	Heavy lines and blotches of deeper purple.	Short, with small, constricted apex, cells of testa small.	Normally short, almost dwarf, robust plant, with very rich purple spike.
4. *O. latifolia* L.	Palmate, not divaricate, robust.	More or less hollow.	Oblong-lanceolate, broadest in middle, rather thin, blotched, spotted or ring-spotted, spreading, rarely unspotted.	Green or purplish, lower exceeding fls.	Lilac and purple of various shades, often pale, very rarely white.	Rather more slender, horizontal or obliquely erect.	Conico-cylindrical, longer and more slender than in (1) and (3).	Elliptical, broader than long, base cuneate, side-lobes rounded, rather incurved, centre-lobe usually rounded.	Continuous or broken lines, oftenest in a double loop, with lines and spots inside and outside loop.	Very much like (2), apex rounded, slightly curved.	Tall, with thick spike, and rather large, flattish fls.
5. *O. maculata* L. (= *O. Fuchsii* Druce).	Palmate, not divaricate.	Solid	Lowest leaf oval, flat, upper ls. narrower, conspicuously spotted, often unspotted.	Narrow, slender, not conspicuous.	All tints of lilac and rose, mostly pale, very rarely white.	Slender, erect or obliquely spreading.	Slender, straight, slightly enlarged at base.	Very variable, markedly three-lobed, side-lobes rhomboidal, mid-lobe long and pronounced (on basic soils) or lobes sub-equal (on chalk).	Double loops or fine lines and spots, often faint or absent.	Narrow, with curved apex and cells of testa long, with thickened coils.	Robust, leafy and tall stalk, with pyramidal spike (on basic soils) or short and slender with oval spike (on chalk).
O'Kellyi Druce	.....	.....	Always unspotted.	.....	Pure white.	.....	.....	.....	.....	.....	Rather more slender (calcareous soil).
6. *O. elodes* Griseb. (= *maculata* s.s. *ericetorum* Linton = *O. præcox* Webster).	Palmate, not divaricate.	Solid	Lowest leaf narrow, acute, usually keeled, upper ls. still narrower, spotted, often unspotted.	Narrow, slender, not conspicuous.	All tints of purple, mostly pale, frequently white.	Narrrow, long, less erect than preceding, often drooping.	Rather long and slender, often very slender, wide at mouth, rarely quite short.	Usually broader than long, very variable, side-lobes large, irregularly crenulate, centre-lobe mostly small, often minute, often shorter than side-lobes.	Fine lines and spots or heavy lines, in great variety of shapes, absent in very pale fls.	Narrow, with rounded apex, cells of testa long, with thickened coils.	Slender, or rather stout, on average shorter than (5), chiefly on heaths and peaty ground.

prefer basic and chalky soil, and *O. elodes* peaty moors; but often both species grow together.

As to time of flowering, *O. incarnata* is usually a fortnight earlier than the other Marsh Orchids in the same locality, and *O. elodes* than *O. maculata*.

In nearly every character some exceptional forms will be found, the sum of the characters must be considered. We have tried to summarize average types in the table.

No account has been taken of hybrids, which in some localities are numerous. These must be determined by careful comparison with parent-forms on the spot.

It is doubtful whether the British straw-coloured forms of *O. incarnata* belong to var. *ochroleuca* Wüstnei.

TRINOMINALS.

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

I. For Species.

It is somewhat surprising to discover a case of reversion in the twentieth century to ternary names for species. Ascherson and Graebner (Syn. Mitteleur. Fl. vi. Abt. 2, 442–472; 1907) employed trinominals for six species of *Melilotus*, three of the combinations having been published previously in their Fl. Nordostd. Flachl. 434–435 (1898), the others being new. They were omitted from Supplements II. and IV. of the *Index Kewensis*—doubtless on account of their ternary nature—and are accordingly listed below, with the names on which they are based.

Melilotus melilotus Italicus Asch. & Graebn. Fl. Nordostd. Flachl. 434 (1898): *Trifolium Melilotus italica* L.

M. m. Indicus Asch. & Graebn. op. cit. 435: *T. M. indica* L.

M. m. officinalis Asch. & Graebn. l. c.: *T. M. officinalis* L.

M. m. Tauricus Asch. & Graebn. Syn. Mitteleur. Fl. vi. Abt. 2, 442 (1907): *T. M. tauricum* Bieb.

M. m. Polonicus Asch. & Graebn. op. cit. 455: *T. M. polonica* L.

M. m. segetalis Asch. & Graebn. op. cit. 469: *T. M. segetalis* Brot.

About seventy trivial names in Sp. Pl. ed. 1 consist of two uncombined words. Five have by general consent been treated as invalid, namely, *Apocynum foliis androsæmi* (*A. androsæmifolium* L. Syst. ed. 10, 946), *Salvia africana cærulea* (*S. africana* L. Sp. Pl. ed. 2, 38), *Salvia africana lutea* (*S. aurea* L. l. c.), *Asplenium Trichomanes dentatum* (*A. dentatum* L. Syst. ed. 10, 1323) and *A. Trichomanes ramosum* (*A. viride* Huds. Fl. Angl. 385). The remaining trivials have been regularized in various ways, mostly by being hyphened, e. g. *Cactus Ficus-indica*, *Cratægus Crus-galli*, occasionally by being run together to form a single word, e. g. *Atropa Belladonna*, *Mespilus ChamæMespilus*. *Asplenium Trichomanes dentatum* was abbreviated to *A. dentatum* and *Trifolium Melilotus corniculata* became *Trigonella corniculata* (L. Syst. ed. 10, 1180),

by suppression of the first word of the trivial in each case. The same course has been taken with the other species of "*Trifolium Melilotus*," which are generally known nowadays under the names *Melilotus italicus*, *indicus*, *officinalis*, *tauricus*, *polonicus* and *segetalis*, *Trigonella cærulea*, *cretica* and *ornithopodioides*. The last species is sometimes placed in *Trifolium* or treated as an independent genus *Falcatula*. The combination *Trifolium ornithopodioides*, which is commonly ascribed to Sm. Fl. Brit. i. 682 (1800), should be cited from Huds. Fl. Angl. ed. 1, 282 (1762), where it was misprinted "*ornithopoides*," or from ed. 2, 324 (1778), where the mistake was corrected.

The case for suppression of "*Melilotus*" in the combinations *Trifolium Melilotus officinalis* etc. is supported by the following considerations:—

1. As originally published, such trinominals were, if not actually invalid, at least irregular.

2. Linné himself suppressed the "*Melilotus*" when he transferred one of the species to *Trigonella*, and it has been suppressed by general consent in the other species.

3. "*Melilotus*," as employed by Linné, was virtually a subgeneric or sectional name. He united *Trifolium* Tourn. (Inst. 404, t. 228) and *Melilotus* Tourn. (Inst. 406, t. 229), treating the latter as a section, headed "Meliloti leguminibus nudis polyspermis." Species subsequently added to this section by other authors had their trivial names prefixed by "*Melil.*" or "*M.*," e. g. *T. Melil. segetalis* Brot. Fl. Lusit. ii. 484 (1804), and *T. M. parviflorum*, *T. M. tauricum* and *T. M. hamosum* Bieb. Fl. Taur.-Cauc. iii. 506, 507 (1819). In the latter work the names *parviflorum* etc. agree with *Trifolium*, which indicates that *Melilotus* has ceased to be part of the trivial, and is now actually a sectional name. It was probably for this reason that *T. M. hamosum* and *parviflorum* were omitted from the *Index Kewensis*, but why *T. M. tauricum*, which has no more claim to recognition, should have been included, is not obvious.

Briquet (Prodr. Fl. Corse, ii. 291) accepts *Trifolium Melilotus-ornithopodioides* L., but rejects such combinations as *Melilotus Melilotus-italicus* because the trivial includes a repetition of the generic name. "Les combinaisons de noms créées par MM. Ascherson et Graebner en faisant passer dans le genre *Melilotus* les noms spécifiques linnéens doubles (composés du nom *Melilotus* et d'un adjectif) sont contraires aux *Regl. internat. de la Nomenclature*. C'est là selon nous un cas particulier de l'art. 55, 2°, qui interdit dans l'épithète spécifique la répétition pure et simple du nom générique." But Art. 55, 2° does *not* prohibit the repetition of the generic name *in* (*i. e.* as part of) a trivial: it rejects trivials which simply and solely repeat the generic name, which is a very different matter. *Melilotus-italicus* is more than a mere repetition of *Melilotus*, hence Art. 55, 2° is not applicable. Fortunately, however, the superfluous "*Melilotus*" can be discarded for the reasons given above.

It is not very easy to understand why Ascherson and Graebner should have employed trinominals, instead of hyphening the two words of which the trivial was composed. In accordance with the

typography adopted in their book they did not hesitate to alter the spelling of the trivial from *Melilotus italica*" to "*melilotus Italicus*," but they omitted to insert the hyphen, thus giving to species the semblance of subspecies, varieties or forms, as cited by many botanists in the United States. This practice is adhered to throughout the work so far as it has appeared. Briquet also employed trinominals in the first volume of his Prodr. Fl. Corse, e. g. *Athyrium Filix femina* and *Lychnis Flos cuculi*, but adopted the use of the hyphen in the second volume, e. g. *Capsella Bursa-pastoris*—possibly in response to criticism (Journ. Bot. 1911, 277).

II. For Subdivisions of a Species.

The Editor of this Journal has frequently condemned the practice of employing trinominals for subdivisions of a species (e. g. in Journ. Bot. 1924, 88). Mr. Rehder, on the other hand, countenances their use. "As long as the rank is clearly stated in the original publication, there can be little objection to omit it when using the name afterwards" (Journ. Bot. 1921, 294). He would for example employ the combination *Cratægus æstivalis luculenta* Sarg. I take a middle view and see no objection to *C. æstivalis luculenta* (without author's name) in cases where the reader is presumably acquainted with the group in question, but if it is necessary for the sake of precision to add the authority, then in my opinion the rank should also be given. This plan avoids the attribution of trinominals to authors who did not employ them.

SHORT NOTES.

Cardamine Waldsteinii. The union of *Dentaria* with *Cardamine* necessitated the creation of a new name for *Dentaria trifolia* Waldst. & Kit., as there was already a *Cardamine trifolia* L. In his monograph of *Cardamine* (1903) O. E. Schulz accordingly proposed the name *C. savensis*, which has been adopted by Handel-Mazzetti, Hayek, and Fritsch. But this is antedated by the combination *C. Waldsteinii* (1895), which was inadvertently omitted from Index Kewensis, Suppl. I, and has consequently been overlooked. The synonymy and distribution of the species are as follows:—

Cardamine Waldsteinii Hort. Kew ex Kew Hand-List Herb. Pl. ed. 1, 97 (1895); ed. 2, 243, 381 (1902). *Dentaria trifolia* Waldst. & Kit. Pl. Rar. Hung. ii. 148, t. 139 (1805).

Cardamine savensis O. E. Schulz in Engl. Jahrb. xxxii. 355 (1903); Hand.-Mazz. in Österr. Bot. Zeitschr. 1905, 438; Hayek Fl. Steierm. i. 489 (1909); Fritsch Exkursionsfl. ed. 3, 160 (1922).

Distrib. Styria, Carniolia, Croatia, Slavonia, Bosnia, Montenegro (*fide* Preissmann in Mitteil. Nat. Ver. Steierm. xxx. 220; 1894) and Servia (*fide* Pančič Fl. Princip. Serb. 141; 1874).—T. A. Sprague.

A Goodyer-Stonehouse Confusion? Can any reader explain the following entry in the Diary of Antony à Wood for the year 1667?

"Mr. . . . . Goodier of Darfeld (Derneford, quaere) the flourest, died at Grey in circa 1661."

That Wood omitted Mr. Goodier's Christian name indicates that he was not well acquainted with him and that he may have obtained the information from a muddled source; but his statement nevertheless contains a sufficient basis of truth to merit a thorough examination, for it may contain a clue to facts that are as yet unknown to us. The ascertained facts are that John Goodyer was of Mapledurham, of Buriton, and of Petersfield, while his friend Walter Stonehouse, who might also be described as a "flourest," was of Darfield. Goodyer died in 1664, presumably in Petersfield. Stonehouse died in 1665, presumably in London. Does Wood's statement really refer to Stonehouse and give us a clue to the place of his last domicile on earth—Gray's Inn?—R. T. Gunther.

Preserving Power of Sugar. Under this heading *The West India Committee Circular* for April 24 publishes the following interesting note: Aublet's Guiana plants formed part of the Banksian Herbarium collections, and are of course in the National Herbarium:—

"Dr. John M'Lean Thompson, Professor of Botany at the University of Liverpool, in a letter to the West India Committee, writes: 'During a recent examination of the herbarium collections of Aublet which resulted from his famous expedition to the West Indies and Guiana, it was found that many of his plants collected during the years 1780–84 had been preserved in what is apparently a sugar, and dried before mounting. The preservation has been so perfect that I have been enabled to employ Aublet's plants for the most minute histological study, with results which compare favourably with those obtained from modern plants preserved in spirit or formalin. The matter is one of very great interest from the point of view of the preservation of plant tissues. There is, of course, no possibility of employment of other than cane sugar by Aublet, and I should be most interested to trace the method employed.'"

Apium leptophyllum (see Journ. Bot. 1923, 129). This species was first detected in Scotland in October 1907 by the late Prof. Trail on rubbish on Old Aberdeen Links (Trail Memorial Volume, 176; 1923).—T. A. Sprague.

Tautonyms (see p. 41). An additional example in favour of the acceptance of tautonyms is furnished by Schinz and Thellung in their eighth paper on the nomenclature of Swiss plants (Vierteljahrsschr. Nat. Ges. Zürich, lxviii. 461; 1923). They have just discovered that the name *Mariscus Cladium* previously adopted by them for *Schœnus Mariscus* L. (*op. cit.* liii. 523; 1909) must be replaced by *M. serratus* Gilib. But for the rule rejecting tautonyms (Art. 55, 2°), they would have been able in 1909 to retain the original trivial name *Mariscus* under the genus *Mariscus*, and further name-change would have been avoided.—T. A. Sprague.

REVIEW.

LINNÆUS.

Linnæus (*afterwards Carl von Linné*): *the Story of his Life*, adapted from the Swedish of THEODOR MAGNUS FRIES, Emeritus Professor of Botany in the University of Uppsala, and brought down to the present time in the light of recent research by BENJAMIN DAYDON JACKSON, Knight of the Swedish Order of the Polar Star, Hon. Ph.D. (Upsal.), etc. Demy 8vo, pp. xi, map, portraits. Witherby, 1923. Price 25*s.* net.

THE confidence rightly expressed by Dr. Jackson in his Introduction that "in consequence of the fullness and accuracy of Professor Fries's work, this volume will give a better idea of the life and aims of the Father of Modern Biology than any previous publication in the English language," is greatly increased by the fact that it has fallen to his lot to make the work accessible to the English public. During the more than forty years of his tenure of office as Secretary to the Linnean Society, Dr. Jackson has acquired a unique and intimate knowledge of the collections of Linnæus which form its chief treasure, and has published numerous papers relating to these, including the history prepared for the centenary celebration of the Society in 1888 and an Index to the Herbarium; and it is obvious that no one could be more fitted to undertake the task which he has now carried to a successful issue.

The original work appeared in 1903, and shortly after its publication Dr. Jackson was asked to undertake its adaptation for English readers. Omitting nothing that is essential nor of general interest, he judiciously leaves out "details of persons, places and things comprehensible to the Swedish reader [which] would need explanation to those of any other nationality"; while supplementing the text by information acquired from various sources during the twenty years that have passed since Fries's work appeared. The present book may therefore be regarded as the most comprehensive biography of Linnæus in existence.

To notice at adequate length a volume so crammed with interesting information, not only with regard to Linnæus himself but concerning the contemporaries with whom he was associated, would occupy more space than this Journal can afford; we can therefore only glance at a few points of special interest, mainly those connected with Linnæus's early life.

The child of parents who had a love for flowers—his father was no inconsiderable botanist—Carl almost from his birth (May 23, 1707) manifested the same feeling; when, at the age of a year, he was troublesome, he became silent as soon as a flower was put into his hand. As a boy at school, his devotion to plants increased; he collected them in the fields and taught his comrades their names, earning for himself the title of "the little botanist." This interest continued throughout Carl's school life, and when he entered the Gymnasium at Växjo in 1723, he was fortunate in finding a Rector and professors who encouraged his botanical tastes; he made excursions, extending over nearly thirty English miles, and was able to

locate any plant within that radius. "Besides this he also busied himself to gain knowledge from certain old botanic books .... [which] he read day and night till he had them at his fingers' ends."

At the age of twenty, Carl went to the University of Lund, where he made the first of those scientific acquaintances to whose encouragement he was to be so much indebted in the person of Professor Stobæus, who showed him much kindness. In the following year he went to Uppsala, and was disappointed to find the University and especially the botanic garden, in a most unsatisfactory condition; here, however, he met Celsius, in whom he found another Stobæus. In recognition of his indebtedness, Linnæus presented Celsius with a pamphlet on the sexes of plants—a subject that was then attracting attention; this was circulated in manuscript, and came to the knowledge of Rudbeck, who communicated it to the Royal Society of Science of Uppsala, who desired that it should be printed and published. Through Rudbeck's influence, Linnæus obtained a university lectureship in botany; his demonstrations were very successful—"he wrote to Stobæus that he had almost always from two hundred to four hundred hearers, while the professors seldom had more than eighty." Linnæus then took up his abode with Rudbeck, as pupil to his sons, and here began his *Genera Plantarum* and other works.

During his residence with Rudbeck the description of the latter of his journey to Lapland in 1695 fired Linnæus with a vivid desire to undertake a journey in that country. For this an opportunity presented itself in 1732; Linnæus's diary of the journey was translated into English, and published by Smith in 1811 under the title *Lachesis Lapponica*; and the botanical results of the expedition were published by Linnæus himself in 1737 as *Flora Lapponica*.

Having decided to abandon the clerical career, for which he was intended, for the study and practice of medicine, Linnæus graduated in 1734 at the University of Harderwijk, and then went to Leyden; here he met Gronovius (1690–1762), to whom he showed the MS. of his *Systema Naturæ*. Gronovius was delighted and undertook to subsidise it, and the work, which at once established Linnæus's reputation, appeared in 1737. Among the many to whom Linnæus was indebted for help and encouragement, none merits a higher place than this Senator of Leyden, who "laboured for him night and day, year in and year out, on the correction of his work, and made it what it was." It was Gronovius who commemorated Linnæus in the genus *Linnæa*, although he assuredly would not have traced the comparison suggested by Linnæus himself (*Critica Botanica*, p. 81): "*Linnæam* dixit Gronovius plantam Lapponicum, depressam, vilem, neglectum, brevi tempore florentem, a consimili suo Linnæo."

Even more important was the help he received from Boerhaave (1668–1738), who introduced him to Burman (1706–1780). With Burman Linnæus visited George Clifford (1685–1760), a wealthy merchant of Leyden who had a wonderful garden and museum at Hartecamp, between that town and Haarlem. On the recommendation of Boerhaave, Clifford engaged Linnæus as resident physician

and keeper of his herbarium; the two years spent with Clifford were described by Linnæus as the happiest of his life. The catalogue of the garden—*Hortus Cliffortianus*—was printed in 1737; the herbarium was, as is well known, acquired by Banks in 1791 (for £23), and is now in the Department of Botany. Dr. Jackson does not mention this important collection, the history of which before its acquisition by Banks is somewhat obscure. The only account of it hitherto published, and of its connexion with the *Hortus Cliffortianus*, is, so far as we are aware, that given by Dr. Rendle in this Journal for 1923 (p. 114), in the course of which he quotes Robert Brown's reference to it as the principal authority for the plants described in the *Hortus*; a more detailed account will be found in the address delivered by Dr. Rendle, as President, at the Anniversary meeting of the Linnean Society, which will be printed in due course.

The year 1737 was indeed that of Linnæus's greatest activity; it saw the publication of the *Genera Plantarum*, *Flora Lapponica*, and other works; the books which bear that date "consist of nearly 500 pages in large folio, and more than 1,350 pages in octavo .... the year did not end before he was busily engaged with writing and printing other and important productions." Moreover his correspondence was enormous; Dr. Jackson gives a list of the naturalists in many countries with whom Linnæus exchanged letters, which includes all the notable botanists of the time.

It was during his stay at Hartecamp and at Clifford's expense that Linnæus visited England; he saw Sloane in London, Philip Miller at Chelsea, and Dillenius at Oxford; his reception by the two latter was somewhat frigid—Dillenius "received him so haughtily that he was hardly invited to step in," but misunderstandings were removed, and when Linnæus left Oxford, "Dillenius embraced him and parted from him with tears, having before that invited him to live and die there." The pages devoted by Dr. Jackson to the account of Linnæus's visit to England will be read with special interest; G. D. Ehret, Peter Collinson, and John Martyn were among those whom he met while in London.

In May, 1738, Linnæus left Hartecamp and went to Paris; here he visited the brothers Antoine and Bernard de Jussieu, who showed him much kindness. He visited the Botanic Garden and consulted the herbaria of Tournefort, Vaillant, the de Jussieus, and others; and was elected a Foreign Correspondent of the Académie des Sciences. In September of the same year Linnæus took up his residence in Stockholm as a practising physician, but for some time without success; his position however improved—he obtained public appointments and was elected first President of the newly formed Scientific Academy. Linnæus now felt justified in terminating his long-standing attachment by marriage; this took place at Falun in Dalecarlia at the end of June 1740, and was followed in the succeeding year by the birth of a son (Carl), familiar to botanists as "Linn. fil."

On his return to Stockholm, Linnæus "began to find his extensive medical practice an oppressive burden, and longed for a return to the quiet world of botany." The conditions at Uppsala "were similar to

those of his student time"; after a stormy period, the chair of botany there became vacant, and Linnæus sent in his application. He was not alone in so doing, and it was only after an official wrangle, lasting more than a year, that Linnæus was appointed to the vacant post. At the same time he was ordered to travel through Öland and Gotland to investigate their natural productions; this done, he took up his residence in Uppsala on Oct. 6, 1741, where he remained for the rest of his life, entering on his professorial duties upon the 27th of the same month. "His first discourse after installation was held on the 2nd November, 1741, and he continued thus [? there] to the end of 1776 with never-slackening industry, so that except during the time that he was absent from the town, ill, or hindered by other causes, he did not neglect a single lecture."

A very interesting chapter is that on Linnæus as a teacher and on his relations with his pupils. This begins with a description of the botanical excursions which he conducted, by a participant in them, J. G. Acrel; at one time he was accompanied by as many as two to three hundred students. Dr. Jackson gives a list of his pupils, among whom of course Scandinavians predominated, though Russians and Germans are fairly represented, and England, France, Italy, Holland, and America have each one representative. Several, including many not in the list, are selected for special notice—among them Daniel Solander, "the best of his disciples after Löfling" and future librarian of Sir Joseph Banks; the mere enumeration of these would occupy more space than we can afford. For the same reason we must content ourselves with mentioning the chapters which treat of Linnæus as administrator of the Botanic Garden and Museum, of his relations with members of the Medical College and in other official capacities, of his authorship and correspondence, of his benefactors and friends: all of these are full of interest, and incidentally contribute to our knowledge of Linnæus's contemporaries.

The later portion of the volume is devoted mainly to the history of Linnæus "as a private person"; beginning with his own description of himself—at what date is not stated, but evidently late in life. A great smoker, he was abstemious in drink, except as to coffee; his son says he never worked "unless he was in good humour," which the context suggests meant in the humour for work. The accusation of avarice which had been brought against him is repelled, except as it related to his herbarium: "He was greedy in adding to his collection .... he considered he had a right to receive the plants collected by his pupils, at home or abroad, and valued them highly; if he missed such confidence he could not conceal his displeasure." Thus he "complained that [Solander] never sent him a single plant or insect from the voyage of the *Endeavour*, but he overlooked the fact that the whole of the collection belonged to Banks, who had incurred great expense in equipment." "Without doubt the most noteworthy trait of his character was his ardent piety"; of this evidence is afforded by a memorandum, "never meant to be read by any but his children," in which Linnæus enumerates his numerous grounds for gratitude to God, who "provided him with the greatest

herbarium in the world, his greatest delight" and "let him see more of His created world than any mortal before him."

The picture of Linnæus's home life is not attractive. His wife, though an excellent *hausfrau*, "who kept house while he worked," seems to have been unsympathetic, and, during his last days, neglectful; she was not present at his death, and ignored his instruction—"entertain nobody at my funeral"—by "providing, on the day after, an ample dinner." "With his children he was a too indulgent father, the elder son being spoiled by him for life": the younger Linnæus, indeed, seems to have been an unsatisfactory character, and in the document disposing of his herbaria Linnæus writes: "My son should not have them, as he never helped me in botany and has no love for it." His death, which was preceded by much suffering, occurred on Jan. 10, 1778, only his son-in-law elect and his English pupil, John Rotheram, being present. The history of the Linnean collections and of the events which preceded and followed their acquisition by Smith are narrated at length.

The book ends with a summary of the contemporary opinion and later criticism of Linnæus and with an estimate of his scientific importance not only as botanist, but as zoologist and mineralogist, and of his "activity in the domain of medicine." The appendixes include a list of his autobiographical MSS., which "have been diligently made use of in the present work," genealogical tables, lists of his principal pupils, and some curious "Notes on 'Nemesis Divina' (divine punishments)," drawn up for his son's guidance, with curious examples and "divinations" which should be noted by those interested in psychical research. There is also a "Select Bibliography," containing Linnean books and works relating to Linnæus: among the former we note, under the heading "Amœnitates Academicæ," that although Dr. Druce's paper on Linnæus's *Flora Anglica* (published in the *Scottish Botanical Review* for 1912) is mentioned, there is no reference to the reprint of the *Flora* itself (on which Dr. Druce's paper is based) issued as a Supplement to this Journal for 1909, nor to the subsequent papers by Dr. Druce and the Editor which appeared in Journ. Bot. 1912–13. Mrs. Florence Caddy's pleasant little book, *Through the Fields with Linnæus* (1887), might also have been included. A useful map showing places visited by Linnæus in his travels through Scandinavia, with portraits (not very well reproduced) and other illustrations add to the completeness of the work. The translation, though presumably accurate, does not always read quite smoothly, and the meaning is sometimes a little obscure. The book is well and carefully printed: "*Spiræa filipendula*" (p. 182) should be *S. Ulmaria*. The rather startlingly bright blue cover and yellow top-edge represent the Swedish colours.

One or two points suggest criticism. The placing at the head of the pages the year under discussion would have saved the reader much turning back; and the table of "contents" merely gives the chapter headings. This would be less serious if the entries under "Linnæus" in the index had been given in chronological order, but unfortunately an alphabetical arrangement is adopted—the entry begins: "applied for post as gardener, 41; authorship, 271; benefactors, 283–329" and so on; so that nowhere do we get a chronological survey of the contents of the book. The index presents other grounds for criticism, as those who use it will discover, but we do not propose to indicate them lest by so doing we should appear to lay undue stress on defects in what is after all only a detail (though an important one), and cannot detract from the value and excellence of the volume as a whole.

BOOK-NOTES, NEWS, ETC.

At the meeting of the Linnean Society on 1st May, Mr. J. Ramsbottom showed, on behalf of Mr. Edward Clement, seedlings of *Odontoglossum*, *Dendrobium*, *Cattleya* and *Cymbidium*—both on culture medium in tubes, and potted out—which had been germinated without fungal aid. A series of lantern-slides were shown illustrating the mycorrhiza of orchids and the manner in which the fungus infects the seeds and stimulates germination. The work of Bernard and Knudson in inducing germination by chemical means was outlined; all previous success was gained with seeds which are easily germinated; the present cultures showed that with suitable media, about 90 per cent. of *Odontoglossum* seeds could be got to germinate, and that normal growth continues after transfer from the medium to potting materials. Experiments so far seem to show, however, that *Odontoglossum* is so exacting in its needs that the slightest variation in the composition of the medium is immediately detected; indeed, a medium suitable for the seed of one species may be distinctly out of favour with the seed of an allied species, and a modification be necessitated.

The *Journal of the Linnean Society* (xlvi. Botany, no. 310; April 16) contains papers "On New Species of Permian *Osmundaceæ*," by M. D. Zalessky (3 plates); "Notes on Indian Charophyta," by James Groves, with keys to the genera and species and descriptions and plates of two novelties (*Nitella mirabilis* and *N. Wattii*); "On the Cuticular Structure of *Psilophyton*," by W. F. Edwards (1 plate); "The Onosmas of Linnæus and Sibthorp, with a note on those of Tournefort's Herbarium," by C. C. Lacaita (1 plate); "On the Function of the Bladders in *Utricularia vulgaris*, L.," by C. L. Withycombe (11 text-figures).

At the meeting of the Botanical Society of Edinburgh on 1st May, Mr. E. J. A. Stewart and Dr. Donald Patton submitted a paper on the flora of the Culbin Sands, which lie on the extreme west of the seaboard of Elginshire. The authors described the changes which had taken place in the vegetation of the area since the time of their survey in 1913, an account of which was published in the Society's *Transactions*, vol. xxvi. 1915. The major topographical features have been maintained, although owing to movement of the sand and

consequent alteration of the water-table there have been striking changes in the character and distribution of the flora of the dune marshes. The origin of dune vegetation was traced, beginning with the following plants as pioneers—*Psamma arenaria*, *Salix repens*, *Calluna vulgaris*, *Juncus conglomeratus* and *J. squarrosus*,—and numerous observations were made on the part played by mosses and lichens in the fixation of the sand. Interference with the natural succession has been caused by the planting of Marram and Corsican Pine, the continuance and success of which may, in the course of time, change the flora of the dunes completely. At the same meeting a paper was read on behalf of Mr. Arthur Bennett dealing with some recent additions to the list of Caithness plants. At the meeting of the same Society on 15th May, Mr. L. B. Stewart gave an account of his results in the budding of various garden varieties of *Acer* which fail to come true from seed, and which are difficult to propagate by cuttings. Dr. R. J. D. Graham followed with observations on the vegetative propagation of *Drimia*, the scale-leaves of which respond to appropriate treatment. The Society will hold a two days' meeting in July, when extensive demonstrations will be given of various methods of plant propagation employed at the Royal Botanic Garden, Edinburgh; we hope to give some indication of the programme in our next issue.

THOSE who are led by its title to expect from Mrs. Cran's volume *The Garden of Experience* (Herbert Jenkins, 6*s*. net) a treatise on practical gardening will be somewhat surprised when they turn over its pages. We will not say disappointed; for they will find a delightful series of chapters, infused throughout with the love of flowers and of gardens at home and abroad, with a variety of other matters of interest attractively described. When the author acquired her "shaggy stretch of unkempt soil" in Surrey, she "did not know a rhododendron from a laurel," and chronicled her lack of knowledge in a volume entitled *The Garden of Ignorance*, which was so well received—it must have been very amusing, for Mrs. Cran has a keen sense of humour—that she was asked to write a companion volume when she knew more about flowers; and it is this that is now before us. The most informing chapter is that in which she describes "Flowers Far Off"—in South Africa, where "people love their gardens," and where "I have at last really seen things *grow*!"; or in Australia, where "the wild flowers are like no other in the world, so full of variety, of sweetness, and of intimate beauty." There are famous gardens, too, in America, but "considering its size and great population they are rare, though the movement towards them has undoubtedly begun," although Mrs. Cran's enthusiasm was in the first instance checked by a man who told her—untruly—that "no one in America had any gardens and no one wanted any; who wants a garden out in the middle West?" The volume is suitably illustrated and well printed; as is usually the case with books of this kind, the author would have done well to submit her proofs to someone acquainted with plant-names—we should have then been spared "*Malus Floribundi*" (thrice), "Teraxicum," and the like.

THE Belfast Naturalists' Field Club published last year a *Second Supplement* to, and Summary of, Stewart and Corry's *Flora of the North-east of Ireland*, compiled by the late Sylvanus Wear, of whom a portrait faces the title-page. The preparation of the Supplement was undertaken by a subcommittee of the Belfast Naturalists' Field Club, but Mr. Lloyd Praeger in his brief Introduction tells us that the labour of preparing the work fell entirely on Mr. Wear, to whose thoroughness and accuracy a high tribute is paid, who died within a week of its completion. The progress of research since 1888—the date of the publication of the *Flora*—is summarised, including a list of plants which were then supposed to be lost but have since been refound, and of others for various reasons withdrawn. The additions are incorporated in the Summary, which, like the rest of the book, is very well done; no attempt, however, has been made to bring the mosses and hepatics up to date, owing to the deaths of Canon Lett and Rev. C. H. Waddell, the principal workers at these groups. The volume is published by the Belfast Field Club at the very reasonable price of 5*s*.

THE *Botanical Magazine* (published March 23) is entirely the work of Dr. Stapf, who describes a new species of *Amorphophallus* (*A. cirrifer*) from Bangkok; other new names are *Thryptomene calycina* (known as *T. Mitchelliana* F. M., but described earlier by Lindley as *Baeckia calycina*) and *Lavatera bicolor*, described by Rouy as a subspecies of *L. maritima* L., with which it was identified by Planchon. Among the more interesting of the other plants figured and described are *Schizophragma integrifolia*, in connexion with which a useful new term—*sematophoræ*—is proposed for plants "bearing special show- or semaphore-leaves (*sematophylla*) in this case highly modified sepals"; *Rhododendron Searsiæ* Rehd. & Wils., one of Mr. Wilson's Chinese discoveries; *Lithospermum oleifolium* Lapeyr., a Spanish plant of very local distribution allied to *L. fruticosum* and *L. diffusum* (*prostratum*); and *Callistachys ovata* Sims, for the description of which we are glad to see that Robert Brown's MSS. have been consulted. The English descriptive matter is very full and interesting, dealing with the geographical distribution, the names, and other particulars; the Latin descriptions are often very long, and as they are followed by English descriptions of almost the same length, one would think that they might be abridged.

WE have from time to time called attention to the useful papers on "The Weeds of South Africa" by Miss K. M. Lansdell, of the Division of Botany, Pretoria (who is also responsible for the excellent illustrations of the life-history which accompany the descriptions), that appear in the Journal of the Department of Agriculture of the Union of South Africa. We have now received a second instalment of the reissue of these, wherein is also given a coloured figure of the plant: the species included are *Cnicus lanceolatus*, *Cuscuta chinensis*, *Acanthospermum hispidum*, *Centaurea melitensis*, and *Opuntia aurantiaca*. A list of the species included in each part might usefully occupy the blank page of the wrapper, and the name at the head of each page would facilitate reference. The pamphlet contains 38 pages and costs only 3*d*.!

Botaniska Notiser (Häfte 2, 1924) contains a biography of Otto Nordstedt (1838–1924) by Otto Gertz, accompanied by an excellent portrait and bibliography; a paper on *Phippsia*, by O. R. Holmberg; descriptions of numerous new Swedish "Archieracier," by K. Johansson and G. Samuelsson; "Zur Entwicklungsgeschichte zur *Tofieldia calyculata*," by W. Seelier; "Till Kännedomen om *Webera sessilis* utbredning i Sverige," by A. Hässlar; "Intravital guld-impregnation hos i guld-hydrosol växande *Aspergillus*," by O. Gertz; and a brief notice of Prof. J. N. F. Wille, of Christiania (†. 1924).

THE adventures of Captain F. Kingdon Ward in search of plants have for some time found record, so far as their botanical and horticultural results are concerned, in the columns of the *Gardeners' Chronicle*. In the handsome volume before us—*The Romance of Plant Hunting* (Edward Arnold, 12*s.* 6*d.* net)—he has brought together his experiences in his six expeditions—three before and three since the War—in the lofty marches of Burma, China, and Tibet. The floral results of his travels have entitled Captain Ward to a place among the great benefactors of horticulture and of botany—Farrer, Wilson, Forrest, and others—who have during so many years enriched our gardens with spoils from the same inexhaustible regions; "it is certain," he says, "that we have as yet only skirmished on the fringes of botanical Asia . . . . we have been up to the barriers which fence off the garden; we have yet to climb over the wall." As with the collectors named, Captain Ward's discoveries, which are duly recorded in the text and in a special index, lie largely, though by no means entirely, among Rhododendrons and Primulas. The author, while urging upon the plant-hunter the duty of making a herbarium, points out that those who finance him "are not themselves interested in dried plants," and speaks somewhat disparagingly of "our great centres of botanical knowledge": "in the dungeons of those feudal institutions are held the necessary inquests for purposes of identification . . . . the describing and naming of new species is often the hobby of some overworked enthusiast who does it in his spare time with no thought of extra remuneration." It is, however, satisfactory to be told that the collector "will always meet with the utmost kindness, courtesy and assistance from the headquarter staffs of famous gardens." It is, of course, the floral side of the book (which is suitably illustrated) that chiefly appeals to us, but the general reader will find much that is interesting and even exciting in the author's personal experiences.

The Rock, a Catholic magazine published at Hong Kong, gives in its February number an account of the Natural History Museum at Siccawei, Shanghai. The Museum was founded (in 1881) and directed by Fr. Pierre Heude, S.J. (1836–1902), who had travelled extensively in various provinces of China and Japan, and whose collections formed its nucleus. The herbarium of the Kaignan province contains between two and three thousand species represented by some 30,000 sheets, to which frequent additions are made; there is also a herbarium of plants of Mongolia, Chihli, Fukien, Yunnan, and Chêkiang, presented by Mr. Oliver of the Chinese Maritime

Customs, formerly at Hangchow. Fr. Heude was succeeded at his death by the present Director, Fr. Frederic Courtois.

VOL. IX. pt. 3 (March 31) of the *Transactions of the British Mycological Society* contains lists of the fungi and lichens observed during the Bristol foray in April of last year; and papers on "Some Scottish *Uredineæ* and *Ustilagineæ*," by Dr. Malcolm Wilson, who, with Mr. R. B. Anderson, also describes *Camarosporium abietis*, n. sp. (2 plates); "A *Rhizoctonia* causing Root Disease in Uganda," by W. Small (2 plates); "The 'Slime-fluxes' of Trees," by L. Ogilvie; "*Rhytisma acerinum*, and *R. pseudoplatani*," by R. Bracher (1 plate); "*Hormodendron olivaceum*," by F. C. F. Robertson.

THE fifth part of Mr. H. H. Haines's *Botany of Bihar and Orissa* contains the Apetalæ and Monocotyledones, extending to part of the *Gramineæ*. There are full keys to the species and ample descriptions; the only drawback, which perhaps will not be apparent to those for whom the Flora is intended, is the absence of any bibliographical references. A number of new combinations are indicated, but no new species are described. The part, which is "sold by the agents for Indian Official Publications," costs 11 rupees.

Notes from the Royal Botanic Garden, Edinburgh, dated November 1923, but only recently to hand, contains numerous descriptions, alphabetically arranged, of new *Primulaceæ*, by Prof. W. W. Smith and Mr. George Forrest, the collector of most of them; a paper on "The Leaf Glands of *Dioscorea macroura*," by M. Y. Orr (2 plates); and the description of a new *Desmogyne* (*D. angustifolia*), by Mary M. B. Knagg.

THE Cambridge University Press has issued a "second edition revised" of Mr. Harold Long's *Plants Poisonous to Live Stock* (8*s.* 6*d.* n.), the first edition of which was noticed in this Journal for 1917 (p. 294). We have nothing to add to the commendation then given, both as to the completeness with which the subject is treated and to the arrangement of the volume. In this new issue "the text relating to a number of species has been much amended, and a further considerable batch of literature has been examined," though the bibliography has not been increased by the addition of new titles.

THE Cambridge University Press will shortly publish a small book of *Descriptive Labels for Botanic Gardens*, by Mr. H. Gilbert-Carter, Director of the Cambridge University Botanic Garden, the object of which is to give information as well as pleasure to those who visit this and other public gardens, and to suggest their general use.

IN *Torreya* for January–February Miss (?) Patty Thum Newbold publishes "Notes on some Foreign Crab-Grasses," which practically resolve themselves into a list of new combinations, a brief agricultural note being appended to each name. As it is desired to refer to these under their correct names in another connection, eleven species heretofore known under various other generic namas are here referred to *Syntherisma*, the oldest valid name for the crab-grasses. As we have said on more than one occasion, we think that this wholesale creation of new combinations, without any indication that the

plants to which they are applied have been critically examined, is greatly to be deprecated.

It is not often that periodical publications are antedated, but the *New Phytologist* of "April 23" was on our table on April 17. It contains papers by J. Henderson Smith "On the Early Growth Rate of the Individual Fungus Hypha"; on "The Cytology of *Matthiola incana*," by Irene M. Allen; and the conclusion of "The Factors Governing Bud Formation," by F. Summers.

The seventh part of Mr. Oakes Ames's *Schedulæ Orchidianæ* (Boston: Earnshaw Press Corporation) is devoted to "Additions to the Orchid Flora of Tropical America," and is mainly concerned with *Pleurothallis*, of which a large number of new species are described and figured with the completeness and care which characterise the author's work.

The *Kew Bulletin* (no. 3) contains a continuation of Mr. Craib's "Contributions to the Flora of Siam," with descriptions of many new species: "*Scabiosa rhodopensis*," sp. n. (with figure), by N. Stoianoff and B. Stefanoff; "The Mexican and Central American Species of *Ouratea*" (many new), by L. A. M. Riley; "*Tilia Henryana* var. nov. *Carlesii*," by C. V. B. Marquand.

The *Transactions of the Perthshire Society of Natural Science* (vol. vii. part 5) contains a paper by Mr. J. R. Matthews on the Potamogetons of the Garn District of Perthshire.

"The Flowers of New Forest."

In his recent volume, *The Oxford Circuit*, Lord Darling becomes pathetic over the possible result of the teaching of Botany in Technical Schools, which, we gather, has been set on foot in Essex. Here are three of the verses:—

"Alas! loud our wail is for thee, *aestivalis*,
Spiranthes—you herald no longer the day.
Near Lyndhurst they spied thee—they cut thee, they dried thee,
The flowers of the Forest are all stolen away.

"Thy flowers, *Calycinum*, they pluck and they twine 'em
With damp *Humifusum*—they found these near Sway,
The bright *Pyrus malus* next Springtide must fail us;
For flowers of our forest are all borne away.

"Wherever there grows a *Lastrea spinulosa*,
Felix-mas [sic], *dilatata*—next Bank Holiday
Learn'd 'En'ry and 'Arriett will cut, and will carry it—
The flowers of New Forest are all torn away."

We venture to hope that his Lordship's fears are exaggerated: the *Spiranthes*, we believe, still exists in the old locality, and of the Hypericums intended, the first is hardly a New Forest plant, and the second, even if sufficiently conspicuous to attract 'En'ry and 'Arriett, is hardly likely to be exterminated. The danger, if such there be, is more likely to come from another class of collector, of whose rapacity sad instances are on record.

GENTIANA ULIGINOSA Willd. IN BRITAIN.

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

Among the interesting plants that I collected last September around Tenby is a dwarf Gentian of the *Amarella* group, which is clearly an annual with the cotyledons still green at the time of flowering. It grew in a damp, sandy pasture, and I saw at once that it was probably referable to *G. uliginosa* Willd., which does not appear to have hitherto been recorded with certainty for Britain.

In the British Floras of the last century *G. Amarella* L. was always treated as an annual, and the first indication in this country of its biennial duration and the existence of a separate annual *G. uliginosa* appears in Journ. Bot. xxxii. pp. 1 *sq.* (1894), where Beeby gave a synopsis of a recent monograph of the generic group *Endotricha* Froel. by Herr Svante Murbeck (*Acta Horti Bergiani*, ii. No. 3, pp. 10 *sq.* (1892)). Beeby briefly mentions the chief diagnostic features of these plants, adding that Murbeck did not know *G. uliginosa* from Britain, although it was recorded for Scotland by Nyman. In 1897 a further paper on this group was published (Denkschriften Akad. Wissen., Band 64. pp. 309 *sq.*) by Prof. R. v. Wettstein, who repeated Murbeck's description of *G. uliginosa* and gave three British stations (Arbroath, Richmond, Yorks, and Derbyshire), from which, however, he does not appear to have seen specimens. Another synopsis of Murbeck's paper was inserted in 1904 in the second edition of Townsend's *Flora of Hampshire* (Appendix p. 631), where rather fuller diagnoses than those printed by Beeby are given, and Wettstein's three British stations for *G. uliginosa* are repeated, with the addition of a fourth, which is accurately located (Marshall, No. 2171, E. of Nairn). Marshall's plant from this last station, as represented in Herb. Mus. Brit., however, is an annual form belonging not to the *Amarella* but to the *Campestris* group, and is presumably a state of *G. baltica* Murb. The only remaining British material that I have traced which may be *G. uliginosa* is "Marshall, No. 2281, Damp sandy ground, Pembrey Burrows, Carmarthenshire, 1899." This is labelled "*G. uliginosa* Willd. me judice." The specimens, which are in flower, show no cotyledons or basal leaves, and are perhaps biennials. Their habit is that of *G. Amarella* rather than *G. uliginosa*, and their calyx-teeth seem too regular for the latter species. The habitat is certainly unusual for *G. Amarella*, but it is not unique, for I collected in 1899 a similar form on damp ground on Braunton Marsh, which likewise I should not refer to *G. uliginosa*; and I have seen other material in herbaria from such situations.

Gentiana uliginosa was originally described and differentiated from *G. Amarella* in 1797 in Willdenow's *Species Plantarum*, i. p. 1347, the type being a North German plant, and it is figured with *G. Amarella* (as *G. axillaris*) in Reichenbach's Iconogr. Bot., tabs. lviii. & cxxx., where the features of the two species are well contrasted, although in both the corollas are wrongly shown as bright blue in colour. The later and more detailed accounts of Murbeck and

Wettstein evidently refer to the same plants, as also the excellent exsiccata that these authors have issued; and it is clear that *G. uliginosa* is well understood by the Central European and Scandinavian botanists.

The Tenby Gentian that I collected (unfortunately, rather too sparingly) matches the above-mentioned descriptions, figures and exsiccata exactly, except for a lack of scabridity on the margins of the upper leaves and calyx-teeth. I cannot, however, trace this character in my British material of *G. Amarella*, to which it is also assigned, and I think it likely that it may be an inconstant feature in all of these plants, and its presence or absence not a matter of taxonomic importance. Wettstein admits that it may be wanting in the upper leaves.

As the characters of *G. uliginosa* seem imperfectly known in British botany, I append a full translation of Murbeck's description, with remarks, partly taken from the same source, on its differences from *G. axillaris* Reichb., with which the common British form of *G. Amarella* has been identified, and *G. lingulata* C. A. Agardh, v. *præcox* Wettst.

GENTIANA ULIGINOSA Willd. Sp. Plant. i. 1347 (1797). Murbeck, Gentianen (Endotricha) in Act. Hort. Berg. ii. No. 3, p. 14 (1892); Wettstein, Gentiana (Endotricha) in Denk. Akad. Wissen., Band 64, p. 357 (1897).

Icones. Reichb. Iconogr. Bot., tab. lviii. figs. 118 & 119; Reichb. Fl. Germ. xvii. tab. mxlvi. fig. 4 (as *G. Amarella*); Dietrich, Fl. Boruss. viii. tab. 506 (as *G. Amarella*); Wettstein, *l. c.* tab. iii. fig. 6.

Exsicc. Dörfler, Nos. 3773 & 3774; Pugsley, No. 409, Tenby.

Annual. Stem furnished at the base with cotyledons which are green even at the time of flowering and a few larger leaves, erect, 3–20 cm. high, branched from the middle or even from the base. Branches erect or suberect, one–several-flowered, forming a racemose inflorescence. Basal leaves ovate or lanceolate, attenuated to a narrow petiole, broadest below or at the middle, narrowed towards the apex, rather obtuse or subacute except the cotyledons, 4–30 mm. long and 2–8 mm. broad, glabrous. Lower stem-leaves ovate-lanceolate or lanceolate, broadest below the middle, more or less acute, of a length 2–4 times exceeding the breadth, up to 35 mm. long and 14 mm. broad, subpatent; upper stem-leaves dilated from the base, ovate-lanceolate or subtriangular-lanceolate, acute, generally spreading horizontally, with scaberulous margins. Calyx 5-fid or not rarely 4-fid; the segments quite unequal, linear-lanceolate or lanceolate, not dilated above the base, with margins more or less reflexed and scaberulous with most minute teeth, separated by sinuses which are generally acute; tube obconic, only half as long as the segments, angular. Corolla 5-fid or frequently 4-fid, tubular, 9–20 mm. long, dull violet or rarely whitish; tube equalling or a little longer than the calyx. Capsule cylindrical, sessile, finally exceeding the corolla. Stigmas ovate.

It may be added that *G. uliginosa* is usually quite dwarf—

Willdenow in the original description gives its height as 1–2 inches—with relatively few basal leaves above the cotyledons and very few (commonly 2–3) pairs of cauline leaves. The stem is tetragonal and often somewhat winged towards the base, and the branches frequently bear a single long-peduncled flower.

Contrasted with this plant morphologically the common British plant referred to *G. axillaris* Reichb. is usually taller (3–60 cm. high), with more numerous basal leaves and many more nodes to the stem. Its branches are thus usually more numerous although often they do not extend to the base of the stem, and they are more floriferous. The basal leaves are broadest above the middle, more or less spathulate and quite obtuse; the lower stem-leaves oblong and obtuse; and the upper only lanceolate or ovate-lanceolate and subacute. The segments of the calyx are subequal and shorter than the corolla-tube; their margins are flat and not reflexed, and the sinuses are generally obtuse.

G. lingulata C. A. Agardh v. *præcox* Wettst. closely resembles in habit the dwarfer forms of *G. uliginosa*. But its basal leaves are numerous and still more spathulate in outline than those of *G. axillaris*, while the stem-leaves are oblong and obtuse, except only the uppermost pair, which become more ovate-oblong and subacute.

The range of *G. uliginosa* extends, according to Murbeck, from North Germany to Silesia, South Sweden, Denmark, and Northern France; and its British station is thus a western outlier as in the case of *G. lingulata* v. *præcox*. It is possible that *G. uliginosa* grows in other localities, not only in Britain but perhaps in France, from which it is at present unrecorded through confusion with dwarf forms of its allies.

Touching the duration of these Gentians, although the life-cycle of *G. uliginosa* in Britain evidently coincides with that of the Continental form as described by Murbeck, this does not seem to be the case with the other two British plants. Murbeck states that *G. axillaris* and *G. lingulata* are biennials, germinating in the spring and forming during the first summer radical rosettes, which complete their development and produce the flowering stems in the following year. The life of each generation is thus two years. In British Floras and herbaria I have been unable to find any evidence that *G. Amarella* is anything but an annual; none of our botanists seem to be acquainted with the first year's rosettes; and during the past winter I have searched localities on Box Hill, where last year's dead plants were common, without finding any trace of young individuals although seedlings of *Erythræa Centaurium* were seen without difficulty. I therefore think that in Britain the common *Gentiana Amarella* is frequently, if not always, an annual plant, germinating in the spring and flowering in the autumn, as it has hitherto been shown in our Floras. It probably springs up much earlier in the season than *G. uliginosa*, and so has time to develop a more or less marked radical rosette, which is often dried up by the time the plant flowers. In these circumstances, although it is morphologically indistinguishable from *G. axillaris* Reichb., it is

perhaps desirable in our present knowledge to retain the Linnean name. Rouy also does not adopt Murbeck's view for the French *G. Amarella*, which he shows as an annual.

There is a note in this Journal (xxx. 153 (1892)) by Mr. Arthur Bennett on the growth of *G. lingulata* v. *præcox*, where it is stated that germination takes place in the autumn, the flowering stage being reached the following May and June. Here the autumnal seedlings presumably spring from seed of the same summer, and the plant is thus an overwintering annual, in which a fresh generation arises each year, rather than a true biennial like the Swedish *G. lingulata*, which requires two years for its development.

PROPOSED ALTERATIONS IN THE INTERNATIONAL RULES.

By T. A. Sprague, B.Sc., F.L.S.
(On behalf of the Sub-Committee on Nomenclature, Imperial Botanical Conference.)

Drs. Schinz and Thellung devote their ninth paper on the Nomenclature of the Swiss Flora (Vierteljahrsschr. Nat. Ges. Zürich, lxix. 172–190; 1924) to a protest against the changes in the International Rules advocated in "Tautonyms, Nomina Abortiva, and Homonyms" (pp. 41–47), and in "Imperial Botanical Conference: Interim Report on Nomenclature" (pp. 78–81), and to a warning of the dire consequences which—in their opinion—will ensue, if any substantial alteration in the Rules is permitted. As before (*op. cit.* lxvi. 311; 1921), they treat the Vienna Rules as "the law of the Medes and Persians, which altereth not," and formulate their views in the following propositions (*op. cit.* lxix. 184):—

1. No clear and unequivocal decision of the International Rules of Nomenclature may be upset.

2. Alterations of the Rules must be limited to *additions*, and may only concern:

(*a*) Explanatory additions to confused and equivocal passages in the Rules, which experience has shown to give rise to differences of opinion as to interpretation.—*Example*: the definition of the term "valid name" (in regard to the question of still-born names) in Art. 56, which definition was not inserted until the second edition of the Rules.

(*b*) Decisions on questions newly raised, and not yet dealt with in the Rules.—*Example*: the question of accidental binary names published in works in which binary nomenclature was not consistently adopted.

(*c*) Further Recommendations.

(*d*) Extension of the List of Nomina generica conservanda.

Alphonse De Candolle, the author of the "Lois de la Nomenclature Botanique," 1867, on which the Vienna Rules were based, held more progressive views. "Every author is necessarily led by certain tendencies, by certain exigencies of the times in which he lives: whence it follows that it is useful—every twenty years, for instance—to revise the *ensemble* of received rules. Advantage is taken of this revision to abandon useless rules, and to replace them by more suitable ones" (Laws of Botanical Nomenclature, 11; 1868). "In the meantime, let us improve the system of binomial nomenclature introduced by Linnæus. Let us endeavour to accommodate it to the continual and necessary alterations that take place in science, and, for this purpose, let us diffuse, as well as we can, the principles of the method; let us attack slight abuses, slight negligence, and let us come, if possible, to an understanding on debated points. We shall thus have prepared, for some years to come, the way for better carrying out works on systematic botany" (*op. cit.* 16).

Schinz and Thellung seem to consider the question of the alteration of the International Rules purely from the standpoint of the Swiss flora. During the past twenty years they have devoted much time to bibliographical and nomenclatural research in order to ascertain the correct names of the Swiss Spermatophytes and Pteridophytes, and they naturally view with apprehension any alterations in the Rules which would necessitate a considerable number of further changes in Swiss nomenclature. The value of their researches will, however, not be lost by any alteration in the Rules. Whatever Rules are finally adopted, the synonymy of each species must be carefully investigated before the Rules can be applied—hence Schinz and Thellung's work possesses a permanent value. It is also important as affording a means of testing the operation of the Rules. The instability which arises from the rejection of tautonyms under Art. 55, 2° has already been demonstrated (pp. 42–44); and Schinz and Thellung (*op. cit.* 181) frankly admit that the adoption of Art. 50 has done more harm than good, and that it would have been better had the Vienna Congress adhered to the principle of "once a homonym, always a synonym." So far, the mischief arising from Art. 50 and 55, 2°, has been confined largely to the Swiss flora, which represents only one-eightieth part of the whole flora of the world (2500 Spermatophytes out of 200,000). Would it not be wise to revoke these two undesirable provisions before further harm has been done?

Schinz and Thellung think that the general agreement reached at the Vienna Congress and confirmed at Brussels would be endangered if any of the Rules were revoked, and that nomenclature would relapse into the former condition of anarchy and chaos (*op. cit.* 182). Their fears seem unfounded. They forget that it is not reform, but the denial of reform, which breeds anarchy. Furthermore, the agreement at Vienna was by no means so complete as might be gathered from their remarks. An important section of American botanists was alienated by the invalidation of names of new groups unaccompanied by Latin diagnoses, by the conditional acceptance of homonyms, and by the adoption *en bloc* of a lengthy list of *nomina conservanda* prepared by a single botanist representing a single school of taxonomy and nomenclature, and presented without any statement of the cases for and against their conservation. The fact that thirty-two of these

nomina conservanda have been shown to be superfluous (pp. 143–145) indicates that the list requires revision.

Schinz and Thellung completely ignore the nomenclature of American plants. The phanerogamic flora (known and unknown) of the American continent and islands is probably about one-third of that of the whole world, say 70,000 out of 200,000. I have shown (Journ. Bot. 1922, 129–131) that one species out of every nine bears different names under the International Rules and the American Code, therefore about 7700 out of the 70,000 American Spermatophytes will eventually be burdened with a dual nomenclature. If the Type-method—which is a common possession—is developed on divergent lines by Internationalists and Codists, the proportion will be much higher. Moreover, the mischief will not necessarily be confined to the American flora. The American botanists in the Philippines and Hawaii have hitherto accepted the International Rules, but we have no guarantee in regard to the future. Hence it is possible that the blight of dual nomenclature may spread to tropical Asia and the Pacific, or even further. If either the Rules or the Code were eventually to prevail, matters would right themselves, but there is not the slightest prospect of such a consummation. Each has definite points of superiority, and each has serious defects. Hence the hope of the future lies in such a modification of the Rules (by an International Congress) as may secure their world-wide acceptance (*Science*, 1923, n. s. lvii. 207; Journ. Bot. 1923, 109). The extremists who will not abate one jot or tittle of the Rules or Code, as the case may be, block the way. If only the large body of botanists who hold moderate views on nomenclature could come together in consultation, reunion might be effected. The longer it is delayed, the more difficult it will be to secure, owing to the growth of vested interests. Even now Schinz and Thellung oppose alteration of the Rules on the ground that it would annihilate their nomenclatural work of the last twenty years (*op. cit.* 182). In another twenty years' time opposition based on similar grounds will have greatly increased.

ORCHIS FUCHSII Druce.

[A number of circumstances have contributed to delay the publication of the following paper by Dr. Druce. It is the result of a suggestion made to him by the Editor that it would be of interest to our readers to have his comment on the paper on *Orchis Fuchsii* by Colonel Godfery published in this Journal in December last. To this we have appended a note by Colonel Godfery.

It may be well to say that, although both are printed as sent by the writers, Dr. Druce was good enough to abridge the earlier version of his paper, in order to bring it within the necessary limits of space. We may add that the suggestion that Mr. Rolfe was responsible for the reference of *O. elodes* to *O. incarnata* in the *Index Kewensis* is not borne out by the MS. of that work, which is preserved at Kew, and is indeed inherently improbable.—Ed. Journ. Bot.]

In this Journal for December Colonel Godfery has a paper on *Orchis Fuchsii* Druce. From it I gather that he admits that there are two distinct species of the Spotted Orchis. If this be so, an important onward step has been made, and the point of difference narrows down to the name each segregate shall bear.

In the *Report of the Botanical Society and Exchange Club*, p. 99, 1914, I gave the reasons which induced me to restrict the name *O. maculata* L. to the sub-species *ericetorum* Linton and the *O. maculata* var. *præcox* Webster, and to name as a separate species the plant figured in Eng. Bot. t. 632, 1799 (which, however, does not conform to Smith's description), from Norbury, Surrey, as *Orchis Fuchsii* (the separate flower on the plate is different). *O. Fuchsii* is fairly well represented in my copy of Fuchs' *Kreuterbuch*, t. cccevii. Edit. Basle, 1543, hence the name selected. Colonel Godfery thinks otherwise, and, although I am sure unintentionally, seriously misrepresents me. He says my case rests on the last three words of the description in the *Species Plantarum* "intermedio angustissimo, integerrimo." On this assumption, which is groundless, a large part of four pages is occupied with statements or deductions, which made as they are from wrong premises, might be deemed as not necessitating a reply, but I should be very sorry to act with any discourtesy or to leave myself open to the charge of evading the main issue. This is, why do I identify *O. maculata* in the sense of *ericetorum*? Why do I found *O. Fuchsii*? As these questions may be of interest not only to British, but to continental botanists, it may be well to bring the facts before the readers of this Journal.

In the paper alluded to I quoted the description of Linnæus from the *Species Plantarum*, ed. 1, p. 1753: "Petala 3 exteriora erecta; 2 interiora conniventia. Nectarii labium trifidum planum; lobis lateralibus majoribus crenatis; intermedio angustissimo, integerrimo," which, it will be observed, is not limited to the last three words. This, as I showed, agreed well with Linton's description of *ericetorum* and with Webster's *præcox*. It does not agree with *Fuchsii*, which I characterised as having "Labellum deeply three-lobed, the lobes subequal, the centre longer and somewhat larger than the lateral, entire. The lateral ones have their outer margin straight or only slightly curved or rounded, slightly crenate or entire." Three years later, in the fifteenth edition of *Hayward's Botanist's Pocket Book*, p. 277, I gave the contrasting characters of the flowers:—

"O. maculata labellum tri-lobed, the lateral segments larger than the middle one, and as long or longer."

"O. Fuchsii labellum tri-lobed, the middle segment as large and longer than the lateral." As will be seen, there is no reference to the three words detached from their context on which Colonel Godfery says my case rests. My case depends on the Linnean *description*, which is exceptionally clear: it eliminates *Fuchsii*. Colonel Godfery agrees that *ericetorum* equals *præcox*, and as he says *O. elodes* Griseb.; if he is correct in this view all three names are much antedated, and must be superseded by the Linnean *maculata*. It must be remembered that in defining a species the description comes first, if

the synonyms agree well and good (of the Linnean synonyms cited for *O. maculata* Vaillant's plant is not *Fuchsii* nor is the third synonym), if not, they must fall. Of the Linnean synonyms cited for *maculata*, that of Bauhin's Pinax may be either plant, but since, according to St. Lager, it is not represented in the Basle Herbarium, one cannot say: it is really immaterial, since if it is *maculata* it is all right—if *Fuchsii*, then it does not agree with the description and becomes a misapplied synonym. Vaillant's plant as figured is not *Fuchsii* nor is the third synonym, cited from Dodoens' *Pemptades* (borrowed from the woodblock of Lobel's *Observationes*, p. 90, f. 4, 1576), which represents *maculata*, not *Fuchsii*.

As to the specimen in the Linnean Herbarium, Dr. Moss, who working at the subject quite independently arrived at the same conclusion, emphatically states that it is true *maculata* which he says "equals *ericetorum*, and as you say *præcox* Webster."

Therefore if one had to determine the question by the synonyms cited and by the herbarium specimen we might safely discard *Fuchsii*, but the identification fortunately also rests upon the bed-rock of a good description which, as will be seen, cannot be made to fit *Fuchsii*.

One need not touch upon the other points raised, since they are covered by the statements already made. Nor need we discuss at length the assertion that *O. elodes* is in universal use for *ericetorum*. I know of only two instances of its use. It is not mentioned in any British Flora, not even in Wilmott's edition of Babington's *Manual*. In the *Index Kewensis*, probably on the suggestion of Mr. Rolfe, it is made synonymous with *O. incarnata*. In Beck's Fl. Nied.-Oester. 205, 1890, it is placed under *Orchis maculata* × *Gymnadenia odoratissima*: most continental authorities ignore it. In Camus' Atlas *O. elodes* is represented by a white-flowered plant with unspotted leaves unlike the ordinary form of our *maculata*.

As to the inability to find *O. maculata* in Switzerland, persevering search alone is needed. It is represented from Lausanne and elsewhere in the National Herbaria, it is plentiful in Western France, in Italy, Spain, Belgium, Sweden (Ahlberg says it is abundant about Upsala), Norway, Russia, etc. It is to be found chiefly where primitive or acid rocks are near the surface, or where much humic acid is present in the soil. One would not look for it among *Dryas*, but the searcher would probably find it among *Drosera*, *Scirpus cæspitosa*, and *Carex echinata*.

To summarise: Even if *O. maculata* L. included *O. Fuchsii*—of which there is no clear evidence—the description excludes it.

The Linnean description unmistakably refers to the *ericetorum* Linton, the *O. maculata* var. *præcox* Webster, and (possibly as a variant) to *O. elodes* Griseb.

Inferences drawn from plants gathered in the same locality in 1922 as one to which Linnæus refers in his Iter Oeland in 1745 have no bearing on the case. He describes nothing apart from *maculata* in the Sp. Pl.: he gives no restricted habitat such as Rella, but says "in pratis Europae succulentus," in which situations *O. maculata* delights to grow. Suppositions respecting what must have been in

the mind of Linnæus, or as to what he may or may not have seen, being conjectural, are valueless in the face of what he has written in establishing the species in 1753. Even if he saw *Fuchsii*, he may not have thought it worthy of specific distinction as in the case of *Quercus* and *Cratægus*. He must have seen both species of the Oak and Hawthorn, but only gives one. As regards the Orchis, this is the plan followed by Lindman in the *Svensk Fanerogamflora* of 1918 and by Syme in *English Botany* of 1866, where only one species is given, but Syme, unlike Linnæus, has widened the description so as to cover both plants, which he thought were indefinable variants of one species.

G. Claridge Druce.

I withdraw with pleasure the expression to which Dr. Druce has taken exception. What I meant to convey was that the only part of Linnæus's description, as quoted by Dr. Druce, which lends any support to the idea that it applied exclusively to *O. elodes*, is the last three words. This may easily be seen from the description itself. "*Petala* 3 *exteriora erecta*" applies solely to *O. Fuchsii* Druce, for in *elodes* the sepals are not erect. "*Nectarii labium trifidum planum*" applies equally to both. "*Lobis lateralibus majoribus crenatis*" applies not only to *elodes*, but to forms of *Fuchsii* found both in Britain and abroad. The last three words, however, "*intermedio angustissimo integerrimo*," appear at first sight to apply only to *elodes*, because in the latter the mid-lobe is as a rule much smaller than the side-lobes.

Like Dr. Druce, I at first thought that Linnæus intended to imply that the mid-lobe was extremely narrow *as compared with the side-lobes*. As soon as I saw the Rella specimens, I realised that what he really meant was that it was very narrow in *comparison with its length*. It is long, sharp, and dagger-like, a good deal longer than the side-lobes, and very narrow in proportion to its length.

As to the relative dimensions of the lobes of the lip, Linnæus simply says "*interiore minore integerrimo*" (Act. upsal. p. 14) and "*lobis lateralibus majoris*" (Sp. pl. 942). The employment of the comparative degree only in this connection shows that the superlative "angustissimo" was not intended to refer to the relative magnitude of the lobes, but solely to the shape of the mid-lobe itself.

It was always difficult to understand why Linnæus should have used the word *integerrimo* with reference to the tooth-like mid-lobe of *elodes*, which is too small to admit of any but microscopic dentation, but it applies aptly enough to the smooth edge of the long mid-lobe in the Rella specimens.

It is impossible to escape from the fact that Linnæus, in his description of *O. maculata* in both editions of the *Flora suecica*, cites It. oel. 48, thereby establishing beyond question the fact that the Rella plant was his *O. maculata*. Rella is the only definite locality he gives for *maculata*. As Dr. Druce admits that the specimens recently brought from Rella are *O. Fuchsii*, the chain of

evidence appears to be complete that *O. Fuchsii* was included in *O. maculata* L.

It would have been helpful if Dr. Druce had given the authority (*i. e.*, whether personal observation or otherwise) for his statement that *elodes* is plentiful in Western France, Italy and Spain, as the extension of this northern plant into warm southern regions would be of much interest.

M. J. Godfery.

SOME NEW BRITISH ROSES.

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

A new and thorough revision in the British Roses entitled *The Roses of Britain* is now in the press, and it is hoped will be in time for use this year. In the course of the revision I have established the following new varieties, forms, and hybrids :—

× Rosa scotica hybr. nov. (*R. spinosissima* × *mollis.*)

Prickles straight and slender, running into eglandular acicles, which are often few. Leaflets seven, rarely nine, large or rather large, oval, rounded or subacute at the apex, biserrate, greyish tomentose on both sides, without subfoliar glands. Petioles densely tomentose, but typically hardly at all glandular or prickly. Peduncles solitary, of medium length, thinly and weakly aciculate. Petals white. Sepals more or less pinnate, with foliaceous tips, somewhat glandular. Fruit small, and apparently ill-developed, globose, clothed as on the peduncles or nearly smooth.

This hybrid, represented by Marshall's No. 2904 from Banff, and 2936 from S. Aberdeen, is much nearer to *R. mollis* (probably f. *cærulea*) than to *R. spinosissima*, but its heteracanthy and ill-formed fruit show the latter influence. I associate with it a very similar-looking plant gathered by Rogers in E. Inverness, differing in having numerous green or whitish subfoliar glands, which appear also on the upper surface. Its petioles also are somewhat aciculate and prickly. I hardly think it deserves a separate name.

× R. mayoensis hybr. nov. (*R. spinosissima* × *mollis.*)

Prickles falcate or declining, running into acicles, sometimes very numerous and almost eglandular. Leaflets seven, of medium size, oval, rounded or obtuse at the apex, fully biserrate, greyish tomentose both sides, without subfoliar glands or with inconspicuous sessile green ones. Petioles more or less clothed with glandular setæ and pricklets. Peduncles short, usually in clusters, thickly clothed with gland-tipped acicles. Fruit globose, similarly clothed. Sepals much as in × *R. scotica*, but often broader and darker.

This is near × *R. scotica*, but differs in its prickles and much more strongly armed peduncles. It is also of a darker colour, especially the stem and branches, which are often dark red.

It has been found in Mayo, Marshall No. 1625, and almost exactly the same form in W. Sutherland, Marshall No. 1891.

× R. Barclayi hybr. nov. (*R. spinosissima* × *omissa.*)

5–6 ft. high, running at the roots. Prickles straight, slender, sometimes rather stouter and arcuate, very unequal, running into numerous glandular and eglandular acicles. Leaflets seven, oval, rounded or obtuse at the apex, fully biserrate, dark green, subglabrous above, rather thinly pubescent beneath, densely covered with dark stipitate glands, which also appear in some quantity on the upper surface. Petioles densely glandular, with numerous very unequal straight prickles. Peduncles short, one to three in a cluster, armed with long spines, which also cover the whole calyx-tube. The longer spines are naked at the tip, but bear several very short lateral gland-tipped branches, the shorter spines are simple and gland-tipped. Sepals pinnate, intensely glandular, with some branched spines in the lower half. Petals deep red. Fruit ovoid-subglobose.

The description is from a plant gathered near Auchterarder, Mid Perth, by Barclay in 1895, 1907, and 1918. The armature of the calyx-tube is unique. It is doubtless derived from var. *suberecta* (Ley).

× R. borealis hybr. nov. (*R. spinosissima* × *omissa.*)

5 ft. high. Prickles declining, straight, very unequal, the longest up to $\frac{3}{4}$ in. long, running into acicles, which in my specimen are mostly eglandular. Leaflets oval, more narrowly so than in most of the hybrids of the *Villosae* with the *Spinosissimae*, acuminate, fully biserrate, glabrous above, thinly pubescent beneath, with a few, sometimes very few, subfoliar glands. Petioles glabrous, with some stipitate glands and a few small pricklets. Peduncles one to four, of moderate length, with numerous long and short glandular or eglandular acicles, which extend in variable quantity to the calyx-tube, which is also sometimes smooth. Sepals long, not much pinnate, with a dark brown central band, and broad conspicuous pale edges, the band glandular, the edges tomentose and eglandular. Flowers white or tinged with rose. Fruit not formed, but probably ovoid or subglobose.

This is also almost certainly of *omissa* var. *suberecta* origin, but is quite distinct from the very striking × *R. Barclayi*. I have only seen it from Sutherland, Marshall's No. 4081.

R. canina var. aspernata f. globosa f. nov. (*R. aspernata* auct. Britt. p.p.)

Characters of var. *aspernata* Briggs, but fruit globose or subglobose, typically densely, but sometimes thinly covered with glandular setæ, not with acicles as in var. *aspernata*, though rarely some of the setæ are almost strong enough to be described as acicles. Whole plant less glandular in all its parts.

I find quite a number of forms answering this description which have been labelled *R. aspernata* in the past by British botanists, but the clothing and shape of the fruit differ materially. It has a less restricted distribution than *R. aspernata*, but is not common.

R. Pouzini Tratt. Rcs. Monogr. ii. 112 (1823).

From the first time that I gathered the Ham Common, Surrey, *R. stylosa* var. *evanida* Chr., and examined the type-specimen gathered by Nicholson, I have doubted whether it was a *Stylosa* form at all.

Moyle Rogers was also sceptical about it, while R. P. Murray thought it was an *obtusifolia* form. Sudre at first thought it was an *andegavensis* form and proposed to call it var. *Wolley-Dodii*, but later said he thought it might after all belong to the *Stylosæ*. Dingler agreed to its position in the *Andegavenses*, but associated it with *R. litigiosa* Crép. His opinion was that it was a form of *R. Pouzini*, and thought it might be labelled *R. Pouzini* var. *Wolley-Dodii* (Sudre, 1908) Dingler, a cumbersome and unsatisfactory name. I have since submitted my specimens to Dr. R. Keller, of Winterthur, who thinks it is neither a *Stylosa* nor a *litigiosa* form, but one of *R. Pouzini*. So far as I know, Crépin never saw it.

Another plant from Fawke Common and the neighbouring Bitchet Green, W. Kent, was seen by Crépin, who at once suggested that it was a form of *R. Pouzini*, but asked for ripe fruit. As I had gone abroad I asked Marshall to obtain this, but unfortunately he gathered fruit from the wrong bushes, which made Crépin decide that it was *R. tomentella* var. *decipiens*. Dingler, to whom I submitted all the specimens, saw the mistake, and quite confirmed Crépin's original opinion that my first gathering was a form of *R. Pouzini*, for which he suggested the name of var. *anglica*. More recently, Dr. Keller confirms these opinions, so I describe the two forms.

I first give a short description of *R. Pouzini* Tratt., drawn up from those of Crépin and R. Keller, with the assistance of specimens of the typical species from Italy, kindly sent to me by Dingler. The species has several striking varieties on the continent. Its chief characteristics are its prickles and the leaf toothing.

Rather low growing, with slender branches. Prickles with long, slender, curved or somewhat hooked points from long low bases. Leaflets remarkably small, glabrous, narrowed at each end, acute, but not acuminate nor cuspidate, often reddish when young, with conspicuously deep and open toothing, each tooth with a single glandular denticle on the back, none on the front. Petioles glabrous and densely glandular, the glands hardly extending to the midribs. Peduncles glandular-hispid. Flowers pale rose. Fruit ellipsoid or oblong, or ovoid with a narrowed apex, often very small. Styles glabrous or very thinly hispid. In Dingler's specimens the sepals are very short and little divided, but this does not appear to be a characteristic feature.

R. CANINA (Andegavenses) var. POUZINI f. ANGLICA f. nov.

Leaflets usually more acuminate or cuspidate than in the type of *Pouzini*, with less deep and more compound toothing. Petioles less glandular but more pubescent, the pubescence rarely extending slightly to the midribs. Fruit subglobose or ovoid.

Found on Fawke Common, W. Kent, my No. 22, and between Bitchet Green and Stone Street, in the same neighbourhood, my No. 29, not Marshall's No. 1585 from the former station.

f. SIMPLICIDENS f. nov. (*R. stylosa* var. *evanida* Chr. in Bot. Exch. Club. Rept. 1879, 12 (1880).)

Leaflets, prickles, and slender habit of the type, but quite simply serrate (the original var. *evanida* was described as biserrate, but wrongly), the toothing finer and more porrect, petioles not glandular and often much less pubescent than in f. *anglica*. Styles in an exserted column. Fruit as in f. *anglica*.

Found in some quantity on Ham Common, Surrey, but the station may have been destroyed by a fire which occurred a few years ago. My Nos. 45 and 1520.

A specimen from Stokes Heath, Surrey, I believe to be the same. It differs almost solely in its more pubescent petioles. It had been labelled *R. litigiosa* Crép. by Sudre, which R. Keller said it certainly was not, and labelled it *R. canina* L. subsp. *R. vulgaris* Gams (*Andegavenses*) var. *adenotricha* Burn. et Grem., a name he oddly enough gave to my No. 45, which is undoubtedly the same as my No. 1520.

× R. DRUCEI hybr. nov. (*R. canina* × *rubiginosa*.)

Prickles hooked, mixed with, but quite distinct from, numerous fine acicles and stalked glands on various parts of the branches. Leaflets elliptical ovate, with a long acuminate point and somewhat rounded base, fully biserrate, coarsely so on the lower leaflets, much more finely on the upper ones, with plentiful subfoliar glands. Petioles densely glandular, with few pricklets. Peduncles very short, glandular hispid. Fruit large, ovoid, smooth. Styles glabrous.

This has most of the characters of *R. rubiginosa*, but the leaflets of the upper leaves are quite different from any I ever saw in that species. My specimen might almost be described as heterophyllous, since the leaflets of the lower leaves are not only differently serrate, but are of a more regularly oval. much less acuminate form than those of the upper ones. The sepals have fallen.

It was gathered in 1878 by Druce on Barnwell Wolds, Northants, without any collector's number. Crépin labelled it "*R. rubiginosa* var.," and Baker said it was *R. rubiginosa*, but a very unusual form.

× R. LATENS hybr. nov. (*R. canina* × *micrantha*; *R. micrantha* × *canina* f. *Wolley-Dodii* Dingl. in litt.)

Prickles stout and hooked, often running into acicles at the ends of the flowering branches. Leaflets oval, subacute, broadly rounded at the base, subglabrous above, very thinly pubescent beneath, sometimes with numerous, sometimes few subfoliar glands, finely glandular-biserrate. Petioles and stipules densely glandular. Peduncles one to five rather long, some smooth, some thinly and weakly glandular-hispid. Sepals glandular on the back, reflexed and deciduous. Petals pale rose. Styles subglabrous. Fruit ovoid or broadly so, in some some years almost wholly abortive.

The appearance and colouring of this hybrid is quite unlike that of *R. micrantha*, though it has most of its technical characters, with a weaker development of glands.

It occurs for some distance along a hedge in Hogtrough Bottom near Kingswood, Surrey, my No. 2042, and Britton's No. 2419. The determination is due to Dingler.

R. DUMETORUM var. ERECTA v. nov. (*R. dumetorum* var. *erecta* W.-Dod in Journ. Bot. lviii. Suppt., 11 (1920).)

Prickles stout and hooked, but short. Leaflets rather large, oval, irregularly serrate, pubescent only on the midribs and nerves beneath. Petioles pubescent, rarely a little glandular, unarmed or nearly so. Peduncles conspicuously long, almost always in clusters of two to five. Sepals long, typically remarkably erect, but sometimes only spreading, or a few even reflexed, green and eglandular on the backs. Styles hispid or thinly so. Fruit globose or broadly ovoid.

This might be mistaken for a *Coriifolia* form but for its long peduncles and only hispid styles. It often has the broad bracts and upper stipules of that Group, but this feature is a frequent one in *Dumetorum* forms. Crépin has expressed his opinion that it is a new variety of *R. dumetorum*. It is not always easily separated from var. *jactata*.

It was originally gathered in Radnorshire, but has since been found in Surrey, Shropshire, Cheshire, and Cumberland. Examples from Essex, Middlesex, and Perth also probably belong here.

R. DUMETORUM (Collinæ) var. INCERTA (Déségl.) f. LÆVISTYLA f. nov. (*R. leucochroa* auct. britt. non Desv.)

Differs from the variety in its glabrous styles.

This is the plant which has often been misnamed *R. leucochroa* Desv. in Britain, but it has none of the characteristics of the *Stylosæ*, its disc being almost flat, that of the *Stylosæ* being conical. The styles and stigmas, short peduncles and more slender prickles also differ.

f. SUBGLABRA f. nov. (*R. canina* (Andegavenses) var. *Wolley-Dodii* R. Kell. in litt.)

Midribs alone very thinly pubescent, some of them often glabrous. Leaflets often more acuminate. Styles usually glabrous.

This form is considered by Dr. Keller to be intermediate between *R. andegavensis* and var. *incerta*, and he proposed to place it in the *Andegavenses* in spite of its pubescent midribs. I believe the admission of pubescent-leaved varieties into *R. canina* and glabrous ones into *R. dumetorum* may be correct, but have not adopted this arrangement, so place it under *R. dumetorum*.

f. PSEUDO-INCERTA R. Kell. in litt. (as var.) f. nov.

Leaflets more or less subbiserrate.

I restrict typical var. *incerta* to forms with the leaflets almost or quite simply serrate.

R. DUMETORUM (Aciculatæ) var. SETICAULIS nom. nov. (*R. dumetorum* var. *aciculata* W.-Dod in Journ. Bot. lviii. Suppt., 12 (1920) non Rouy.)

Prickles few, small, with aggregations of fine glandular and eglandular acicles on the flowering branches. Leaflets rather small, rather narrowly elliptical, fully biserrate, thinly hairy beneath only. Peduncles solitary, long, glandular-hispid. Sepals strongly gland-ciliate. Styles thinly hispid or subglabrous. Fruit ovoid, smooth.

This variety is only known from one station in Surrey.

R. DUMETORUM (Mercicæ) var. MERCICA W.-Dod. in Journ. Bot. lviii. Suppt., 12 (1920).

6–8 ft. high. Prickles of moderate size, hooked or declining.

Leaflets dark bluish green, rather large, regularly oval, acute, not acuminate, rounded at the base, thinly pubescent on both sides, with a few scattered inconspicuous subfoliar glands, biserrate, the secondary teeth often reduced to sessile glands. Peduncles 14–18 mm. long, rather densely glandular-hispid. Sepals reflexed, more rarely more or less spreading, glandular on the backs, with narrow pinnæ. Styles often exserted, hispid, sometimes densely so, but more usually thinly. Petals pale rose. Fruit ovoid or broadly so, more or less glandular-hispid.

This variety has been mistaken for *R. cæsia* Sm., with which it has no affinity. It is peculiar for the presence of subfoliar glands. It is often very near forms of var. *incerta*. It occurs frequently in Dovedale and elsewhere in Derbyshire.

R. DUMETORUM (Mercicæ) var. SAVERYI var. nov.

Prickles few, slender, arcuate. Leaflets of medium size, broadly ovate, almost suborbicular, obtuse, cuspidate, fully biserrate, slightly pubescent on midribs only beneath, with a few subfoliar glands. Peduncles in clusters of three, glandular-hispid. Sepals somewhat gland-ciliate. Styles glabrous on a very conical disc. Fruit not formed, but the calyx-tube looks as if it would develop into a small, broadly ovoid fruit.

This variety is known only from one station in S. Devon.

R. CORIIFOLIA var. SUBHISPIDA var. nov.

Prickles of the type. Petioles glandular, sometimes densely so. Leaflets oval or broadly so, somewhat rounded or not much narrowed at the base, subacute, or subobtuse and cuspidate, rarely acuminate, glabrous above, pubescent all over beneath, without subfoliar glands, more or less irregularly, sometimes doubly serrate, very rarely simply so. Peduncles one to three, short, with a few glandular setæ, some of them smooth. Sepals spreading or suberect, often very roughly hispid on the backs. Fruit globose or subglobose, smooth or rarely with a few scattered setæ.

I use this name to cover specimens which have been referred to var. *Watsoni*, but have more or less hispid peduncles. They differ from var. *Bakeri* mainly in the absence of subfoliar glands, and usually in less biserrate leaflets.

R. CORIIFOLIA var. BAKERI (Déségl.) f. SETIGERA f. nov.

Peduncles with strong or with numerous glandular setæ. Fruit often more subglobose. Otherwise as in var. *Bakeri*.

I have segregated a few specimens which come under the above definition, and which can hardly be Baker's idea of v. *Bakeri*. I can find no continental name to suit them, unless it be possibly *R. glauca* var. *pseudo-cinerea* Rouy.

× R. TOMENTELLIFORMIS hybr. nov. (*R. tomentella* var. *Borreri* × *rubiginosa*.)

Prickles few, large and much hooked, degenerating into numerous acicles below the inflorescence on some of the flowering branches. Leaflets rather large, oval, acute, subglabrous above, thinly pubescent beneath, subfoliar glands sometimes very numerous, sometimes few. Petioles pubescent, glandular and prickly. Peduncles in considerable

clusters, densely glandular-aciculate. Fruit small, ellipsoid, often ill-developed or abortive; smooth or slightly aciculate at the base. Sepals closely reflexed, shaped as in var. *Borreri*. Styles somewhat salient, hispid.

A very peculiar plant, which I think is certainly this hybrid, though *R. rubiginosa* is only known in gardens in the district where it grows. It has been suggested that it is only a strong form of var. *Borreri* or of *R. tomentella* var. *decipiens*, but all its characters are against either suggestion. It runs at the roots so as to fill several yards of the hedge where it grows.

It is known in one Cheshire station only.

R. MOLLIS var. TYPICA f. GLANDULOSA f. nov. (*R. mollis* Baker in Journ. Linn. Soc. xi. 212 (1869). *R. mollis* var. *recondita* Ley in Journ. Bot. xlv. 204 (1907) non Pug.

As in typical *R. mollis*, but with subfoliar glands.

Smith's specimens have no subfoliar glands, and his description does not mention them, so I have segregated the form which Ley used to call "glandular *mollis*," but named var. *recondita* in his paper.

× R. GLAUCOIDES hybr. nov. (*R. mollis* × *glauca*.)

Prickles long, straight, but with stoutish elongate bases. Leaflets of medium size, elliptical-oval, narrowly rounded or quite narrowed below, obtuse or acute, pubescent on both sides, almost without subfoliar glands, fully glandular biserrate. Petioles tomentose, glandular, and prickly or unarmed. Peduncles as long as the fruit, smooth. Sepals long, narrow, pinnate, very glandular, erect. Fruit globose or subglobose, smooth. Styles villous.

I have this from two stations in Cumberland, in not quite identical forms. It has the appearance of *R. glauca*, and Dingler suggested its hybrid origin.

× R. SHOOLBREDI hybr. nov. (*R. mollis* × *omissa* var. *suberecta*.)

Prickles straight, often unequal in length. Petioles tomentose, very variable in armature, sometimes quite without glandular setæ and prickles, sometimes almost as densely clothed with them as in var. *suberecta*. Leaflets oval, subacute or obtuse, or even quite rounded at the apex, grey-green and more or less densely tomentose on both sides, typically without subfoliar glands, but in some forms with numerous ones, fully biserrate. Peduncles one to three, occasionally more, variable in length and armature, sometimes nearly smooth, sometimes densely aciculate with eglandular acicles. Fruit ovoid or broadly so, clothing variable as on the peduncles. Sepals erect or spreading, sometimes entire, sometimes as much pinnate as in var. *suberecta*.

The description is a comprehensive one, since the hybrid varies, as all hybrids do, but the variations do not occur in combinations which would admit of segregation. They all seem to be intermediate in characters and general appearance between *R. omissa* var. *suberecta* and *R. mollis*, including its forma *cærulea*, often having the red colouring of the former. The leaflets are more like those of *R. mollis*. Some of the fruits are often abortive or ill-formed, which supports the idea of the hybrid origin.

I have a considerable series from Ross and Sutherland, several of which have been labelled *R. pomifera* var. *vogesiaca* Rouy by Sudre, but I do not think they have anything to do with *R. pomifera*.

R. TOMENTOSA Sm. var. TYPICA Chr. f. EGLANDULOSA f. nov.

As in the type, but without subfoliar glands.

There is little doubt that Smith meant his *R. tomentosa* to have subfoliar glands, and he expressly mentions them in his later description, so I segregate the forms which are without them.

R. TOMENTOSA (Scabriusculæ) var. BRITTONI var. nov. (*R. britannica* Boulenger (?) in Journ. Bot. lviii. 185 (1920) non Déségl. MS. nec auct. britt.)

Prickles few, long, stout-based, quite straight or falcate, sometimes quite absent. Leaflets often five only, very large, often 1¾ in. long by ⅞ in. wide (Boulenger gives even larger dimensions), widely spaced, usually rounded or even emarginate, more rarely narrowed at the base, thinly pubescent on both sides, with some, sometimes many, subfoliar glands, remarkably coarsely biserrate. Petioles densely but finely tomentose, moderately glandular, sometimes with numerous pricklets, sometimes unarmed. Peduncles rather long, densely hispid, sometimes almost aciculate. Sepals variable, usually more spreading-erect than is usual in the Group, but deciduous by mid-September. Fruit typically ovoid, but varying from broadly so to quite ellipsoid, though forms with it so have it ill-developed, almost always more or less hispid, sometimes densely so, rarely quite smooth. Styles usually glabrous, but some forms have them hispid.

A constant character is the very large coarsely biserrate leaflets, widely spaced on the petioles. It comes near var. *fœtida*, but is quite different from specimens from Cheshire and elsewhere, which I believe represent Bastard's species.

So far as I can judge from his description, this is Boulenger's *R. britannica*.

It occurs frequently north of the Downs in E. Surrey and extends into W. Kent. I have also seen it from Oxfordshire.

REPRODUCTIVE MECHANISM IN LAND FLORA.

II. LIFE-CYCLES.

BY A. H. CHURCH, M.A.

FROM preceding general considerations of the condition of reproductive mechanism, as first approached in higher plants and animals, it would appear that for Land Flora the essential process is enshrined within the confines of special gamete-nuclei, which act as carriers of individualized chromosomes; while within the latter are located the actual *genes* which in some way control the working out of all the morphological and biological characters of the plant-soma [1]. Such mechanism involves two distinct phenomena included as (1) *Karyogamy*, (2) *Meiosis*. The former process, in simplest

[1] Morgan (1922), Proc. Roy. Soc. p. 194.

terms, including the mingling of the chromosomes of two haploid gametes into a single rejuvenated diploid nucleus of the zygote; the latter process a phenomenon of binary segregation, by which the diploid nucleus is restored to a haploid organization. These proceedings may be spaced far apart in the cell-history of distinct individuals; the nuclear cycle being interrupted possibly by many intervening stages of apparent 'resting,' or by the active mitosis involved in the general continuation of vegetative cell-division[1]. Meiosis is thus to be regarded as the second act in the drama, in that it follows karyogamy, which may then appear as a causal factor (post hoc ergo propter hoc). But it may be reasonably concluded that the haploid state with its single set of determining factors (genes) is to be considered phylogenetically the older condition; if only because there must have been a time before such reproductive processes had been evolved, and any such organism, admittedly hypothetical, if they had possessed chromosomes would have been classed as haploid[2].

The second point that emerges is that in karyogamy and segregation, the two sets of paternal and maternal chromosomes have equivalent value and function; *i.e.*, they do not themselves present sex-characters. In many insects special 'sex-chromosomes' were described (1905); either a distinct pair (idiochromosomes, *x* and *y*), or one only (*x*-chromosome); the function of these being apparently to control the sex of the zygote-soma. A comparable idiochromosome set was first described for a plant in the Hepatic *Sphærocarpus* (Allen, 1917), and more recently similar sex-chromosomes have been found in higher plants of diverse relationship (e. g., *Elodea, Humulus, Rumex Acetosa, Lychnis alba*), while in *Vallisneria spiralis* even an 'odd' sex-chromosome[3]. But the point of interest centres in the

[1] In the case of *Pinus*, between karyogamy and meiosis the diploid zygote may grow to a tree for 10–20 years before producing flowers, and hence intercalates a wholly indefinite number of somatic divisions. Between meiosis and karyogamy, in the case of the megaspore at least 10 successive haploid mitoses, spaced over 12 months (June to June): in the case of the microspore, 5 haploid mitoses between April and June of the succeeding year. The popular hypothesis of 'Germ cells' (Weismann) does not apply to plants.

[2] This is opposed to the zoological suggestion that the diploid zygote is the starting-point, and the segregation of chromosomes provides for the elaboration of single-factor gametes, with sexual fusion as the vital climax. The 'pairing' of the chromosomes is no indication of a miniature act of sexual union; but is solely a necessary device employed in the act of segregation. 'Fusion' only applies to the nuclei as plasmic tracts. *Syngamy* is a less satisfactory term than karyogamy. Chromosomes are sorted only. Any hypothesis of normal blending, or exchange of material substance, would destroy the individuality so carefully guarded during wholly indefinite numbers of somatic divisions on similar mitotic spindles. Hence 'crossing over,' however general, appears as a defect or accident of the colloidial mechanism.

[3] Winge (1924) 'Nature,' p. 208: Doncaster (1920), Cytology, p. 158. There must be something wrong with a terminology which commits one to the paradox that a 'sex-chromosome' controls the differentiation of sex in an asexual generation. The idiochromosome expresses a mechanism for the binary differentiation of the individuals of the same generation. It has no direct connection with karyogamy; but only very indirectly as part of the arrangement for securing the crossing which renders the reproductive scheme a success.

fact that while the 'sex-chromosomes' of animals control the differentiation of a diploid gamete-producing soma, in the higher plant the effective diœcism (or sex-distinction) is expressed in the morphology of the 'asexual' diploid sporophyte; in *Sphærocarpus* that of a haploid gametophyte. The intimate mechanism has no sex in the original sense of the obvious morphological distinction of somatic characters. The terms originally used to mark external and secondary features have been gradually carried on to essential organs and cells, as the process of fertilization was reduced to its ultimate details, until their connotation has been entirely changed. Thus in the plant, the chromosomes of the two gametes may be regarded as equally balanced, even if the nuclei are of different size following heterogamic differentiation; and when karyogamy and meiosis are spaced apart as two distinct though correlated phenomena, the nuclear cycle is cut into two sections, but one half is theoretically no more 'sexual' than the other.

Hence in the case of the land-plant, in which the two phases are isolated in distinct individuals (gametophyte and sporophyte), *one plant soma is really no more 'sexual' than the other.* It takes the two to make up the whole mechanism; and all sex-terms of anthropomorphic origin and introduction, as applied to the more visible differentiation of function in parts (members, organs, and cells) associated with the maintenance of *crossing*, are uncalled for, and might be preferably wholly eliminated. Neither generation is wholly devoted to the reproductive process; in either the necessity for a mechanism of crossing may be insistent. The morphological distinction of 'sex' bears a relation to some physiological mechanism of transfer only. In lower forms (Algæ, Bryophyta, Pteridophyta) arrangements are made for the translocation of gametes in a manner directly comparable with the fertilization of animals; but in Phanerogams the onus of crossing falls on the sporophyte generation; hence cross-pollination has been confused with the cross-fertilization it ensures, and the mechanism of the approximation of spores has been equally and popularly distinguished by conventional sex-terms as 'male' and 'female' (flowers, trees).

The situation is readily expressed in simple phraseology. A heterogamic distinction in gamete-construction, analogous with that of animals, is very general, giving the *microgamete* and *megagamete*. But comparable differentiation of spores may be equally efficient in the mechanism of crossing, giving the *microspore* and *megaspore* respectively. Among Gymnosperms (*Cycas, Ginkgo*) both types of differentiation obtain to a marked degree in the same life-cycle. Heterogamy of the gametes is extreme in Cycads, as is also the Heterospory (though now expressed in the sporophylls rather than in the spores) of the sporophyte. It is useless to attempt to describe distinct sets of biological phenomena in the same conventional sex-terms (male and female). There will always be a natural tendency to keep these words as convenient metaphorical expressions applicable to the original gametes themselves; since their mechanism of approximation (by chemotaxis and flagellar action) is at bottom identical

with that of animal gametes. But such mechanism of translocation has nothing to do with the essentials of karyogamy and meiosis. There can be no objection to the use of any simple terms [1], in the absence of better; so long as it is clearly understood to what extent they refer to realities, and are not merely subjective and metaphorical: *e. g.*, the higher animal (Metazoan) has two types of body ('dicœcious' in the Linnæan sense), male and female, as also the 'monœcious' hermaphrodite, commonly diploid, but not invariably so. The higher type of flowering plant may have four types,—(asexual) staminate and carpellary, together with the monœcious form, and commonly diploid,—the 'sexual,' 'male' and 'female,' also (adding Pteridophyta) with the monœcious possibility, and commonly haploid. The hermaphrodite (monœcious) may be common to all three; but it is obvious that the same sex-terms, male and female, should not be used in all the cases. Lower plants may present additional 'intercalated' stages. Hence the terms 'haploid and 'diploid' remain exact indications of the normal condition of the nucleus, at respective stages of its cycle. But, though commonly associated, they have no necessary bearing on the morphology of individuals; and being in no sense factors of causation they are not absolutely constant [2]. Dating from Strasburger, 1905, these terms are precise and definite at their obvious connotation; they are not to be mixed up with or confused with either older sex-conceptions of male and female, or sexual and asexual; nor again with the conception of gametophyte and sporophyte which belongs to the latter half of the nineteenth century. Older terms are useful in their place, but they are not to be read into new points of view.

Again, since every occurrence of karyogamy demands a consequent meiotic segregation—it being obvious that chromosome sets cannot go on duplicating indefinitely, even if they do so now and then [3],—it

[1] The use of the expressions n and $2n$, x and $2x$, for haploid and diploid had a certain vogue; but the latter terms due to Strasburger (1905) are preferable. The chromosomes of gametes in the zygote may be indicated as P and M (paternal and maternal, in origin, respectively). Blakeslee introduced the use of + and − for dicœcious stages of Mucorini, previously regarded as monœcious and (exceptionally) autogamous. The terms male and female will be always applied to heterogametes, and the organs and somata producing them; but there is still no conveniently short terminology for microspore, megaspore, and the corresponding micro and megasporangia or micro and megasporophytes.

[2] Thus diploid protonema and gametophytes can be grown from *Funaria* capsules. Haploid *Aglaozonia* and in Florideæ haploid plants bearing tetrasporangia are general. The Nemalionales present a haploid carposporophyte. Among Ferns the sporophyte may be haploid (*Nephrodium molle*) and no different to the eye from the normal type, as prothallia may be diploid (Bower, 1923, The Ferns, p. 327). The haploid drone Hive Bee is a finer insect than the diploid worker (Doncaster, Cytology, p. 152),

[3] That such may occur occasionally, and be fixed in phylogeny, would appear from the chromosome-number given for related species: *cf.* the very full catalogue in Tischler (1921, Allegemeine Pflanzenkaryologie, pp. 610). Thus, for example, *Nephrodium molle* (Yamanouchi, 1908) with 64 as haploid number, distinctly suggests that reduction may have been omitted in racial history 3–4 times, at least (*e. g.*, 32/64, 16/32, 8/16 (*Pellia*), 4/8, 2/4 (*Puccinia*, *Ascaris* and 1/2 *Ascaris* var. *univalens*): *cf.* also species of *Rumex*, *Rosa*, *Viola*, *Solanum*, *Carex*.

follows that all organisms, with nuclei which present phenomena of karyogamy, also normally exhibit meiosis. The former process, commonly expressed by initial plasmic fusion (syngamy) of gametes, being comparatively easy to check, has been the first to be generally described. Nuclear fusions in plants have been known since 1879 (*Spirogyra*), but meiosis only since 1890. Hence in every nucleated organism a racial sequence is set in operation; karyogamy and meiosis may alternate indefinitely over a range of individuals in progression of time. But the case of the higher animal, in which the entire cycle is included within the life of one individual, is so commonplace to our own animal perceptions of what is 'fitting,' that the case of the plant, in which the nuclear cycle may be spread over two or more generations, appears at first sight anomalous and even fantastic; while the few forms presenting a life-cycle completed in one individual appear better equipped as 'sexual' organisms. There is really no inherent biological necessity why the nuclear cycle should not be spread over a succession of individuals. A division of labour, for example, in which one individual takes on the function of securing karyogamy, and another that of meiosis, is no more remarkable than the separation of bodily function commonly presented in the 'micro' and 'mega' organisms, whether gamete- or spore-producing of the same generation. The race, again, is not controlled by the exigencies of individuals; the latter are the servants of the race.

However, the fact that in all land-flora the nuclear cycle is so divided between two successive individuals of the life-cycle, as opposed to the story of the land animal, some consideration is required as to the possible manner in which this may have been effected—beginning with the case of simpler forms of aquatic habit still available, as suggesting the general lines of divergence from the original inception of the nuclear mechanism of inheritance. There is no need to force the plant into agreement with the animal, or to crush all the phenomena into one cast-iron scheme. The story of the animal (Metazoan) is curiously uniform on general lines of heterogamy; but too much consideration of one special case may militate against obtaining a true perspective for the whole range of living organism [1]. The plant is not derived from the animal, any more than is the animal from the plant. Both present phases of the same problem. But the plant-story is distinctly more comprehensive, more open to variation, modification, and interpolation. In this way it covers a wider range of biological possibility. The more complex and specialized animal body may be associated with more advanced and stereotyped nuclear mechanism, but the simpler plants present better examples of the general case; and hence the plant story should be given priority in any discussion of the elementary relations of sex-phenomena and nuclear cycles.

The preceding may suffice to indicate the confusion that has resulted from collecting a large number of distinct biological phenomena under the old sex-headings (male and female). Originally

[1] *Cf.* Weismann's Theory of Germ-Plasm, 'Reduction,' 'Maturation' of gametes.

employed to denote differentiation of external form and function in higher animals, these terms were passed on by anatomists to internal cell-organs, and ultimately to the cell-gametes. In plants, applied first to members and cells utilized in cross-pollination, they were again passed on to the organs and cell-gametes of lower forms, to be finally extended to the essential nuclei. It now appears more clearly that in all organisms in which the nuclear tract has attained the differentiation of chromosomes, the latter are involved in a mechanism of racial inheritance, expressed in a nuclear cycle. This relation, again, is quite distinct from any plasma-controlling function the nucleus may perform during its so-called 'resting-stage' in the metabolism of the cell. This nuclear cycle (changing at karyogamy and meiosis) is present in all phases of plant organism, right back to the unicellular stage of the free plankton-flagellate. In higher plants it appears as the inherited equipment of remote cellular organization, and remains unchanged in all essentials as the key to the problem of racial entity. Organisms whose nuclei can successfully cooperate in the functions of both karyogamy and meiosis are recognized as specific forms, in which, bar accidents, the inheritance is maintained and continually cross-sorted and shuffled. These processes not only establish the race as a community of living interbreeding units, but stabilize it to a standardized type, which by natural selection is again adjusted to a certain class of environment, isolating it the more definitely from other competitors, to the end that the survivors appear 'adapted' to their surroundings. On the other hand, successful co-operation demands very precise agreement, and the result of so complex a mechanism going wrong at any point affords scope for a wide range of possible variations, which take their chances of success under equally variable changes of environment. No species can remain absolutely constant, as no environment to which it can be subjected is constant either over an unlimited period.

The condition of the sea is the most invariable; though even here the factors of light-supply and temperature may vary locally with the depth over a wide range. The age of sea-weed forms is beyond computation. Hence to the botanist of the land, the sea remains a vast reserve of the most archaic plant-life of the world. So slow are the changes in such environment, that it is probable that the vegetation of the sea was, in somatic and reproductive attainment, much the same as it is now, before there was any land-flora at all, or even any land above the water for the plants to grow on. On the other hand, the same priority cannot be claimed for fresh-water algæ; all of which, owing to the casual nature of any water-supply on land, have to face a water-problem somewhere in their life-history—hence affording copious examples of 'resting-stages,' as perennation-devices over drought, which are wholly wanting in the sea; as again they face the starvation of food-solutions diluted to the concentration of rain-water.

REVIEWS.

Die Laubmoose Fennoskandias. By V. F. Brotherus. 118 Text-figures, pp. i–xiii, 1–635, 1923. Helsingfors, Akademische Buchhandlung. London: Wheldon & Wesley.

This fine volume is issued by the Society pro Fauna et Flora Fennica as *Flora Fennica i*, with the aid of a State subvention. It is an important contribution to the Bryological literature of continental Europe, comprising the mosses (excluding Sphagnaceæ) of the whole Scandinavian peninsula and Finland, which together form a fairly well-defined and self-contained phyto-geographical area. The work therefore takes up and concludes Hagen's Forarbeider til en Norsk Løvmosflora, which was left uncompleted at his death, and also Hj. Möller's *Lofmossornas utbredning i Sverige.*

The full distribution of each species is given for Finland, and the provincial distribution for Norway and Sweden (the more detailed localities for those countries being given in the works named). The general geographical distribution is also given for each species. The subject is, however, treated on quite fresh lines. Whereas, for instance, Hagen does not (except in the case of newly-published species) give descriptions of the plants, but only critical notes, more or less fully according to the circumstances, the present work gives descriptions of all the species; these are brief and concise, but are aimed to give the principal distinguishing characters, and with the aid of the Keys under each genus will be found to supply most of the information required to distinguish the species. The entire lack of critical or descriptive notes will certainly be regretted, but the already considerable size and weight of the volume is no doubt responsible for this.

The general system followed is that which Fleischer has gradually evolved in his work on the Mosses of Java; thus departing rather widely on the one hand from the system of Engler & Prantl, Pflanzenfamilien, and on the other from the order mostly followed hitherto in works on European bryology. It will seem strange to many European bryologists to find the *Orthotrichaceæ* and *Ptychomitriaceæ* grouped with *Fontinalis*, *Climacium*, the *Neckeraceæ*, &c., while the families of the *Pleurocarps*, like many others of our old families in these revolutionary times, have been to a great extent broken up, and various members of them sent abroad to find a home in distant parts. The genera of *Entodontaceæ*, for instance, as understood in the *Pflanzenfamilien*, are distributed over at least five families in Fleischer's system. Apart from the arrangement, moreover, the new system shows a considerable increase in the number of genera. This arises to some extent, at least, from following Hagen's system, under which an appreciable number of new genera were created, *e. g.*, under *Dicranaceæ*, where *Pseudephemerum*, *Cnestrum*, *Kiæria*, and *Paraleucobryum* will have to many readers an unfamiliar ring.

In some respects we think it rather unfortunate that Hagen has been so closely followed—*e. g.*, in his division of the higher genera of

Dicranaceæ into the two groups: (i.) Section of leaf showing the lamina gradually diminishing in thickness from the nerve to the margin; (ii.) Section of leaf scarcely thinner at margin than near the nerve. The actual facts seem extremely doubtful; the distinction even where valid is frequently by no means easily observed, and the resulting system surely violates the natural grouping of the genera, as when *Dicranella* is separated from *Anisothecium*, and placed with *Campylopus* and *Dicranodontium*, while *Dicranum* is separated from all these. If *Leucoloma* and *Dicranoloma* found a place in the Scandinavian flora, it is hard to say where, under such a system, they would be consigned! From their narrow marginal cells they would have to be put under (i.), with *Dicranella* and *Campylopus*; but would they "stay put"—as our American friends say,—when no author as yet has been able to define the limit between *Dicranoloma* and *Dicranum*?

One other point as to which there will be some difference of opinion is the nomenclature employed. Hagen, as is well known, was not in sympathy with the decision of the Brussels International Bot. Conference, whereby the nomenclature of the Bryales began with Hedwig Sp. Musc. Following this view we have *Bryum crispum* Schreb. (1771) resurrected, so that *Dicranella Schreberi* (Sw.) Schimp. becomes *Anisothecium crispum* (Schreb.) Lindb., while *Dicranella crispa* Schimp. becomes *A. vaginale* (Dicks.) Loesk.; *Trematodon ambiguus* (Hedw.) becomes *T. elongatus* (Stroem) Hag.; *Seligera recurvata* (Hedw.) Bry. eur. becomes *S. setacea* (Wulf.) Lindb., and so on.

European bryologists would be grateful to this volume, if for nothing else, in that the welter of northern species of *Bryum* (their descriptions scattered through many publications)—133 species, apart from subspecies—has been reduced to an ordered train with a practical key.

The volume is well got up and well printed; the misprints seem very few, so far as we have observed. *Pterigynandrum* is spelled *Pterygynandrum* throughout, but this is no doubt in deference to Hagen, who constantly spelled it so. Hedwig, however, certainly spelled it *Pterigynandrum*—and surely he was right. The spelling *Pterygynandrum* seems to arise from confusion with πτερυγο-.

The illustrations are drawn in line for insertion in the text, and add greatly to the value of the book; but the lines seem to be unnecessarily hard, and therefore often convey a rather false idea of solidity. The detail with which the volume is produced is evidenced by the fact that the name of the firm supplying the paper, and even of that supplying the stiff paper for the cover, is given. If the price had been mentioned a still more useful detail would have been added.

H. N. D.

Flora of the Presidency of Madras. By J. S. Gamble, C.I.E., F.R.S., F.L.S. Part VI. Scrophulariaceæ to Plantaginaceæ. Published under the Authority of the Secretary of State for India in Council. London: Adlard & Son. Pp. 963–1160. Price 10*s.* net.

The sixth part of Mr. Gamble's *Flora* ends the Gamopetalæ and includes part of Scrophulariaceæ and the orders following in the Bentham and Hooker sequence, the chief of which are the *Acanthaceæ*, *Verbenaceæ* and *Labiatæ*: "Such Supplementary Notes as are necessary will soon appear in the *Kew Bulletin*, but they are not many."

No new species are described, the work being entirely in English; Latin diagnoses of the novelties have already appeared in the *Kew Bulletin*. There are, however, a certain number of new names: in *Justicia*, for example, three plants regarded by C. B. Clarke as varieties are raised to specific rank, and *Pogostemon nilagiricus* is proposed for *P. rotundatus* Wight non Benth.; *Eranthemum malabaricum* C. B. Clarke is transferred to *Pseuderanthemum*.

Of the value of Mr. Gamble's work there is no need to speak; but it is to be regretted that the convenience of those who use the *Flora* has been so little consulted. We do not know whether this part concludes a volume; it ends, however, with p. 1160, which, taken in connexion with the size of the page, will make it uncomfortable to handle. The arrangement of the text is also inconvenient; we must assume that there was some good reason for departing from that in use in the floras issued by Kew and the British Museum, but it is difficult to conjecture what this can have been. In these a diagnostic clavis of the principal characters of the species is given under each genus, followed in due course by a full description, an account of its distribution, and such remarks as might be necessary. In the Madras Flora there is no separate diagnostic clavis; the full descriptions are given in clavis form, separated from the distribution and short descriptive notes, which come later, thus necessitating two references instead of presenting all the information at one glance. Moreover, the descriptions are printed throughout in small (though excellent) type, no attempt being made to emphasise typographically the principal characters. In the case of large genera—such as *Strobilanthes*, which has 46 species and occupies ten pages, exclusive of the distribution—it is impossible to obtain at a glance a general view of the distinctive specific characters, and the consequent loss of time is thus considerable.

Hortulus, or The Little Garden; a Ninth Century Poem by Walafrid Strabo. 4to, French paper boards, pp. 38. Printed by hand and sold by Richard & Elinor Lambert at the Stanton Press, Dodona, World's End Lane, Chelsfield, Kent. Price One Guinea.

This volume claims attention not only on account of its historical interest, but for the beauty of its typography. Its author, Walafrid Strabo, was born about 809, and "lived through the trouble-

some times that witnessed the disruption of the Carolingian empire after the death of Charlemagne. He entered the Abbey of Reichenau, in Swabia, and in course of time became its abbot .... There he died, from some cause unknown, on September 17th, 849, leaving to the world a number of elegant poems and several prose works which entitle him to a high place among Carolingian writers." This we learn from the introduction to this translation—the first to appear in English—of *Hortulus*, a poem which was exceedingly popular in the middle ages; it was first printed at Nuremberg in 1510, from a manuscript found in the monastery of St. Gall, in Switzerland, and has often been reprinted. Mr. Lambert's translation is from a text published in 1884; Strabo, he says, "was the first amateur gardener in literature .... the first part of *Hortulus*, describing how the monk laid out his garden, struggled with adversity, and finally produced what to himself seemed the finest crop in the world, is indeed a vivid literary snapshot which we moderns can appreciate."

The text begins with a charming dedication to the Abbot of Weissenburg. Then come practical instructions as to the making of a garden and its difficulties.

Strabo begins with the destruction of the nettles which covered "the little court-yard that adjoins my front door," and whose

> "roots formed a thick mat
> Just like what the plough-boys so cleverly plait
> For their stables, of osiers twined in a knot
> To protect horses' hooves from the damp and the rot,"

and describes the preparation of the soil.

Having dwelt on the reward of perseverance, Strabo proceeds to

> "Try to describe by its name and to teach
> The virtues of every plant that I grew,
> That the least may have honour, where honour is due."

Then follow the contents of the garden, beginning with Sage, "to which must be given the pride of first place."

The Pumpkin and Melon are described at considerable length: "the use and the power of redoubtable Horehound" include a tribute to its antidotal value:

> "Again, if your step-mother bears you ill-will
> And mixes a poisonous aconite pill
> In your food, and rejoices to see you look sad
> As you swallow the drug and begin to feel bad,
> Never worry, but drink off a cup of this herb.
> Your step-mother's evil designs it will curb."

"Mint" seems to have had a very comprehensive signification—

> "What a number of separate species and kinds
> Of different colour and power one finds!"

What was the "delectable species" that "provides"?

> "With its foliage plenty of shade on all sides;
> Like the elder, it puts forth a fresh set of shoots
> From its branches, the higher they grow from the roots.
> The scent of this kind is distinct and the taste
> Especially bitter"?

Of Pennyroyal we are told that

> "Its value in India is reckoned as dear
> As a peck of black Indian pepper is here.
> Who can doubt of its power our ills to allay
> When a people so rich as the Indians pay
> Any price to obtain it, and readily bring
> To us ivory, gold, every wonderful thing."

The praises of Parsley, Lovage, Fennel, Chervil, Betony, Catmint, Agrimony, and Poppy are sounded in turn: for the last name an original derivation is suggested:—

> "... the name of the Poppy is said to be due
> To the 'pop' of the seeds in your mouth as you chew."

The Rose and the Lily, of course, find due place; it is only in connexion with these that ecclesiastical symbolism finds expression.

We have already referred to the beautiful printing (in "Gondola" type); the book is further embellished with 34 small woodcuts, mostly of the plants mentioned, executed in the style of the herbals by Mrs. Lambert; these and the sectional headings are printed in red, the pages thus presenting a very attractive appearance. Our only regret is that the Latin text is not given.

BOOK-NOTES, NEWS, ETC.

THE Forestry Commissioners of New South Wales have undertaken the publication of *An Elementary Text-book of Australian Forest Botany*, the first volume of which is before us: all Australian forestry students and forest officers who take their profession seriously and wish to gain real knowledge of their trees will find it of great assistance. The book is divided into three main portions, the first of which deals with morphology in chapters devoted respectively to root, stem, leaf, inflorescence, flower, fruit, and seed; it is this part which we think the forester will find the most suited to his needs. The second part contains an account of the internal structure of plants; this is followed by a section on physiology. The numerous illustrations consist of line drawings, some of which are rather crude. The reproductions from photographs are a noteworthy feature; they give a good idea of the principal types of Australian vegetation, and also serve to make clear to the student the meaning of the technical terms employed. The photographs showing the difference in character of bark between young and old trees is very striking. Mr. C. T. White, Government Botanist of Queensland, is responsible for the work, which is published at Sydney by the Government Press. The second volume will deal with systematic botany and Australian plant associations, and will also contain chapters on the structure and identification of timbers.—A. B. J.

WE are glad to see that Dr. Drewitt's excellent little volume on *The Romance of the Apothecaries' Garden at Chelsea*, which we warmly commended on its appearance (Journ. Bot. 1923, 123) has passed into a second edition—"revised and enlarged" (Chapman

and Dod, 7*s.* 6*d.* net). The book has been increased by thirty pages, the most interesting addition being a translation of a letter introducing Linnæus to Philip Miller, which was apparently presented to the latter by Linnæus himself. "This new edition also contains further notes on Linnæus and on his two pupils, Kalm and Fabricius, who came to Chelsea; many additions have also been made to the chapter describing the trees." The attribution to Johnson of the portrait on the title-page of his edition of Gerard's *Herball*, to which we called attention, might be corrected in the future edition which we cannot doubt will be called for.

THE many who visit Kew Gardens should not fail to obtain at the gate the *Illustrated Guide* which has just been issued by the Stationery Office at the very reasonable price of a shilling. While giving much useful and interesting information as to the history and arrangement of the Gardens, the contents of the houses, etc., the most attractive feature is the admirably produced and well chosen illustrations which, to the number of thirty, adorn the book. There is also an excellent map of the Gardens, and a useful list, arranged under months, of "objects of interest to be found at different Seasons." The Guide is well and carefully printed—we note that the spelling "Sion" is substituted for the traditional "Syon," which has always been associated with Syon House—and will form not only an interesting souvenir for those who visit them, but a welcome present to those at a distance who wish for some account of the world-famed Gardens. We are glad to note that the charge of a penny for admission, rendered necessary during the War, has been removed, except on Tuesdays and Fridays, when sixpence is charged.

WE have received from the Cambridge University Press a neat little collection of *Descriptive Labels for Botanic Gardens* (1*s.* 6*d.* net) prepared by Mr. Humphrey Gilbert-Carter, Director of the University Garden. The object of this little book is "to induce those in charge of collections of plants to exhibit them so as to give information and pleasure to as many people as possible," and to this end it is thought that labels giving fuller information than the names and countries usually supplied in botanic gardens would be of service. The sixty-two labels here provided are admirably done, giving in small compass a vast amount of interesting information; a preface contains instruction as to the preparation of water-proof labels, similar to those in actual use in the Cambridge Garden; a specimen so prepared of any of those in the book can be obtained from the Gardens for a shilling, post free. We note with pleasure that only English names that are in actual use are given on the labels.

A NEW and vigorous impulse to the study of Algæ is given by the publication of the *Revue Algologique*, to be issued every three months by the Laboratoire de Cryptogamie of Paris (63 Rue de Buffon) under the editorship of MM. P. Allorge and G. Hamel. It will be devoted to algology from every point of view, by means of original articles, and by bibliographic analyses and diagnosis of all novelties published since January 1923. The first number, published in March, opens with an introduction by Prof. L. Mangin, which is

followed by Prof. Ch. Flahault's valuable biographical account of the distinguished algologists Gustave Thuret and Édouard Bornet, with appended bibliographies; the late Prof. N. Wille, of Christiania, is similarly commemorated by K. Münster Ström. P. Frémy begins a contribution to the algalogic flora of French Equatorial Africa; G. Hamel writes on the appearance on the Normandy and Brittany coasts of *Antithamnionella saruiensis*—the genus was first described and figured by Miss Lyle in this Journal for 1922, pp. 346–350. "Phytoplankton and environment in the English Lake District" are discussed by W. H. Pearsall. The remaining pages are occupied with bibliography, supplying a classified series of careful abstracts with full citation of new diagnoses.

WE have received the reprints from the British Association Report for 1922 of the "List of Papers" bearing upon British Natural History during that year. In general features it corresponds with that for 1921, which we noticed in last year's Journal (p. 157); the criticisms and suggestions then made apply to the present list, although we understand that they are being considered in regard to future issues. The list, which is very exhaustive, reflects great credit on the compiler—Mr. T. Sheppard, M.Sc., of the Museums, Hull.

AT the Annual Meeting of the Linnean Society on May 22, Dr. Rendle (President), delivered an address on the work of Linnæus in Holland, his connection with Dutch naturalists, especially with George Clifford, and the *Hortus Cliffortianus* descriptive of Clifford's Herbarium. He also referred to the Cliffortian Herbarium (purchased by Sir Joseph Banks in 1791) and showed evidence of its intimate relation with the *Hortus Cliffortianus*. Other instances of the importance of early collections for interpreting Linnæus's *Species Plantarum* were described, namely, Hermann's Herbarium, the basis of Linnæus's *Flora Zeylanica*, and John Clayton's American collection, the basis of Gronovius's *Flora Virginica*: these, with Clifford's Herbarium, are now in the Natural History Museum.

AT the meeting of the Manchester Literary and Philosophical Society on April 29, Professor Weiss exhibited a plant obtained by pollinating the hybrid between the Primrose (*Primula acaulis*) and the Oxlip (*P. elatior*) with the pollen of *P. Juliæ*, a small alpine species with purple flowers, thus obtaining a tri-hybrid. This, though of larger size, has the habit of *P. Juliæ*, and also the almost glabrous character of foliage and flowers, the tomentose condition of the Primrose and its hybrid having been lost. The leaves are larger and more elongate than those of *P. Juliæ*, but smaller than those of the Primrose and the Oxlip: the leaf-stalks have the distinctly red coloration of *P. Juliæ*; the flowers are also generally borne singly, though in one or two cases a diminutive scape is formed. The colour of the flower was in the majority of cases that of the Primrose, or somewhat paler, but in two cases the plants produced purple flowers, and in one case yellow flowers with a few purple streaks. It has as yet not been ascertained whether this tri-hybrid is fertile. The Oxlip employed was the true *P. elatior* Jacq., which, Prof. Weiss informs us, he obtained from Cambridgeshire many years ago and has had in cultivation ever since.

At the meeting of the Botanical Society of Edinburgh on 19th June a paper was read on behalf of Col. H. H. Johnston on "Additions to the Flora of Orkney." The additions are mainly in the nature of varieties and micro-species and include a dandelion, *Taraxacum lætifrons*, described by Dahlstedt as a new species. Under notes on *Zannichellia*, Col. Johnston states on the authority of Dr. H. Dahlstedt and Prof. C. H. Ostenfeld that the Orkney plant from Loch Kirbister referred by Dr. Boswell to *Z. polycarpa* var. *tenuissima* Fr. is not that species, but *Z. repens* Boenn. As noted in our last issue, the Society will hold a two days' meeting on Thursday and Friday, the 17th and 18th of this month. The forenoon sessions on both days will be devoted to demonstrations of various methods and results of plant-propagation as practised at the Royal Botanic Garden, Edinburgh. The afternoons will be occupied in the reading of papers dealing with special problems of propagation in certain species and genera. The results of recent work on Clematis, Camphor and Bulbous Plants will be presented, while the general subjects of Root Cuttings and Horizontal Branch Propagation will also be discussed. Further particulars of the meeting may be obtained from the Secretary of the Society, Royal Botanic Garden, Edinburgh.

The *Journal of the Botanical Society of S. Africa* (part 10) contains papers by Miss A. V. Duthie on 'South African Mycetozoa' (plate); R. H. Compton on 'The Ferns of Kirstenbosch,' with a key to those of the Cape Peninsula; and by Mrs. Levyns on the *Rutaceæ* (plate). Under the heading 'The Kew of South Africa' Mr. Compton, the Director of the Kirstenbosch Gardens, criticises a speech delivered by the then Prime Minister, General Smuts, at the opening last July of the new herbarium at Pretoria in connexion with the Department of Agriculture: "You want a Kew: what Kew is to England and the British Empire, this Herbarium must be to South Africa." The Kirstenbosch Garden, says Mr. Compton, "was founded as the National Botanic Garden of S. Africa long before the establishment of the Botanical Survey and its associated herbarium; in Kirstenbosch and the Bolus Herbarium—those two institutions were associated from the first—an embryo South African Kew already exists. The Bolus Herbarium, the finest in S. Africa, ekes out an existence on the bequest of its founder; Kirstenbosch is starved of funds. And yet it is seriously proposed to establish and finance another 'Kew' in Pretoria! Is it official blindness or jealousy, or is it an example of the mania for centralisation?"

The *Bulletin de la Société Botanique de France* (vol. 71, parts 1 and 2; Jan., Feb. 1924) contains 'Écologie d'une aulnaie [alderplot] dans les Moëres,' by Dr. M. B. de Lesdain; 'Un nouveau genre de Dioscoréacées' (*Avetra*; Madagascar), by H. P. de la Bathie; 'Festucarum varietates novæ,' by A. Saint-Yves (British specimens are referred to); 'Sur les espèces du genre *Klainedoxa*,' by F. Pellegrin; '*Poilania* n. g. Compositearum (Annam),' by F. Gagnepain; 'Associations végétales de la forêt de Preuilly," by R. Gaume; 'Un genre nouveau africain à affinités brésiliennes' (*Tulea*; Congo), by F. Pellegrin; 'Plantes des Corbières et des Pyrenées,' by Col. Verguin; 'Anomalies florales chez les Orchidées,' by A. Camus; 'Étude sur la végétation des côtes basses en Provence,' by J. Arènes; 'Euphorbiacées nouvelles' (*Deutzianthus*, n. g., Tonkin), by F. Gagnepain; 'Cyperacées africaines critiques,' by H. Chermezon; 'Le sommeil des plantes,' by E. Gadeceau; 'Pour la nomenclature ternaire,' by P. Fournier; '*Sedum Perroti*, sp. n.,' by Raymond-Hamet.

In *Notes from the Royal Botanic Garden, Edinburgh*, for November 1923, Mr. M. Y. Orr has an interesting paper on the leaf-glands of *Dioscorea macroura* Harms. This species, which is an inhabitant of West African tropical rain-forests, has remarkably well-developed acuminate leaf-apices with a complex glandular system traversing them from base to apex. The mucilaginous secretion which fills the lumen of the glands harbours great numbers of a species of bacterium, which, when isolated and grown in pure culture, is able to fix nitrogen to an appreciable degree; the nitrogen content of the glandular acumen is greatly in excess of that of the leaf-lamina, indicating that a similar process of nitrogen fixation is taking place within the glands. The "symbiosis" between leaves and bacteria in different plants (*Psychotria bacteriophila*, *Ardisia crispa*, etc.) is not common.

Annals of Botany (April) contains 'Anatomy of Buds of *Coniferæ*,' by F. J. Lewis and E. S. Dowding; '*Danae*, *Ruscus*, and *Semele*; a Morphological Study,' by Agnes Arber; 'Effect of General Anæsthetics on the Respiration of Cereals,' by E. P. Smith; 'Chemical Nature of the Cellulose Membrane,' by F. M. Wood; 'Evaporation in Wind,' by W. Stiles; 'Response of Plants in Soil- and in Water-Culture to Aeration of the Roots,' by R. C. Knight; 'Spermatia of *Rhodymenia palmata*; 'Ovule and Development of Female Gametophyte of *Macrozamia Fraseri*,' by K. E. Light; 'Morphology and Physiology of *Eidamia*,' by A. S. Horne and G. H. Jones; 'Chromosomes and Chromosome Behaviour in the Salicaceæ,' by K. B. Blackburn and J. W. H. Harrison'; 'Studies of *Fusarium*,' by W. Brown and A. S. Horne; 'Effect of Mosaic Disease on Cells of Potato-leaf,' by K. M. Smith.

The *Kew Bulletin* (no. 4) contains in tabular form a 'Proposed Rearrangement of Families comprising the Archichlamydeæ,' by J. Hutchinson; 'A Revision of *Emilia*,' by S. Garabedian' (23 species, 2 new); '*Citharexylum Bessonianum*'=*C. spicatum*, comb. nov., by T. A. Sprague; 'A Revision of *Passerina*,' by D. Thoday (15 species, 5 new).

The *Gardens' Bulletin, Straits Settlements*, issued April 15, is entirely occupied by "A List of Oriental Vernacular Names of the Genus *Dioscorea*," by Mr. I. H. Burkill, who "has been engaged on a botanic and economic study of the oriental species of the genus and has collected much native opinion upon them." The list of names so collected, which, with preliminary notes, occupies 124 pages, is printed in the belief that "used as a quarry of statements meant for examination it can be of considerable ethnological value." The paper includes various maps, illustrating the distribution of the species.

THE fourteenth number (April) of *The Flowering Plants of South Africa* contains ten plates by various artists, with descriptions of interesting species; they include *Diplocyatha ciliata* N. E. Br., of which no figure has been published since that of Masson in 1796; *Protea Rouppelliæ* Meisn., whose misspelling of the commemorative name is followed; *Urginea Burkei* Baker, a plant extremely poisonous to stock; *Ceropegia ampliata* E. Mey., and *Eulophia leontoglossa* Rchb. f.

THE *Bulletin of the Torrey Club* for April contains 'The Tissue Fluids of *Cuscuta*,' by J. A. Harris; 'Chinese Marine Algæ,' by M. A. Howe (2 pl.); '*Solanum* § *Tuberarium* in Mexico and Central America,' by P. A. Rydberg (many new species).

THE *Journal of the Arnold Arboretum* (vol. v. no. 2; April) contains papers by T. Nakai on the Sino-Japanese species of *Raphiolepis* and *Eriobotrya*, with a clavis to each genus, and "New and Noteworthy Ligneous Plants of Eastern Asia" with descriptions of many new species. Mr. H. Wilson writes on the Rhododendrons of Hupeh, and Mr. E. J. Palmer on "The Ligneous Flora of Rich Mountain, Arkansas."

MR. S. SAVAGE contributes to the *Gardeners' Chronicle* for May 24 some interesting plant-lore from an old Latin Dictionary, printed in London in 1552—"a revised edition of Sir Thomas Elyot's Latin Dictionary" (the title-page is missing). It contains an interesting account of the making of "wad" (woad) which "hath remayned vnknowen in Englande 1000 yeeres, and mo, vntill now of late an honest marchaunt man (zelous of the common weale) hath eftessones nouryshed that herbe in his gardeyn at London, and by the example, which he founde in countreies beyond the sea, he makyng houses and mylles, to his importable charges, hath now experienced to make the same wad to the inestimable commoditee of this realme, yf it bee woorthyly imbraced, the merchantes name is Ra. goodman (*i. e.* Ralph Goodman) a name ryghte agreable unto his qualitees, who deserueth to be incouraged, that by his thanke and rewarde, other maie the rather endeuoure themselues, either to inuent by their wittes, or to attempte by the example of other countreys, to augmente the weale and honour of this realme of England."

THE Botanical Department of the Natural History Museum has just acquired the extensive Scandinavian herbarium of Dr. Hugo Granvik, of Malmo, which consists of more than 16,000 sheets of excellently dried and selected plants. It contains series of critical plants, not previously represented in the Museum collections, which had been needed for comparison with British specimens, *e. g.*, several of Alchemillas, *Euphrasia fennica*, *Polygonum calcatum*, etc. The collection should be very useful to British botanists who study critical forms, and also to students of nomenclature who desire to know the forms which Linnæus would have known in the field. There is a fine series of plants from Oeland and Gotland, which should help in the understanding of the plants mentioned by Linnæus in his account of his journey thither.

THE BOTANICAL NAME OF WATER-CRESS.

BY T. A. SPRAGUE, B.Sc., F.L.S.

THE loyal acceptance of the International Rules of Nomenclature by a great majority of botanists has brought about a degree of uniformity and stability previously unknown in nomenclature. This is not generally realized, for the simple reason that there is no need to discuss names as to which everyone is agreed, and attention is consequently drawn only to disputed cases. The relatively few instances in which there is difference of opinion as to the correct name of a particular group under the Rules are due either to ambiguity in the Rules or to undesirable provisions. Both causes have operated in the case of the Water-cress, which has consequently been known since 1905 under eight different names, in addition to six used during the period 1890–1905, or solely in the United States.

Radicula officinalis (R. Br.) H. & J. Groves in Babington Man. ed. 9, 26 (1904).

Radicula Nasturtium Druce in Ann. Scott. Nat. Hist. 1906, 219.

Radicula Nasturtium-aquaticum (L.) Britten & Rendle List Brit. Seed-pl. 3 (1907); Schinz & Thell. in Bull. Herb. Boiss. sér. 2, vii. 405 (1907); Druce List Brit. Pl. 4 (1908); Robins. & Fern. Gray's New Man. Bot. ed. 7, 431 (1908).

Roripa Nasturtium G. Beck Fl. Nied.-Österr. 463 (1892); Britton & Brown Ill. Fl. ii. 126 (1897); Britton Manual, 453 (1901); Coult. & Nels. New Man. Bot. Centr. Rocky Mount. 216 (1909); Small, Fl. S.E. United States, ed. 2, 472 (1913).

Roripa Nasturtium-aquaticum (L.) Hayek Sched. Fl. Stir. Exs. Lief. 3–4, 22 (1905); Schinz & Thell. in Vierteljahrsschr. Nat. Ges. Zürich, liii. 539 (1909), et *op. cit.* lx. 353 (1915); Briq. Prodr. Fl. Corse, ii. 29 (1913).

Baeumerta Nasturtium-aquaticum (L.) Hayek Fl. Steierm. i. 498 (1909).

Nasturtium Nasturtium-aquaticum Karst. Deutsche Fl. 657 (1881–83); ed. 2, ii. 202 (1895).

Nasturtium Nasturtium Cockerell in Bull. Torr. Bot. Club, xix. 95 (1892).

Nasturtium officinale [R. Br. in] Ait. Hort. Kew. ed. 2, iv. 11 (1812); Hayek *op. cit.* 1223 (1911); Wilmott in Babington Man. ed. 10, 26 (1922); Schinz & Thell. Fl. Schweiz, ed. 4, i. 301 (1923).

Nasturtium fontanum (Lam.) Aschers. Fl. Brandenb. i. 32 (1864); Fawcett & Rendle Fl. Jam. iii. 237 (1914).

Nasturtium aquaticum Garsault Fig. t. 403 (1764); Desv. 241 (1767); O. E. Schulz in Urb. Symb. Antill. viii. 243 (1920).

Sisymbrium Nasturtium-aquaticum L. Sp. Pl. 657 (1753); Britton & Brown Ill. Fl. ed. 2, ii. 162 (1913); Small Fl Lanc. County, 133 (1913); Hitchc. & Standley Fl. Distr. Columbia, 166

(Contrib. U.S. Nat. Herb. xxi.; 1919); Millsp. & Nutt. Fl. Santa Catalina Island, 116 (Publ. Field Columb. Mus. Bot. v.; 1923).

Cardamine fontana Lam. Fl. Fr. ii. 499 (1778); Bubani Fl. Pyren. iii. 146 (1901).

Crucifera fontana (Lam.) E. H. L. Krause in Sturm Fl. Deutschl. ed. 2, vi. 109 (1902).

The Generic Name.

The genus was long known as *Nasturtium* R. Br. (1812). *Roripa* Scop. (1760) was revived by Beck in 1892, and *Radicula* Hill (1756) was restored by H. and J. Groves in 1904, and by E. L. Greene (for the Yellow-cresses only) in 1905 (Leafl. Bot. Obs. i. 113). Schinz and Thellung at first accepted the name *Radicula*, but afterwards considered that it should be rejected under Art. 54, 1°, "Names of genera must be rejected . . . . when they are formed from a technical term borrowed from morphology, unless they are accompanied by specific names." Rendle and Britten had pointed out by letter (*see* Vierteljahrsschr. Nat. Ges. Zürich, liii. 537, footnote 2; 1909) that *Radicula* Hill was *not* borrowed from morphology, but was the diminutive of *Radix* in the sense of Radish—Hill gave Water-Radish as the English equivalent; both Columella and Celsus used the name for a small kind of Radish; and *Radicula* of Pliny was a kind of Fuller's weed or Soapwort. Nevertheless, Schinz and Thellung maintained that *Radicula* Hill was invalid, and that the word "borrowed" in Art. 54, 1°, was not intended to bear its plain meaning. The same view was taken by Briquet at the Brussels Congress (*Actes*, i. 51), and the wording of Art. 54, 1°, was so modified as to make *Radicula* invalid. "Names of genera must be rejected . . . . when they coincide with a technical term concurrently used in morphology, unless they are accompanied by specific names." In order to clinch the matter, *Radicula* was cited as one of the examples of names to be rejected. In 1909, Hayek, who regarded the Water-cress as constituting one genus, and the Yellow-cresses as another, revived the name *Baeumerta* Gaertn. Mey. & Scherb. (1800) for the former. This led Janchen to propose that the name *Nasturtium* should be conserved for the Water-cress (Prop. Amplif. Liste Nom. Gén. Conserv. 4; 1909), and at the Brussels Congress *Nasturtium* was added to the list of *nomina conservata*. It was entered as genus No. 2965 (partim) of Dalla Torre and Harms's *Genera*, and only two *nomina rejecta* were cited—*Cardaminum* Moench and *Baeumerta*. It is thus clear that the name *Nasturtium* was conserved for a genus including a single species, *Sisymbrium Nasturtium-aquaticum* L. What happens if the generic concept is widened? One would have imagined that a "nomen utique conservandum," one of the "noms qui doivent être conservés en tous cas," would not be affected thereby. This view has been taken by Fawcett and Rendle (1914), O. E. Schulz (1920), and Wilmott (1922), who accordingly adopt the name *Nasturtium* for the genus in the wide sense, comprising both Water-cress and the Yellow-cresses. Briquet (1913), and Schinz and Thellung (1915), on the other hand, adopt the view that the name

Nasturtium must be superseded by *Roripa* as soon as the Yellow-cresses are brought into the genus. This seems contrary to the very raison d'être of *nomina conservata*. *Nasturtium* was conserved because it is by far the best known generic name for a very common plant, the Water-cress. This practical reason is unaffected by the inclusion of the Yellow-cresses in the genus. The proposal to displace the conserved name *Nasturtium* by *Roripa* on grounds of *priority* seems totally at variance with Art. 20. "However, to avoid disadvantageous changes in the nomenclature of genera by the strict application of the rules of nomenclature, and *especially of the principle of priority* in starting from the dates given in Art. 19, the rules provide a list of names which must be retained in all circumstances." [The italics are mine, and the expression "in all cases" of the English version is replaced by "in all circumstances," which corresponds more exactly to "en tous cas" and "unter allen Umständen."]

There is much to be said, on the one hand, for strict application of the Rules without exceptions of any kind, and, on the other, for their ruthless suspension in order to conserve certain well-known generic names. But a half-hearted adoption of *nomina conservata* has little to recommend it. In the event of two genera represented on the list being united, the earlier of the two conserved names should, of course, be adopted, as it is manifestly impossible to retain both. And, if a segregate genus on the list is reunited to a genus not on the list from which it was originally separated, the very object of *nomina conservata* would be defeated if the name of the original genus were replaced by that of the segregate. Thus, if *Mahonia* Nutt. is reunited to *Berberis* L., the name *Berberis* must stand, although it is not on the list and *Mahonia* is. Apart from these two eventualities *nomina conservata* should, in my opinion, be conserved unconditionally.

Britton (Ill. Fl. ed. 2, ii. 162; 1913) states that the Water-cress is the type-species of *Sisymbrium*. He has apparently selected it as such because it is the first in order and the best known of Linné's sixteen species. When one remembers that "in the early days of taxonomy a name was applied to a concept rather than to an entity" (Hitchcock in Am. Journ. Bot. viii. 251; 1921), and that there is no reason to suppose that Linné did regard any particular species as the type, the method of selection seems not only inconvenient but arbitrary. The Linnean genus included eight species of *Sisymbrium* (sensu Benth. & Hook. fil.), three of *Nasturtium* (sensu R. Br.), two of *Diplotaxis*, and one species each of *Arabis*, *Brassica*, and *Dontostemon*. Obviously, what Linné had chiefly in mind was the genus commonly known as *Sisymbrium* at the present day, which constituted half of his genus in Sp. Pl. ed. 1. As the rules of the Type-basis Code (Science, n. s. xlix. 333; et *op. cit.* liii. 312) are more elastic than those of the American Code, it may be hoped that its adherents will recognise the advisability of selecting the type of *Sisymbrium* from one of the eight Linnean species still commonly referred to that genus. Those who are interested in the question of generic types should refer to Hitchcock's "Type species of the first 100 genera of Linnæus' Species Plantarum" (Am. Journ. Bot. x. 510; 1923).

The Trivial Name.

No one appears to have adopted *Nasturtium Nasturtium-aquaticum* Karst. recently, although the trivial does not *merely* repeat the generic name (see p. 179 for the parallel case of *Melilotus Melilotus italica*). *N. aquaticum* Garsault is invalid for reasons given by Britten and Rendle (Journ. Bot. 1909, 322). The next trivial in chronological order is *fontanum*, but the combination *N. fontanum* (Lam.) Aschers. is invalid, since *Cardamine fontana* Lam. is a *nomen abortivum* on account of the trivial *Nasturtium-aquaticum* not having been retained on transference to the genus *Cardamine*. Hence if *N. Nasturtium-aquaticum* Karst. is really excluded under Art. 55, 2°—about which I have doubts,—the correct name for the Water-cress under the Rules is *N. officinale* R. Br.

Causes of the Instability in Nomenclature.

Ambiguity in Art. 54, 1°, of the Vienna Rules led to divergence of opinion as to the validity of *Radicula*. This has now been rectified.

Ambiguity in Art. 20 (as to whether a *nomen conservatum* becomes subject to the rule of priority when the genus is united with another one) still causes difference of opinion among experts as to whether *Nasturtium* or *Roripa* is the correct name for the genus comprising both Water-cress and the Yellow-cresses. The rejection of tautonyms ("duplicating binomials") was the primary cause of instability of the trivial under the generic name *Nasturtium*.

Conclusions.

(1) *Nomina conservata* of purely segregate genera should cease to be conserved if they are reunited to the genus from which they were originally separated.

(2) In the event of two genera on the list of *nomina conservata* being united, the earlier name of the two should be adopted.

(3) In all other cases *nomina conservata* should be conserved against all competing names.

(4) Tautonyms should not be rejected (see pp. 41–46, 81).

MISCELLANEA BRYOLOGICA.—IX.

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

(Continued from Journ. Bot. 1922, p. 291.)

On some Mosses from High Altitudes.

I recently received from Mr. D. B. Bradshaw of Dublin a small tuft of moss gathered by his cousin (who is engaged on the Geological Survey of India) at the altitude of 18,900 ft., on the Hindu Kūsh Mts. He writes—"I gathered it last week (August) at a height of 18,900 feet on one of the highest peaks of the Hindu Kūsh. There

was no other vegetation whatever, but whenever a small patch of ground projected through the surface this moss was quite abundant and must be extremely hardy." The tuft contained two species, *Bryum pallens* Sw. and a few stems of a form of *Hygroamblystegium filicinum*, probably referable to var. *supra-alpinum* Boul. The *B. pallens* was an ordinary form, except for the presence of a large number of bright red adventitious shoots, either leafless or with rudimentary leaves, from the upper part of the stems; these may have been developed after gathering, as is sometimes the case with Brya kept in semi-darkness for some time before thoroughly drying; but in that case one would not have expected the bright red colour. Both species are of wide distribution in the North Temperate and Alpine-Arctic regions of both hemispheres.

This tuft represents one of the highest altitudes, if not actually the highest, at which mosses have been gathered. The only record from a similar height appears to be from Chimborazo; the statements as to this are very vague, and I have been at some pains to investigate them.

Wilson, Bry. Britannica, p. 191, says of *Ulota phyllantha* (B. & S.): "It grows at the highest point of vegetation on Chimborazo, in South America." This was written in 1855, and it seemed strange that Mitten in *Musci austro-americani* (1869) should make no mention of the occurrence. The only locality he gives for the plant is "Magellan, Hermite Island, *J. D. Hooker*." Nor does he give any species of *Orthotrichum* (including *Ulota*) from any such height on Chimborazo; three species only are given from that mountain, and the highest altitude recorded for any of them is 13,000 ft. The only record I have found exceeding this belongs to *O. psychrophyllum* Mont., "in jugis Andium prov. Potosi, ad rupes prope glacies aeternas (2500 hexap.) *D'Orbigny*." This may be supposed to be somewhere about 15,000 ft.

Failing to obtain confirmation of Wilson's statement in this way, I then searched his herbarium. Here there are two specimens labelled: "*Ulota phyllantha*. On Chimborazo, 18,800 ft., 1832; last trace of vegetation, monoicous"; "Chimborazo, 19,000 ft. by Col. Hall. H. 1305. Same as the barren one by Jameson, H. 1304." A note describes the unripe fruit, but there is no fruit present. These are quite clearly not *U. phyllantha*, and indeed are not in any way much like it, and it is rather difficult to know why Wilson referred them there. They are a species of *Orthotrichum*, but the material, in absence of fruit, would hardly allow of accurate determination.

Hooker's herbarium at Kew, however, throws further light on the matter. There I find a sheet of an undetermined species of *Orthotrichum*, containing three specimens, which include those referred to by Wilson. They are: (*a*) H. 1305. Found by Col. Hall on Chimborazo at an elevation of 19,000 ft.; (*b*) H. 1304. Rocks of Chimborazo, about 18,000 ft.; (*c*) On trachytic rocks, Chimborazo, about 18,800 ft. Last trace of vegetation. Jameson, 1832. (*c*) is the same plant as (*b*), H. 1304. All three plants are vegetatively identical. (*b*) is without fruit; (*a*) has one young

capsule with quite naked calyptra, and another young capsule; (*c*) has one immature fruit with calyptra quite hairy.

In spite of the difference in the two calyptræ—a difficulty certainly rather hard to get over—I cannot help concluding that both these plants represent one species. There is, to begin with, the antecedent improbability that at that extreme limit of vegetation—no other plants at all being present—two species of *Orthotrichum* should be growing side by side. But the chief argument for the conclusion lies in their vegetative characters, which are identical and very unusual. The leaves are elongate, with more or less undulate margins, and with a very peculiar apex; the leaf is longly acuminate, then abruptly prolonged into a proboscis-like tip, linear, more or less obtuse, opaque in texture, often half-twisted, and very fragile—similar in character to, though shorter than, that of *Macromitrium sarcotrichum* C. M. and *M. goniorrhynchum* (Doz. & Molk.) Jaeg. In addition to this marked and peculiar character, both plants agree in having the margin often narrowly bi-stratose, as well as here and there narrowly recurved. This, too, is an unusual feature. The capsule in (*a*) while immature showed superficial stomata; one of those seen being in the upper half of the capsule, another about one-third of the way up.

The vegetative characters which unite the two plants collected by Hall and Jameson respectively are so strong, especially that of the curious apical prolongation of the leaf—unique, so far as I know, in the genus—that they must be held to outweigh the single naked calyptra; and I have no hesitation in referring both to *O. apiculatum* Mitt. Mitten's description, based on Spruce's No. 124 ("Andes Quitenses, in monte Pichincha, 11,000 ped."), applies well to the Chimborazo plants, so far as the vegetative characters go, the form and exsertion of the capsule, &c.; the calyptra he describes as hairy. Spruce's No. 124 quite bears out the identification; the leaf has the same peculiar apex, and the margin recurved and here and there thickened.

But Mitten's name, published in 1869, cannot, I think, stand. It is, I feel assured, synonymous with *O. Wagneri* Lor. (Moos-stud., p. 162) 1864. I have unfortunately been unable to see specimens, but the description agrees exactly with Mitten's, except in one respect; the capsules are described as "plane estriata," while Mitten in his Key describes the capsule of *O. apiculatum* as "fere ad basin usque plicata." The capsules in the Kew specimen of Spruce 124 (*O. apiculatum*), however, are only lightly and variably striate, not plicate, one or two are only obsoletely striate, while one operculate capsule, at least, is entirely smooth; and the same is the case with the British Museum specimen. The case is clearly the same as in *O. speciosum*, where capsules quite smooth or lightly striate may be found on the same tuft, or on different tufts, especially when gathered at different stages of maturity. Mitten was evidently unaware of Lorentz's species, as he makes no mention of it. It was gathered by Wagner in practically the same locality as Spruce's *O. apiculatum*, viz., "Von der höchsten Region des Pichincha bis an die Schneegrenze 13,500–14,500', auf Trachyt und vulcanischer Asche." *O. Wagneri* Lor.

seems therefore to me clearly the name that the Chimborazo moss must bear, while *O. apiculatum* Mitt. must become a synonym.

As to the altitude of the specimens, Jameson's (18,800 ft.) would appear to be nearly calculated, while Hall's "at an elevation of 19,000 ft.," would perhaps be given in round numbers. And as Jameson says of his plant "Last trace of vegetation" it would appear unlikely that Hall's plant was gathered at any higher altitude. In this case the Hindu Kūsh moss possibly represents the highest station actually recorded for a moss, but the point cannot be definitely settled, nor is it of very great importance.

Cheilothela chilensis (Mont.) Broth.

The genus *Cheilothela*, allied to *Ceratodon*, is a small and well-defined one. It was founded by Lindberg on the Mediterranean *Ceratodon chloropus* Brid., to which Brotherus has added *Trichostomum chilense* Mont., and has further described a New Zealand species, *C. novæ-seelandiæ*.

Spruce distributed (Musci Amazon. et Andini, No. 214) as *Tortula chilensis* (Mont.) Mitt., the plant collected by himself "Andes Quitensis, ad pontem Agoyam prope Baños (5500 ped.)," determined by Mitten as Montagne's species, and placed by him in *Tortula*. This plant has no doubt been generally accepted as Montagne's species; R. S. Williams has issued a Bolivian moss as *Trichostomum chilense* (Mont.), and this determination was made, as he informs me, on the faith of Mitten's naming of Spruce, No. 214.

Having occasion to examine Montagne's specimens in Herb. Hampe ("Chile merid., Gay, *Trich. Gayi* Sch., Chile"; "*Trichostomum chilense* Mtgne."; and "Chile, D'Orbigny"), I saw at once that it was a different plant from Mitten's; and moreover, on careful examination, that it was quite inseparable from the New Zealand plant, which I have received from numerous localities in both islands. It varies considerably in length of seta, but not greatly in other respects. I have also had the Chile plant sent me from Bio Bio Prov., S. Chile, 1922, leg. J. Hamilton, ex herb. D. Lillie; Nos. 692, 693, 694, 701; mostly sterile, but with a few capsules. I cannot explain Mitten's identification of Spr. 214 with Montagne's species, as they are not very closely alike.

What Spruce's plant actually is remains to be made clear. It is in the fruit very closely allied to *Trichostomum andinum* Sull., as described and figured by Sullivant, and this should to some extent define its affinity in *Trichostomum*—to which genus it undoubtedly belongs—since the capsule is of a very different form and structure from that of most species of the genus (rather wide and large, pachydermous, often plicate when dry, ovate-elliptical or ovate).

R. S. Williams has distributed in "Plants of Bolivia," Nos. 1790, 1791, 2870, specimens named *T. quitense* Hampe, which are the same. These were named on the strength of a specimen from Bolivia (No. 4703), determined as such by Herzog. *T. quitense* Hampe is included by Brotherus under *Trichostomum*, but it is not given in Paris's Index. The reference is no doubt traceable to a statement

in C. M. Gen. Musc. Frond. p. 419, as follows:—"*Tr. Quitense* Hpe. (Tortula Trichost. brachydontia Mitt. in Sprucei Coll. No. 148) in den Anden von Quito (5000 F.)." Spr. 148, however, was issued as *Syntrichia pinchinchensis*, and is described by Mitten as *Tortula pinchinchensis*. It is a *Syntrichia*, and has no relationship whatever to *Trichost. brachydontium* or to the present plant.

Trichostomum quitense Hampe, in fact, is as mythical as Mrs. Harris. No specimens occur in Hampe's herbarium, and I can find no evidence of such a name ever having been published. The reference could hardly be to *Barbula quitoënsis* Tayl. (*Tortula quitoënsis* Mitt.), a specimen of which occurs in Hampe's herbarium, since this is a true *Tortula*, of the Section Zygotrichia, nearly allied to *T. subulata*.

Spruce's 214 is, in fact, the same thing as his 210 (issued as *T. æquatoriale* Spr.) and 211 (as *Trichostomum* sp., and described by Mitten in *Musci austro-americani* as *Tortula brachydontia* Bruch.). The Andine plant, however, differs from the European in several respects: the leaf-base is broader, the basal cells are longer and more hyaline, and ascend at margin obliquely as in *T. tortuosum*, though not nearly to the same extent; the capsules are considerably larger and stouter, more pachydermous, and the peristome rather longer and more persistent.

In the apparent absence of a validly published name, it seems appropriate to give it Spruce's Catalogue name. I propose, therefore, the following:—

Trichostomum æquatoriale (Spr.) Dixon, sp. nov.

Syn. *Tortula brachydontia* Mitt. in Journ. Linn. Soc., Bot. xii. (1869), p. 148, nec Bruch.

Tortula chilensis Mitt. *op. cit.* p. 146, nec *Trichostomum chilense* Mont.

A *T. brachydontio* Bruch (*T. mutabile* Bruch) peraffine differt folii basi latiore, cellulis basilaribus tenuioribus, magis hyalinis, ad marginem distincte, sed breviter oblique ascendentibus; theca majore latiore, pachydermatica; peristomii dentes paullo longiores, minus fugaces.

It may be added that Spr. No. 213 was wrongly issued as *Trichostomum andinum* Sull. It does not agree with that species; and, moreover (in M. austr.-amer. p. 147), Mitten described it as a new species, *Tortula contortifolia* Mitt.

Reverting to *Cheilolhela*; *C. novæ-seelandiæ* Broth. must in my opinion be added to the synonymy of *C. chilensis* (Mont.) Broth., and is a further and very marked instance of the community of plant distribution in New Zealand and Southern and Andine South America.

Fissidens linearis and F. linealis.

These names have given rise to a good deal of confusion, which it may be well to clear up.

Paris, Ind. ed. ii. gives—

"F. linealis Bryol. eur. Mon. p. 12, t. 6 (1843); C. M. Syn. i. p. 46 (1849) et ii. p. 528 (1851) . . . Afr.; Pr. B. Sp."

"F. linearis Brid. Bryol. univ. ii. p. 71 (1826) et ii. p. 532 (1827); Ster. . . . Afr.; Pr. B. Sp."

The latter entry is all wrong. It should read—

F. linearis Brid. Meth. ad Musc. p. 187 (1819), et Bryol. univ. ii. p. 691 (1827); C. M. Syn. i. p. 71 (1849) et ii. p. 532 (1851); and the locality should be Pac.: Austral. or.

The locality is probably due to confusion with *F. linearis* Hornsch. in sched., from the Cape, which is referred by Hampe (MS. in Herb.) to *F. plumosus* Hornsch.

I have examined Schimper's type of *F. linealis* Bry. eur., and find it identical with *F. fasciculatus* Hornsch.; and Mr. Gepp informs me that Hampe had arrived at the same conclusion, as evidenced by his MS. notes. *F. linearis* Hornsch. therefore—though cited by Brotherus (Musci, p. 559)—is an unpublished name. *F. linealis* Bry. eur. is a synonym of *F. fasciculatus* Hornsch.

What the true *F. linearis* Brid. is appears to need clearing up. Hampe has two specimens so named, one agreeing with the plant afterwards described by Rodway (Tasmanian Bryophyta—Mosses, p. 74, 1914) as *F. leptocladus* C. M. MS., the other identical with *F. pungens* Hampe & C. M.; both belonging to the section Bryoidium, but very different from one another. Brotherus places it in the section Bryoidium. Fleischer, however, informs me that the original plant is an *Aloma*. If this be the case it is much to be desired that a full description may be published, so that its exact position and relationships might be made clear to bryologists.

Garovaglia tortifolia Mitt.

The genera *Garovaglia* and *Endotrichella* are so much alike in vegetative characters that sterile plants may be and often are difficult to assign to their right place. The fruiting characters are, however, generally distinct. In *Garovaglia* the calyptra is mitriform, the capsule immersed in a cup-shaped perichætium, the inner bracts being wide, sheathing, and imbricated; in *Endotrichella* the calyptra is cucullate, the inner perichætial bracts are narrower, not imbricated nor sheathing one another, so that the perichætium is not cup-shaped; and the capsule is nearly, but not quite always, exserted above them.

The Bornean *G. tortifolia* is described by Mitten in his paper on Thwaites's Ceylon mosses (Journ. Linn. Soc., Bot. xiii. 314); the calyptra is not described; the capsule is described as "immersa," the perichætial bracts are given as "late ovalia," but nothing is said to suggest their imbrication or convolution into a cup-shaped perichætium. On this ground, therefore, together no doubt with the resemblance of the species to *E. elegans*, Brotherus, who had not seen the plant (or, at any rate, not the fruit), places it in *Endotrichella*.

Everett's Borneo plant has the perichætium large, with broad, numerous bracts, completely hiding the capsule, but not closely imbricated and convolute as in typical *Garovaglia*; so that its conformation is not altogether conclusive. A specimen, however, collected in Borneo by J. C. Moulton, in 1914, "summit of Muhrud Mt.," and clearly

belonging to this species, had a single calyptra *in situ*, of the characteristic mitriform shape of *Garovaglia*, and as usual extremely small, barely reaching to the base of the lid, which is obliquely rostrate with a sharp beak, about equal in length to the width of the capsule. The species must therefore, I think, certainly be placed in *Garovaglia*.

Barbula torquescens Schimp.

The Cape plant, described by C. Mueller in Bot. Zeit. 1853, p. 163, is only one of the forms of *Tortula pilifera* Hook., an extremely variable plant, as may be judged from the varieties already described, and as would be expected from its wide distribution (India, S. Africa, Chile). C. Mueller in describing his species makes no comparison, perhaps wisely, with *T. pilifera*; the only characters that would suggest any difference are the short hair-point and the peristome "breviusculo"; both features that might be expected in a small or dwarfed form of *T. pilifera*.

The areolation and other characters appear to me to justify its retention in *Tortula* (not *Barbula*) as Fleischer has done; although it must be confessed that it is difficult to assign it any close relation in that genus with any other species—it would perhaps be best to create a new section for it.

Rhynchostegiella convolutifolia (Hampe) Broth.

Brotherus (*Musci*, p. 1161) writes of this "Mit dieser Art ist *Hypnum cucullatum* Mitt. in Ostaustralia wahrscheinlich identisch (Exemplare nicht gesehen)." I have received from the New York Bot. Garden part of the type of *Hypnum cucullatum* Mitt. (Dargo, Victoria, Australia, leg. F. Mueller), and it is certainly identical with Hampe's plant. The species must therefore be known as

Rhynchostegiella cucullata (Mitt.) Dixon, comb. nov.

Syn. *Hypnum cucullatum* Mitt. in Hooker's Journ. Bot. viii. 264 (1856).
Hypnum convolutifolium Hampe in Linn. xxx. 641 (1859–60).
Rhynchostegiella convolutifolia Broth. in Engler & Prantl, Pflanzenfam, ii. 1161.

Hampe's name was a very appropriate one, as the dry leaves roll up and become convolute and straight almost in the form of a cylinder.

Fissidens humilis Dixon & Watts.

In Proc. Linn. Soc. N.S.W. xli. 384 (1916) we published the above species, as belonging to the Section Amblyothallia, comparing it with *F. integerrimus* Mitt. I have recently recognised, however, that it belongs, not to Amblyothallia but to Crenularia; the error led to my overlooking its identity with *F. coarctatus* C. M. (Gen. Muse. Frond. p. 76 as Conomitrium). As, however, this is a *nomen nudum*, the name *F. humilis* must stand.

Some West African Stereophylla.

I have recently received from Mons. R. Naveau of Antwerp among various collections of Congo mosses several forms of *Stereophyllum*. One of these with usually glossy leaves, obtuse and rounded at apex, the median cells long, narrow, smooth, pale, thin-walled, and the apical very short and oval, often obscure, the nerve scarcely reaching to the middle, and weak, appeared to me to agree with the description of *S. nitens* Mitt.; but specimens issued by Paris as "*S. nitens* Mitt., leg. Pobeguin" had very different cells, the median short, shortly elliptic, the nerve stout and longer, the apex of the leaf bluntly pointed, and the seta considerably longer. Comparison with Mitten's type of *S. nitens* at Kew, however, showed that this is incorrectly determined; the Congo plants are the true *S. nitens*, while Pobeguin's plant is *S. rivulare* Mitt.

S. pallidifolium Ren. & Card. in Bull. Soc. Belg. xxxix. 112 (1900) is, I have no doubt, from the description, the same thing as *S. nitens*. The comparison of the authors with *S. nitens* leaves little doubt that the plant that they had under that name was not the true species, but the "*S. nitens*" of Paris—i. e., *S. rivulare* Mitt.; while the description (given much more fully in *op. cit.* xli. 114 (1902–03)) applies exactly to *S. nitens* Mitt.

Mitten was himself, no doubt, to some extent responsible for the error. He compares *S. nitens* with *S. radiculosum* (Hook.), but as differing *inter alia* in "the upper cells elongate." But he figures the cells elliptic, in no way differing from those of *S. radiculosum*, or if anything a little shorter, Moreover, he describes (and figures) the cells as "parietibus crassis," which they are not in his type-specimens. This has no doubt contributed to Paris' error in the determination of Pobeguin's plant.

Philonotis afro-uncinata (C. M.).

This was issued by Rehmann in the M. austr.-afr. No. 532, and described by C. Mueller in Hedwigia, xxxviii. 91, as *Bartramia afro-uncinata*. He there describes it as dioicous. Rehmann's plant, however, is upon dissection found to be autoicous; the ♂ flowers are very inconspicuous, with rather long antheridia. It is certainly *P. androgyna* (Hampe) Jaeg.

The Peristome of Arthrocormus Schimperi Doz. & Molk.

A. Schimperi is a fairly frequent and widely distributed moss in the Indo-Malay region, but is rarely found fruiting. The peristome is described and figured both by Dozy & Molk. and Fleischer as of very short teeth "dentibus brevissimis" (Doz. & Molk.), triangular-lanceolate and obtuse, more or less approximated in pairs. A specimen from "old wood close to the ground, Telok forest reserve, Klang, Selangor, 1921; I. H. Burkill (5991)," however, has one or two capsules, and these show a peristome rather markedly different from that described above. . . . The teeth are much longer, in length equalling almost half the width of the capsule; much narrower, being narrowly linear-lanceolate, and very little wider below; and they are

dark reddish-brown, whereas the figures referred to above depict them as pale. They are highly papillose, as described. The plant is rather small, but otherwise betrays no differences from *A. Schimperi*.

The specimens of this species at the British Museum (Borneo, Lacoste) show only one imperfect peristome, which if anything agrees rather with that of Burkill's plant than with the structure as described. The plants at Kew have several capsules, but the peristome is for the most part lacking. One, however, "Borneo, hb. v. d. Sande Lacoste" (and probably therefore identical with the Brit. Mus. specimen) shows the teeth quite distinctly, though broken off at the tips, and they agree exactly with Burkill's 5991. The plant is of moderate size. Other capsules at Kew, so far as they go, support this character of the peristome, and certainly none contradict it.

The difference in peristome, even if established, could hardly, alone, constitute a specific distinction. I suggest, however, that the specimen examined by Doz. & Molk. may represent an old and worn peristome, with imperfect teeth—a view which would be supported if Fleischer had under his eye the same specimen. Otherwise one may assume a certain degree of dimorphism, or of variability, in the peristome of this plant.

ARABIS CILIATA IN WALES?

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

This seems to have been first reported as a plant of Great Britain—it had been known from Ireland for some fifty years previously—by C. C. Babington in 1856 (Man. Brit. Bot. ed. 4, 23), the locality being given as Lidstep, Pembrokeshire. In all subsequent editions, right up to Wilmott's (the tenth) in 1922, the same entry appears.

In 1863 Syme (Eng. Bot. ed. 3, i. 167) created the variety *hispida* of *A. ciliata* and placed the Welsh plant under it; it is so reported for v.c. 45 Pembroke in Watson's Comp. Cyb. Brit. 483, 1870, and his Top. Botany 58, 1873; ed 2, 41, 1883.

For some time I have been interested in *A. ciliata* and have asked various friends who visited Pembrokeshire to keep a good look-out for the plant in Babington's station. In 1916 a flowering example was sent me by Mr. J. N. Haines; in 1918 Mrs. Wedgwood kindly sent fruiting examples: none could be put to *A. ciliata*. In 1923 Mr. Arnett, who is compiling a new Flora of that county, kindly gave me some particulars as to its supposed occurrence but I saw no specimens. The Rev. H. J. Riddelsdell had examples sent him in 1916 from Babington's district, and he considered they came under *A. Retziana* var. *hispida* (as far as the young specimens sent could be determined) which he had gathered on the Glamorgan coast.

Reference is made to this plant in Rep. B. E. C. 1910, 539, where it is stated that M. Rouy is responsible for this name. I have been unable to discover where the varietal name was published.

Through the kindness of Prof. Seward I have been able to

examine the actual specimens collected by Babington. There are two gatherings from Lidstep Haven upon one sheet, made on August 19, 1848, and August 18, 1851. Fortunately both gatherings include examples with ripe fruit, and there can be no doubt that all the specimens represent *A. hirsuta* (or a closely allied form) and not the Irish *ciliata*. Babington (see *Memorials*, 1897) made no note in his diary as to collecting any *Arabis* upon the dates mentioned.

The pods upon the Lidstep specimens are about 1 mm. broad and the seeds 1 mm. long × ½ mm. broad (or a little larger in the same proportions), ±truncate at the base and rounded at the apex. In the Irish plant the pods are about 1¼ mm. broad and the seeds 1 mm. long × ¾ mm. broad (or a little larger proportionately), rounded at the apex and ±rounded also at the base (some may be found, however, in a large batch, distinctly truncate).

Superficially, *A. ciliata* and *A. hirsuta* var. *glabrata* Syme are somewhat similar; but besides the pod and seed characters, leaf-differences are pointed out in Watson, B. E. Club Report, 1917–8, 51, which need not be repeated here.

In Revue Bot. Systemat. 1903, 61, an interesting article by G. Rouy appeared upon *A. ciliata* R. Br.; this was translated practically literally by F. Townsend and printed in this Journal for 1903, 278. It should be noted, however, that the seed description "graines ovales, étroitement ailées au sommet et sur l'un des côtés" should not have been interpreted "seeds ovate, narrowly winged at the summit on one side only." The winging of the seeds does not seem a very reliable character, as in a large batch of seed of the Irish plant (kindly sent me by Mr. W. C. Barton) almost every variation could be noted. Some were even practically wingless, others had a prônounced wing at the summit only or with a narrow wing along one side only or entirely so margined all round; a frequent state seemed to be a seed with a narrow wing (rather more pronounced on one side than the other) which is slightly wider at the apical end. Seeds of *A. hirsuta* (agg.) seem to vary, as regards this character, just in the same way, and it is apparently in the *proportion* of breadth to length that the best distinction between the seeds of *ciliata* and *hirsuta* may be found. Rouy (op. cit. 63) states that *A. ciliata* is closely allied to *A. Retziana* Beurl. and also to *A. curtisiliqua* DC. (which he makes a variety of the former) and that both these occur in Great Britain.

A. Retziana P. J. Beurling (Plant. Scand. 4, 1859) is classed apparently as a variety of *A. ciliata* R. Br.; no description is given, but the plant is based upon "*Turritis alpina* Linn. herbar., Retz.! *Arab. hirsuta* δ. Wg. svec." This leads us back to "*A. hirsuta* ε. *glaberrima* Linn. it. gotl. p. 192, 228" in Wahl. Fl. Suec. pars 1, 415 (1824), with the description—"foliis præcipue radicalibus glaberrimis singularis." Linné's plant (op. cit. 228; 1745) is merely described as "*Turritis foliis omnibus dentatis hispidis, caulinis amplexicaulibus* men med helt glatte Blad" [misprinted Blan]. This would seem to indicate *Arabis hirsuta*, "but with entirely smooth leaf."

As regards the other plant, *A. curtisiliqua* DC., which Rouy noted as a close ally of *A. ciliata*, A. P. De Candolle's description (Regni Vegetab. Syst. ii. 223; 1821) runs: "A. foliis oblongis subintegris pilis simplicibus ciliatis, radicalibus in petiolum attenuatis, caulinis subamplexicaulibus, pedicellis calycis longitudine, siliquis erectis. Turritis curti siliqua. *Fries ex Horn! herb.* Hab. in Scaniâ. (2)? (v.s. sp. in herb. Horn).—Habitu accedit ad duas priores [*A. sagittata* & *A. hirsuta*] sed ab utrâque diversa videtur foliis supernè glabris, pilis foliorum ferè omnibus simplicibus, siliquis dimidio circiter brevioribus. Folia omnia minùs dentata, magis oblonga, radicalia patula in petiolum longiusculum attenuata, caulina vix ac ne vix cordato-amplexicaulia ferè sessilia."

It is difficult to see how Beurling's *Retziana* & Wahlenberg's *glaberrima* can be separated from the plant Syme (Eng. Bot. i. 168; 1863) called *A. sagittata* DC. var. *glabrata*, which is no doubt the *A. hirsuta* L. var. *glabrata* Hartm. and var. *glabra* of Lange's Danske Fl. and Fl. Dan. 2911.

The Tenby plant certainly cannot be placed under *A. curtisiliqua*, but may be one of the Jordanian segregates of *A. hirsuta*. As regards the Irish plant, Mr. Wilmott (Journ. Bot. 1924, 26), in pointing out that the name *A. ciliata* R. Br. is not tenable, proposed it should be called *A. hibernica*; he has seemingly overlooked Jordan's name *A. Brownii* (Diagn. 123; 1864). For extremely interesting notes upon this plant Scully's *Flora of Kerry*, 19 (1916) should be consulted.

In 1902 E. S. Marshall distributed (n. 2650) specimens of *A. ciliata* var. *hispida* Syme from Castlegregory, Kerry (Rep. B. E. C. 1902, 36), and stated that *A. hirsuta* was associated with it as well as type *ciliata*. It would be well to investigate whether in these hairy-leaved *ciliata* forms any parentage with *A. hirsuta* can be traced.

Unless the Welsh record stands upon a better footing than that afforded by the Babingtonian specimens, *A. ciliata* must disappear as a Welsh plant.

NOTES ON THE FLORA OF THE VARNA DISTRICT, EASTERN BULGARIA.

By W. B. Turrill, M.Sc.

During 1923 a valuable collection of plants growing in the area around Varna, the chief port of Bulgaria, was formed by my friend Mr. B. Gilliat-Smith, the British Vice-Consul. The collection was sent to me in parts and will be deposited in the Kew Herbarium; its value is considerably enhanced by the careful field-notes which accompany the specimens. This district on the Black Sea has been explored botanically by Velonovsky, Davidoff, and others, but Mr. Gilliat-Smith has found a number of species and varieties not hitherto recorded from it, and an enumeration of these, together with some taxonomic notes, is given below.

Hypecoum ponticum Vel. in Sitz. böhm. Ges. Wiss. 1893, xxxvii. 6, et Fl. Bulg. Suppl. 14 (1898). On a sandy bank, north of Varna, in flower 21–4–23, no. 20. The outer petals are entire, while the inner petals are three-lobed, the middle lobe being long, narrow, ciliated, and erect against the pistil hiding the stamens, the lateral lobes are short and spreading. The flowers open about 10 A.M. and close about 6 P.M.

Berteroa incana (L.) DC. Syst. ii. 291 (1821) var. stricta Turrill in Kew Bull. 1920, 181. *Berteroa stricta* Boiss. Diagn. ser. 2, i. 35 (1853). On the plain, north of Varna, in flower and fruit, 17–11–23, no. 350.

Most of the specimens of *B. incana* which I have seen from the Balkan Peninsula belong to this variety, which, in its extreme forms, is distinguished by having the silicules much less inflated, often, in the dried state, with nearly plane and elliptical valves. I have, however, seen intermediate conditions, even on the same living plant. More complete isolation might fix and increase the differences, but I am not at present inclined to retain the species *B. stricta*.

Silene wolgensis Otth. in DC. Prodr. i. 370 (1824). *S. volgensis* Spreng. Syst. ii. 413 (1825). In Aschers. & Graebn. Syn. v. 2, 195 (1921) the quotation Besser ex Spreng. Ind. sem. Hort. Halens. 1818, 7, is given, but I have not seen this work. North of Varna, 20–6–23, no. 223.

Cotinus Coggygria Scop. Fl. Carn. ed. 2, i. 220 (1772) var. pubescens Engl. in Engl. Jahrb. i. 403 (1881) et in DC. Monogr. iv. 351 (1883). A small tree or bush, north of Varna, 20–5–23, no. 99.

Astragalus Onobrychis L. Sp. Pl. 760 (1753), var. Gilliatii Turrill, var. nov., ab varietatibus omnibus adhuc designatis calyce pilis longis subpatulis instructo, semisegmentis longioribus recedit. Varna district, just begun to flower, 25–5–23, no. 123; prope Varnam, in saxosis ad Euxinograd, 22–5–07, *C. K. Schneider*, 216.

Lathyrus sphæricus Retz. Obs. iii. 39 (1783). On woody hills, south of Varna, 7–5–23, no. 68.

Achillea compacta Willd. Sp. Pl. iii. 2206 (1804) [non *A. compacta* Lam. Encyl. i. (1783)=*A. Millefolium* L. var. *magna* Rouy et Fouc. Fl. Fr. viii. 247 (1903)]. *A. coarctata* Poir. in Lam. Encyl. Suppl. i. 94 (1810). *A. clypeolata* S. et S. Prodr. ii. 193 (1813), et Fl. Gr. ix. 71, t. 893 (1837). Near Varna, just begun to flower, 20–5–23, no. 101. Most authors have referred to *A. clypeolata* S. et S. plants, from various parts of the Balkan Peninsula, which do not belong to *A. compacta* and do not agree with the figure of *A. clypeolata* in the *Flora Græca*. They belong to a species for which I have at present no name, but of which *A. Vandasii* Vel. may be one of the varieties, though without seeing an authenticated specimen of this I am not at all sure.

Centaurea sterilis Stev. in Bull. Soc. Nat. Mosc. xxix. ii. 390 (1856). Hills south of Varna, 10–6–23, no. 199, 20–8–23, no. 261, 14–11–23, no. 343; on the plain south of Varna, 26–10–23, no. 328 *a*; on the sandy plain near the shore, 14–11–23, no. 344. I have failed

to separate *C. euxina* Vel. Fl. Bulg. 304 (1891) from this species. There is variation in the intensity of the brown blotch on the phyllaries, but this is also seen in a series of Crimean specimens.

CENTAUREA SUBLANATA Boiss. Fl. Or. iii. 645 (1875). *C. paniculata* L. Sp. Pl. 912 (1753), var. *sublanata* DC. Prodr. vi. 584 (1837). South of Varna, on the hills, 30–8–23, no. 274 and also nos. 357, 367. With the series of specimens now available at Kew I have failed to find any satisfactory division between this species and specimens referred to *C. jurineifolia* Boiss. I have not seen the type of the latter from Bessarabia (Tardent), but specimens from the Dobruja and Eastern Bulgaria are at Kew. Boissier originally described *C. jurineifolia* in his Diagn. ser. 2, iii. 73 (1856), but in Fl. Or. iii. 643 (1875) he suggested that it might be a variety of *C. rutifolia* S. et S.

GNAPHALIUM LUTEO-ALBUM L. Sp. Pl. 851 (1753). Near Varna, no. 330.

PULICARIA DYSENTERICA Bernh. var. MICROCEPHALA Boiss. Fl. Or. iii. 202 (1875). At the coast on the over-hanging shore-line, in flower, 1–9–23, no. 277, and in fruit 17–11–23, no. 348. The plant is very common and often grows to a great size. The variety is widely distributed in South Europe, but intermediates are said to occur between it and the usual northern variety. The plant is more branched, slenderer, decidedly less tomentose, the leaves with stronger venation, the capitula smaller and the ligular florets shorter than in the more northern specimens examined. Boissier reduces *Inula dentata* S. et S. Prodr. ii. 181 (1813), et Fl. Gr. ix. 57, t. 874 (1837) to this variety, but in the figure cited the leaves are longer and relatively narrower than in our plant. Halácsy, Consp. Fl. Gr. ii. 26 (1902), uses the combination *P. dysenterica* (L.) Gaertn. *β dentata* (S. et S.). Our plant agrees closely with the specimen of Heldreich Herb. norm. 675, preserved at Kew, this number being quoted by Halácsy.

XANTHIUM ITALICUM Moretti, De quibusdam plantis Ital., Dec. 5, in Diarii Phys. Chem. et Hist. Nat. v. 8 (1822); Widder in Fedde Repert. Beih. xx. 94, 182 (1923). Waste places near the shore, Varna, in fruit, 17–9–23, no. 286.

CYNANCHUM ACUTUM L. Sp. Pl. 212 (1753). A series of specimens showing the considerable range of leaf-shape and coronal development found in this species.

PERIPLOCA GRÆCA L. Sp. Pl. 211 (1753). In hedges north of Varna, 17–9–23, no. 292. The flowers are all galled, giving the specimen a very strange appearance.

LYCIUM BARBARUM L. Sp. Pl. 192 (1753). In hedges in and around the town, 8–10–23, no. 302.

CYMBALARIA MURALIS Gaertn. Mey. et Scherb. Fl. Wett. ii. 397 (1800). *Antirrhinum Cymbalaria* L. Sp. Pl. 612 (1753). *Linaria Cymbalaria* Mill. Dict. ed. 8, n. 17 (1768). Growing in the crevices of a door-step, Varna, in flower, 9–4–23, no. 18, and in fruit, 21–9–23, no. 296.

LINARIA EUXINA Vel. in Sitz. böhm. Ges. Wiss. 1888 et in Fl. Bulg. Suppl. 425 (1891). On the sandy plain south of Varna, in flower and fruit, 26–10–23, nos. 301, 326 *a*. This is morphologically related to *L. genistifolia* Mill., a species widely distributed in the Balkan Peninsula and, as generally understood, decidedly polymorphic. The characters mentioned by Velenovsky for *L. euxina* appear to be sufficient for separating it specifically and, according to the author, remain constant under cultivation.

PEDICULARIS COMOSA L. Sp. Pl. 609 (1753). On the hills south of Varna, 29–5–23, no. 143.

VERBASCUM GLANDULIGERUM Vel. in Oesterr. Bot. Zeitschr. xxxiv. 424 (1884), et Fl. Bulg. 417 (1891). On the hills south of Varna, in flower, 5–6–23, no. 177 and, in fruit, no. 312.

VERONICA OFFICINALIS L. Sp. Pl. ii. (1753). Near Varna, nos. 353, 356.

VERONICA ORCHIDEA Crantz, Stirp. Austr. iv. 333 (1769). On hills south of Varna, 17–8–23, no. 255 (planta foliis integris); no. 256 (planta capsulis glandulosis).

VERONICA THRACICA Vel. in Sitz. böhm. Ges. Wiss. 1893, xxxvii. 50. *V. Teucrium* L. subsp. *thracica* Vel. Fl. Bulg. Suppl. 214 (1898). Wooded hills south of Varna, in flower, 14–5–23, no. 72, in fruit, 24–11–23, no. 355.

CALAMINTHA NEPETOIDES Jord. Obs. Pl. Nouv. iv. 16, t. 2, f. B (1846). North of Varna, 19–8–23, no. 240. Specimens of *C. ascendens* Jord. and *C. Nepeta* Savi are also included in the collection. I suspect that *C. nepetoides* is no more than a variety of *C. Nepeta*.

SALVIA OFFICINALIS L. Sp. Pl. 23 (1753). In vineyards on the hills to the north of Varna, in flower, 20–5–23, no. 92, and in fruit, 1–6–23, no. 159.

STACHYS THIRKEI C. Koch in Linnæa, xxi. 685 (1848), var. CONDENSATA Boiss. Fl. Or. iv. 720 (1879). North of Varna, 9–6–23, no. 196. It is possible that this species has a wider distribution in the eastern parts of the Balkan Peninsula than has hitherto been recognized, but has been confused with *S. germanica*, from which it is easily separated by the indumentum of the leaves and the very glandular calyx. A specimen in the Kew Herbarium from "prope Sliven in graminosis ad collum Sekerdze," collected by C. K. Schneider and referred to *S. germanica*, is, in my opinion, also *S. Thirkei* var. *condensata*. I have not seen Koch's type of the species, but have based my determination on Wiedemann's specimen, from near Byzantium, and on descriptions. Briquet, Les Labiées des Alpes Maritimes, 224 (1893), reduces, as I think wrongly, *S. Thirkei* and its var. *condensata* to *S. germanica* subsp. *italica* var. *italica*.

COLCHICUM TURCICUM Janka in Oesterr. Bot. Zeitschr. xxiii. 242 (1873). Dry places in the hills south of Varna, flowers 14–9–23, fruits 29–5–23, no. 133, leaves 30–3–24, no. 384.

LILIUM MARTAGON L. Sp. Pl. 303 (1753). Damp places in the hills south of Varna, in bud 9–6–23, no. 215, in fruit 17–8–23, no. 234.

FOUR SHROPSHIRE ALIENS.

By James Cosmo Melvill, M.A., D.Sc.

Nowadays, when so much attention is paid to the presence of plants, foreign to Great Britain, that seem establishing themselves permanently in our midst or occur sporadically and therefore disappear after a time, I think it well to record what Shropshire, our largest inland county, with its large extent of 850,000 acres, is contributing towards the sum total. It has not hitherto been known to harbour many, and those that have been noted recently come from the neighbourhood of Buildwas, where a small amount of ballast has been dumped. Here I, in company with Mr. George Potts and the late W. B. Allen, of Benthall, have gathered *Delphinium Ajacis*, *Sisymbrium* and *Erysimum*, three or four species, *Brassica juncea*, *Silene dichotoma*, *Melilotus* three species, *Achillea nobilis*, *Anthemis arvensis* and *A. tinctoria*, *Stachys annua* and *S. italica* Mill.—the three most abundant being *Reseda lutea* var. *longifolia*, *Epilobium angustifolium* typical, and varying with white flowers, and *Salvia verticillata* most frequent of all. The most unexpected find was a small quantity of *Hypericum linariifolium* Vahl, in 1911, happily in flower and unmistakably the true species.

Geranium Endressi J. Gay. Native in the Pyrenees, and first recorded as a British alien from Halford, Corvedale, near Craven Arms, by the then Vicar of the Parish, the late Rev. E. H. Gilchrist de Castro, M.A. At his invitation I came to inspect and examine the locality, and found it growing in some plenty a fair distance from any houses. It bears some resemblance to *G. maculatum* L., so frequent in the Atlantic States of the U.S.A., where I have noticed it from Canada southwards to N. Florida, but the petals of *G. Endressi* do not seem fully to expand, but present a funnel-like form. Colour pale or bright pink. Miss Ida M. Roper has lately reported it as a casual near Bristol, and it is likewise named by Dr. Druce (Adventitious Fl. Tweedside, p. 277) as occurring at the junction of the rivers Till and Tweed, Berwick.

Torilis macrocarpa Besser. Discovered by myself in company with the late W. B. Allen in 1910, in very small quantity on waste ground at Buildwas. Nearly allied to the common *T. Anthriscus* L., but leaf-segments much narrower bi- or tripinnatisect, and agreeing with this species also in the 4–6-leaved involucre. It does not appear to be the typical form, but is Boissier's var. b. *aculeata* (=*grandiflora* Boiss. in Ann. Sc. Nat. iii. 56, 1844) as found near Ouchak, Phrygia, and Cæsarea, Cappadocia, by Balansa, and Elmalu, Lycia, by Bourgeau, all in Asia Minor, with which specimens close comparisons have been made. It has not before this been noticed in any other part of Great Britain, and must not be confounded with *Caucalis grandiflora* Hook. & Arn., an American species. Further particulars as to *T. microcarpa* Bess. will be found in Boissier, Fl. Or. ii. p. 1081, 1872.

Lactuca (Mulgedium) macrophylla (A. Gray) Willd. This handsome plant has been known to me in two places, very near to each other, not far from Shrewsbury; and in 1922 specimens were forwarded by Miss Agatha Wilkinson to the Botanical Exchange Club, and duly recorded on p. 847 of their report for that year. Of late years it has increased considerably, its large lettuce-like leaves, runcinate-pinnatifid, and glabrous, with sericeous blue-grey flowers, profusely displayed, rendering it very ornamental; it is a native of the Caucasian range. It is more nearly allied to *Mulgedium tataricum* (L.) from Russia and Siberia than to our native *M. alpinum* Lesson, though all three are of the same character. Curiously enough, from some unexplained reason, it was at first believed to be a North American native, and as such was described by Dr. A. Gray. For fuller particulars *vide* A. Gray, Synopt. Fl. N. America, vol. i. pt. 2, p. 444, 1884, and Boissier, Fl. Or. iii. pp. 799, 800, 1875.

Rudbeckia amplexicaulis Vahl. Waste places at Benthall House, Broseley, noticed the last three or four years past by Mr. George Potts; a native of Mexico and the Southern States of U.S.A., and occasionally found as far south as Rio de Janeiro. It is smooth, leaves dark green, amplexicaul, receptacle conical, central inflorescence dark brown-purple, rays bright orange, or sulphur-yellow. Named by Vahl, 1793, and figured by Jacquin (Icon. Plant. Rar. iii. 16, t. 592). I am indebted to Mr. Edmund Baker for the determination.

NOMENCLATURE.

The following Resolutions were adopted by the Imperial Botanical Conference:—

1. That the Sub-Committee on Nomenclature remain in being (with authority to co-opt additional members) to continue its work and to receive and collate proposals for the modification of the International Rules of Nomenclature.
2. Certain alterations should be made in the International Rules of Nomenclature.
3. Art. 36 (invalidating names of new groups published on and after Jan. 1, 1908, without Latin diagnoses) should be replaced by a strong *Recommendation* to supply Latin diagnoses.
4. All combinations which are homonyms (*i. e.*, later homonyms) should be rejected.
5. All generic names which are homonyms (*i. e.*, later homonyms) should be rejected except such as may be specially conserved.
6. The principle of the Type-method of applying names should be formally accepted.
7. Art. 55, 2° (rejecting "duplicating binominals," e. g., *Linaria Linaria*), should be revoked.
8. The "principle of nomina abortiva" should be expunged from the Rules.
9. The List of *Nomina generica conservanda* should be revised.
10. It should be made clear how far each of the *Nomina generica conservanda* is conserved.

11. That for the future the name of a group shall not be regarded as effectively published when the description is issued only with exsiccata.

12. Publication of new genera and species should be only in scientific publications and, if possible, only in such as habitually reach systematic botanists.

Proposals for the modification of the Rules may be addressed to the Convener of the Sub-Committee, T. A. Sprague, the Herbarium, Kew

The next International Botanical Congress will be held in June 1926, at Ithaca, N.Y., U.S.A.

SHORT NOTES.

COTONEASTER MICROPHYLLA Wall. IN I. WIGHT. On p. 62, in the course of a notice of the *Wild Flower Magazine*, we referred to the record in its pages of the occurrence of *Cotoneaster vulgaris* on downs in the Isle of Wight, and suggested that a voucher specimen of the plant would be desirable. This has kindly been supplied by Mrs. R. W. Dent, the editor of the Magazine, and the plant proves to be the well-known *C. microphylla* Wall., common in our gardens (to which it was introduced from the Himalayas in 1824). The specimen was collected by Miss Marcia Mason, and is accompanied by a letter which states that it "was picked a few days ago on the downs above Bonchurch—there were several patches growing among blackberry bushes. My aunts, who are still, though over eighty, keen flower-hunters, have known it there all their lives." The letter also speaks of the plant's recent occurrence on a heath far from houses in Dorset. In this Journal for 1906 (p. 357) the *Kew Bulletin* for that year (p. 231) is quoted as stating that "specimens have been received at Kew from the chalk downs near Ventnor, communicated by Mr. F. R. Armitage, and from Radborough [Rodborough] Common near Stroud, sent by Mr. A. D. Annesley." Mr. S. T. Druce in his *Alien Flora* records it from Brean Down, Somerset, whence it was received at Kew in 1892; other records in this Journal are from Minchinhampton Common, Glos. (1908, 395); Fowey, Cornwall, in which county—see Davey's *Flora*—it occurs in several places (J. Bot. 1907, 119); and different parts of Glamorganshire (J. Bot. 244, 274); it is also completely naturalised on a small island adjacent to Anglesey (J. Bot. 1909, 235), and other records of its occurrence have been published elsewhere. The free fruiting of the plant in cultivation doubtless leads to its distribution by birds. The misnomer in *W. F. M.* is, we think, capable of a simple explanation: the I. Wight plant was certainly a *Cotoneaster*, and, as only one species occurs in the British list, the natural conclusion was that it was this. *C. vulgaris* is not generally known, and no one who had ever seen it could mistake *C. microphylla* for it.—ED. JOURN. BOT.

COMBINATIONS BASED ON NOMINA NUDA. In his account of the *Gramineæ* in Biol. Centr.-Amer., Bot iii. 475–588 (Nov.–Dec. 1885), Mr. Hemsley was "able to use an unpublished monograph of [the Mexican grasses] (which we understand will now shortly appear) by the late Dr. Eugène Fournier." As Fournier's Enumeration did not appear until 1886, six new combinations based by Hemsley on new species described by Fournier are invalid, since the binominals on which they were based were *nomina nuda* in 1885.

Pennisetum bambusiforme Hemsl. Biol. Centr.-Amer., Bot. iii. 507 (1885): *Gymnothrix bambusiformis* Fourn. Mex. Pl. Enum., Gram. 48 (1886).

P. mexicanum Hemsl. *op. cit.* 508: *Gymnothrix mexicana* Fourn. *l. c.*

Chrysopogon Francavillanus Hemsl. *op. cit.* 530: *Andropogon Francavillanus* Fourn. *op. cit.* 56.

Sporobolus noterophilus Hemsl. *op. cit.* 546: *Vilfa noterophila* Rupr. ex Fourn. *op. cit.* 99.

Oryzopsis Fournieriana Hemsl. *op. cit.* 538: *Stipa brevicalyx* Fourn. *op. cit.* 150.

Festuca Fournieriana Hemsl. *op. cit.* 581: *Gouinia polygama* Fourn. *op. cit.* 103.

Hitchcock (Contrib. U.S. Nat. Herb. xvii. 266, 267) has pointed out that the effective publication of *Pennisetum bambusiforme* and *P. mexicanum* dates from Ind. Kew. ii. 458 (1894). Similarly, *Sporobolus noterophilus* may be cited from Ind. Kew. ii. 970 (1895). *Chrysopogon Francavillanus*, however, was not effectively published in Ind. Kew., as it was there treated as a synonym. *Oryzopsis Fournieriana* is a *nomen abortivum*, because the specific name *brevicalyx* was not retained on transference to the genus *Oryzopsis*. *Festuca Fournieriana* is also a *nomen abortivum*. The combination *Festuca polygama* was preoccupied by *F. polygama* C. Koch (1848), but this had been reduced to *Nephelochloa persica* (*Poa persica*) by Grisebach (Ledeb. Fl. Ross. iv. 367; 1853) and Boissier (Fl. Or. v. 610; 1884), and there was consequently no obstacle in 1885 to the retention of the specific name *polygama* on transference from *Gouinia* to *Festuca*.—T. A. SPRAGUE.

NOMENCLATURE UNDER INTERNATIONAL RULES AND AMERICAN CODE. Some years ago I estimated (Journ. Bot. 1921, 153) that in the Seed-Plants one species out of every nine bears different names under the Rules and the Code. As this estimate was regarded as exaggerated by Dr. Pennell (Journ. Bot. 1922, 116), I subsequently checked it by a test including all the genera contained in Britton and Brown's *Illustrated Flora*, and showed (*op. cit.* 131) that the ascertained differences slightly exceeded the estimate (3501 : 3477). I now offer further evidence which suggests that the actual proportion of different names under the two systems of nomenclature may be even higher than my original estimate of one in nine.

The five parts hitherto published of Mr. L. A. M. Riley's Contributions to the Flora of Sinaloa (Kew Bull. 1923–4) include 467 species; 80 of which bear different names under the Rules and the Code.

Instead of one in nine (11 per cent.) the actual proportion of different names is more than one in six (17 per cent.). As the objection might be raised that this proportion is unduly high, owing to the 467 species including 180 *Leguminosæ*—a family in which *nomina conservanda* cover more than one species out of every six (1905: 11,000),—it seems desirable to give the figures for the *Leguminosæ* and the remaining *Polypetalæ* separately:

Leguminosæ: 46 names out of 180 different, *i. e.* more than one in four (over 25 per cent.).

Remaining *Polypetalæ*: 34 names out of 287 different, *i. e.* one in eight-and-a-half (nearly 12 per cent.).

Thus, even excluding the *Leguminosæ*, the ascertained differences are greater than the estimated. Instead of being exaggerated, my original estimate of the differences in nomenclature under the two systems may have been too low. I now estimate that *at least one name out of every eight* (12·5 per cent.) is different.—T. A. Sprague.

Seeds of Ulex. With regard to the interesting account given by Mr. J. R. Matthews (p. 52) of the appearance of seedlings of *Ulex europæus* around the margin of burnt patches, it may be pointed out that the seeds need not have lain in the ground the whole of the period during which the 70 years old trees were growing. As I have shown in the *New Phytologist*, viii. 27 (1908), the seeds of *Ulex*, provided as they are with an orange-coloured caruncle, are largely distributed by ants, which carry them off to their nests. In this way many of them may have been transported into the wood, when the trees were comparatively well grown. This does not, however, touch the interesting phenomenon of their sudden germination after the burning of the brushwood.—F. E. Weiss.

Ferns grown under Bottles (p. 146). It may be of some interest to your readers, with regard to the planting under bottles of the scum derived from washing ordinary surface-soil, to know that the times of fertilisation have been as follows:—

Scum planted under bottle July 24, 1923.
First appearance of prothalli October 1923.
First appearance of a fern-frond June 22, 1924.

The initial growth of the minute frond is remarkably rapid, shooting up fully ¼ inch in 24 hours.—Charles E. Benham.

Lotus siliquosus L. in Berks. I found a single specimen of this pretty plant in long grass on Streatley Down, near Goring, on June 11th, and think its occurrence here may be worth recording. The locality was an ordinary chalk down with abundance of *Helianthemum vulgare*, *Gymnadenia conopsea*, and the ordinary chalk-flora. There were no other plants which could have been garden-escapes, and only one house within sight, from which it did not seem likely to have come. I had no further time to seek thoroughly for more of it. The species seems to be widely spread over Europe, and, as far as distribution goes, I see no reason why it should not be a native plant.—H. N. Ridley.

REVIEW.

Flora Balearica: Étude phytographique sur les Iles Baléares par Herman Knoche. 8vo, vol. i. pp. 534, 1921; vol. ii. pp. 585, 1922; vol. iii. pp. 411, 1923; vol. iv. (plates and maps) 1923; Thèse soustenue à la Faculté des Sciences de Montpellier, pp. 169, plates and maps, 1923. L. Lhomme, 3 Rue Corneille, Paris. 300 francs.

The contents of this comprehensive and handsomely printed work are summarised in the third volume, in the essay (also printed separately) submitted by the author in June of last year to the Faculty of Sciences of the University of Montpellier as a thesis for the doctorate, which was duly conferred upon him. Of this an admirable analysis—more complete than the limited space at our disposal will allow us to supply—appeared in *Le Monde des Plantes* for July–August of last year.

The investigation of the islands from a phytogeographical point of view was suggested to Dr. Knoche in 1905 by M. Flahault, Professor of Botany at Montpellier, to whom this work is appropriately dedicated; between that year and 1912 the author paid a dozen visits to the islands. Its preparation was carried out at the Institut Botanique of Montpellier, which contains collections made by Cambessèdes (1790–1863)—the first to make a serious study of the Flora, of which in 1827 he published an *Enumeratio*—and by Marès and Vigineix, whose *Catalogue raisonné* (1880) is the most complete flora hitherto published. Dr. Knoche's bibliography (iii. 100–110) with its elucidatory notes sufficiently indicates his thorough acquaintance with the literature relating to the botany of the islands.

In the course of preparing the work, the author visited the Herbaria of the British Museum, Kew, and Paris, and acknowledges help and specimens from numerous botanists. He was unable to examine those collected by M. Gandoger—"je le regrette d'autant plus que nos idées sur la valeur de l'espèce sont totalement différentes." The assistance of Frère Bianor, of the Christian Schools at Soller, is especially acknowledged; his herbarium "deviendra certainement la plus belle qui ait jamais été réunie aux îles Baléares."

The flora of the islands, situated as they are midway between Europe and Africa, exhibits a mixture of the two countries, those of the Mediterranean region largely predominating. It includes 1280 species of phanerogams and vascular cryptogams, of which 61 are endemic; *Leguminosæ*, *Compositæ*, and *Gramineæ* are the predominating factors. Besides the endemic species there are 59 which occur in certain isolated stations in the Mediterranean. Of these, *Buxus balearica*, which is found in Catalonia and Malaya as well as in Morocco, and *Centaurea dianæ*, recorded from Spain and Southern France, are examples; 24 occur in the Tyrrhenian islands, and 35 have a more extended distribution.

The comparatively small number of species is largely due to the fact that the author has excluded a great many common plants that have appeared in the lists of preceding authors, for the existence of which

there is no sufficient evidence. He also gives a list of subspontaneous species whose presence is due to cultivation and of those whose verification is desirable; these, with the dates of his excursions, an alphabetical enumeration of the localities cited, maps of the islands and other introductory matter, precede the systematic portion, which begins with the Algæ. For these and the rest of the cellular cryptogams Dr. Knoche has depended upon the assistance of others: the Algæ follow the work of Rodriguez and Piccone (1888–9); the Fungi are taken from various authors, the two or three collected by himself being determined by Prof. Maire; the Lichens and Mosses obtained by Dr. Knoche are determined respectively by Dr. Bouly de Lesdain and Dr. F. Camus: the author's own work begins with the Filicales, where the method followed throughout is established. The enumeration begins with the name of the plant, with its place of publication, followed by synonyms, so far as these bear upon the Flora or are of importance in connexion with the history of the species; then comes a full enumeration of the localities, those visited by the author being specially indicated; in the case of the more interesting species an outline-map is given, in which are shown the places in the islands in which the plant occurs; there is also a note on the general distribution of the species, with descriptive or general remarks where these are needed. The arrangement followed is that of Engler and Prantl, and the nomenclature is that of the Vienna Congress. Three subdivisions of the Linnean species are admitted—varieties ("les petites espèces des auteurs"), subspecies ("intermédiaire entre la variété et le type"), and forms which present no permanent characters.

While turning over the pages, numerous points of interest presented themselves, to some of which attention may be drawn. *Scolopendrium vulgare* is very rare in Majorca, only one locality being given; its occurrence in Minorca needs confirmation. *Alisma ranunculoides* has been recorded by Willkomm for Minorca, but Dr. Knoche thinks that this was a form of *A. Plantago-aquatica*. *Poa balearica* Porta is regarded as a form of *P. trivialis* L., and *Carex rorulenta* of the same author is placed as a variety of *C. Halleriana* Asso. A similar reduction is of frequent occurrence throughout the work—*e.g.*, under *Smilax aspera* three varieties and one species of other authors are reduced to forms; Dr. Knoche's intimate acquaintance with the living flora and his frequent opportunities of access to types give a special importance to his conclusions.

In attributing the name *Romulea parviflora* to the Editor of this Journal (Journ. Bot. 1914, 217), the author has overlooked, as we did when printing it, the previous publication of the combination by Bubani in 1901—the correction is made in the same volume of the Journal (p. 217). The *Iris majoricensis* of Barcelo is lost; Dr. Knoche thinks it was probably *I. albicans*, a form or variety of *I. florentina* to which Barcelo himself had at first referred it. *Aristolochia Bianorii*—described by Sennen and Pau in 1911 and figured on plate xii (as *A. balearica*)—is an endemic species with numerous affinities in the East, in South Europe, North Africa, and Mexico.

Cerastium semidecandrum L., "Rod., Willk." &c., is placed as a form of *C. varians* Coss. & Germ.—"Rodriguez n'est pas sûr que c'est bien là la plante de Linné"; Hermann, however, having re-examined the plant (referred by Knoche to *C. varians* as a "form," which he described as f. *balearica*), regards it as "une forme à petites fleurs et à pétales atrophiés du *C. semidecandrum*." *Spergularia rubra* is treated very comprehensively; all the Balearic Spergularias are, in Dr. Knoche's opinion, forms of this species; he groups them doubtfully under four varieties, the first of which, "var. ? Dillenii," has five forms.

Among the most interesting of the endemic species is *Ranunculus Weyleri*; this, with a number of species (which he enumerates) from all parts of the world save Europe, where it is only represented by *R. Balbisii*, forms, according to Dr. Knoche, a distinct and very ancient group, characterised by the pale tint and thickness of the enamel (émail) on the face of the petals. "L'ancêtre du *R. Weyleri* a pu migrer pendant le Miocène de la Tasmanie par la Nouvelle-Guinée, les Philippines, Java et l'Himalaya. Au contraire, si cette espèce est venue par le continent Transpacifique et la région des Andes, c'était pendant l'Eocène." Another interesting endemism of the same order is *Helleborus lividus* Ait., here placed as a variety of *H. trifolius* Mill., on which we hope to publish a note on a future occasion. *Rubus* and *Rosa* are very sparingly represented, the former only by *R. cæsius*, the latter by *R. canina* and *R. sempervirens*. A new species of *Euphorbia*—*E. Maresii*—is described and figured, with two varieties; these had been referred by previous authors to *E. Gayi* Salisb., to which they are "très voisines," but Dr. Knoche regards them as distinct. There is an interesting note on *Buxus balearicus* in Majorca: "Marès et Vigineix disent qu'en 1858 le *Buxus balearica* couvrait en véritable forêt le Teix et le Puig de Ternellas. Quelques-uns de ces arbres avaient des troncs de la grosseur du corps d'un homme. . . . . en 1852 les charbonnières (fumantes encore) l'avaient avalées, jusqu'aux racines mêmes. Il ne restait plus alors que dix pieds de l'espèce au Puig Gros de Ternellas."

An especially interesting plant is *Rhamnus Ludovici Salvatoris* Chod. (*R. balearica* Willk.), which nothing in the whole Mediterranean region resembles. In all the herbaria which Dr. Knoche has consulted, the only plant which showed any affinity with this was *R. croceus* Nuttall, a Californian species, of which he saw at the British Museum the type, collected by Nuttall at Monterey—a town in which he says (having lived there) the ecological conditions resemble those of the Balearics. It is remarkable that, of the only two species of Gecko (*Phyllodactylus*) belonging to the northern hemisphere, one should be found in the Balearics and in the Ligurian and Tyrrhenian islands and the other in California.

Another interesting endemic species is *Daphne velleoides* Rod., which, belonging to the *Cneorum* group and presenting a vague resemblance to some European species, has no near relationship with any. An even more remarkable example of an unrelated plant is afforded by *Adarianta Bicknelli*, described by Briquet as a

Pimpinella in 1898, but here raised to generic rank. The plant, of which two plates are given, was discovered by the late Clarence Bicknell, but had, Dr. Knoche tells us, been found previously by Cambessèdes, in whose herbarium is a specimen collected in 1825; it is of doubtful affinity, approaching *Conopodium* in its fruits, but differing from that genus in many other characters. The name is derived from Ariant, a farm near Pollezza (Majorca), its only known locality; it is mentioned by the late Cedric Bucknall in his paper on Balearic plants in this Journal for 1907 (p. 55), who with Mr. J. W. White was guided to the station in 1903 by a native of Pollenza, "who assured us that we were the only botanists who had visited the spot since its discovery by Clarence Bicknell," who directed them (and Dr. Knoche) to the locality.

The only form of Primrose, found rarely at high elevations in Majorca, is that named by the author *Primula acaulis* var. *alba*, in which, however, he sees little difference save that of colour between the Balearic form and the type. *Statice* has given Dr. Knoche much trouble; numerous forms are described, but "il règne une telle confusion dans la synonymie qu'un monographe seul pourrait décider"; his conclusions so far do not correspond with those of Mr. Bicknell (J. Bot. 1907, 57). The plant called *Erythræa latifolia* Sm. can hardly be that species. Considerable amount of space is given to *Teucrium*, beginning with "*T. Polium* var. *Polium*," under which are placed many names, with the remark: "Les paroles de Linné (Sp. Pl. 566)—'Species *Polii*, a varietatibus distinctas, hodie confusas'—reproduisent exactement mon opinion sur cette espèce."

Digitalis dubia, described by Rodriguez as a species and variously referred by other authors, is here placed as a subspecies of *D. purpurea*; in the mountains of Spain and Portugal there is a series of forms which approach it, but Dr. Knoche regards it as endemic. In the same way he distinguishes *Sibthorpia balearica*, a plant which has been referred to *S. africana* L., but which his examination of specimens from Shaw, who sent the plant to Linnæus, leads him to consider distinct.

We had noted many other points for comment, but space will not allow; nor can we do more than indicate the contents of the third volume, in which the history of the islands from every point of view is fully and elaborately dealt with. The fourth volume is entirely devoted to plates—all of them excellent—and maps; in this are figured, from photographs, a selection, to the number of about 40, of the most interesting species, with aspects of vegetation and other views.

In every respect the 'Flora' has clearly been a labour of love: it has been produced regardless of expense, and the cost, although high, cannot repay the author the money that has been spent upon it; the work was indeed originally printed for private distribution, and only a few copies have been placed upon the market. This leads us to express the hope formed while perusing it that Dr. Knoche may see his way to produce an edition of the text more convenient in form and less extravagantly printed; in the present the unnecessarily large type employed for the names of divisions, orders, and families gives

the pages on which these appear an ugly appearance and serves no useful purpose. Opportunity might then be taken to correct certain misprints which, although not serious, are somewhat numerous; the most noticeable is that of "Solederer" for "Solander" (i. 487). We note with pleasure that the page-headings are utilised, and that each volume has an excellent index; the placing of the synonyms by themselves in a second alphabet after the list of those retained is an innovation which has little to commend it. These criticisms are are made with a view to the new edition that has been suggested, which will, we hope, not be long delayed.

BOOK-NOTES, NEWS, ETC.

AT the meeting of the Linnean Society on 5th June, Mr. Ramsbottom, as Botanical Secretary, gave an account of a paper by Mr. G. Erdtman, entitled "Studies in the Micropalæontology of Post-glacial Deposits in Northern Scotland"—an investigation of the pollen grains preserved in the peat from thirty-eight localities situated in Ross-shire, the Isle of Skye, the Isle of Lewis, Sutherlandshire, and the Orkney and Shetland Islands. From the thirty-eight localities examined Erdtman has found pollen of the following genera:—*Acer*, *Alnus*, *Betula*, *Carpinus*, *Fagus*, *Fraxinus* (?), *Pinus*, *Quercus*, *Tilia*, *Ulmus*, *Ilex*, and *Salix*. Of these *Betula* is by far the most abundant, usually providing 70 per cent. of the total pollen. Next in order came *Pinus* (14·6 per cent.), *Alnus* (11·8 per cent.), *Salix* (11·25 per cent.), *Carpinus* (4·25 per cent.), *Quercus* (2·4 per cent.), and *Ulmus* (1·2 per cent.). The beech was represented by a single pollen grain in three separate localities. Holly also occurred but rarely, viz., in five places, of which three were the same as those containing beech. *Acer* was rare, as in Scandinavian post-glacial deposits. The first appearance of the pollen of *Alnus* probably marks a definite horizon, and it is suggested that this may correspond to the level of the first appearance of alder pollen in Scandinavia. The latter is late Boreal or about 6000 B.C. A striking difference, as compared with Scandinavia, is the total absence of *Picea*. The occurrence of *Carpinus*, though very rare, is extremely interesting, since it has only been recorded hitherto from fossil deposits in Great Britain from pre-, late-glacial and Roman deposits south of the Wash. The presence of *Fagus*, too, in these post-glacial peats of the north of Scotland rather negatives the idea that the present restricted range of this species is the outcome of its recent immigration. Pine pollen is always associated with that of Birch and it seems probable that these two trees were the principal constituents of the post-glacial forests of northern Scotland.—Mrs. Reid stated that the statistical study of pollen in the peat-mosses held the best hope for arriving at a knowledge of woodland floras; also of climate since Late Glacial times; because the deposits are so widespread that they give continuous evidence over wide areas, and they are fairly continuous in time in their deposition, so that they give a consecutive history.

At the meeting of the same Society on 19th June, Dr. A. B. Rendle, the President, exhibited a hybrid between *Carex remota* and *C. divulsa* sent by Mr. C. E. Salmon. This occurred near Mayfield, in Sussex, in one large clump with a quantity of *C. remota* and a little *C. divulsa*. It differs from *C. remota* by its more scabrous stem, only one bract (or at most two), spikelets male at the summit, or even wholly male, and in other particulars. *C. remota* hybridises with *vulpina* and produces × *C. axillaris*, which has longer-beaked fruit than the specimens exhibited, compound spikelets, &c. It also hybridises with *C. paniculata* and produces × *C. Boenninghauseniana* —a very different plant. *C. remota* × *divulsa* seems extremely uncommon and is perhaps new; Ascherson and Graebner mention it with some doubt. Mr. T. A. Dymes showed a series of slides illustrating the seed of *Orchis latifolia*. In a previous communication (see J. Bot. 1923, p. 224) he stated that the seeds of the British Dactylorchids fell into two groups: (1) Maculatæ, and (2) Latifoliæ. The question of *O. latifolia* L. in Britain had to be left in abeyance, because all the material that had then been examined appeared to be of hybrid or mongrel origin, and always a blend of both groups. Further research has revealed a form, agreeing in other respects with *latifolia* L., whose seeds are obviously pure. They belong to group (2) Latifoliæ, and are very like those of *O. prætermissa* Druce, but somewhat shorter and broader and inclined to taper and curve in the apical half. The kernel, as in the other forms, is remarkably constant, both in shape and measurements, and it, too, is shorter and broader than in *O. prætermissa*; the mesh is smaller. The evidence of the seeds of these plants, which came from Winchester and Chippenham Fen, suggests that *O. latifolia* L. and *O. prætermissa* Druce are close allies or forms of the same species. It would also seem that some of the hybrids are hardly to be distinguished in the field from *O. latifolia* L., but that their seeds betray the strain of the Maculatæ by the spirals or lines of thickening on the walls of the cells of the testa.

At the same meeting Mr. T. B. Blow exhibited an extensive series of Charophyta collected by him during a recent visit to Madagascar. He stated that great interest in these plants has arisen during the past five years by reason of their affording a possible means of preventing the spread of malaria by acting as larvicides. A pioneer in this field, Dr. Caballero, of Barcelona, observed that, in pools where certain species of *Chara* abounded, there was an entire absence of the larvæ of mosquitoes, whereas in pools free of *Chara* these larvæ abounded. He made a great number of observations round Barcelona, and his conclusions were confirmed by several workers, such as Monsieur Alluaud in Morocco and Dr. Vasconcelos in America. On the other hand, other workers almost completely negatived these observations, notably W. C. Rooker and M. A. Barber in America. Caballero's idea was that the *Chara* produced toxic matter which spread through the water and was fatal to the mosquito larvæ. It was judged desirable to make further experiments and

observations in a tropical country where malaria abounded, and Madagascar was selected. The country covered there was not only the East coast line, where are great marshes and much water, and where malaria is rampant, but also the higher ground around the capital, Tananarivo, where the climate is much healthier, and the mountainous portions near Antsirabe, where mosquitoes scarcely exist, and lastly the district of the great Lake Alaotra, which is probably the most malarious part of Madagascar. It was noticed in connection with several species of *Chara* that, where they abounded, there were rarely any mosquito larvæ in the water. The species that seemed to keep the water quite free of mosquito larvæ were as follows:—*Chara zeylanica*, *C. gymnopitys*, *Nitella Roxburghii*, and some other species of *Nitella* probably new. The time occupied by Mr. Blow in Madagascar in searching for these plants was seven weeks. Some of the country explored had no roads, only tracks, over which one had to be carried in a chair on the shoulders of four men.

Under the title "A Great Pioneer Gardener" the *Times* of July 7 gives an interesting sketch of the life and work of the late Sir Harry James Veitch, who died at his residence, East Burnham Park, Slough, on the preceding day. Born at Exeter on June 29, 1840, at the age of eighteen Harry, who had been placed with the horticultural firm of Vilmorin in Paris, joined his father at Chelsea, and with him developed the great establishment which attained world-wide celebrity under the name of James Veitch and Sons; the burden of this rested upon his shoulders from the death of his father in 1869 until his retirement in 1913–14. James Veitch had set on foot while at Exeter the experiments in the hybridisation of Orchids; this, under his son, developed into an important branch of the business, and formed the subject of a paper read by the latter before the R. H. S. in 1885, in which the process of hybridising and of raising the seed, until then a trade secret, was revealed to the public. The sending by the firm of collectors to California, South America, and the Far East, while primarily horticultural in its object, added greatly to our knowledge of the botany of those regions. Sir Harry's name is associated with numerous plants, of which *Ampelopsis Veitschii* is the best known.

Young collectors will derive considerable help from Mr. J. H. Crabtree's *British Mosses and how to identify them* (London: Epworth Press, 1/6 net), wherein they will find photographs of about 60 of our common mosses, each with half a page of notes on habitat and specific characters. The nomenclature, apart from some antiquated exceptions, is taken from Wilson's *Bryologia Britannica* published nearly seventy years ago, and is therefore quite old-fashioned. The tedious English names are also copied from Wilson's work—names which never caught the public fancy, and long since became effete. Who would go out of the way to memorise such a concoction as "Neat Meadow Feather Moss," when the crisp *Hypnum purum* is so easy to grasp and has been in common international use for a century and a half?—A. G.

THE *Kew Bulletin* (no. 5) contains a revision of the genus *Sphæranthus* (38 species, 9 new) by Dr. Walter Robyns, of the University of Louvain; it may be suggested that the usefulness of the Keys in the Bulletin would be increased were smaller type and a somewhat different arrangement employed: in the present instance it extends over five pages. Mr. Riley continues his "Contributions to the Flora of Sinaloa," with descriptions of many new species and detailed descriptions of two Lopezias briefly diagnosed in this Journal for January (p. 15); there is a Decade (the fiftieth) of New Orchids; Dr. Burtt Davy continues his notes on "New or Noteworthy South African Plants" and Mr. J. S. Gamble his "Notes on the Flora of Madras."—In No. 6, Mr. C. V. B. Marquand revises the genus *Cyananthus* (21 species, 5 new); and "Diagnoses Africanæ" and "Decades Kewenses"—the first in its 78th, the second in its 109th instalment—are continued.

THE *Botanical Magazine* for June contains plates and descriptions of two new species—*Pentas coccinea* (Tropical Africa) and *Dendrobium lævifolium* (Louisiades Archipelago); there are also descriptions of a new *Cassiope* (*C. pectinata*, Tibet–Yunnan frontier) and a new *Spenceria* (*S. parviflora*); a plate is given of *S. ramalana*, the original species figured and described by Trimen in this Journal for 1879, which seems likely to become a valuable addition to the rock-garden. Dr. Stapf writes "Trimen wrote *Spenceria*. I prefer the form *Spencera*, following the usual practice in latinising names derived from proper names ending in *-er* and the recommendations of the International Code"; such alterations seem to us neither necessary nor desirable. Two new Chinese species of *Photinia* (*P. obliqua* and *P. scandens*) are also briefly diagnosed. The part is entirely the work of Dr. Stapf, whose descriptions contain much of botanical and geographical interest.

PERHAPS the most remarkable feature of *Science Progress*—the "Quarterly Review of Scientific Thought, Work and Affairs"—is the absence of Botany from its pages. In the July number, save for the eight pages devoted to Dr. R. C. Knight's summary of "Plant Physiology," as represented in some American periodicals, and reviews of Mr. Tansley's *Plant Biology* and Dr. Scott's *Extinct Plants*, occupying between them little more than a page, Botany is unrepresented.

Rhodora (dated April) contains a monograph of North American Scutellarias, by C. W. Penland, with a key, based on nutlet-characters, to the 21 species described and two plates.

THE *Botanical Gazette* (June) contains papers on Determination of Sex in *Elodea*, by J. K. Santos, with 5 plates; Protein Synthesis by Plants, by S. H. Eckerson; the Female Gametophyte of *Microcycas*, by L. G. Reynolds; Transpiration in *Encelia farinosa*, by E. B. Shreve; Development of Seed in *Crotalaria sagittalis* (2 plates), by M. T. Cook; and a memoir with portrait of George Lincoln Goodale (1839–1923).

IN the *Bulletin of the Torrey Botanical Club* (May) P. A. Rydberg concludes his paper on the *Tuberarium* section of *Solanum* in Mexico and Central America; and C. C. Plitt and L. J. Pessin write on the Effect of Evaporation and Light on the Distribution of Lichens. We note that the *Bulletin* follows the practice of *Rhodora* in giving in each number the actual date of publication of that which preceded it.

The Bulletin Soc. Royale Bot. Belgique (lvi. fasc. 2) includes a continuation of the 'Essai de Phytostatique en Jurassique belge,' by A. Verhulst; Paul van Oye writes on *Euglena acus* Ehrenb.; V. Grégoire on 'L'organogénèse de l'ovaire et la déhiscence du fruit,' and J. Hennen on *Desmatodon cernuus*.

In *Contributions from the U.S. National Herbarium*, vol. 22, part 7, Mr. A. S. Hitchcock adds to his Monograph of Grasses "The North American Species of *Aristida*"; 59 species, of which 7 are new, are enumerated and described with the care and detail inseparable from Mr. Hitchcock's work. Part 8 is devoted to "New American Asteraceæ,' by S. F. Blake, mostly from Mexico, Central and South America; they include a new genus (*Trichocoryne*, Heleniеæ), 118 new species with 10 plates, and numerous new names, with descriptions of additional material for species already published.

Annales Mycologici (xxii, 1/2) is mainly occupied by a continuation of F. Petrak's 'Mykologische Notizen,' in which many new genera and species are described. H. Sydow and E. Werdermann write on new and interesting fungi of the Canary Islands; F. Höhnel on *Cylindrosporium*, and A. Pilat on *Thelephoraceæ*; H. Sydow describes a new genus *Petrakiella* (Diaporthiaceæ) and new South African Fungi; a critical enumeration of Bohemian *Parmeliaceæ* is contributed by A. Hilitzer.

Annali di Bot. (June 30) B. Longo, *Pinus magellensis* and *Idesia polycarpa*; C. Sibilia, 'Sul fiore di *Anemone apennina*'; M. Raymond-Hamet, 'Sur le genre *Macrosepalum*'; R. Ciperri, 'Sul polimorfismo di un Fusarium della zucca'; F. Lanzoni, Tommaso Luigi Berta (1783–1845).

THE *Naturalist* for July contains "Further Notes upon the Vascular Plants characteristic of Peat," dealing principally with *Calluna vulgaris*, by Mildred Hinchliff and J. H. Priestley, of the Botanical Department, University of Leeds; and "The Plankton of the River Wharfe," by E. W. Butcher.

THE *Times* of July 15 records the death on July 13 at Gilfachgach, Glamorganshire, of Dr. ROBERT KIDSTON, of Stirling. "He was a Doctor both of Laws and of Science, a Justice of the Peace for Stirlingshire, and a Fellow of the Royal Society, of the Geological Society, and of the Royal Society of Edinburgh. He was a leading authority on palæobotany, and his works include over a hundred papers and memoirs on the Carboniferous Flora, published in the transactions of various societies. In 1890 the Royal Society of Edinburgh awarded him the Neill medal, and in 1916 he received the

Murchison medal from the Geological Society." His Catalogue of the Palæozoic Plants in the British Museum was published in 1886.

MESSRS. WHELDON and Wesley have re-issued, as a "second edition" at half the original price, Miss Ellen Willmott's handsome folio volume of views (41 in number) of *Warley Garden in Spring and in Summer*, which was published at a guinea by Mr. Quaritch in 1909, and noticed in J. Bot. for 1910, p. 32. The only text is the table of contents.

THE Royal Academy Exhibition at Burlington House included portraits of Professor Seward and Dr. Druce—the former by Mr. W. O. Hutchinson, the latter by Mr. Walter W. Russell, A.R.A.

WE note with pleasure that the University of Cambridge has conferred the degree of Doctor of Philosophy on Mr. Joseph Burtt Davy, who left Kew for California in 1892 and subsequently went to the Transvaal as Government Botanist; he is now working at Kew on his *Handbook of the Transvaal Flora*. A portrait of Dr. Davy appears in the *Gardeners' Chronicle* for May 10; in the same number is an illustrated account of the Pear-scab Fungus (*Venturia Pirina*) by E. S. Salmon and W. M. Ware.

THE writer of "Rhymes for the Times" which for some years have formed a daily feature of the *Evening News* occasionally chooses a common plant for his subject. His verses on the Coltsfoot and Groundsel have already been reprinted in these pages (J. Bot. 1917, 168; 1920, 96), and to these may be added those on "Rosebay" (*Epilobium angustifolium*) from the issue of July 17:—

"Here on the heath where fire and smoke
Quite put the wind up country folk
It seems to me but lately
A wondrous glory comes to birth,
And flowers that hide the blackened earth
Appear to flourish greatly.

"The setting sun refulgent shines
Through open ranks of red-stemmed pines,
And, in his splendour glowing,
Acre on acre thickly spread
And blushing with a rosy red,
The willow-herb is blowing.

"This is the vision of delight
That bursts upon the traveller's sight,
A prospect quite amazing,
To make one rub one's eyes and doubt
Whether, as in that time of drought,
The heath is truly blazing.

"Thus Nature with a lavish hand
Revives the parched and stricken land
To new and greater glory.
Perchance when we have passed away
Those who come after will display . . .
But that's another story!"

NORFOLK MYCETOZOA.

By HENRY J. HOWARD, F.R.M.S.

RECORDS of Mycetozoa found in the county of Norfolk have appeared at somewhat wide intervals in the *Transactions of the Norfolk and Norwich Naturalists' Society*, but no full list has hitherto been published. Since many alterations in nomenclature have taken place within recent years, and several new species have been recorded in the nine years during which the writer has been working on the group, it was thought that the following notes might be useful to enable Norfolk records to be compared with those made in other parts of the country, and in the hope of encouraging other workers to interest themselves in the subject. The present list contains 114 species.

The climate of Norfolk is, generally speaking, dry; the average rainfall for the ten years, 1912 to 1921 inclusive, being 27·61 inches (this period includes the wet 1912, when the rainfall was 35·03 inches, and the drought year 1921, giving 15·71 inches for the year), a fact not apparently favourable to the development of such moisture-loving creatures as the Mycetozoa. Most of the woods are comparatively small, and, being closely preserved for game-rearing, are inaccessible to the mycologist during certain parts of the year. I have only had opportunities for paying regular visits to localities within a few miles of Norwich, yet the record is a very extensive one. More observers are needed in other parts of the county, for, if more ground were covered, the number of species recorded would doubtless be increased and a better knowledge of the distribution of this extremely interesting but little-known group would be obtained.

The first records of Mycetozoa appear in the lists of Norfolk Fungi by that gifted mycologist Dr. Plowright, of King's Lynn (see Trans. Norf. Norw. Nat. Soc. (abridged later as Trans. N. N. N. S.) i. 47; iii. p. 751). Further records were made by Mr. W. H. Burrell, F.L.S., who did much valuable work upon the group; he was furnished with additional data by Mr. L. R. J. Horn, of Woodton, near Bungay (*op. cit.* vi. 449; ix. 106).

The localities in which my researches were carried out are chiefly Whitlingham Woods, Dunston Woods, a small fir wood belonging to the Earlham Hall estate, Buckenham and Strumpshaw Woods, the woods belonging to Mousehold House, and also those belonging to Sir Eustace Gurney at Thorpe. I am greatly indebted to the owners for permission to visit these places from time to time. Those species which have been previously recorded and have not been met with by the author are marked with an asterisk (*).

I am deeply indebted to Miss Gulielma Lister, F.L.S., for her encouragement and valuable help in verifying or correcting the records which have been made. Mr. W. H. Burrell, of Leeds, has kindly given assistance with regard to previous records, and Messrs. H. Springall and Cockle, of King's Lynn, have forwarded a considerable amount of material collected in their neighbourhood.

Ceratiomyxa fruticulosa Macbr. Very abundant in June and July on decaying pine wood in most localities; a pinkish form is occasionally met with.

**Badhamia capsulifera* Berk. Gathered on a stump at Spixworth.

B. utricularis Berk. Fairly common; it has occurred in the Whitlingham, Buckenham, and Racecourse woods; a very large gathering was also obtained from the Reffley woods, King's Lynn. Has been met with throughout the year upon leathery fungi; a very large gathering covering several inches was made in Jan. upon some dead horse-chestnut logs.

**B. nitens* Berk. Two records have been made of this, one on a dead oak branch in Reffley woods.

B. macrocarpa Rost. A large gathering of sessile sporangia was made on the bark of a fallen poplar in July; a stalked form was found on bark in the August of the succeeding year. Both gatherings were made at Whitlingham.

B. panicea Rost. Fairly common on dead wood and old ivy stems, April to Sept.

B. foliicola List. On dead branches, Dunston, Earlham, and Whitlingham woods in summer and autumn. On two occasions it was found in a heap of dead branches partly covered with leaves.

B. rubiginosa Rost. var. *dictyospora* List. Two large gatherings were made upon dead brambles and bracken in the Mousehold House woods in Oct. 1920 and 1922.

Physarum psittacinum Ditm. Gathered on old pine stumps in Buckenham and Melton Constable woods, July and Aug.

P. penetrale Rex. Large colonies of this rare species were found in Dunston, Mousehold House, and Bramerton woods on dead bracken and brambles, July and Aug. The only other British record is from Luton (Beds); it also occurs in Ireland.

P. carneum G. List. & Sturgis. Found for several years in succession in the Mousehold House woods in late summer and early autumn (see Journ. R. M. S. 1917, p. 265). With the exception of a small gathering made near Lisbon by Dr. Torrend, this interesting species has only been met with elsewhere in Colorado, U.S.A.

P. viride Pers. The typical form is common on dead wood in summer. Var. *incanum* List. A single gathering was made on mossy bark in the Racecourse plantation, Thorpe, in Oct.

P. galbeum Wing. On dead bramble and bracken in bramble thickets in Buckenham, Dunston, and Mousehold House woods, July to Oct., especially after rain.

P. nutans Pers. Very common on dead wood everywhere throughout the year, is sometimes associated with a limeless form known as var. *violascens*. Var. *leucophæum* List. is also fairly common.

P. pusillum List. On dead ivy stems at Whitlingham; a smaller neat form occurred on straw heaps at Earlham; summer and early autumn.

P. compressum Alb. & Schwein. On dead wood and bark, fairly common throughout the year. A very large growth was seen at Earlham in July covering old cabbage-stalks thrown into a heap.

P. straminipes List. On old straw heaps at Whitlingham, Earlham, and Dunston, July and Aug.

P. didermoides Rost. On an old straw heap at Swainsthorpe in Sept. in great abundance.

P. cinereum Pers. Common on dead and living leaves, April to Sept.

P. vernum Somn. The typical form is not common; var. *iridescens* G. List. is fairly abundant on dead leaves and bracken in the Mousehold House woods during summer.

P. sinuosum Weinm. Frequent on dead leaves and bramble-stems, June to Sept.

P. bitectum List. In similar habitats to the preceding, July to Jan.

P. contextum Pers. Two gatherings of this were made; one on dead ivy at Earlham in Nov., the other maturing from yellow plasmodium on larch needles in Whitlingham woods in July.

P. gyrosum Rost. Found in Feb. 1922 by Mr. A. Adcock, of Upton Road, Norwich, in a cucumber-house. It had matured upon a dead stick; a fine group of sporangia was seen by the writer two days afterwards upon humus formed of decaying beech leaves in the same greenhouse. In June 1919 it was found in a greenhouse in the Edinburgh Botanical Gardens by Dr. M. Wilson, F.L.S., who cultivated the plasmodium (fed on bread) from spores. Probably Berkeley's *Didymium dædalium*, described as occurring in great abundance in a cucumber-frame at Milton, Northants, in 1850, was this species; apart from this Mr. Adcock's is the only English gathering known.

P. lateritium (Berk. & Rav.) Morg. On dead wood at Dunston; also in abundance on dead leaves beneath low bramble growths in Mousehold House woods; it matured from yellow plasmodium—a fact not previously recorded—and occurred in July, Aug., and Sept. The only other British record is on holly leaves near Smethwick, Staffs, by Mr. A. Camm.

P. virescens Ditm. On moss, Whitlingham, and at Elsing, near East Dereham, maturing from yellow plasmodium; also obtained from Stratton Strawless (W. H. B.). Var. *obscurum* List. has been frequently found in the interior of dense bramble clumps in Mousehold House woods, July and Aug.

Fuligo septica Gmel. Very common, May to Aug. It usually occurs on old stumps, and has been noted on sawdust heaps and on living bracken-stems. Var. *rufa* List. has been met with in three successive years on a fallen horse-chestnut tree in Dec. at Whitlingham.

F. cinerea Morg. On old straw, scattered over a small area, and looking like the droppings of large birds; found in July at Earlham.

Craterium minutum Fr. Common on dead leaves, straw, and twigs throughout the year.

C. leucocephalum Ditm. Common on dead holly and oak leaves throughout the summer.

C. aureum Fr. Has occurred at Whitlingham, Dunston, Mousehold House, and King's Lynn on dead leaves throughout the summer.

Leocarpus fragilis Rost. Frequent on dead and living bracken, dead leaves, and often on pine needles, during summer.

Diderma spumarioides Fr. Fairly frequent on dead leaves, March to Aug.

D. globosum Pers. A fine gathering of this species, which is rare in Britain, was made on dead grass-stems and moss in a boggy alder copse at Buckenham in Oct.; a small specimen was found in similar surroundings on a piece of dead wood in the Strumpshaw woods in July, and Mr. J. Saunders gathered it at Holt in Oct. 1897. All the Norfolk gatherings are of a form intermediate between typical *D. globosum* and *D. spumarioides*, having the eggshell-like walls of the former and spores measuring only 9–10 μ.

D. testaceum Pers. On dead leaves in Mousehold House wood, Aug., Sept.

D. hemisphæricum Hornem. On dead leaves, stems, and old straw in Whitlingham, Earlham, and Mousehold House woods, April to Nov.

D. effusum Morg. On dead leaves, bracken, and dead herbaceous stems in Mousehold House, Buckenham, and Earlham woods, July to Nov.

D. deplanatum Fr. One gathering on dead bramble-stems in Mousehold House woods, Sept.

D. simplex List. A large gathering on dead leaves under low brambles during Aug. in the Dunston woods; the sporangia were pale drab in colour.

D. radiatum List. On a mossy pine branch at Whitlingham in Oct. Var. *umbilicatum* Meylan. On dead pine wood at Earlham in Nov.

D. floriforme Pers. Seen in all stages of development on dead wood and bracken in Dunston woods in Aug.; also in the same woods and in Mousehold House woods in Sept.

**D. asteroides* List. The first British gathering of this species was made in Oct. 1910 by Mr. W. B. Burrell upon stems of *Equisetum palustre* on marshy ground on Flordon Common.

Diachea leucopoda Rost. Fairly common on dead brambles, bracken, etc., during summer in Mousehold House, Whitlingham, and Dunston woods.

**D. subsessilis* Peck. Found at Holt by J. and E. Saunders (see Trans. N. N. N. S. vi. 451).

Didymium difforme Duby. Common everywhere on dead leaves, straw, and decaying herbaceous stems throughout the year.

D. vaccinum (Dur. & Mont.) Buchet (*D. Trochus* List.). In fair abundance amongst the under layers of decaying straw forming the bottom of an old stack at Swainsthorpe in Sept.

D. complanatum Rost. On bracken, bramble-stems, and moss in Dunston, Mousehold House, and Earlham woods during summer.

D. Clavus Rabenh. Fairly common on dead leaves and decaying herbaceous stems, July to Nov.

D. melanospermum Macbr. On dead leaves and twigs in Buckenham, Dunston, and Mousehold House woods during summer. Var. *minus* List. One gathering in Mousehold House woods on dead leaves in Sept.

D. nigripes Fr. On dead leaves in Buckenham and Earlham woods during summer. Var. *xanthopus* Fr. is much more common and occurs in summer in similar habitats.

D. squamulosum Fr. An exceedingly common and protean species, occurring throughout the year. An iridescent form has been met with, and in the summer of 1922 flat specimens resembling *D. complanatum* were found on leaves of *Nepeta Glechoma*.

Mucilago spongiosa Morg. Plowright mentions this species as being very common, but I have gathered it only three times—once on wild raspberry-canes in Nov. at Earlham (between 1914 and 1922), and during the summer of 1922 two large growths on *Nepeta Glechoma* at Earlham and Whitlingham.

Colloderma oculatum G. List. After several years of vain searching, this was discovered during wet weather, maturing amongst moss on a fallen tree-trunk in the Belmore Plantation, Thorpe, in Oct.

Stemonitis fusca Roth. Fairly common on dead wood, May to Sept. Var. *confluens* List. On a prostrate tree-trunk in the Whitlingham woods in Aug. and Sept.

S. splendens Rost. var. *flaccida* List. Has been met with several times on dead wood; one specimen matured two feet up an erect dead pine tree, another on a painted gatepost four feet from the ground on College Road; Whitlingham woods, May to Sept.

S. herbatica Peck. On an old pine stump in the garden, Thorpe, Aug.

S. flavogenita Jahn. On dead pine wood and old pine needles in most localities, June to Sept.

S. ferruginea Ehrenb. A large gathering appeared during three successive seasons on a fallen horse-chestnut trunk in the Whitlingham woods; it has also been found on dead wood at Dunston; May to Sept.

S. hyperopta Meylan. Fairly common on coniferous wood in most localities, May to Aug. Var. *microspora* List. On dead wood, Whitlingham, Aug.

Comatricha nigra Schroet. Common on dead branches and sticks during every month. Var. *alta* List. On dead wood in the Whitlingham woods, Feb. to April.

C. fimbriata G. List. & Cran. Two gatherings of this tiny species were made on dead pine wood in the Whitlingham and Earlham woods in Sept.

C. elegans List. A single colony was found on a dead oak twig in the Mousehold House woods in July.

C. typhoides Rost. Fairly common on dead wood from May to September; it appeared for several years on a fallen horse-chestnut trunk in the Whitlingham woods.

C. pulchella Rost. Abundant on dead leaves and bracken in Mousehold House woods, and less so in the Dunston and Whitlingham woods; in summer.

C. tenerrima G. List. On dead wood, once on straw; at Earlham and Whitlingham, Aug. to Nov.

C. rubens List. On dead coniferous wood at Earlham in Nov.

Enerthenema papillatum Rost. Fairly common, chiefly on dead pine trunks and on horse-chestnut logs, in all localities, March to Sept.

Lamproderma columbinum Rost. Found once on a mossy log in the Whitlingham woods, developing from white plasmodium, Sept.

L. arcyrionema Rost. A single gathering of this, which is uncommon in Britain, was made on dead wood, probably beech, in the Whitlingham woods in July.

L. scintillans Morg. Abundant throughout the year on leaf heaps, particularly beech, in all localities.

L. violaceum Rost. Two large gatherings on a mossy tree-trunk in the Whitlingham woods during Nov. and Dec.; on one occasion a few sporangia were found maturing on the pileus of a small fungus.

L. atrosporum Meylan var. *debile* G. List. & Howard and var. *anglicum* G. List. & Howard. Both were found in considerable abundance and close together in 1918, 1920, and 1923, upon the same two heaps of beech leaves in Whitlingham woods (see Journ. Bot. 1919, 25, pl. 552). The typical form of the species has not been recorded in Britain.

L. Gulielmæ Meylan. A few sporangia were found on a beech scale in the Earlham woods in Nov. 1918; the only other British gathering was made by the Rev. W. Cran in Aberdeenshire in Sept. 1913.

**Amaurochæte fuliginosa* Macbr. Found at Sheringham by Mr. W. H. Burrell.

Brefeldia maxima Rost. A single gathering on an old elder log in the Strumpshaw woods in May.

Cribraria argillacea Pers. Common on dead wood in summer.

C. rufa Rost. On dead coniferous wood in Earlham and Mousehold House woods during Nov.

C. vulgaris Schrad. Very common on fallen pine logs during summer; often forms large colonies, especially in the Whitlingham and Buckenham woods. Var. *aurantiaca* Pers. Appears at the same time and places.

C. tenella Schrad. A single large gathering was made in the Whitlingham woods on a dead pine trunk in July.

Dictydium cancellatum Macbr. After a spell of wet weather the developing sporangia form a remarkable sight; the rain-sodden pine logs are covered for several feet with the purple-black moist sporangia which quickly change to red-brown on maturing. It is fairly common in all localities visited. Var. *fuscum* List. also appears on dead coniferous wood, but has been recorded only in the Whitlingham woods in summer.

Licea flexuosa Pers. Frequent on dead pine branches in the Whitlingham, Earlham, and Racecourse woods in summer.

**Orcadella operculata* Wing. The first gathering of this minute species outside North America was made by Mr. Burrell in 1908 on *Frullania dilatata* and other small liverworts on a beech tree at Nash's Grove, Stratton Strawless (see Trans. N. N. N. S. ix. 106).

Tubifera ferruginosa Gmel. Common on pine logs in the Whitlingham and Buckenham woods during summer.

Dictydæthalium plumbeum Rost. Not uncommon on dead wood in the Dunston and Whitlingham woods throughout the year.

Enteridium olivaceum Ehrenb. A single specimen on dead wood at Dunston in March.

E. liceoides G. List. On dead pine wood at Earlham in Nov.

Reticularia lycoperdon Bull. Common in various situations; on one occasion it was seen maturing on the end of a recently cut willow in the full sun, and on another occasion four silvery white æthalia were seen five feet up the trunks of living limes in a city churchyard.

Liceopsis lobata Torrend. A single gathering of this somewhat rare species was found on an old pine stump at Dunston in July.

Lycogala flavofuscum Rost. A large æthalium was found upon a rotting stump, probably elm, in the Whitlingham woods in Aug.

L. epidendrum Fr. One of the earliest species to appear in spring; the developing æthalia are often very numerous and conspicuous; very common on dead wood, April to Sept.

Trichia favoginea Pers. In Plowright's List (Trans. Norf. Norw. Nat. Soc. i. 47) occur *T. turbinata* and *T. chrysosperma*, which are now regarded as synonymous with *T. favoginea*. Plowright probably followed Berkeley's classification in Smith's *English Flora*; he mentions both species as occurring commonly. The writer has never met with *T. favoginea* in the county; the records probably refer to either *T. scabra*, *T. persimilis*, or *T. affinis*, which only came to be recognised after Berkeley's time.

T. affinis de Bary. On decaying logs at Whitlingham and elsewhere throughout the year.

T. persimilis Karst. Very common on decaying wood in all localities; found all the year round, but more abundant from Nov. to April.

T. scabra Rost. Occurred for successive years on decaying tree-trunks in Whitlingham woods; the colonies of sporangia found in winter were often very large and were occasionally associated with *Hemitrichia vesparium*.

T. varia Pers. Very common on dead wood in the Whitlingham woods, Sept. to March.

T. contorta Rost. Found occasionally in Whitlingham woods, March to April.

T. lutescens List. A few scattered sporangia of this rare species were found in July on a dead alder branch which had been submerged in a wide ditch that was still in a boggy condition; after removing the sporangia the branch was returned to the ditch and a further gathering was found on it in the following Oct. The gatherings were made in the Belmore Plantation, Thorpe.

T. decipiens Macbr. Common in early spring in the Whitlingham, Dunston, and Earlham woods. It also occurs less frequently throughout the year, maturing sporangia being found in Aug. upon beech and horse-chestnut wood.

T. Botrytis Pers. Occurs on dead wood during most months of the year at Whitlingham; also obtained from Woodton, near Bungay (L. R. J. Horn). Var. *flavicoma* List. was found on dead holly leaves in the Mousehold House woods in Sept.; a solitary specimen was seen on a pine needle in Earlham woods in Feb. Var. *munda* List. Several gatherings were made on dead wood in the Belmore Plantation at Thorpe during the winter months, also at Beeston Regis (W. H. Burrell).

Hemitrichia vesparium Macbr. Fairly common on rotten wood at Whitlingham during the early part of the year.

H. clavata Rost. Common on decaying horse-chestnut wood in the Whitlingham woods during spring.

H. minor G. List. The tiny scattered sporangia were found on the mossy trunk of a living sycamore some four or five feet from the ground in the Whitlingham woods in the early part of Nov.; they were discovered with the aid of a reading-glass.

Arcyria ferruginea Sauter. On dead wood in all localities during most months.

A. cinerea Rost. Fairly common on dead wood in summer.

A. pomiformis Rost. Found chiefly on dead oak wood in various localities, June to Sept.

A. denudata Wettst. Common on rotten wood during most months; it has been found maturing upon bare earth, whence the plasmodium had probably crept from decayed wood.

A. incarnata Pers. Frequent on dead branches, especially oak, April to Nov. Var. *fulgens* List. Two gatherings on rotting beech wood at Whitlingham in Jan. and May.

A. nutans Grev. Common, particularly on dead oak logs, May to Sept.

Perichæna depressa Libert. On the bark of dead branches and old ivy stems at Whitlingham from Jan. to May, and in Oct. and Nov.

P. corticalis Rost. On the bark of fallen trees, notably poplar, at Buckenham and Whitlingham in every month except March, May, June, and Nov.

P. vermicularis Rost. A single gathering on dead beech leaves in the Whitlingham woods during Aug.

Margarita metallica List. This beautiful species was found in June scattered over some old larch cones in a small hollow on Ipswich Road, Norwich; also with *Perichæna corticalis*, on dead wood at Whitlingham in Dec.; and on dead coniferous wood at Dunston in June.

Dianema depressum List. Seven gatherings have been made in March and April, and one in Dec. At Whitlingham it usually occurred on heaps of stripped willow bark; at Dunston it was on a dead branch.

Prototrichia metallica Mass. On dead wood in the Whitlingham woods, March and April 1915.

ANEMONE NEMOROSA VAR. CÆRULEA.

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

In the recently-issued *Report of the Watson Botanical Exchange Club* (p. 246) the question is raised as to the status of variety *cærulea* of *Anemone nemorosa*, and it is suggested that this plant may be merely a colour-form.

I have seen this plant in a number of stations in the *Quercus sessiliflora* woods of Cornwall, where, in my experience, var. *cærulea* (DC. Fl. Fr. ed. 3, iv. 884; 1805) never occurs in large patches but in small groups of from two to three to perhaps twenty flowering shoots together. Such patches, owing to the clear pale blue of the upper surface of the perianth segments, are conspicuous features and appear as islands of colour in a sea of the white flowers of the var. *genuina*. The colonies appear in the same spots year after year, and their small size and scattered distribution amongst the normal white variety seem to warrant the assumption that the colour is not a direct response to a changed environment and that therefore the status of *forma* cannot be applied. It may be added that the pink-flowered condition, sometimes of a very deep colour, also grows in these Cornish woods, but whereas all gradations are to be found between the white and pink states, I have been unable to find any such gradations between var. *genuina* and var. *cærulea*.

Nevertheless, though var. *cærulea* cannot be properly called a form, we do not as a matter of custom—for our systematic units are aggregates of convenience—give the status of variety to every Mendelian segregate that only differs by a single phenotypic character. It is more convenient in such cases to adjust the varietal or specific diagnosis to include them. In the case of var. *cærulea* there are other differences besides that of colour of which the most noteworthy is the difference in number of floral parts. The number of parts, whether of perianth segments, stamens, or carpels, is not, of course, a constant, but is capable of presentation as a variation curve, the mode for each type of floral structure or for the parts of the flower as a whole being subject to variation both with season and locality.

When studying the Cornish woodlands I took the opportunity to examine material of both var. *cærulea* and of var. *genuina*, the latter being from plants growing immediately adjacent to the former. In the case of var. *genuina* the perianth showed a range of from 6 to 11 segments, the number of stamens ranged from 51 to 109, and the number of carpels from 6 to 46. The total number of parts to the flower varied between 64 and 164. The corresponding ranges for var. *cærulea* were: perianth 6 to 8, stamens 51 to 106, and carpels 5 to 33. The total number of parts ranged from 62 to 145.

The mean values with their 'standard errors' are given below.

Anemone nemorosa var. *cærulea*: Perianth 6, stamens 69 ('standard error' of mean 2·58), carpels 13 ('standard error' of mean 1·78); total number of parts 90 ('standard error' of mean 0·39).

Anemone nemorosa var. *genuina*: Perianth 7, stamens 78 ('standard error' of mean 3·20), carpels 23 ('standard error' of mean 2·57); total number of parts 111 ('standard error' of mean 4·8).

Taking the differences between the two varieties we have then :—

Stamens, difference = 9 ('standard error' of difference 4·1);
Carpels, difference = 10 ('standard error' of difference 3·02);
Totals, difference = 21 ('standard error' of difference 4·8).

It is apparent that, since the difference in the total number of parts is more than four times the standard error of difference, the difference may be regarded as "significant" with a high degree of certainty. In the case of the carpels the difference is more than three times the standard error, so that here again we can attach considerable importance to the difference observed. As to the number of stamens, the difference here is less than three times the standard error, so there is here a possibility that the samples examined do not fairly represent, in this respect, the "population" from which they were taken, and that the difference noted is accidental. In view, however, of the obvious significance of the data as to the total number of parts the difference with regard to the stamens is very likely also of significance.

The conclusion then to which our statistical examination leads us is that colour alone is but one of the features by which var. *cærulea* is distinguished from var. *genuina*.

It is interesting to note that, in one of the woods from which the material of var. *cærulea* was collected, specimens were also obtained of the rare var. *robusta* Salisbury (*cf.* Ann. Bot. xxx. 525–528; 1916). These were too few in number to justify placing much reliance on the means obtained, but they are included together with data respecting *A. ranunculoides*, also based on a few specimens only, in order to show the approximate relation of the varieties and species, either wild or naturalised in Britain, with respect to the number of floral parts.

It will be at once apparent that the various Anemones are fairly clearly separated with regard to the number of stamens and carpels, the more so that, when sufficient numbers are examined, it becomes at once evident that there is a primary mode about which any secondary modes that may be exhibited are grouped. The acquisition of such data is, of course, a laborious matter, but, nevertheless, one may hope that Floras of the future will no longer be satisfied with the bald statement that the carpels or stamens of a genus or species are numerous.

Number of Parts in Flowers of Anemones.

Anemone nemorosa.
var. *cærulea* DC. (Cornwall.).
P. 6–8. A. 51–106 (Mean 69). G. 5–33 (Mean 13).
var. *genuina* Salisbury. (Herts.) (*Cf.* Ann. Bot. xxxiii. 67; 1919.)
P. 5–8. A. 23–93 (Mean 60). G. 9–41 (Mean 21).
var. *genuina* Salisbury. (Cornwall.) P. 6–11. A. 51–109 (Mean 78). G. 6–46 (Mean 23).
var. *robusta* Salisbury. (Cornwall.)
P. 6–11. A. 65–96 (Mean 83). G. 19–43 (Mean 31).
Anemone apennina L. (*cf.* Ann. Bot. xxxiv. 107; 1920).
P. 9–21. A. 48–111 (Mean 72). G. 27–87 (Mean 60).
Anemone ranunculoides L.
P. 5–6. A. 33–62 (Mean 50). G. 10–21 (Mean 16).

STATICE AND LIMONIUM.

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

As the name *Statice* has been commonly used in this country for the Sea-Lavenders since 1913 (Journ. Bot. 1913, 92; 1915, 237, 325; 1917, 33; 1922, 345; 1923, 97; 1924, 133), it seems desirable to point out (1) that the correct name for the genus in question—whether under International Rules or Type-basis Code—is *Limonium*; and (2) that this is now widely recognized both in Europe and America.

It is a mistake to suppose that Art. 45 of the International Rules requires in all cases that the original name of a genus which is divided into two or more genera should be applied to that part of it which contains the larger number of species. Art. 45 consists of three sentences. The first requires that when a genus is divided the generic name should be retained for one of the parts. The second requires that, if the genus contains a section or some other division which, judging by its name or its species, is the type or origin of the group, the name should be reserved for that part of it. It is only where there is no such subdivision that the name is reserved for the part (if any) which contains many more species than the others. The origin of *Statice* L. (Sp. Pl. 274; Gen. Pl. ed. 5, 135) was *Statice* Tourn., which is *Armeria* Willd.; and Linné recognized two subdivisions, *Statice* auctorum (calyce communi triplici florem subrotundum componit), including the Thrifts, and *Limonium* auctorum (calyce communi imbricato flosculos serie oblonga exhibet), comprising the Sea-Lavenders. Hence it is clear that the name *Statice* should be applied to the Thrifts.

In order to justify the application of the name *Statice* to the Thrifts, Schinz and Thellung in 1907 adduced the fact that Miller, who was the first to divide *Statice* after 1753, reserved the name for the Thrifts (Bull. Herb. Boiss. sér. 2, vii. 334). But this fact is immaterial—the International Rules do *not* state that the first author who divides a genus into two or more genera is to be followed in his application of the original generic name. Schinz and Thellung afterwards, however, supported their position by citation of Art. 45 (Vierteljahrsschr. Nat. Ges. Zürich, liii. 555; 1909). The following authorities among others are agreed that the name *Statice* should be borne by the Thrifts: Druce, Britten and Rendle, London Catalogue, Schinz and Thellung, Hayek, Robinson and Fernald, Blake, L. H. Bailey, and N. L. Britton. To those familiar with nomenclature this list will be fairly conclusive. It may be useful to cite the principal works in which *Statice* has been used for the Thrifts, as distinguished from the Sea-Lavenders; references to authors who included both genera under *Statice* are excluded :—

Statice L. emend. Mill. Gard. Dict. Abridg. ed. 4 (1754); Hill Brit. Herb. 345 (1756); Mill. Gard. Dict. ed. 7 (1759); Boehm. in Ludw. Def. ed. 3, 287 (1760); Adans. Fam. ii. 283 (1763); Fabr. Enum. Hort. Helmst. ed. 2, 164 (1763); Mill. Gard. Dict. ed. 8 (1768); Hill Hort. Kew, 183 (1768); Hill Veg. Syst. v. 26 (1772); Moench

Meth. 623 (1794); S. F. Gray Nat. Arr. Brit. Pl. ii. 296 (1821); Dum. Fl. Belg. 27 (1827); Gaud. Fl. Helvet. ii. 453 (1828); Wirtgen Fl. Preuss. Rheinprov. 380 (1857); Kuntze Rev. Gen. ii. 396 (1891); Druce in Journ. Linn. Soc., Bot. xxxv. 76 (1901); H. & J. Groves in Bab. Man. ed. 9, 346 (1904); Schinz & Thell. in Bull. Herb. Boiss. sér. 2, vii. 334 (1907); Britten & Rendle List Brit. Seed-Pl. 24 (1907); Druce List Brit. Pl. 48 (1908); Lond. Cat. ed. 10, 28 (1908); Schinz & Thell. in Vierteljahrsschr. Nat. Ges. Zürich, liii. 555 (1909); Hayek Fl. Steierm. ii. 2 (1911); Britton & Brown Ill. Fl. ed. 2, ii. 718 (1913); Druce in Journ. Bot. 1915, 356; Hubbard in Rhodora, xviii. 156 (1916); Blake in Rhodora, xix. 1 (1917); Schinz & Thell. Fl. Schweiz, ed. 4, i. 520 (1923); L. H. Bailey Man. Cult. Pl. 588 (1924).—*Armeria* Willd. Enum. 333 (1809).

The name *Statice* being reserved for the Thrifts, the Sea-Lavenders become *Limonium* Mill. Gard. Dict. Abridg. ed. 4 (1754); Gard. Dict. ed. 8 (1768). It is unnecessary to give a separate list of citations for *Limonium*, as most of the references are the same. Additional references for *Limonium* are: Robinson & Fernald in Gray's New Man. Bot. ed. 7, 643 (1908); F. N. Williams Prodr. Fl. Brit. i. 435 (1910); and Blake in Rhodora, xviii. 53 (1916).

The view has been taken that the application of the name *Statice* to the Thrifts will be liable to cause confusion, and that it would therefore be better to retain the name *Armeria*, rejecting *Statice* altogether (F. N. Williams, *l. c.*). Under International Rules, however, *Armeria* cannot be retained unless it is placed on the list of *nomina conservata*.

I may mention that the present investigation was undertaken at the suggestion of Mr. C. E. Salmon, to whom I am indebted for some of the above references.

REPRODUCTIVE MECHANISM IN LAND FLORA.

II. Life-Cycles (*continued from* p. 214).

By A. H. Church, M.A.

Meiosis in the Plankton-Phase. The plankton-phase may be defined as including the condition of free unicellular organism, and may be visualized as covering all that earlier period of the world's history, of wholly indefinite duration, during which the constitution of the typical autotrophic plant-cell was being elaborated from the first photic syntheses in sea-water. The great majority of such residual plankton forms at present available are nucleated. Karyogamy following plasmic union is characteristic, and has been described for examples of several diverse groups; although full details are wanting for many forms whose life-history is still very imperfectly known. In fact, for no flagellated form of photosynthetic metabolism is the entire life-cycle of karyogamy and meiosis yet available. Information is largely deductive; and, being admittedly incomplete, must be taken

at its suggestive value, which only becomes satisfactory as confirming conclusions drawn from the corresponding phases of higher algal forms.

Advanced nuclear organization, with distinct and numerous chromosomes has been described for types of unicellular Protophyta as Diatoms, Brown-Flagellate Peridines, a few Green Flagellates (*Euglena*, *Phacus*, *Trachelomonas*) [1], and also for derivative holozoic groups as Heliozoa and Mycetozoa. In these last groups alone has meiosis been definitely located, and the succession of haploid and diploid phases accounted for. On the other hand, granted nuclei with chromosomes presenting karyogamy, it is evident that meiosis is equally obligatory, though as yet traced with difficulty, and in only a few examples, owing to the imperfection of methods for dealing satisfactorily with the cytology of minute objects not available in any great mass.

The fact that meiotic segregation is effected on a nuclear spindle-mechanism, in all respects similar to that of normal mitosis—to the extent that it is often stated that meiosis is intercalated in a condition of mitosis [2],—undoubtedly implies that the latter as a nuclear function, involving a high degree of specialization in chromosome-content, had been so long in existence as to be fully established as a fundamental feature of the normal mechanism of cell-control and binary fission in all advancing organism, long before any karyogamy occurred, bringing with it new problems of a reduction-scheme. Fertilization and meiosis may thus be regarded as comparatively late departures in the history of the evolution of the plankton-cell.

Given the existence of a normal cell-organization, and free suspension in the medium, karyogamy following plasmogamy, and hence giving a diploid nucleus, may be regarded as an extreme case of stimulation for both gametes—the entire organism acting as a gamete;—and, as a matter of fact, all future gametes are essentially no more than similar isolated cell-units. Again, since the general result of all stimulation of plasma may be considered as a shock-effect to which the organism responds more or less quickly by an attempt to regain the former condition of equilibrium (recoil), the first effect of karyogamy should be expressed in an attempt to revert to the antecedent condition. Hence meiosis might be expected to normally follow at the first opportunity—*i. e.*, at the next spindle-mechanism, or at the first division of the diploid zygote. Where the products of such meiosis immediately separate, as freely as following the mitosis of ordinary binary fission, there would be little to mark the nuclear cycle, which must nevertheless be existent; and all somatic cell-individuals would be so far classed as haploid. In such case, it will be noted, meiosis introduces no special problem or difficulty in the life of the individual or in the life-cycle; and this is undoubtedly the original inception of the process. It created no confusion;

[1] Tischler (1921), Allgemeine Pflanzenkaryologie: *cf.* chromosome-numbers p. 530.

[2] Doncaster (1920), Cytology, p. 88.

though, on the other hand, the advantages to be gained are doubly suggestive. Karyogamy admittedly affords the stimulus which rejuvenates the moribund plasma, and out of two old units makes one new one with blended inheritance. Meiosis, in correcting the nuclear community of chromosomes, tends to standardize the race, though with minor differences in the inheritance of each individual—*i. e.*, all are alike, but practically no two identical. This double gain is apparently so valuable an asset in maintaining and establishing the race, that it is fixed by natural selection (that it to say, by the death of all which do not conform to the rule), and it remains the primary key to advancing racial mechanism for ever after. Higher plants at first do little more than retain this elementary plankton-phase in their reproductive processes. The mechanism may be soon further elaborated in some respects (*e. g.*, by heterogamy, apogamy, siphonogamy, autogamy, etc.); but behind all these advanced stages one comes back to the consequences of such chromosome summation and segregation.

To what extent any forms of really primitive organization remain in existence at the present time is extremely doubtful. All are now advanced in specialization in some respect. Primitive features require to be deduced and isolated from the complex of residual 'lower' forms—many conceivably decadent, or relegated to modes of life widely divergent from that in the original medium of the sea (Bacteria of soil, Cyanophyceæ of mud).

Among more elementary plant-forms, it is interesting to note that the clearest suggestions of such a cycle are to be found in Akontæ, an algal series which, as the name implies, now wholly lack all flagellar mechanism. They are all confined to fresh water, and hence can in no sense be regarded as wholly primitive. The case of the Desmids (*Closterium*, *Cosmarium*) illustrates syngamy of whole individuals, with formation of four nuclei by two successive divisions in the zygote. These are divided between two distinct individuals, and one nucleus is suppressed in each. Though the chromosome numbers are not given, it is difficult to avoid the conclusion that this 'post-sexual' phase is only the expression of the fact that the two complementary meiotic nuclei must separate as free Desmid individuals [1]. Very similarly in *Spirogyra*, as a catena-form of cell-segments in uniseriate floating filaments, the characteristic zygospore formed by siphonogamic approximation of two whole gamete-cells, gives on germination four nuclei, of which three are suppressed, and one haploid unit survives to build the new individual [2]. *Zygnema* follows the same rule [3]. But the extent to which these phenomena are primary or merely express decadence of an older story may be left open.

[1] West (1916), Algæ, p. 374. Bower (1908), Land Flora, p. 71. Klebahn (1891), Prings. Jahrb. 22, p. 415.

[2] Tröndle (1911), Zeitschr. f. Bot. 3, p. 593. Oltmanns (1922), Morphologie und Biologie der Algen, p. 104. Tischler (1921), Allegemeine Pflanzenkaryologie, p. 370.

[3] Kurssanow (1912), Flora, 104, p. 65.

Beyond the condition of the primary autotrophic flagellate of relatively small size (5–10 μ) and comparatively simple organization, even the plankton-phase presents complications, as it also includes the various attempts of organism to attain a larger and more efficient soma-complex. These somata may retain the plankton-habit, but may freely pass on to benthic stages, in which they present phenomena running parallel with the generally accepted benthic forms conventionally regarded as more normal cellular algal types. The conventional idea of a 'plant' is again based on observation of the more familiar cellular organization of the higher vegetation of the land, which is hence accepted as affording the most generally successful solution of the soma-problem. Such somatic phases comprise:—

(1) The large complex *cell-bodies*, with highly differentiated plasmic tracts, still controlled by a single nucleus (larger Flagellates, *Euglena*, Peridines, Diatoms, *Pyrocystis*, *Gymnodinium*).

(2) *Catena-stages*, as colonial aggregates of independent cells (many Diatoms, Desmids, *Spirogyra*, *Ceratium*).

(3) *Palmella-forms*, as colonial aggregates in three dimensions, often with distinct form-factors (*Cosmocladium*).

(4) The *Coenocytic soma* (Foraminifera, *Polykrikos*).

(5) The *Communal soma* (Mycetozoa).

(6) The Plankton true *sphere-soma* (mistermed 'Coenobium'), *Volvox*, *Hydrodictyon*, *Cœlastrum*.

Many of these assume the benthic habit with little change—*cf.* benthic *Palmella*-forms, *Hydrurus*, *Schizonema*-Diatoms, *Licmophora* (Diatom), *Oocladium* (Desmid), *Dinobryum*.

In all such cases the problem of maintaining syngamy of regressive flagellates arises, and meiosis requires to be adjusted to a nuclear cycle. The varying possibilities are probably most clearly estimated from the consideration of the successful solution by the benthic alga. At present details of cytology are scanty, and serve best to emphasize the lacunæ still obtaining in our knowledge of the origin of some of the most fundamental features of plant-biology. Among these, as in the case of the Desmids and *Spirogyra*, one distrusts the freshwater forms, as advanced and specialized migrants introduced to new water-problems, involving also a time-factor (often seasonal), as expressed in the provision of large 'resting spores' with abundant food reserves. In many cases syngamy is still undescribed; yet it is difficult to deny its probability in the case of any complex soma. Where mass-production of cell-units is associated with narrow conditions of life, rapid mass-production may have a stabilizing effect on the race-aggregate (Bacteria), as all weaklings fall out of the race on a time-schedule, even in binary fission. But where the soma has definite form-factors, and the individuals are freely isolated, some means of standardization appears obligatory; else 'species' could not have been defined. Hence even where still undescribed, syngamy of regressive flagellates is probable; at any rate, as the general rule, even though many residual but long-established forms may now continue to exist without it.

In the case of the large cell-somata of Peridines, elaborate nuclei have been described for *Ceratium tripos*[1], with many chromosomes; in some forms up to 200; but syngamy only for *Ceratium hirundinella*[2], a form with the conjugation mechanism of the Desmid (Akontæ), which is probably equally secondary with a fresh-water resting-spore. On the other hand, the original method of the race is more clearly discerned in marine *Gymnodinium*[3] and *Pyrocystis*[4] (*Diplodinium*), the complex adult cell being broken down to smaller 'Gymnodine young' with the characteristic flagellation of the group. Though these may develop 'asexually,' it is evident that syngamy should be their normal fate. But whether meiosis takes place at the change of state in 'gametogenesis,' or at the 'germination' of the possible zygote, is still unknown.

Similarly, the case of the Diatoms of fresh water approaches the Desmid type in conjugation before the production of a resting-spore (auxospore). The antecedent division of the nucleus of *Rhopalodia gibba*[5] into two (of which one is decadent) has been interpreted as a 'reduction'; but there is no apparent necessity for the suppression of potential gametes, and the chromosome story is still a little vague. A more definite case is described for similar reduction in gametogenesis in *Surirella saxonica* (chromosomes 128–130 and 64–65), one gamete being retained from the four nuclei[6], as clearly a decadent phase of once multiple gametes set free in the medium. On the other hand, many neritic and pelagic Diatoms break down to smaller units (*Coscinodiscus*, *Biddulphia*, *Corethron*); *Corethron Valdiviæ* to as many as 128. These last are said to act as gametes, and the zygote to show a suggestive stage on germination; but the details require confirmation[7]. Syngamy has been claimed for the green Flagellate *Euglena*, by means of small non-flagellated gametes[8]; but in the allied heterotrophic *Copromonas*[9] the individuals fuse whole, and the nuclear story follows the scheme for *Rhopalodia*; the loss of half the nucleus of each gamete being interpreted as a 'reduction'[10], though the cytology is not further known. Hence special interest attaches to *Actinophrys sol*, a fresh-water *Heliozoon*. Isogamous conjugation takes place between adults[11]; the nuclei of the two gamete-individuals divide in the manner of *Rhopalodia*; one nucleus of each deteriorating, the others fusing to constitute the zygote. According to Belar[12], meiosis takes place in such gameto-

[1] Borgert (1910), Archiv. f. Protistkd. 20, p. 1.
[2] Zedebauer (1904), Berichte, 22, p. 1; West (1916), Algæ, p. 74.
[3] Dogiel (1906), Mitth. Zool. Stat. Neap. 18, p. 1.
[4] West (1916), Algæ, p. 56.
[5] Klebahn (1896), Prings. Jahrb. 29, p. 595.
[6] Karsten (1912), Zeitsch. f. Bot. 4, p. 417; Tischler (1921), p. 370; West (1916), p. 111; Oltmanns (1922), p. 163.
[7] Karsten (1904), Berichte, 22, p. 544, in spirit-material; Oltmanns (1922), p. 192; West (1916), p. 111.
[8] Hasse (1910), Archiv. f. Protistk., 20, p. 47.
[9] Dobell (1908), *cf.* Doflein (1916), Protozoenkunde, p. 191.
[10] Doflein, *loc. cit.* p. 443.
[11] Doflein, *loc. cit.* p. 189.
[12] Belar (1923), Archiv. f. Protistk., 46, p. 1.

genesis, with reduction of chromosomes from 44 to 22[1]. This implies that these specialized Protista are diploid organisms, and reduction with loss of half the product of meiosis approaches the animal story of 'maturation.'

Among the Foraminifera, as a distinct marine holozoic group, with cœnocytic somata, often of great complexity and 'chambered,' attaining the value of reef-building organism in earlier stages of the world's history, a definite alternation of generations, as dimorphic sexual and asexual individuals (gamont and agamont), has been described in some detail for *Peneroplis pertusus*[2]; but details of cytology are still wanting. It is difficult to avoid the obvious suggestion that one is haploid and the other diploid.

A more definite nuclear cycle occurs in Mycetozoa, which attain an almost plant-like habit, as they solve the extreme wastage-problems of subaerial existence and the insistent water problem, by a mass-aggregate soma (plasmodium) and the production of a vast number of cutinized 'spores.' These last on germination give flagellulæ which become amœboid, and then divide and fuse to constitute a communal soma. Karyogamy occurs in the plasmodium[3], which may thus be regarded as essentially diploid, and meiosis is interpolated before spore-formation. Lastly, taking the sphere-soma of *Volvox* as another line of somatic progression in a free-plankton condition, it is interesting to note that meiotic reduction does not take place in gametogenesis of this heterogamic type, but in the germination of the zygote (perennating spore)[4].

Such fragmentary considerations suggest that, even in the plankton phase, the whole matter has been worked out in varying possibilities, between the horizon of the first flagellate and the various attempts at more massive aggregated somata, and settled once for all. Even the benthic alga can do no more than follow along the same lines. One point appears clear: all questions of origin of reproductive processes and life-cycles are to be referred to the plankton-phase of the sea. It is useless to look for origins elsewhere; and though survivals may throw light on the subject, the problem of the origin and even full establishment of the details of karyogamy, meiosis, and the nuclear cycle, remain inconceivably remote. The causal factors are to be sought in adaptation to the environmental demands of marine plankton.

On the other hand, while the plankton-phase deals with regressive flagellates, pure and simple, as a retention of the older phase of the plankton individual, the Benthic phase illustrates the progressive evolution from such regressive flagellates of 'sexual' cells, as also

[1] The nuclear figures for *Actinophrys* (Belar, 1923) are singularly beautiful, with repeatedly twisted chromosomes in strepsinema; it being evident that in details of chromosome organization, mode of division, constancy of number, and reduction phenomena, there is little to be learnt in higher plants and animals, which has not been well-established in such plankton forms (Belar, *loc. cit.* p. 38).
[2] Doflein (1916), *loc. cit.* p. 735; Winter (1907), Archiv. f. Protistk. 10, p. 1.
[3] Jahn (1911), Berichte, 29, p. 231, *Physarum*.
[4] Zimmermann (1921), Prings. Jahrb. 60, p. 256.

'asexual' zoids or spores, as reproductive units subordinate to the increasingly important soma, to be further specialized in connection with other tissue-units as cell-organs, and even specialized members, for this all essential function. The main interest of higher progression centres in the fact that, while the soma responds freely to new conditions of benthic life, or ultimately of subaerial existence, these reproductive mechanisms lag behind; though the older free plankton life may be long retained in the so-called reproductive cells. All primary reproductive cells (not gemmæ, buds, conidial stages) are regressive flagellates, or their immediate non-flagellated derivatives—(1) losing flagella as they become too large to move by flagellar activity; (2) adding a cutinized wall as they become wind-dispersed; or (3) reduced to mere nuclei in siphonogamic approximation. Such reproductive cells punctuate stages in the life-cycle, as marking changes of phase, recapitulatory of older phylogeny.

Even in the state of free plankton and derivative types included as Protozoa and Protophyta, the various possibilities of meiosis appear to have been tried out, at the possible changes of phase—(1) in the zygote-division (*Spirogyra*, *Closterium*, *Volvox*); (2) in gametogenesis (*Rhopalodia*, *Suriella*, *Actinophrys*); (3) in formation of sub-aerial spores (Mycetozoa) [1]. Though the main line of benthic evolution follows the cellular algal soma, it can only follow one of these methods; the point is, which one and why? What advantages follow the different schemes, especially in connection with soma-building, which is the essentially new departure? Even so far, it begins to appear that the more successful specialization of a soma comes to be associated with a 'postponement' of meiosis from the germination stage of the zygote; and the further elaboration of the diploid organism is the main theme of plant-evolution.

The general suggestions are so far clear:—

(1) Meiosis in the zygote may be taken as the primitive condition; but it does not follow that all forms now presenting it are necessarily primitive.

(2) Any specialized larger mass, even if uninucleate, which breaks down to smaller regressive haploid gametes for reproductive purposes, gives a diploid zygote-soma, which retains the diploid organization until the next change of phase in gametogenesis [2].

[1] Bower (1908), Land Flora, p. 75.

[2] Suggestions as to the effective benefit of the diploid nucleus in the diploid zygote individual may be obtained from the initiation of *tetraploidy*, which occurs as an accident of the mechanism. A doubled nucleus is definitely a larger one, and may thus be expected to control or stimulate a larger tract of plasma. Though the mechanism which admits effective cooperation of two sets of parental chromosomes is unknown, and in the case of four sets may be of diminished efficiency, extensive measurements go to show that the tissue-cells of tetraploid forms are larger and apogamous haploid forms often smaller (Tischler, 1921, Allegemeine Pflanzenkaryologie, pp. 589–603). Hence in the initial case of diploidy, it may be assumed that the diploid cell is metabolically more efficient, and in free competition with haploid individuals would tend to be favoured by natural selection. *Cf.* also the remarkable conclusions of Wettstein for Mosses (Biolog. Centralb. 1924).

(3) Many types in fresh water, with associated production of a large resting-spore containing abundant food-reserves, interpolate meiosis at the germination of this spore, and hence return to a haploid soma, as a phenomenon of secondary deterioration in the life-cycle.

(To be continued.)

PLANT PROPAGATION AT EDINBURGH.

THE meeting of the Botanical Society of Edinburgh on 17th and 18th July took the form of a Conference on the vegetative propagation of plants by means of stems, roots, and leaves. By permission of Prof. W. Wright Smith, Regius Keeper, the meeting was held at the Royal Botanic Garden, and in the large laboratory attached thereto there was on exhibition some 300 species of seed-plants and nearly 200 photographs illustrating various methods of propagation practised at Edinburgh. Many of the results obtained by Mr. L. B. Stewart, who is in charge of the Propagation Department, remarkable enough in themselves, present interesting problems for investigation along anatomical and physiological lines. Certain specific questions were discussed, and a brief indication of the results already obtained may be of interest to readers of this Journal.

In the genus *Clematis* stem-cuttings root freely when the cutting is made through an internode, but generally not at all when cut at a node. This problem was discussed by Miss E. Philip Smith, whose work seems to indicate that the peculiarity has some relation to the large amount of sclerenchyma at the nodes, since it is found that, if the stems are etiolated before the cuttings are prepared, rooting from the node takes place readily. Etiolation is considered to act in two ways, resulting in a softening of the fibrous tissue and in a restoration of the carbon: nitrogen ratio believed to be necessary for full meristematic activity.

Mr. L. B. Stewart read a paper on the propagation of plants which possess horizontal branches. Propagation from such branches used as cuttings results in the establishment of a new individual which fails to develop a shoot axis, but which exhibits, especially in Conifers, a more or less pendulous habit. The genera *Napoleona* and *Gardenia* were discussed as special cases. In the former, a non-orthotropic branch-cutting forms adventitious roots freely, but the new plant does not produce an orthotropic stem axis. In the course of time, however, a new vertically-directed shoot arises from an adventitious bud which appears on the root-system of the plant. The development of this bud into an ordinary orthotropic stem may possibly be related to the fact that it has not previously been affected by the stimulus of gravity. In *Gardenia* a horizontal branch-cutting produces a new plant having a growth-form distinct from the parent in its complete absence of horizontal branches. Moreover, the new individual is precocious in flowering.

Mr. Stewart dealt also with the results of propagation from roots,

dealing especially with *Pelargonium* and *Acanthus montanus*. In the latter, juvenile or adult growth-forms arise according to whether young or old portions of the root are used for cuttings.

Propagation by means of leaves formed the subject of a paper by Dr. R. J. D. Graham, who demonstrated that from leaf-cuttings of non-succulent dicotyledons the root system is first established, followed by the formation of the shoot. The appearance of the shoot is in some instances long delayed, and seems to depend to some extent on the viability of the leaf. On the other hand, in the case of leaves of monocotyledons the shoot-buds appear before the adventitious roots, and succulent leaves of dicotyledons behave in the same way.

A second communication by Dr. Graham dealt with the propagation of bulbous plants, making use of the bulb scales. In *Ornithogalum*, *Drimia*, *Hæmanthus*, and others, isolated scales are exposed to sunlight until the mucilage from the injured surface is dry. The leaf-bases are then laid on sand watered once in ten days, and within four weeks bulbils develope freely on the adaxial side of the scales. The method is a rapid one for providing large numbers of saleable bulbs in a relatively short interval of time. The origin of the bulbils from meristematic tissue was traced in detail.

The Conference, which was well attended by botanists and horticulturists, was brought to a close by a general discussion of the demonstration illustrating the practical side of the questions which had received attention.

J. R. M.

SHORT NOTES.

Sphagnum riparium Angstr. in Cheshire. Amongst a batch of *Sphagnum* sent to me recently for determination, collected near New Ferry, in Wirral (v.c. 58), was that exceedingly rare British species *S. riparium* Angstr. It does not seem to have been collected recently in any of the few stations formerly recorded for it, but Mr. Sherrin found it last year at Burnham Beeches (v. c. 24). It is extinct in West Lancashire, where Mr. A. Wilson and I formerly gathered it, through reclamation of the bog, and the more or less doubtful Staffordshire and Cornish stations have not yielded it for very many years. It was collected at New Ferry on July 19th by some members of the Liverpool Botanical Society. The plant sent me was the var. *coryphæum* Russ forma *gracilescens* Russ, which is apparently new to Britain. I visited the locality with Mr. W. G. Travis on the 23rd and found the conditions extremely different from those of the Lancashire habitat. On Cockerham moss it grew on a peat bog just reaching the stage in which *Betula* was obtaining a footing at the circumference, but the centre was simply quaking liquid peat with a crust of *Sphagnum* etc. The Wirral station was a large excavation in the boulder clay, one of a series of brick-pits near the Mersey shore, nearly all the pits having a different florula according to the depth to which they had been worked, and probably also to the length of time which had elapsed since they were excavated. These pits are under ecological observation by some of the gentlemen named, so I will not describe them further than to state that there seems to be no indication of peat in the vicinity. The predominant associates of *Sphagnum riparium* in the pit in which Mr. Travis and I collected it were: *S. squarrosum*, *S. fimbriatum*, *Polytrichum commune*, *Hypnum cuspidatum* var. *fluitans* v. Klinggr., *Salix aurita*, *Œnanthe Phellandrium*, *Juncus glaucus*, *Typha angustifolia* and *Alisma Plantago*. Reference to p. 30 of the *Flora of West Lancashire* will show how different were the associated species on Cockerham Moss, only the *Polytrichum* and *Sphagnum fimbriatum* being noted.—J. A. Wheldon.

Limonium transwallianum, *nom. nov.* Mr. Sprague has very kindly sent me a copy of his paper (p. 267) proposing to adopt the name *Limonium* for the Sea Lavenders in place of *Statice*, in order that I may place the plant described as a new species at p. 133 of this Journal under the correct generic name. This will therefore stand as *Limonium transwallianum*=*Statice transwalliana* Pugsl. in Journ. Bot. 133 (1924). I must say, however, that I make this change with some misgiving. In all the great systematic works of the last century the genus *Statice* represents the Sea Lavenders, and practically every one of its many species was originally described under that name. Mr. Sprague mentions one work only between 1828 and 1891 in which *Limonium* is used. So, while I can follow the abstract argument in favour of *Limonium*, as its adoption will involve a set of new combinations for a very large number of species, I think the really practical course is to retain *Statice* and *Armeria* for the Sea Lavenders and Thrifts respectively as nomina conservanda.—H. W. Pugsley.

High Altitudes of Mosses (p. 228). Mr. Cosmo Melvill has kindly drawn my attention to a passage in Edward Whymper's *Travels among the Great Andes*, in which he refers to the question discussed at the page mentioned. Whymper distinctly states that 18,500 ft. was the highest altitude on Chimborazo at which he saw any trace of vegetation, represented by the lichen *Lecanora subfusca* L. He gives cogent reasons for concluding that the altitudes given by former travellers, Humboldt etc., were over-estimated. He makes special reference (p. 76) to the Chimborazo *Orthotricha* collected by Col. Hall, and for reasons into which he enters thinks it impossible that they were gathered at the height estimated (18,800 ft.). The highest elevation at which Whymper himself collected mosses on Chimborazo was 16,660 ft. (*Grimmia consobrina* Kunze, *Andreæa striata* Mitt., etc.). It would appear certain that the altitudes given for the Chimborazo Orthotricha are very considerably over-estimated, probably by about 1000 ft.—H. N. Dixon.

Epipogium aphyllum Sw. in Oxfordshire. This rare plant was found this June in an old beechwood in this county. Being previously only known from Herefordshire and Staffordshire, this is a

most interesting extension of its range, and makes one hope that it may be found elsewhere. The plant very rarely flowers, and many seasons may pass without any sign of one. The past year has been a wonderful year for saprophytes, *Monotropa*, *Neottia*, and *Corallorhiza* all being remarkably abundant and luxuriant. Since *Epipogium* was originally discovered in this country during September, there is still time for botanists to keep their eyes open and explore thoroughly old woodlands where decaying leaves accumulate in shady damp sloping places. As this is almost the only British species not represented in the National Collection of British Plants, it is hoped that any discoverer will present a specimen or photograph to the Natural History Museum. An account of the find, by Dr. Druce, appeared in the *Gardeners' Chronicle* of August 16th.—A. J. WILMOTT.

ORCHIS HIRCINA Crantz IN SURREY. A living specimen of this was sent me on June 27 by Miss A. M. Johns; it was collected in the open on the chalk, Ranmore Common, by Miss M. Pank, one of her former pupils at the Powell Corderoy School, Dorking.—A. J. WILMOTT.

BEES AND CLOVER. We clip the following from the *Daily News* of August 4:—"The bumble bee is now employed in a plant-breeding garden at Slough to fertilise red clover which is self-sterile. The plant breeder having spotted his bee among the lupins or delphiniums, for which the species has a preference, places an empty match-box upside down swiftly over the insect, closes it, and the bee is a prisoner. Placed in a tube, the captive is bathed in water sun-heated to the temperature of the bee's body, and after being cleansed of all alien pollen, is dried on blotting-paper under a tumbler. About a dozen bees are needed to pollinate the two plants which are enclosed in a device like a meat safe. Thither the bees, each under his own tumbler, are carried on a tray and released inside. Whether it is because they are hiveless, without a bed at night, or are lonely, the bees usually die in ten days or a fortnight, or even less. In that case relays of fresh bees arrive to complete the fertilisation of the plants."

REVIEWS.

The Saprolegniaceæ, with Notes on other Water Molds. By WILLIAM CHAMBERS COKER. 201 pp., 63 plates. 4to. University of North Carolina Press, 1923. $10.

PROFESSOR COKER, of the University of North Carolina, has published several papers on the *Saprolegniaceæ* during the last dozen years, and in the present imposing volume has monographed the group. The previous American monograph, by J. E. Humphrey, appeared in 1892, and A. Fischer's treatment of the group in the volume on Phycomycetes in Rabenhorst's *Kryptogamen-Flora* was published practically simultaneously. Since that time there have been many developments. The old controversy concerning the presence of

true sexual fusions raged for many years longer and, with the application of cytological methods, served at first to wax even more furious until the work of Trow eventually carried conviction. At the beginning of this period also Klebs applied his cultural methods to these fungi, and proved their varying morphological and reproductive response to differing environmental conditions—phenomena which invariably give great delight to the majority of non-systematic mycologists who periodically vainly imagine that a little further knowledge on the nature of variation will either reduce the identification of species to a matriculation standard or create such chaos that only elementary identifications could be expected.

Lately a certain amount of attention has been paid to the biology of these interesting forms, the names of Petersen and von Minden being prominent in this connection. An important paper by the latter, "Beiträge zur Biologie und Systematik einheimischer submerser Phycomyceten," in Falck's *Mykologische Untersuchungen und Berichte*, i. p. 145 (1916), has been overlooked, and does not appear in the very full Bibliography of the work under review.

The aim of Professor Coker's volume is "to get together a treatment of all known species and to illustrate all species [he has] seen in the living state." It is concerned primarily with the *Saprolegniaceæ*, but genera and species of the other families of the Saprolegniales have been noted, and those of North Carolina treated in some detail. The Introduction is restricted to sixteen pages. In many ways a more detailed introduction would have been of greater convenience, but the author has followed the more logical method of incorporating or referring to cytological and physiological work in connection with the species concerned. There are, however, many general points discussed in the Introduction: one is whether the zoospores of *Saprolegnia*, *Achlya*, etc., leave the sporangia automatically, with the conclusion that the evidence against this view is overwhelming. A preliminary account is given of the work of Mr. J. N. Couch confirming the observations of Rothert that the spores of *Achlya* and *Aphanomyces* are connected by threads on emerging, and showing that in *Achlya*, *Aphanomyces*, and *Leptolegnia* there is material connection between the spores while within the sporangium and that in the first two the connection is maintained until the spores have taken up their position in the apical ball—the opinion being expressed that they play the most important part in drawing the spores together.

A matter of considerable systematic importance is the discussion of the variation from the supposed normal behaviour of the sporangia and spores in *Saprolegniaceæ* and a review of the recorded instances. "In case of bacterial contamination, or foulness from any cause, or where the parts are put in liquid nutrient media, there is a strong tendency for the spores to be retained in the sporangium, or if discharged for them to sprout at once without a second swimming stage." Incidentally the attitude taken up by Lechmere in his papers in the *New Phytologist* (1910–11) is severely criticised.

A general comparison of the biological results obtained by Petersen and by the author shows that "certain differences are found and to be expected, due to the cold climate of Denmark, as that the period of the *Saprolegniaceæ* begins in the spring and generally closes in November. With us there is no closed season, and we find water molds wherever the water is open any day in winter. In Denmark *Apodachlya* is common, while *Leptomitus* is not recorded by Petersen. In Chapel Hill *Leptomitus* is very common, while *Apodachlya* has been found but once." A table is given analysing 593 collections made between February 1912 and December 1913, and it is further stated that the number of collections made since then will easily run into several thousands.

Throughout the work there is an abundance of keys. A key to the families of the Saprolegniales is succeeded by one to the genera of each family as it appears and to the species in each genus. Further, the larger genera *Saprolegnia* and *Achlya* each have two keys, one labelled "natural," the other "artificial," which hardly seems a scientific classification of keys! Following the keys each species is described in the normal way, followed by notes on distribution and any points of biological, cultural, cytological, or other interest. The descriptions are adequate, and every assistance seems to have been given towards definite identification.

The book is lavishly illustrated, there being 63 plates. These are mostly very clear line drawings, often a dozen or more to the plate; the remaining six plates being half-tones. In the matter of plates, however, there is a great waste of paper, and one page contains only the number of the plate and the next (reverse) page the explanation of the plate: the following page contains the drawings on one side of the paper only. Thus the 63 plates occupy 252 pages.

A new genus, *Protoachlya*, is proposed for *Achlya paradoxa* Coker (*Isoachlya* Kauff.). It "differs from *Achlya* in the motility of some or all of the spores on emerging, the not infrequent internal proliferation of the sporangia and their thick rounded tips, the presence of spherical or pyriform gemmæ, and, from all except the *Racemosa* group, in the egg-structure. It differs from *Saprolegnia* in the non-motility of some of the spores on emerging, in the predominant sympodial proliferation of the sporangia, and in the frequent occurrence of dictiosporangia. From *Isoachlya* it differs in the non-motility of some of the spores on emerging, in the frequent occurrence of dictiosporangia, in the absence of chained oogonia and in the presence of antheridia on all oogonia (normally). The relationships of the genus are not obvious. Either *Dictyuchus* or the *Racemosa* group of *Achlya* seems nearest."

The following new species are diagnosed:—*Saprolegnia delica*, *S. litoralis*, *S. megasperma*, *S. parasitica*; *Isoachlya unispora*, *I. eccentrica*; *Achlya proliferoides*, *A. flagellata*, *A. imperfecta*, *A. conspicua*, *A. dubia*; *Dictyuchus sterile*; *Aphanomyces parasitica*, and a few new varieties.

Septocladia Coker & Grant (1922) is sunk as being the same as *Allomyces* Butler (1911), an identity also pointed out by Fitzpatrick a few months ago. Both authors also regard *Rheosporangium* Edson. (1915) as a species of *Pythium*.

The book is well printed and typographical errors are very few. The volume is indispensable to all concerned with aquatic fungi.

J. RAMSBOTTOM.

Extinct Plants and Problems of Evolution. By D. H. SCOTT. 8vo, pp. 240, 63 figs. Macmillan. 10*s.* 6*d.* net.

No other scientific theory has given rise to such a vast mass of literature as the doctrine of Evolution. No other body of literature on a single subject has, after more than sixty years, achieved so little agreement or brought us so short a distance on the road to truth from the point at which it originated. Probably no other theory has become such an important working hypothesis guiding the thought of hundreds of scientific minds, while its exact application has remained so uncertain. Few, if any, will now deny the fact of evolution, but few will confess that they believe the mode of the origin of species to be proved beyond question. Where we once had faith we now have agnosticism on this matter. The study of the plants of to-day and of the facts of heredity have led to most divergent views. Are the great groups of plants independent or related in origin? Has evolution proceeded by small variations or by large mutations? Has the birth of species proceeded more rapidly at some epochs in the world's history than at others? These are a few of the problems still before us.

We may speculate on what *may* have happened, but only the study of fossil plants can ever tell us what *has* happened. Thus the consideration of the extinct plants in relation to the problems of evolution is of fundamental importance. Not that the study of fossil plants has yet advanced sufficiently to give any certain information on the mechanism of evolution or to solve many problems, but it does indicate the main features in the evolution of plant-life on the earth. It points to some possible lines of phylogeny, and perhaps the information already gained would settle many of our difficulties if we only had the clue to its interpretation.

Few, if any, living authors are more competent than Dr. Scott to express an opinion on the subject of this volume. Few have contributed more to our knowledge of the structure of fossil plants, or have accumulated new information of the trustworthy character which structural investigations possess. Few, we may add, can possess the capacity to treat such a large subject in such a concise and interesting fashion.

The plan of the book is as follows:—We are first introduced to some of the current problems of evolution, then the floras of the chief periods in palæobotanical history are outlined and their significance is indicated, and finally we have a brief summary of the bearing of the evidence on the more general problems.

In his account of the history of plants, Dr. Scott adopts the plan of working back from the known to the unknown. He begins with the flora of to-day, and shows how certain of its elements stretch back to Eocene and Cretaceous times, concluding that we have as yet no evidence at all as to the primitive representatives of the Angiosperms. He then describes the changes which are found in the flora when we get back to the earlier part of the Mesozoic period, afterwards dealing with the apparent transformation of plant-life in Permian times and subsequently working back to the oldest-known land-plants of Middle Devonian age. It is to be regretted that more attention could not be given to the questions arising out of the study of the geographical distribution of fossil plants, which probably have considerable significance, but perhaps we cannot expect every aspect of the subject to be discussed in the course of a short book.

One would not be surprised to find, in a book of this character, a restatement of the conclusions which the author had already published in other works of a more special character. But Dr. Scott is not one of those whose views are stereotyped, and his conclusions are drawn in the light of the most recent investigations. Consequently we have here an original contribution to botanical thought rather than an epitome of a text-book. Though all the plants mentioned are, with one or two exceptions, fairly well known, there are several new figures and photo-micrographs among the excellent illustrations which add to the value of the book.

It is impossible here to review the conclusions reached, but at the end the author finds himself compelled to take up an agnostic position with regard to many problems. He feels in concluding his brief survey that "we know a good deal about extinct plants, but not enough, as yet, to throw much light on the problems of their evolution. New discoveries constantly raise new questions, and seldom solve those which were before our minds." This is certainly the case, but one can scarcely read this admirable book without being struck with the importance of the knowledge already gained.

H. H. T.

Die Naturlichen Pflanzenfamilien: 2nd Ed. (A. Engler): Bd. 10. *Musci* (*Laubmoose*); V. F. BROTHERUS and others. Leipzig: W. Engelmann, 1924. Unbound, M. 30; bound M. 36 (1 Goldmark=24 U.S.A. cents).

THIS volume, the first to appear of the second edition of Engler and Prantl's great work, contains the first half of the Mosses, including the greater number of the Acrocarpous Families. The Hepaticæ are now treated in a separate volume.

The introductory matter, by several authors, is little altered, though some additions are made, *e.g.*, a section on the phyllotaxy of mosses (p. 37). The Sphagnaceæ are dealt with by H. Paul, the

system being very considerably altered from Warnstorf's arrangement in the first edition. The remaining groups (Andreæales and Eubryinales) are by Brotherus. The arrangement is that of Fleischer in his work on the mosses of Java; hence the order of the Families is very considerably altered from that of the first edition. Within this arrangement, however, the treatment of the species within each genus is not greatly changed, with certain exceptions; but, as all the species published since the appearance of the first edition are included, the work is considerably enlarged. The number of genera is appreciably increased, in part owing to the foundation of a number of new genera on new material in the interval, and in part through the raising to generic rank of a certain number of the subgenera of the old edition.

Some idea of the fuller contents of the present edition may be formed by comparing the number of species of four of the larger genera in the different editions:—

	1st edition.	2nd edition.
Fissidens.....	570	700
Barbula	234	300
Tortula	186	219
Bryum.....	625	800

It will be seen therefore that the present volume is by no means a mere reprint of the old, but contains a very considerable amount of new matter; and bryologists will find it quite indispensable to a knowledge of the world moss-flora.

The format is greatly changed. The paper is thinner and the surface less suitable for the reproduction of the figures in the text; the disadvantage arising from this, however, is largely counterbalanced by the resulting volume being much more compact and light, and more easily handled than the earlier one. The printing is closer and smaller, while quite clear, and in consequence families that occupied about 500 pages in the first edition are here, in spite of the greatly increased matter, comprised in less than 480.

Misprints seem very few: on p. 176 *Trematodon Braileyi* should be *Baileyi*. *Eccremidium Whiteleggei*, on p. 160, appears as "*E. Whiteleggei* Brotherus, n. sp.," though it was published in 1901. No New Zealand species of *Leucobryum* appear: if this were in accordance with facts, it would be a great relief to systematists in that country; unhappily this is not the case.

It is unfortunate that more use is not made of the page headlines; the Family alone is there given, more than once the same heading appears for 50 pages at a time. If the genus had been given instead it would have greatly added to convenience of reference, especially as there is no index to this volume.

One is a little disappointed to find the bibliography somewhat cut down. In the first edition the very valuable bibliographical matter is divided in two, part being given by C. Mueller in his introductory

section, and a supplementary list by Brotherus bringing it up to date, *i. e.*, up to the commencement of the work. The bibliography of the present volume omits a large number of the less considerable papers contained in the former lists, while retaining the more important ones, and adds papers of importance subsequently published. For anything like a complete bibliography, therefore, the three lists in the two editions need to be consulted, and even then they overlap. No doubt conditions of expense are responsible for this, but it would seem better either to have made the present list as complete as possible—a very much needed work—or failing that to have attempted merely to supplement the previous ones by adding papers published during the intervening years.

Another defect—and perhaps the only one that is of any moment (apart from the page head-lines)—due also, no doubt, to limitations of expense, lies in the illustrations. The principle carried out in the previous edition was to represent each genus by at least one figure. In the present edition practically all the old illustrations are reproduced, and one or two new ones (*e. g.* in *Sphagnum*) are brought in; but, practically speaking, none of the newly-included genera are figured. It seems a pity that the funds could not run to this, partly because the new genera are, naturally, those for which the illustrations are most required, and partly because it makes a departure from what was a distinct feature of the publication, one of its principal specific, not to say generic, characters!

The wonder is, however, that under present conditions in Germany it is possible to issue at all, and at so reasonable a price, a volume so well produced and so complete, and one which will certainly be indispensable to all bryologists who desire an acquaintance with the mosses of other regions beside their own.

H. N. D.

BOOK-NOTES, NEWS, ETC.

THE *Times* of April 25 contains a biographical notice of the late Dr. R. Hingston Fox, the author of the volume on *Dr. John Fothergill and his Friends* which was reviewed at some length in this Journal for 1920, pp. 56–59. Dr. Fox was born at Stoke Newington in 1853, and died at Beaconsfield on April 20. Apart from his professional work, his chief undertaking was the Centenary History of the Hunterian Society, to which body he held the highest offices.

IN the part (vol. xxv. pt. 4) of the *North American Flora* published March 10, the *Trigoniaceæ* and *Vochyaceæ* are described by Mr. P. C. Standley, who has adapted Aublet's name for the genus usually known as *Vochysia*; the *Meliaceæ* by Mr. Percy Wilson; the *Polygalaceæ* by Mr. S. F. Blake are begun in this part and concluded in pt. 5 (March 20)—179 species, some new, are enumerated and described. We note that *Securidaca* of authors (not of Linnæus) is replaced by *Elsota* of Adanson; in *Dichapetalaceæ*, undertaken by Mr. H. A. Gleason, *Dichapetalum* Thouars (1806) is replaced by *Symphyllanthus* Vahl (1810)—the former being regarded as a "hyponym." Apparently in order to retain the name of the species more or less in the centre of the page, references are split into two lines—

"*Swietenia cirrhata* Blake, Jour. Wash.
Acad. 10: 292. 1920"—

innovations of this kind, while they testify to the inventive genius of the human mind, seem to us of no possible utility. We note that "in," which should, we think, always precede a reference to a paper in a periodical publication, is usually omitted, though sometimes, as in the above instance, indicated by a comma.

THE late Professor v. Höhnel (1852–1920) was so prolific a writer that is not surprising to find that he left sufficient material for the publication of several papers, which have been edited by his successor, Prof. J. Weese. One of these (on the microfungal flora of Java) appears in the Buitenzorg *Bulletin du Jardin Botanique*, vol. vi.; this includes two new genera—*Phragmodochium* and *Septoriopsis*; the latter name has, however, previously been used by Fragoso (1915) and Stevens and Dalby (1919). Von Höhnel's herbarium has been acquired by Harvard University.—J. R.

THE Fifteenth Report of the Botany Committee of the Transactions of the Devonshire Association, edited by the Secretary, Miss C. E. Larter, shows that useful work continues to be done in the various Botanical Districts. The Torquay station for *Tortula canescens*, which formed the subject of a note in this Journal for 1911 (p. 127), has been completely destroyed by the excavations for a new drive; "the whole face of the rock on which it grew has been cut away, and the mass of débris hurled over the cliffs"; a specimen of *Lycoperdon giganteum* found at Chagford weighed 19½ lbs., with a girth of 63 inches; a number of freshwater algæ from the Honiton District are new county records. *Omphalodes verna* has established itself in great plenty near Littlehempstone. Some of the records stand on the authority of local field clubs at Exeter and Plymouth. We note that Miss Larter finds it necessary to protest against "the present processes of extermination by 'Botanical Rambles' and by certain clubs, some field clubs and others," which, unless abandoned, will render it necessary to withhold even the names of the parishes in which a rare plant is found. Phenological notes from the Barnstaple and Torquay Districts add to the interest of the Report; in the former "the early leafing generally this year of *Quercus Robur* was notable; by Dartside, in the otherwise dark woods, the fresh gold-shining leaves of the trees looked like masses of brilliant flowers lighting up the gloom."

THE verses on *Epilobium angustifolium* which we printed last month (p. 256) may be supplemented by the lines prefixed by Miss Muriel F. Watson to her recent novel; this has for its title *Fireweed*, the American-Canadian name of the plant, referring to its appearance after fires—a fact also embodied in the poem already quoted. The verse runs:—

"And ever after Fire still flies the glory of the Weed,
With the purple of its blossom, and the ermine of its seed,
To cloak the beggared soil anew, redeeming it from flame
With its majesty of courage and its lowliness in name."

Contributions to the U.S. National Herbarium, vol. xxiv. part 5, is devoted to an account of the "Economic Fruit-bearing Plants of Ecuador," the result of eight months' work in the Republic by Mr. Wilson Popenoe, agricultural explorer of the U.S. Department of Agriculture, during which "an effort was made to obtain data concerning the distribution, common names, and uses of all cultivated fruit-bearing plants, as of wild ones, the fruits of which are utilised by Ecuadorians." The descriptions, which are very full, are preceded by an interesting introduction, from which we learn that "one *Passiflora*, two species of *Disterigma* and one of *Macleania* have been named from material collected during the investigations"; these are named and described in the text, which is accompanied by sixteen plates.

THE American Orchid Society (Boston) has issued in a beautifully printed little volume *An Enumeration of the Orchids of the United States and Canada*, prepared for the Society by Mr. Oakes Ames. It contains a short account of the *Orchidaceæ* and a key to the genera; the names of these and of the species then follow in alphabetical sequence, with complete synonymy (including bibliographical references), geographical distribution, and "common names," manufactured and other—does anyone, even in the Bahama Islands to which the plant is confined, ever speak of "Mrs. Britton's Ponthieva"?

THE Report for 1922–23 of the Botanical Section of the South-Eastern Union of Scientific Societies contains a list of the plants seen at the four 1923 excursions and a list of botanical referees, with useful notes as to the condition in which specimens should be sent and on the methods of sending them.

Rhodora for July contains "*Orobanche ramosa* on a *Coleus*" (with plates); "Extension of Range in *Salix* and a new variety (*S. discolor* var. *Overi*) in *Salix*," by C. R. Ball; "Some new Cladonias," by C. A. Robbins. The August number contains: "A Study of *Zizania*," by N. C. Fassett; "Notes on British Columbia Algæ," by W. R. Taylor.

THE *Bulletin of the Torrey Club* (July) includes "Across the Sonoran Desert," by Forest Shreve; "Notes on Southern Californian

Plants," by P. A. Munz and J. M. Johnston; and a continuation of C. P. Smith's "Studies in *Lupinus*."

IN *Osterreichische Bot. Zeitschrift* for July–September are: "Entwicklunsgeschichte und systematische Stellung von *Secotium agaricoides*" (with plate); "Über blattbürtige Knospen bei *Lycopersicum*," by K. Linsbauer; "Geologisches Alter und geographische Verbreitung der wichtigsten Algengruppen," by J. Pia; "Über einige kritische *Heracleum*-Sippen der Alpen," by A. Thellung; "*Artemisia Absinthium* × *laxa*," by A. Heimerl.

Icones Plantarum Japonicarum (vol. i. n. 6), March 1, Maruzen Co., Tokyo, which has not previously reached us, contains excellent plates, with full descriptions in English and Japanese, of *Sanicula rubriflora* F. Schmidt, *Primula Sieboldii* Thunb., *Saxifraga sarmentosa* L. f., and *Lychnis coronata* Thunb.

THE *Fortieth Report of the Watson Botanical Exchange Club*, edited by the Hon. Sec., Mr. H. S. Thompson, contains, as usual, much interesting matter, some of which we hope to quote later, should space permit. We note the description by Mr. Pugsley, who also contributes notes on *Euphrasia scottica*, *Rumex elongatus*, and other species of a new variety (*cornubiensis*) of *Fumaria muralis*, and an interesting note by Mr. J. W. White on *Limonium recurvum*; the species of *Salix* have received the special attention of several contributors.

WITH much regret we announce the death of the Rev. OSWALD MOSLEY FEILDEN, Rector of Welsh Frankton, near Ellesmere, Salop. Born on September 16, 1837, he was educated at Christ Church, Oxford, and as long ago as 1865 was appointed Rector of Welsh Frankton, Lord Brownlow being the patron of the living. Here for nearly sixty years he lived among a devoted people a typical parish priest, foremost in all good work, and a great lover of Nature, especially its trees and flowers. His parish, though a large one of some three thousand acres in extent, was entirely rural; in its neighbourhood are the seven meres of Ellesmere, and the celebrated Whixall and Fenn's Mosses, so rich in local species, and I, as Recorder for Botany in the Proceedings of the Caradoc Field Club for the past fifteen years, have received from time to time valuable lists from him, mainly from his own neighbourhood, which have been of the greatest service. Mr. Feilden was also President of the more recently constituted Offa Field Club, its headquarters being Oswestry, situate five miles W. of Frankton, whose particular hunting-grounds are the extreme western portion of Salop and most of Montgomery, this last including the far-famed Breidden Hills. He thoroughly deserved the kindly appellation of the "Gilbert White of Shropshire," by which he was locally known. After a brief illness, he passed away on June 20th in his 87th year.—J. C. M.

THE *New Phytologist* (23 July) contains "Factors governing Bud Formation" (concluded), by F. Summers; "Respiration and Breakdown of ripe Pears," by J. C. Luthra; "The Ceramidium of *Polysiphonia*," by R. W. Phillips; "*Polytrichum piliferum* Schreb. mut. *psilocorys*," by J. Heimans (1 pl.); "Periodicity of Leaf-form in *Taraxacum officinale*," by B. M. Griffiths; "Cell-wall in Radicle of *Vicia Faba*," by A. M. Tupper-Carey and J. H. Priestley; "Abnormal Flowers of Honeysuckle," by R. H. McCrea.

THE *Annals of Botany* for July contains: "The Cytology of the Cotton Plant," by H. J. Denham (4 pl.); "The Problem of identifying the Wood of Cretaceous and Later Dicotyledons," by I. W. Bailey (*Paraphyllanthoxylon*, gen. nov.; 1 pl.); "On the Theory of 'Age and Area,'" by S. Schonland; "Development of Sporophyte in *Anthoceros fusiformis*," by D. H. Campbell; "*Tempskya Knowltoni*, sp. n., from Montana," by A. C. Seward (2 pl.); "Duration of Light and Growth," by J. Adams; "The Plant Cuticle," by B. Lee and J. H. Priestley; "Structure of *Spyridia filamentosa*," by R. W. Phillips; "The Staling of Fungal Culture," by C. A. Pratt.

THE *Annals of the Royal Botanic Gardens, Peradeniya*, is now issued as "Section A. Botany" of the Ceylon Journal of Science, and appears in a greatly improved form. The first part of vol. ix. (June 23) contains a paper on "Thread Blights" (9 pl.) by the editor, Mr. T. Petch, who also contributes an article on "Gregarious Flowering"; Mr. C. H. Gadd writes on *Phytophthora Faberi* (1 pl.), and Mr. E. J. Livera on Ceylon *Dipterocarpeæ*, in the course of which he transfers *Shorea lissophylla* Thw. to *Isoptera* and *Stemonoporus Lewisianus* Trim. to *Vatica*, in each case retaining the original specific name.

THE *Journal of Ecology* for July contains a continuation of A. S. Watt's paper on the Ecology of British Beechwoods, in which he deals with the development and structure of Beech communities on the Sussex Downs; "Plant Production as a Measure of Environment," by J. E. Weaver (5 pl.); "Plant Successions of the Brush-Prairie in Minnesota," by J. Ewing; "Edaphic Factors after Burning on Harpenden Common," by T. Eden; "Ecology of English Heaths" (Oxshott Heath and Esher Common, Surrey), by V. S. Summerhayes, L. W. Cole, and P. H. Williams (1 pl.); "Lichens and Mosses on Mt. Gedeh, Java," by W. Seifriz (1 pl.); "Ecology of Radipole Lake, Weymouth," by R. D'O. Good and C. D. Day; "Supplementary Note on *Primula alatior*," by Miller Christy.

THE vacancy in the Department of Botany caused by the retirement of Mr. E. G. Baker has been filled by the appointment of Mr. A. W. Exell, B.A., late Scholar of Emmanuel College, Cambridge.

CARL FREDRIK OTTO NORDSTEDT.

(1838–1924.)

BY the death of the eminent algologist Otto Nordstedt, Sweden has lost another of the long line of distinguished botanists who have contributed so much to the advancement of the science.

The list of books and papers by Nordstedt which is appended to the memoir from the pen of Dr. Gertz in the *Botaniska Notiser* for 1924 (pp. 119–125), numbering well over a hundred and extending over a period of sixty years, affords some measure of his untiring energy. Many of the papers relate to Flowering Plants, but the more important of his writings are those referring to the Desmids and other Freshwater Algæ, and to the Charophytes. His *Index Desmidiacearum*, published in 1896, was his most considerable work, and this must for a long time remain a standard book of reference. Comparatively few possess the depth of knowledge of their subject, coupled with the patience and capacity for dealing with literary detail, which are necessary for the production of such works as the *Index*, the value of which as an aid to other workers it is difficult to overrate.

Nordstedt's first paper, published in 1863, related to the Charophytes; although latterly he gave more attention to Desmids, the queer detached little group of Cryptogams had always a fascination for him, and he wrote many papers about them, describing a number of new species. Of his papers on this subject perhaps the most important are the series which appeared in 1880 and 1888 under the title "De Algis et Characeis," especially No. 4, which related to the oospore-membranes of the Charophytes, in the investigation of the structure and decoration of which he did important pioneer work. His *Australasian Characeæ*, a quarto with fine full-page illustrations, which bid fair to be a monumental work, unfortunately never got beyond the first part (issued 1891) owing to obstacles in the way of further publication. Between 1871 and 1874 he had issued in collaboration with L. J. Wahlstedt an extremely beautiful set of Scandinavian Charophytes consisting of 120 numbers, and from 1877–1903 he issued an extensive series of Freshwater Algæ. No one but the great master of the subject, Alexander Braun, had so wide a knowledge of the Charophyta as had Nordstedt; and it was a fortunate thing for succeeding generations of students of the group that the editing of Braun's posthumous work was placed in such capable hands. The invaluable *Clavis synoptica Characearum* in the *Fragmente* was Nordstedt's work, and he added many useful notes.

I feel proud to have been able to count Nordstedt among my own close personal friends: my late brother and I enjoyed a pleasant correspondence with him, which extended from 1879 to the beginning of the present year, and we were much indebted to him for assistance, readily afforded, from the very outset, in the study of the Charophytes. On his first visit to London he stayed at our house, and we all became much attached to him. He was an ardent field botanist, and we had several pleasant botanical expeditions together; it was impossible to be in his company without feeling the stimulus of his

enthusiasm. On his second visit to London, while staying with my brother he met with an accident, which unfortunate occurrence, though interfering with his plans, was to our advantage in affording an exceptional opportunity for increasing our intimacy.

Nordstedt was a good correspondent and took a great delight in the company of his friends. He amassed a large collection of botanical portraits and autographs; in a letter I had from him last year he told me that the former numbered some 500 and the latter 2500. The very pleasing portrait which accompanies the memoir in the *Botaniska Notiser* gives a good idea of the kindly humorous personality of this very lovable man.—J. GROVES.

For the following admirable sketch of Nordstedt's life we are indebted to his friend Miss Elin Millde :—

Otto Nordstedt, the oldest among the Swedish botanists, died at Lund on the 6th Feb., 1924, at the age of 86; he was born at Jönköping, 20th Jan., 1838. His father was Carl Peter Nordstedt, a well-known physician and a descendant of the Linné family, his grandfather having married a niece of Carl von Linné. Having passed his childhood in Jönköping, Otto went in 1856 to Lund, where he entered the University the same year. He very soon came under the fascination of Jakob Georg Agardh, the celebrated algologist. This acquaintance resulted in his abandoning the medical studies; he had begun to consecrate his life to the plant-world, and especially the Algæ. In 1861 Nordstedt had passed a primary medical examination and was practising at a hospital in Stockholm. A revival of interest in botany had just then arisen at the University; the young and energetic professor, Frederic Areschoug, had gathered around him a number of enthusiastic young men interested in botanical studies, and had started with them the Botanical Society of Lund in 1858. Being financially independent, Nordstedt decided to give up his medical studies and join this band, and soon became the leading power among them. The purpose of the Society was to encourage the study of botany in the northern countries of Europe, to introduce to each other those interested in the plant-world, and to facilitate the exchange of specimens. Dividing his time between work for this Society and his own scientific researches, Nordstedt's life was from then onward filled up with hard work, and in a few years he had gained a world-wide reputation as an algologist. He never held any office as a teacher, but was always willing to give information and assistance to the young men who came to him, placing freely at their disposal his own considerable botanical experience and the resources of his library.

The bent of his character and genius fitted him for the work of a collector and editor rather than that of a professor, and in 1873 Nordstedt accepted the office of amanuensis at the Botanical Institution of Lund, which office he retained until 1921, more than forty years. About 1879 a new post, that of conservator at the same institute, was created on account of the gift of the extensive herbarium made by Agardh, comprising about 40,000 specimens, and Nordstedt was appointed to the position. In 1919 he gave up this post, receiving a small pension from the State. In 1881 the degree of Doctor was conferred upon him, and in 1903 he was given the title of Professor. During his latter years Nordstedt held office in a fresh capacity. Agardh had presented his library to the Institution, and Nordstedt was appointed as its first librarian, an office without salary, in which his extensive knowledge of botanical literature was of the greatest value. For twenty-two years he was actively at work in this capacity; only a few days before his death he was to be seen in his place registering magazines and answering letters.

Perhaps his most important work, however, was his editorship of Swedish botanical review *Botaniska Notiser*. Published for the first time in 1839 by Lindblom in Lund, this journal had existed about thirty years when it suddenly ceased to appear for lack of an editor. After two years' interval, Nordstedt decided to resuscitate it, and he continued its publication without interruption for fifty-one years. Until 1907 it was the only botanical magazine in Sweden, and its importance is enhanced by the record which it furnishes of the great share taken by Sweden in the botanical activities of the latter part of the nineteenth century. To carry on such a publication with a very limited number of subscribers involved hard work and careful management, but Nordstedt was particularly well qualified for the task, and before he gave up the editorship he had secured an annual contribution from the State towards the support of the Journal.

As regards his purely scientific work, his researches in algology have made Nordstedt's name well known, especially in connection with the Desmids and Characeæ, upon which he concentrated his attention. On the death of the distinguished botanist Alexander Braun in 1877, Nordstedt was entrusted with the publication of the Monograph of the Characeæ, which Braun had left unfinished. This he accomplished in 1882, having added much valuable matter to the work. Another remarkable achievement, and the one by which he will perhaps be best known, is his *Index Desmidiacearum*, published in 1896, a standard work of the greatest value.

In summer Nordstedt used to make long excursions in Sweden and Norway. Several times he went to continental centres, assisting at scientific congresses or travelling as a private individual, always with eyes and mind intent on his favourite objects. He twice visited England and once travelled in Scotland. When Rome was mentioned, he would tell in his characteristic humorous way how he found a new species of Desmid, *Cosmarium læve*, on the very top of St. Peter's.

Friendly, modest and always in good spirits, Otto Nordstedt was everywhere a welcome guest, and in his little home in Lund he had often the opportunity of returning the hospitality he had enjoyed while abroad. The generation to which he belonged and with whom he had worked has passed away; but those of the present generation who knew him will not readily forget the lively old man with the young soul, working until his last days with the same energy and enthusiasm as in his prime. With the history of the Botanical Institution in Lund his name will always be associated, as much for the work he did for it as for his generous donations of money, books and botanical collections.

AUTHORITIES FOR CORRECTED NAMES.

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

It is generally considered that a trivial grammatical or orthographic alteration in a plant-name does not warrant the citation of another author than the one who first published the name in question, but there is no agreement as to where the line should be drawn. Linné is cited as the author of *Ranunculus acer* and *Erigeron alpinus*, though he published these species as *R. acris* and *E. alpinum* respectively; and *Cydonia maliformis* is ascribed to Miller, though he spelt the trivial name "*Maliforma*." Trelease (the genus *Phoradendron*, 5) made "new combinations" under *Phoradendron* for species published under *Phoradendrum*, and C. B. Clarke (Urb. Symb. Antill. ii. 58–75, 103–133) did the same in *Eleocharis* (*Heleocharis*) and *Rynchospora* (*Rhynchospora*), but few botanists consider it necessary to carry accuracy of citation to such an extreme. Druce (Fl. Berks. 268; List Brit. Pl. 34) made "new combinations" under *Kentranthus* for *Centranthus ruber* and *C. Calcitrapa*, but Briquet and Cavillier (Burnat Fl. Alp. Marit. v. 186, footnote) regard *Kentranthus* and *Centranthus* as orthographic variants which do not require the citation of different authors for binary combinations. *Sesbania* Scop. was conserved under International Rules as against *Sesban* Adans., apparently in order to avoid the necessity of making new combinations under the latter. Britton and Millspaugh (Bahama Fl. 182), however, treated these names as being equivalent, ascribing combinations under *Sesban* to authors who employed the form *Sesbania*. The cases of *Cajanus* DC. (*Cajan* Adans.) and *Canavalia* DC. (*Canavali* Adans.) are similar. *Annona* and *Anona*, *Jussiæa* and *Jussieua*, *Pirus* and *Pyrus*, *Stigmaphyllon* and *Stigmatophyllum* are generally regarded as mere variants.

There is some difference of opinion in the case of *Vochy* Aubl. (*Vochya* Vell. ex Vand., *Vochisia* Juss., *Vochysia* Poir.). The *Index Kewensis* treats these four spellings as interchangeable, but Standley (N. Am. Fl. xxv. 302) makes "new combinations" under *Vochya* for four species originally published under *Vochysia* (not *Vochisia*, as he states). He regards *Vochy* and *Vochya* as one name, *Vochisia* and *Vochysia* as another. This seems rather like hair-splitting! But in any case why alter *Vochy* to *Vochya*? Names ending in "y" occur both in Greek and Latin, though they are rare in the latter language. Has he never heard of the herb moly, μῶλυ Theophrastus *Enquiry into Plants* ix. xv. 7; *Moly* Plin. Hist. Nat. ed Harduin. ii. 262, l. 20; *op. cit.* 362, l. 20; et *op. cit.* 379, l. 26; C. Bauhin Pinax, 75; Moench. Meth. 286; or of βράθυ Diosc., Codex Vindob. fol. 83 verso, 84 recto; *Brathy* Plin. *op. cit.* 342, l. 16? And if *Vochy* is to be "corrected," why not adopt the form *Vochys* on the analogy of *Brathy*, *Brathys*; and of κάχρυ Diosc., Codex Vindob. fol. 175 verso, 176 recto; *Cachry* Cam. Hort. Med. 32; *Cachrys* Plin. *op. cit.* 342, l. 13; L. Sp. Pl. 246?

On the analogy of *Vochya* and *Vochysia*, *Ferdinandia*, *Ferdinandoa* and *Ferdinanda* might be treated as one name, *Fernandoa* and *Fernandia* as another. The type-species of *Ferdinandia* Welw. ex Seem. (*Bignoniaceæ*) was originally described by Welwitsch as *Bignonia Ferdinandi*, and was renamed *Ferdinandia superba* by Seemann. It should accordingly bear the name *Ferdinandia Ferdinandi* under International Rules. Is this a new combination, or may it be attributed to K. Schumann, who used the two different forms *Fernandia Fernandi* and *Fernandia Ferdinandi*? In this case, since the generic name has been spelt in five different ways, and the specific name in two ways, there are ten possible binary combinations as regards the spelling. It would be absurd to treat these as different binominals, and the conclusion follows that *Ferdinandia*, *Ferdinandoa*, *Ferdinanda*, *Fernandoa* and *Fernandia* are all variants of one name, and do not require the citation of different authors for binary combinations. Similarly, in my opinion, *Vochy*, *Vochya*, *Vochisia* and *Vochysia* are interchangeable.

The names *Montañoa* and *Montagnæa* were regarded by A. P. DeCandolle, Schultz-Bip. and Hemsley as mere orthographic variants, but were treated as different names in the *Index Kewensis* (see Britten in Journ. Bot. 1894, 375), and by Robinson and Greenman (Proc. Am. Acad. xxxiv. 508–521; 1899). Here the two spellings are so different that the connection between them is not obvious, and they may accordingly be treated as different names.

As there is wide divergence of opinion among botanists as to where the line should be drawn between orthographic variants and different names, it is desirable that all doubtful cases should be decided by a small International Committee of taxonomic and bibliographical experts. From this brief survey of the subject two conclusions may be drawn: (1) greater care should be taken in the future in the selection of generic names; (2) names when once effectively published should not be modified without cogent reasons. The unfortunate results of orthographic correction in the cases cited incline me to accept Barnhart's dictum (Journ. Bot. 1922, 261) that alterations in spelling should be permitted only in cases where the evidence is clear that there was an unintentional error in the original publication. Briquet takes the same view, adopting the original spellings *Rorippa* and *Valantia* in place of *Roripa* and *Vaillantia* (Prodr. Fl. Corse, ii. 28; Burnat, Fl. Alp. Marit. v. 171). The Editor of this Journal (Journ. Bot. 1893, 316) considers that in works of a bibliographical nature each name should appear exactly as published—even as regards the gender. If such works were used solely by experts I should agree, but many who consult them have neither the time nor the requisite knowledge to determine the correct genders of generic names, and to such workers it is a distinct convenience to find all the entries under one generic name made uniform as regards their gender. If the expert considers that the gender adopted is wrong—mistakes will occur in the best edited works—he is not obliged to accept it.

NEW MALAYAN PLANTS.

By H. N. Ridley, C.M.G., F.R.S.

The following new species from the Malay Peninsula are based on specimens sent, since the publication of the first three volumes of the *Flora of the Malay Peninsula*, by Mr. Burkill, Mr. Holttum, and their native collectors, Mohammed Haniff and Mohammed Nur, together with a few collected by other botanists. Many were obtained from a mountain now known as Fraser Hill, near what was formerly called the Sempang Mines, at the Pahang or eastern side of the Semangkok Pass, and is on the boundary line between Selangor and Pahang. This very rich botanical district has produced a very large number of interesting novelties. It is the beginning of the great mass of mountains forming the backbone of the peninsula from the west side; these mountains rise to a height of 4600 feet and are densely clad with forest. The flora, though continuous with it, is remarkably distinct from that of the mountains of the Thaiping Hill region to the north.

Mr. Holttum has also explored botanically the mountain of Gunong Belumut, the highest of the most southern mountains of the peninsula, in Johore, a spot which has been very seldom visited and where no collecting botanist has previously been. Messrs. D. F. A. Hervey and R. Hullett ascended it in 1879, and the former gave an account of the expedition in the *Journal of the Straits Branch of the Royal Asiatic Society* (iii. 85). He mentions some plants, and it appears that the two explorers collected some specimens; but I have no clue as to what became of these, if indeed any were preserved.

As most of the mountain-peaks which have been visited by botanists have produced a considerable number of new species, and there are numerous ranges which have never been explored, there must still remain a very large number not as yet collected. It may be interesting to mention that recently Mr. Henderson, Botanist to the F.M.S. Museum, has recorded the occurrence of *Anemone* and *Lonicera*, both new to our area, in the Malay Peninsula.

Sterculia neriifolia Ridl. n. sp. (Sterculiaceæ). *Arbor* parva 3 ad 4 m. alta glabra, *foliis* in apicibus ramorum congestis oblongo-lanceolatis angustis nitidis, apicibus acuminatis obtusis, nervis 17 paribus ferme horizontalibus intra marginem anastomosantibus, tenuibus, prominulis 15 cm. ad 17 cm. longis 2·8 cm. latis, petiolis gracilibus basibus et apicibus incrassatis 2·5 cm. longis, *racemo* subterminali 7·5 cm. longo, *floribus* 1 ad 3 in ramulis remotis 2 mm. longis; *pedicellis* 4 mm. longis, masculis calycis tubo cylindrico-campanulato 5 mm. longo pallide viridi-griseo glabro, lobis linearibus obtusis subæquilongis, marginibus hirtis, andrœcio brevi erecto, antheris 10 in seriebus duabus, serie inferiore quam superiore minoribus. Flores feminei et fructus ignoti.

Hab. Negri Sembilan on Bukit Tangga (*Burkill* 11826).

Allied to *S. lævis* Wall., differing in the remarkably narrow lanceolate shining leaves.

Tetractomia Holttumi Ridl. n. sp. (Rutaceæ). *Arbor* cortice ramorum rugoso griseo, *foliis* in apicibus ramorum congestis, coriaceis elliptico-obovatis basibus angustatis, apicibus obtusis, nervis 5 paribus, costa subtus prominente, 6 cm. longis 4·3 cm. latis, petiolis 1 cm. longis; *paniculis* in axillis superioribus 5 cm. longis, pedunculis 2·5 cm. longis gracilibus, ramis 3 ad 5 gracilibus æquilongis, floribus minimis 2 mm. latis pedicellis brevibus pubescentibus, *sepalis* 4 ovatis, *petalis* multo majoribus ovatis subacutis, *staminibus* ferme æquilongis filamentis validis in apicibus attenuatis e basibus lanceolatis, *staminodiis* ad petala adnata minuta, filamentis applanatis, antheribus minutissimis, disco prominulo, *ovario* profunde quadrilobo, dorsis rotundatis, stylo cylindrico, stigmate pulvinare.

Hab. Johor, in Gunong Belumut ad 3000 pedes, alta (*Holttum*).

Seems to be most closely allied to *T. philippinensis* Elmer, but the leaves are rounded and more obovate.

Connaropsis rubescens Ridl. n. sp. (Geraniaceæ). *Frutex* scandens, *foliis* trifoliatis, *foliolis* coriaceis ovatis breviter obtuse acuminatis-cuspidatis, basibus rotundatis, glabris superne nitidis nervis circiter 7 paribus subtus conspicis 5 cm. longis 2·5 cm. latis, petiolulis 1 mm. longis, petiolis 2·5 cm. longis; *paniculis* in axillis fasciculatis 2·5 ad 3 cm. longis rubris glabris, ramis brevissimis, *floribus* minimis pedicellis gracilibus, *bracteis* brevissimis linearibus, *alabastris* globosis, *sepalis* oblongis rotundatis, *petalis* æquilongis ovatis rotundatis omnibus pubescentibus apicibus et marginibus ciliatis, *staminibus* 10 petalis brevioribus, in serie interiore brevioribus et glabris, *stylis* 5 stigmatibus parvis.

Hab. Pahang, Tengah, Temerloh (*Foxworthy* 5170). Native name, Belimbirig Akar.

The leaflets resemble those of *C. monophylla* Planch., but in that species they are solitary. The glabrous axillary fascicled panicles are very distinct; the plant is a climber.

Ilex Kelsallii Ridl. n. sp. (Ilicineæ). *Arbor* cortice ramorum tenuiter lenticellato, *foliis* glabris coriaceis oblongo-ellipticis acuminatis cuspidatis, basibus rotundatis vel breviter angustatis, nervis tenuibus 5 paribus, basibus in costa crassa decurrentibus, arcuantibus 14 cm longis 6 cm. latis; petiolis crassis 5 mm. longis, *racemis* axillaribus 2·5 cm. longis, pedicellis 3 mm. longis, *bracteis* minimis ovatis patentibus, *sepalis* 6 rotundatis marginibus ciliatis; *petalis* 6 oblongo-ovatis, *staminibus* 6 filamentis brevissimis ad bases petalorum adnatis, *ovario* late conico, lineis elevatis 12, in apice, 12 loculari, stylis 3 brevibus.

Hab. Johor (*Kelsall* 1845), Pahang, Fraser Hill, at 4000 to 4370 ft. alt. Flowers heliotrope, resembling closely those of *I. eugeniæfolia* Pierre of Cambodia, but much bigger and racemose.

Smythea lancifolia Ridl. n. sp. (Rhamnaceæ). *Frutex* scandens glaber, *foliis* tenuiter coriaceis lanceolatis cuspidatis obtusis basibus inæquilateris cuneatis, nervis 5 ad 7 paribus tenuibus, nervulis transversis et reticulationibus tenuissimis, 10 cm. longis 3 cm. latis, petiolis 2 mm. longis, *floribus* minutis 4 vel 5 in glomerulis axillaribus *pedicellis* brevissimis pubescentibus, *alabastris* quadrangu-

laribus complanatis, pubescentibus, *sepalis* triangularibus acutis, *petalis* paulo longioribus unguiculatis, limbo lato obcuneato profunde bilobo, lobis rotundatis, dente minute inter eos, *staminibus* brevioribus, filamentis gracilibus, antheris conicis loculis duobus inferis, *samara* lanceolata obtusa coriacea basi angustato torto, 8·7 cm. longa 1·2 cm. lata.

Hab. Penang, Highlands (*Burkill* 9142), Batu Feringhi (*Curtis* 2780).

This plant, till lately only known from Curtis's flowering specimens, was considered to be a variety of *S. macrocarpa* Hemsl., but the fruits obtained by Mr. Burkill's collectors show it to be very distinct. The fruits are of the form of those of a *Ventilago*, but very much narrower; the wing is lanceolate blunt and has a twist at the narrowed base; the leaves are also narrower and generally smaller, and the petals are deeply bilobed with a minute tooth in the notch.

Micromeles malayensis Ridl. sp. n. (Rosaceæ). *Arbor* 13 ad 16 metr. alta glabra, *foliis* tenuibus membranaceis late lanceolatis acuminatis acutis, basibus longe angustatis, marginibus serrulatis, nervis 6 ad 8 paribus in dentibus desinentibus 8·7 cm. ad 10 cm. longis 3 cm. ad 6 cm. latis; petiolis gracilibus 2·5 mm. longis, *corymbis* terminalibus 5 cm. longis et latis ramulis gracilibus, floribus copiosis albis 4 mm. latis, *sepalis* cuspidatis ovatis, *petalis* oblongis obtusis unguiculatis, *staminibus* 15 in annulo elevato in ore calycis, *stylis* 3 validis, stigmatibus rotundatis, ovulis minutis.

Hab. Pahang, Fraser Hill, 4500 ft. elevation (*Burkill* 11241).

This genus is new to the Malay Peninsula, being hitherto only known from India and China and Japan. The species is very distinct in its small flowers, and is most nearly allied to *M. kachinensis* W. W. Smith, of Burma.

Eugenia alyxifolia Ridl. n. sp. (Myrtaceæ). *Arbor* ramis gracilibus obscure 4-angulatis, *foliis* coriaceis lanceolatis acuminatis obtusis, basibus attenuatis marginibus incrassatis, superne minute puncticulatis, subtus costa prominente, nervis circiter 20 paribus tenuibus obscuris parallelis, intramarginali nullo, 7·5 cm. longis 1·8 cm. latis, petiolis 2 mm. longis, *cymis* terminalibus 1·2 cm. longis, pedunculis et ramis brevissimis crassis, *calyce* tubo-obconico truncato vix 2 mm. longo, *petalis* calyptratis albis rotundatis, *staminibus* brevibus circiter 20.

Hab. Pahang, Fraser Hill, 4000 ft. alt. (*Burkill* 11213).

One of the small-flowered *Syzygium* section with calyptrate petals and few stamens, distinct in its narrow many-nerved leaves.

Eugenia Holttumi Ridl. n. sp. (Myrtaceæ). *Arbor* ramulis gracilibus rufo-furfuraceis, *foliis* glabris tenuiter coriaceis ellipticis acuminatis cuspidatis obtusis, basibus angustatis, nervis gracilibus 20 paribus in utraque pagina conspicuis, nervo intramarginali undulato, 5 cm. longis 2·5 cm. latis petiolis 3 mm. longis, *corymbis* axillaribus et terminalibus 4 ad 6 cm. longis laxe patentibus 3 cm. latis, pedunculis ramisque rufo-furfuraceis, floribus in cymulis 3 ad 5, pedicellis brevissimis gracilibus, *bracteis* lanceolatis subulatis minutis, *sepalis* 5 minutis subulatis, *petalis* calyptratis, *staminibus* plurimis, ovario campanulato 2 mm. longo, stylo persistente.

Hab. Pahang, Fraser Hill (*Burkill & Holttum* 7751).

Remarkable for the rough scurfy papillose indumentum of the branchlets and panicle, the papillæ prolonged into minute points.

Oxyspora scabrida Ridl. n. sp. (Melastomaceæ). *Frutex foliis* glabris late ovato-lanceolatis acute acuminatis, basibus breviter cuneatis nervis 2 paribus exterioribus 2 gracilibus prope margines, interioribus 1·2 cm. distantibus a margine, prominentibus, costa prominente, omnibus scabris, nervulis transversis circiter 22 paribus, pagina inferiore copiose punctata, 27 cm. longis 10 cm. latis, petiolis furfuraceis 5 cm. longis; *panicula* 15 cm. longa 22 cm. lata laxa breviter rigide hirsutula, *calyce* infundibuliformi sparse hirto sepalis obscuris, *petalis* oblongo-ovatis acutis, *staminibus* majoribus 4 antheris linearioblongis rectis obtusis haud acuminatis basibus bilobis, calli dorsalibus nullis, filamentis crassiusculis staminibus minoribus 3, filamentis gracilibus ferme staminibus majoribus æquilongis antheris multiminoribus linearibus dorsifixis, callo in dorso, *stylo* crassiusculo cylindrico, *capsulis* campanulatis costatis sparse hirtis vel glabris, 3 mm. longis.

Hab. Pahang, Gunong Tahan, 4500 ad 6000 ft. alt. (*Mohammed Haniff*).

Casearia minutiflora Ridl. n. sp. (Samydaceæ). *Frutex* parvus, ramorum cortice pallido, *foliis* coriaceis nitentibus, late lanceolatis acutis basibus attenuatis glabris nervis tenuibus 4 paribus reticulationibus æque conspicuis 5 cm. longis 1·8 cm. latis petiolis brevibus gracilibus, *floribus* 1 vel 2 subsessilibus in axillis minutis viridibus, *bracteis* ovatis, *sepalis* 4 ovatis cuspidatis, *petalis* 4 ovatis rotundatis ciliatis, *staminibus* 8, staminodiis 8 oblongis linearibus lanuginosis, *pistillo* cylindrico base dilatato, *stigmate* capitato rotundo.

Hab. Pahang, Fraser Hill, 4000 to 4370 ft. alt. (*Burkill & Holttum* 8581).

Most nearly allied to *C. coriacea* Vent., but with very small sessile flowers and small shining leaves.

Canthium hirtellum Ridl. n. sp. (Rubiaceæ). *Frutex* 2 ad 3 metres altus, ramulis hirtus aculeis stipularibus brevissimis vel nullis, *foliis* tenuibus membranaceis elliptico-lanceolatis acuminatis cuspidatis basibus attenuatis, superne sparse hirtis, costa densius hirta, subtus hirtioribus, costa et nervis 7 paribus hirtis, *cymis* axillaribus hirtis 5 mm. longis congestis, *bracteis* minimis lanceolatis acutis hirtis, *pedicellis* brevissimis hirtis, *calyce* hirto campanulato, lobis 5 ovatis acutis, *corolla* 2 mm. longa alba, tubo globoso, lobis 5 æquilongis ovatis acutis carnosis glabris, *staminibus* 5 brevioribus, antheris ellipticis, *disco* annulari glabro, *drupis* globosis semine unico, bilobis seminibus duobus 8 mm. longis (in sicco).

Hab. Negri Sembilan, Gunong Angsi (*Mohammed Nur, Burkill* 11669).

Perhaps most nearly allied to *C. aciculatum* Ridl., but hairy and not spiny.

Canthium scabridum Ridl. n. sp. (Rubiaceæ). *Frutex* inermis ramis gracilibus pubescente-squamosis, *foliis* membranaceis ellipticis

cuspidatis subacutis, basibus rotundatis, vel acutis, superne sparse scabrido hirtis, costa et nervis dense breviter hirtis, subtus, densius hirtis, marginibus scabrido-hirtis, nervis conspicuis 6 paribus arcuantibus dense hirtis, 8·7 cm. longis 3 cm. latis, petiolis 5 mm. longis hirtis; *stipulis* brevibus ovatis hirtis; *cymis* axillaribus hirtis, petiolis æquilongis, 2 in uno axillo, patentibus 8 mm. latis, *pedicellis* gracilibus, 2 mm. longis, *calyce* pubescente campanulato, lobis acutis 5, *corolla* 2 mm. longa, tubo globoso, lobis 5 æquilongis ovatis acutis, capillis longis albis deflexis in ore tubi, *staminibus* 5, antheris magnis filamentis brevioribus ad bases loborum adnatis, *stylo* basi crasso hirto, superne crasso cylindrico, *stigmate* oblongo-conoideo obtuso canaliculato.

Hab. Johor, Kluang (*Holttum* 9453).

Somewhat near *C. horridum* Bl., but appears to be unarmed, and the leaves are very much larger.

Agapetes pubescens Ridl. n. sp. (Vacciniaceæ). *Fruticulus epiphyticus* ramis et inflorescentiæ pubescentibus, *foliis* lanceolatis longe acuminatis basibus rotundatis, nervis superne conspicuis gracilibus circiter 8 paribus intra margines arcuantibus, omnino glabris, costæ basi subtus pubescente excepto 12·5 cm. longis, 3·7 cm. latis; petiolis crassis 2 mm. longis, *cymis* axillaribus floribus 3 vel 4, pedunculis 8 mm. longis, pedicellis 1·2 cm. longis, omnibus pubescentibus, *calycis* tubo subgloboso pubescente 2 mm. longo, lobis lanceolatis acuminatis æquilongis pubescentibus, *corollæ* tubo 6 mm. longo cylindrico crasso, lobis brevibus recurvis viridi, *staminibus* haud exsertis.

Hab. Pahang, Fraser Hill, 4000 to 4370 ft. alt. (*Burkill & Holttum* 7828).

Allied to and much resembling *A. perakensis* Ridl., but distinct in its pubescence, conspicuous leaf nerves and rather larger flowers.

Ardisia iteophylla Ridl. n. sp. *Frutex* partibus juvenibus et inflorescentia rufo-furfuraceis, *foliis* tenuiter coriaceis anguste lanceolatis obtuse acuminatis basibus attenuatis, subtus minute furfuraceo-punctatis, nervis inconspicuis ultra viginta paribus 11 cm. longis 2·5 cm. latis; petiolis 2·5 cm. longis, *paniculis* terminalibus furfuraceo-pubescentibus 7·5 cm. longis, *bracteis* lanceolatis obtusis 2 mm. longis, pedicellis 5 mm. longis, *sepalis* parvis oblongo-lanceolatis obtusis dense glandulosis, *corolla* 4 mm. longa rosea, in alabastro acuminata, lobis anguste lanceolatis acutis, *staminibus* conniventibus linearibus acuminatis, *stylo* elongato corollam in alabastro superante.

Hab. Johor, Gunong Besidong at 1500 ft. alt. (*Holttum*).

Has the willow-like leaves of *A. tahanica* King, but differs in its scurfiness and small narrow sepals and acuminate corolla.

Trachelospermum obtusifolium Ridl. (Apocynaceæ). *Frutex* scandens, rami nigrescentibus rugosis, *foliis* rigide coriaceis ellipticis obtusis apicibus rotundatis minute cuspidatis, basibus cuneatis marginibus incrassatis, nervis tenuibus 9 paribus, costa elevata 6 cm. ad 7·5 cm. longis 3·7 cm. latis, petiolis 1·2 cm. longis; *cymis* terminalibus 4·3 cm. longis, 7·5 cm. latis, pedunculis 3·7 cm. longis, *cymulis* 3 pedicellis 6 mm. longis, *sepalis* ovatis acutis, *corollæ* tubo brevi crasso 6 mm. longo, ore flocculente papilloso, lobis oblongis latis rotundatis minute denticulatis, omnino pallide flavo, *staminibus* e basi tubo, antheris lanceolatis calcaribus duobus filamentis longioribus apicibus acuminatis mucronatis, *disco* annulari integro, *stylo* brevissimo.

Hab. Pahang, Fraser Hill, 4000 to 4370. Flowers light yellow, fragrant (*Burkill & Holttum* 8898).

Very distinct from our only other species *T. Curtisii* King & Gamble, of Penang and Perak, in its thick coriaceous blunt leaves, ovate sepals and oblong corolla lobes.

Tylophora grandiflora Ridl. n. sp. (Asclepiadaceæ). Scandens gracilis glaber, *foliis* oppositis tenuibus membranaceis ovatis cuspidatis basibus cordatis, nervis 4 paribus intra margines arcuantibus 10 cm. longis 3·7 cm. latis, petiolis 2·5 cm. longis, pedunculis gracilibus 1·8 cm. longis, racemis 1·2 cm. longis floribus circiter 8 ad apicem, pro genere magnis, pedicellis 4 mm. longis, *bracteis* minutis lanceolatis acutis, *sepalis* parvis lanceolatis acutis, *corolla* campanulatis pallide viridi 1·2 cm. lata, lobis 5 ovatis acutis, *columna* minima, corona brevi lobata stamina circumstante, *filamentis* crassis, *antheris* deflexis quadratis exappendiculatis, marginibus inferioribus minute tridentatis, *stigmate* parvo bilobo, *folliculis* ellipticis obtusis glabris 7·5 cm. longis, ultra 2·5 cm. latis expansis.

Hab. Pahang, between Fraser Hill and Tras Valley (*Holttum* 11482).

Remarkable for the size of flowers, perhaps the largest in the genus.

Gærtnera latifolia Ridl. n. sp. (Loganiaceæ). *Frutex* validulus glaber, internodiis 5 cm. longis, *foliis* herbaceis subtus punctatis elliptico-oblanceolatis cuspidatis basibus longe attenuatis, nervis 12 paribus gracilibus paullo elevatis 22 cm. ad 25 cm. longis, 6 cm. ad 12 cm. latis, petiolis 3·7 cm. longis teretibus, *stipulis* basibus connatis triangularibus 1·2 cm. longis, *racemis* lateralibus oppositis extra-axillaribus gracilibus 10 cm. longis, *bracteis* lanceolatis acuminatis binis basi vix connatis 2 mm. longis, *calyce* lobis 5 ovatis brevibus, *corolla* 5 mm. longa, tubo lobis oblongis obtusis æquante, *bacca* globosa 6 mm. longa.

Hab. Pahang, Fraser Hill (*Burkill & Holttum* 8606).

Closely allied to *G. ovata* Ridl. of the same district, but the leaves of that species are ovate, decurrent on a short broad petiole, the bracts on the raceme connate at the base and the corolla shorter.

Æschynanthus lanceolatus Ridl. n. sp. (Cyrtandraceæ). Epiphyticus, *caulibus* repentibus gracillimis, *foliis* tenuiter coriaceis infra pallidioribus oppositis, lineari-lanceolatis acuminatis basibus obtusis 1·8 cm. longis 5 mm. latis, petiolis brevissimis *flore* singulo terminali, pedicello 2 mm. longo, *calyce* cylindrico-tubulari, 1·3 cm. longo sparse pubescente, lobis brevibus ovatis 1 mm. longis, *corollæ* rubra sparse pubescente 5·8 cm. longa basi dilatata, tubo curvo, lobis ovatis obtusis 6 mm. longis, marginibus hirtis, *staminibus* exsertis lobos haud superantibus.

Hab. Pahang, Fraser Hill (*Burkill & Holttum* 8418) on tree-trunks.

Allied to *Æ. parvifolia* R. Br., but the leaves are very small, narrow and linear-lanceolate, and the calyx is much shorter and hardly pubescent.

Gomphostemma lactea Ridl. n. sp. (Labiatæ). *Caulis* lignosus dense stellato-tomentosus, *foliis* ovato-ellipticis acutis, basibus rotundatis vel brevissime angustatis, marginibus integribus, dentibus paucis obscuris ad apices exceptis, superne stellato-tomentosis, subtus dense albo-stellato tomentosis, nervis 8 paribus subtus elevatis nervulis transversis et reticulationibus æque elevatis, 17 cm. longis 7·5 cm. latis, petiolis crassis albo-tomentosis 2·5 cm. longis, *floribus* pluribus congestis in fasciculis axillaribus, pedicellis 4 mm. longis, bracteis linearibus acutis, *calyce* infundibuliformi 7 mm. longo, albo-tomentoso, lobis brevibus acutis 3 mm. longis, *corolla* lactea 2·5 cm. longa hirta, tubo tenui cylindrico ad basin, superne late iufundibuliformi, lobis superioribus brevibus obtusis.

Hab. Pahang, Pinetree Hill, near Fraser Hill, at 4800 feet alt. (coll. *Mahommed Nur*, *Burkill* 11075).

Nearly allied to *G. oblongum* Wall, but leaves rounded at the base not long narrowed to the petiole, and almost entire, except for some short indistinct teeth at the tip.

Piper uncinulatum Ridl. n. sp. (Piperaceæ). *Frutex* glaber verisimiliter scandens, *foliis* coriaceis ovatis acutis basibus rotundatis subinæquilateralibus, nervis 6 a basi prominentibus cum duobus tenuioribus prope margines; nervulis transversis parallelis, 5 ad 6 cm. longis 4·3 cm. ad 5 cm. latis; petiolis 2·5 cm. longis, *spicis masculis* non visis, *spicis femineis* crassiusculis 3·7 cm. longis, *pedunculis* 6 mm. longis, *bracteis* rotundatis marginibus dense lanatis, *ovariis* profunde insertis, *stylis* longe exsertis, stigmatibus 4 vel 5 recurvis uncatis.

Hab. Pahang, Fraser Hill, at 3000 ft. alt. (*Holttum*).

Seems most closely allied to *P. muricatum* Bl. and *P. malaccense* C.DC., but the bracts are very curious, and the style is long, bearing 4 or 5 recurved stigmas.

Baccaurea velutina Ridl. n. sp. (Euphorbiaceæ). *Arbor* 10 ad 13 metres alta, ramulis velutinis, *foliis* coriaceis superne glabris subtus nervis 5 paribus elevatis et costa velutinis ovata cuspidata basibus rotundatis, nervulis transversis prominulis parallelis 17·5 cm. longis 10 cm. latis, petiolis velutinis 5 cm. ad 6 cm. longis, *paniculis* velutinis 8 cm. longis, *bracteis* magnis ovatis ima 5 mm. longa, *bracteolis* ovatis obtusis, floribus masculis 2 mm. longis flavis, *sepalis* ovatis-oblongis obtusis hirto-velutinis utrinque, *staminibus* glabris, filamentis brevissimis, antherarum loculis elliptico-globosis. Flores feminei et fructus ignoti.

Hab. Mountain forests, Selangor, Semangkok Pass (*Ridley* 15692); Pahang, Fraser Hill, 4000 ft. alt. (*Burkill* 11319). Native name, Tampoi Tungnau.

Allied to *B. reticulata* Hook. fil., but has very much larger leaves, panicles and flowers, velvety all over except the upper surface of the leaves.

Ficus staphylosyce Ridl. n. sp. (Urtiaceæ). *Arbor* ramulis appresse hirtis, *foliis* tenuibus submembranaceis lanceolatis acuminatis cuspidatis obtusis, basibus longe attenuatis, nervis gracilibus 5 paribus costa subtus appresse hirta 10 cm. longis 2·6 cm. latis, petiolis gracilibus 5 mm. longis, *sycidiis* in fasciculis remotis in tuberculis caulis, pedunculis gracilibus hirtis 2·5 cm. longis, bracteis 2 aut 3, brevibus ovatis acutis ad apices, *sycidiis* obovatis hirtis viridibus 8 mm. longis, *bracteis* externis in ore ovatis acutis, interioribus longioribus, *flores* masculi non visi, femineis perianthio nullo, *ovario* obliquo-obovoideo pedicellato, *stylo* laterale apice hirto.

Hab. Negri Sembilan, Gunong Angsi, at 2000 ft. alt. (*Burkill* 11599).

Allied to *F. Miquelii* Hook. fil., but differs in its hairiness, narrow lanceolate leaves and very small figs.

Pasania erythrocarpa Ridl. n. sp. (Cupuliferæ). *Arbor* 10 ad 13 metres alta, ramis validis, *foliis* rigide coriaceis elliptico-lanceolatis acuminatis acutis, basibus breviter cuneatis costa utrinque elevata, nervis 12 paribus subtus elevatis, nervulis parallelis inconspicuis, 22 cm. longis 7·5 latis, petiolis crassis 1·2 cm. longis. Flores non visi, *spicis fructiferis* validis, 14 cm. longis, fructibus juvenibus ternis subglobosis sessilibus dense muriculatis, apicibus squamarum brevibus, adultis, *cupulis* rotundatis versus basin dilatatis apicibus attenuatis sessilibus scabris annulis 10 et squamis inconspicuis 1·8 cm. longis et æque latis, 6 mm. profundis, *glandibus* oblongis conoideis, apicibus obtusis, rubris minute furfuraceis ferme 2·5 cm. longis 1·2 cm. latis ad bases, basibus excavatis, umbone parvo.

Hab. Negri Sembilan, Gunong Angsi, near bungalow, at 2700 ft. alt. (*Mohammed Nur*, *Burkill* 11652).

Allied to *P. spicata* Oerst., but the tall red acorns are unlike those of any other oak of its section. The cups are borne sessile in threes, but in only one of the three does the acorn develop. In the young fruit the cups are thickly muricate with the free scale tips, but in the adult the cups are merely roughened and scabrous.

THE AGE AND COMPOSITION OF THE PENNINE PEAT.

By T. W. Woodhead, Ph.D., M.Sc., F.L.S.

For some years considerable attention has been paid to the remains in, and immediately below, the peat in Yorkshire by Messrs. Buckley, Burrell, Cheetham, Pearsall, Priestley, Misses Rankin and Whitaker, and the writer. Some of the results of these investigations, bearing on the age and succession of the vegetation of the Pennines, were exhibited at the Imperial Botanical Conference. The exhibits included photomicrographs and drawings of the organic remains found by Messrs. Burrell and Cheetham, an account of whose work appeared in *The Naturalist* for May 1924; slides illustrating Prof. Priestley's work on the anatomy of peat plants; specimens of

fen and lowland peats, contributed by Dr. Pearsall; and details of Mr. Percival's work on the organisms of the peat pools of Austwick Moss.

Studies of the moors of the Southern Pennines in the neighbourhood of Huddersfield were illustrated by a large series of comparative maps, also a relief map and vegetation maps of part of this area, which is being intensively studied by the writer and his students. One of the latter (Miss Rankin) showed drawings and micro-slides illustrating the ecology and anatomy of the Cotton-grasses (*Eriophorum vaginatum* and *E. angustifolium*); the former species is the chief peat-former in the Southern Pennines, *Sphagnum* and other mosses contributing only in a slight degree to its formation. Upwards of forty maps were shown recording analyses of the various factors influencing the development and distribution of the present flora; these included geological, topographical, altitude and rainfall-maps, and others dealing with soils, plant associations from many points of view, influence of the preceding factors in determining the operations and distribution of man in the area, and the influence of man on the vegetation. These showed that three main movements of man had occurred within the area. Early man, from late Palæolithic times to the close of the Bronze Age, occupied the hills above 1000 ft. O.D. Here numerous workshop sites have been excavated and their contents studied. The result of these excavations has thrown an interesting light on the succession of events in the Southern Pennines. These facts were shown in a diagram giving the results of excavations recently made by Mr. Francis Buckley at Warcock Hill, Marsden, near Huddersfield. The following succession was determined:—

At the base, resting on the sandy shales of the Millstone Grit Series, is a layer of grey sand five inches in thickness. In the lower part of this were found early "Belgian" Tardenois flint tools, along with the usual débris of unpatinated chippings of a workshop site. Associated with these were numerous pieces of charcoal, which on examination proved to be birch. Above this occurred a second workshop floor of later "Belgian" Tardenois tools, also flint débris and charcoal. The flint on this site, however, was patinated white, in strong contrast to that of the lower floor. Resting on the sand is the forest layer; the tree remains are very extensive, and this site is typical of the area. Tree remains have been traced by the writer over the Pennine ridge, including the exposed summit of Pule Hill (1400 ft.) indicating continuous forest or scrub in this district. The plant remains of this floor suggest that the vegetation, in its early phases, was a birch-heath scrub, similar to that now prevailing on the rock-terraces in the neighbourhood at 600–1000 ft. O.D.

In Azil-Tardenois times the peat had not developed, but the finding of birch wood among the flints indicates the presence of trees. The flints of the two workshop floors, of which the older produced unpatinated, and the later, patinated flints, suggests the increase of wetter conditions which would favour the development of forest.

Eventually increasing moisture, accompanied by defective aeration and acidity of the soil, led to the degeneration of the forest and the formation of peat. In this forest, birch was the dominant tree, with some oak, pine and hazel. In the forest layer, and in the lowest layers of the peat, are found tools of neolithic age and triangular or leaf-shaped arrowheads. At a higher level, at the site above mentioned, occurred a horn of *Bos primigenus*, also a piece of bronze and a barbed arrowhead typical of the Bronze Age. The peat above consists mainly of Cotton-grass (*E. vaginatum*), the basal leaf-sheaths of which are readily detected and form the chief part of the remains. Other species, e.g., *Juncus conglomeratus* and *J. squarrosus*, *Eriophorum angustifolium*, *Empetrum nigrum*, *Calluna vulgaris*, and *Vaccinium Myrtillus* are usually quite inconspicuous constituents. In the Northern Pennines, as Lewis has shown, *Sphagnum* and other mosses are important peat-formers. No typical Arctic species, *e.g.*, Arctic Willows, have so far been discovered in the peat of the area studied. Recent excavations by Mr. Ian A. Richmond on the Roman Road at Blackstone Edge, have shown that in the part across which the trench was cut, the pavement rested on a bed of sandy peat at least 22 inches in depth. These excavations suggest that the peat is much older than was formerly supposed. By some it was thought to be post-Roman, and the degeneration of the forest to be due, in part, to their activities.

The succession above indicated seems to be generally applicable to the Southern Pennines. While early man occupied the hills, by historic times he had moved from the summits, and maps indicating pre-Norman village sites showed that he occupied the lower rock-terraces, usually well above the flood plain of the valleys. This was strikingly shown on vegetation maps based on the Domesday Survey. It was only when the rivers were controlled, and the water-power used for the corn and fulling-mills, that man descended into the valleys which he now occupies. Maps showed the effect of these changes in the vegetation, especially in the reduction of forest. The alder-willow swamps of the lowlands are restricted to quite small areas; most of the oak woods of the rock-terraces have gone, the chief remains being on the steep and stony escarpments of little agricultural or commercial value. Maps and a model were also shown illustrating the distribution of single dominant species in a selected area, the life-histories of which are being studied in detail.

These studies of the Pennine peat indicate that the species found at the base, and presumably the oldest in the area, are the same as exist on the moors to-day; further, that they have now the widest distribution and extend into the Arctic regions. It is suggested that, as the Southern Pennines was an unglaciated area during the Ice Age, these moorland species would for the most part persist through that period. As the ice receded, many of these would serve as efficient colonisers and extend their bounds. Maps indicating their distribution in detail, show that they occupy a larger area than any other group of native species. This generalization also applies to the whole county of Yorkshire, thus from a different line of enquiry,

supporting Willis's contention of "Age and Area," that the plants which occupy the greatest area in a given country, in a given time, are the oldest plants in that area.

Further maps showed the influence of successive human invasions by Romans, Angles, Danes and Norse, and the limits of their occupied sites, also how the geographical factors had throughout the ages determined the distribution and operations of man.

A "QUILLED" DANDELION.

By F. E. Weiss, D.Sc., F.R.S.

Some years ago my attention was drawn in a field near Manchester to a peculiar form of Dandelion (*Taraxacum officinale*), which differed strikingly in the colour of its flower-heads from the other Dandelions around it. It was of a pale lemon-colour, and on closer inspection I found that this lighter colour was due to the fusion of the normally ligulate corollas into closed tubes in such a way that only a pale under surface of the petals was exposed to view. Owing to this tubular character of the corollas the inflorescence appeared to be composed of more delicate florets, the tube being naturally narrower than the expanded ligulate flowers of the ordinary Dandelion. I have since cultivated this interesting mutant in the garden and its seeds have produced similar plants, which was to be expected, as they are probably apogamous. I have indeed proved that they are apogamously produced by decapitating the florets at an early stage of flowering. Except for the peculiar structure of the corolla there was no marked difference between the mutant and other specimens of dandelion surrounding it. Drawings of the florets showing a side view (fig. 1 *a*) and a front view (fig. 1 *b*) will indicate the special features better than a mere description.

Some of the external florets of the capitulum may be normal in character, but for the most part they show a tendency to fusion, beginning by a slight incurving of the outermost teeth of the corolla (see fig. 1 *c*). All the inner florets terminate in narrow closed tubes. The corolla is therefore tubular at the base, and at the tip bearing a slit-like opening through which the staminal tube, style and stigma protrude.

It would be interesting to know whether this peculiar mutation occurs elsewhere in Britain. From the Continent it has been recorded on several occasions. Dahlstedt (Act. Horti Bergiani, iv. 1907) describes two such forms which were cultivated in the Bergian Botanic Garden at Stockholm. To these he gave the specific names of *Taraxacum tiroliense* and *T. cucullatum* respectively. These forms, like the British one described above, are characterised by the pale colour of their inflorescence, *T. tiroliense* having been originally distributed by Hellweger under the name of *T. alpinum* Koch var. *ochroleuca tubulosa* m. It was found in the Austrian Tyrol, while *S. cucullatum* was only known in cultivation. But as the seeds of the

latter came from Salzburg it is probably also of Tyrolean origin. Dahlstedt considers them to be distinct types, though closely allied. The corollas, though modified in the same way as in the British form, have a more hooded form, as seen from the copy of Dahlstedt's drawing (fig. 1 *d*). The specific name *cucullatum* is therefore descriptive. An examination of the specimen distributed by Hellweger in 1903 shows a less hood-like corolla. Indeed, the modification seems an exact counterpart of that shown in the British specimen.

Apart from these cases a form with tubular corolla was described by Beauverd (Bull. Soc. Bot. Genève, 1919) under the name *Taraxacum stramineum*. As the specific name (straw-coloured) indicates, this form also is characterised by the pale yellow inflorescences, due to the fact that only the under surface of the corolla is

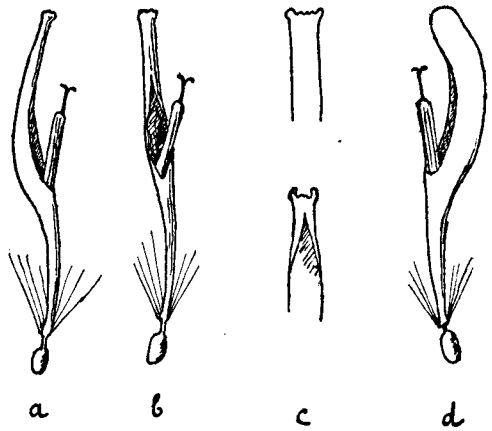


Fig. 1 *a*, *b*, *c*. *Taraxacum officinale* var. *cucullatum*.
a. Side view of one of inner florets.
b. Front view of same.
c. Tips of two outer florets.
d. Floret of *Taraxacum tiroliense*, after Dahlstedt.
The figures are about twice the natural size.

visible. Chodat in his reference to this plant in an article on Alpine Endemism (Verhand. d. Naturforsch. Ges. in Basel, xxxi. 1923) states that apart from the original locality (Savoie) it occurs in quite a number of places in the Swiss Alps. Being probably apogamous, it has been able to multiply and maintain itself pure amongst the plants of *T. alpinum*, of which it is probably a derivative.

The occurrence of a similar mutation in different countries (Tyrol, Switzerland and Britain) and arising from at least two distinct species of a genus is a matter of some interest, and has some bearing on the origin of "corresponding" species of plants and animals in different parts of the world.

I do not suggest a new specific name for the mutation described above, but consider it might be referred to as *Taraxacum officinale* var. *cucullatum*, not that the corolla-tube is particularly suggestive of a hood, but because the variation obviously belongs to the same category as that of the corolla of *T. cucullatum* Dahlstedt.

SHORT NOTES.

SEDUM LANCEROTTENSE R. P. Murray in Journ. Bot. 1899, 201. With the exception of the annual *S. rubens*, this is the only Stonecrop known from the Canary Islands. The describer obtained only a single specimen (1892). By the kindness of the late Dr. Perez, I obtained living material from Murray's station, "El Risco." Dr. Perez's emissary described the place as a cliff about half a mile north of the well-known chapel of Las Nieves, and the plant as occurring very sparingly there. I am glad to report that the plant is not nearly so rare on Lanzarote as these reports would suggest; I found plenty of it in Murray's station, and also under the cliffs directly under the chapel, 1800–2000 feet. It turned up again on high sea-cliffs W. and W.N.W. of Haria, and abundantly farther north of the Risco de Famara, this being the lowest station, about 1000 feet. Inland, it was seen in profusion at the Barranco de Chafariz to the southward of Haria. In spite of three months spent in collecting succulents, no other *Sedum* was found anywhere on the Canaries, although five new species of *Sempervivum* were obtained; but I brought home from Madeira living plants of the endemic *S. fusiforme*, an interesting and pretty plant, with glaucous foliage and large golden petals with a brownish mark. It has very seldom been collected, and so far as I know has not been in cultivation previously.—R. LLOYD PRAEGER.

THLASPI ALLIACEUM L. In the *Journal of the Ministry of Agriculture* for September 1923 (pp. 535–538), Messrs. W. M. Ware and J. E. Chambers, of the South-Eastern Agricultural College, Wye, describe and figure this species, which occurred in abundance in May of the same year in "a weed-infested arable field in the neighbourhood of Hothfield, near Ashford, Kent: the plants were so numerous as to resemble a crop being grown for seed." There is a specimen in the British Herbarium of the Nat. Hist. Museum, labelled in Lightfoot's hand: "*Thlaspi alliacea* [*sic*] British Mr. Tofield." Thomas Tofield was born at Wilseck, Yorkshire, in 1730, lived at Doncaster, where he had a garden, and died and was buried at Portsmouth in 1779. Nothing more seems to be known about him, except that he was a correspondent of Hudson, who commemorated him in the genus *Tofieldia* (Fl. Angl. ed. 2, 175; 1778) but gives no particulars concerning him and does not even include his name among those of the botanists to whom he was indebted (pref. iii). *T. alliaceum* is included in Petiver's "Account of divers Rare Plants" observed in 1714 in gardens about London, and particularly in the Apothecaries'

Garden at Chelsea (Phil. Trans. No. 343, pp. 269–284): he enters it as "Scorodo-thapsi [*sic*] Ulissis Aldrovandi Chabr.," with a note: "That very great and laborious Naturalist Ulisses Aldrovandus first discovered this Plant growing about Bononia. It flowers and seeds in Chelsea-Garden early in the Spring" (p. 275); there are specimens in Petiver's herbarium (Herb. Sloane, 276, f. 30; 171, f. 194). The plant is not included in Mr. Dunn's *Alien Flora* (1906).—JAMES BRITTEN.

CALAMAGROSTIS EPIGEIOS IN KENT. According to Hanbury and Marshall's *Flora* (1899) this is a rare plant in the county, only nine stations being mentioned. Mr. J. E. Chambers has just sent me excellent fresh specimens from a wood near Pluckley; this is new to District 9 of the *Flora*. Mr. Chambers tells me he has found *Dianthus Armeria* between Bethersden and Ashford and *Trigonella purpurascens* on Hothfield Common; both these stations are in District 9, and the latter is an addition to that division of the county.—C. E. SALMON.

COLLECTORS' REFERENCE NUMBERS. Comparatively few British collectors make use of reference numbers for their specimens. Even in one's own collection such numbers are useful, but they should always be used for specimens which are distributed. The number should always appear on the top of the label, preferably on the left-hand side. Numbers are especially useful to distinguish specimens gathered on the same day at the same place. When such plants are sent in for distribution without name or number, it is often impossible to determine whether they are intended by the collector to represent the same species or variety; and here I would suggest that when critical shrubs are distributed, such as *Rosa*, *Rubus*, *Salix*, &c., it is very desirable that a separate number should be given to each bush. I have come across numbers of cases where the collection has admittedly been made from several bushes which are not the same. This method is, of course, impossible in the case of small plants such as *Euphrasia*, or Batrachian *Ranunculi*. In this connection I would point out how confusing is the use of the *London Catalogue* or Druce's Catalogue numbers, which may always be mistaken for the collector's number unless it is clearly shown what they mean, which is often not done. If it is thought desirable to use such numbers, it would be clearer if they were cited after the name of the plant, not before it, and the edition of the Catalogue added. The same argument applies, but with less force, to vice-county numbers; if these are used they should be in addition to, not in substitution for, the vice-county names. It must be very confusing to foreign botanists, not conversant with our methods, to find three numbers on the same label.—A. H. WOLLEY-DOD.

GLADIOLUS ILLYRICUS. Mr. G. H. Dalrymple, of the Nurseries, Bartley, Southampton, writes in *Gardening Illustrated* of Aug. 23: "Last month (June) I found a colony of the rare *Gladiolus illyricus* in the New Forest, about three miles from here. It was then in bud.

I was unable to go again until last week, when I found the blooms were over, and only the seed-pods visible, of which I send two or three. . . . . The colony was growing in the open on the edge of open woodland to the south of it and at the bottom of a range of hills to the north. It was more or less free of *Erica cinerea* and *Calluna*, but bracken was growing up with it and now quite covers it. Cattle graze over the ground and trample it, so it has a struggle to keep going." The specimens which were sent to us for confirmation have been placed in the British Herbarium of the Natural History Museum.

DIGITALIS DUBIA Rodr. I was very interested in the review of Dr. Knoche's handsome *Flora Balearica* (pp. 247–251) which recalled memories of a most enjoyable visit to the fascinating island of Majorca nearly twenty years ago. It a little surprised me to see that Dr. Knoche reduces the status of *Digitalis dubia* Rodr. to a subspecies of *D. purpurea* L., as, quite apart from the differential characters which the two plants present, the behaviour of *D. dubia* when pollinated by *D. purpurea* would seem to indicate that it is entitled to full specific rank. From seed brought back from Majorca, both I and my friend the late Mr. R. S. Standen raised several plants of *D. dubia*, and these when planted out in the neighbourhood of *D. purpurea* invariably failed to set seed which was not the result of pollination by *D. purpurea*. The resulting hybrids were remarkably floriferous plants, much branched and rather untidy in habit, but they entirely failed to set any fertile seed at all, and the plants soon flowered themselves to death. Neither they nor *D. dubia* appeared to be hardy enough to stand an ordinary English winter. The effectual pollination may show that the two species are closely allied, but the sterility of the resulting hybrid is generally considered as some evidence in favour of the specific distinctness of the two species involved. The prepotency of the pollen of *D. purpurea* in fertilising *D. dubia* was apparently absolute, and it occurred to me that in similar cases prepotency on the part of a possibly newer and more robust species might be a very active agent in hastening the destruction of an old and dying-out species, to which category apparently most of the endemic species of the Balearic islands belong.—W. E. NICHOLSON.

CAREX VESICARIA, L. emend. Stokes in With., IN SOMERSET. A specimen of this has been sent me from a marsh near Muchelnay, Langport, collected on July 5 by Dr. Harold Downes. It is not recorded in Murray's *Flora of Somerset*, nor in Marshall's *Supplement*, but is known from a single locality in West Gloucester, and in Cornwall and South Devon from a few localities.—A. J. WILMOTT.

A NEW TYPE-TERM. One might think that the number of terms already coined to describe the various kinds of types—*i. e.* various relations between specimens and names—was more than sufficient. But there is one factor which, so far as I know, has not been considered, as it does not also affect zoological problems—the fact that one can continue to take specimens from the same original holotype plant for many years after its description and name is published. In some cases difference of season may cause such specimens to differ from the original description; in other cases cultivated cuttings (as of *Salix* hybrids) may differ from the original. But from a taxonomic point of view it would be absurd to treat specimens obtained in this way (excluding bud-sports) as not equal in value to the original specimens. We name an individual, although we describe a specimen: it would be pedantic to refuse special importance to specimens thus obtained after publication. Such specimens can be indicated by the prefix *iso-* (equal, equivalent), added to the existing type-term, e. g. *isoholotype, isolectotype*.—A. J. WILMOTT.

SEEDLING ASPHODELUS FISTULOSUS. On Sept. 7th in the vertical wall of the Floating Harbour, Broad Quay, in the centre of Bristol, I saw a small clump of grass, probably *Lolium italicum*, of which a single plant was flowering near; with the former were four seedling *Asphodelus fistulosus*, three of which had very small buds and flowers. The tallest of the three seedlings removed is only 18 cms. high, with three flowering spikes; two of these have about six pedicels with green buds or small flowers, the largest of which is only $3\frac{1}{2}$ mm. in length, but with the characteristic green rib or keel to the segments, which are otherwise dull purplish or dirty white. These two half-open perianths have yellow anthers and a young green ovary visible under a lens, but apparently the styles have been broken off by some insect. The short bracts are of the normal dull white, and the broadened sheath-like bases of the fistulous leaves, only 1 mill. wide in central portion, are very characteristic, as are the slender fibrous roots. The shortest specimen is only 13 cms. high, but its stem bears three green buds. This alien, so widely distributed in the Mediterranean region, was recorded in White's *Flora of Bristol* from St. Philip's, Bristol—two plants in 1904, and from waste ground near Bath, 1908. It is a strange occurrence for seedlings of the plant, often two feet high, to have developed flowers in such a situation and in so wet and cold a season. I observed practically no other phanerogamic vegetation upon the dock wall.—H. S. THOMPSON.

LOTUS SILIQUOSUS L. IN BERKS (see p. 246). This striking plant was found by Mr. V. Murray at Streatley, Berks, so long ago as 1913. It is included in the Report of the B. E. C. 453 for 1918 in the 'Supplement to the Berkshire Flora.' This year Dr. H. Smith showed it me growing plentifully on a grassy slope on the Berkshire side of the river near Henley, where it appears thoroughly established. In both habitats it seems to me to owe its origin to grass-seeds. The Rev. E. Ellman writes to me that it has appeared near Bath in Gloucestershire in great quantity in pasture land. He says that about twenty to thirty years ago the land was hand-cultivated for potatoes and manured with barley-refuse, when the plant came up and has since much increased. Here it is thoroughly and permanently established, chiefly on clay, and also on oolitic limestone.—G. CLARIDGE DRUCE.

REVIEWS.

Standardized Plant Names: a Catalogue of Approved Scientific and Common Names of Plants in American Commerce. Prepared by FREDERICK LAW OLMSTED, FREDERICK V. COVILLE, HARLAN P. KELSEY, Sub-Committee. American Joint Committee on Horticultural Nomenclature, Salem, Mass., 1923. 8vo, cloth, pp. xvi, 546. Price 5 dollars.

IN this Journal for 1923 (p. 244) we called attention to the prospectus of this work and described its plan and scope. It now comes before us as an exceedingly well-printed volume whose typographical arrangement could hardly be improved. Due use is made of the page-headings, and cross-references throughout add to the convenience of the list, which is printed in double columns; the approved scientific names are in black type, approved common names in small capitals, and synonyms or unapproved names in italics.

The American Joint Committee on Horticultural Nomenclature, to which we are indebted for this useful book, was formed in 1915 by committees of the American Association of Nurserymen and of the Ornamental Growers' Association. Gradually enlarging in scope and representative character, "it now includes fourteen organisations, some of general character, others devoted to special groups of plants; and there is a long list of individual collaborators, including such botanical specialists as A. S. Hitchcock for Grasses, A. Rehder for *Salix* and *Syringa*, W. R. Maxon for Ferns, and so on.

"As first constituted, the stated purpose of the Committee was to 'make buying easy' by bringing about, as far as practicable, the consistent use of a single standardized 'scientific' name and a single standardized 'common' name for every tree, shrub, and plant in American commerce": the advantages of this, which indeed need no demonstration, were set forth in a circular issued by the Committee in 1917, wherein the practical importance of stability in nomenclature, and the causes of confusion—including not only mistaken identifications, but the "differences of opinion and of practice among botanists"—are set forth with illustrative examples. With this was distributed as an "Official Code of Standard Plant Names" the "Finding List" (by Dr. L. H. Bailey), printed in the sixth volume of his *Standard Cyclopedia of Horticulture*; this list is superseded by the present work, for which the names of the *Cyclopedia* are taken as a basis.

The nomenclature adopted is discussed at length in the preface, mainly in relation to the common names. With regard to the Latin names, "the Committee has broken with the prevailing practice among botanists in two matters of typography"; no capitals are employed save for genera, and the "double ii ending of species names is changed to single." We are not surprised to learn that these alterations, though "adopted by a large majority vote" met with "vigorous opposition by a minority"; the reasons alleged for the change seem to us singularly inadequate and entirely insufficient to justify a departure from "the prevailing practice," based as that is

on the International Code and endorsed by Professor Bailey, to whose *Cyclopedia*, which it follows so largely in common names, the Committee is so greatly indebted.

As to these latter, it may, of course, for "buying" purposes be possible to establish a single name for each plant, but we fail to see that the existence of "a total of 245 vernacular appellations" for a single plant is "a ridiculous state of affairs"; and the Committee may rest assured that it not only "may" but *will* "be impossible to eradicate names" firmly entrenched in local popular usage," however "contradictory and confusing" they may appear. By way of "eliminating synonymy" "the Committee has adopted this rule": Whenever a common name properly belonging to one genus is used as a name for a plant of some other genus (unless very rarely when very closely related) it is to be used only as part of a compound name, written either with a hyphen or solid." "The Committee prefers, and prints MAYAPPLE. It makes no serious objection to MAY-APPLE. It objects very positively to MAY APPLE, which is apt to mean, for anyone not familiar with the plant [*Podophyllum*] that it is a species or variety of the genus *Malus*": hyphens are to be avoided where they are not clearly desirable. "The sign of the possessive is omitted; thus we have "Adam Laburnum," "Balfour Polyscias," "Engler Abelia" and so on, though, "for euphony or clearness," "Browns Lily, not Brown's Lily or [? nor] Brown Lily." Manufactured names abound, as in our own books: it is difficult to suppose that folk really talk about a "Wavyleaf Plantainlily" or a "Lantern Groundcherry," or refer to *Picea Kosteriana* as "Koster Blue Spruce." Exception may be taken on more serious grounds to "Maplewort" for *Aceranthus*, which must have escaped the notice of those responsible.

The labour expended on the names of florists' forms must have been enormous, and one wonders whether the result will be proportionate. Under *Gladiolus*, for example—a word that reminds us to say that the usefulness of the work would have been greatly increased had the correct pronunciation of the names been indicated,—the list occupies 22 pages in double columns; it was prepared by A. C. Beal, the Registrar of the American Gladiolus Society; the "originator and date of each are given," the former in an abridged form—the names and addresses of these occupy 3 columns. Other florists' flowers are treated at equal or greater length—Tulips have 17 pages and Roses 52; though some, including Hyacinths and Crocuses, remain for consideration, and "the Joint Committee has been unable to prepare an authentic list of the varieties of *Antirrhinum*." The names are standardized for a period of not less than five years, by which time the number will be indefinitely increased. We have often urged the desirability of including all names in one index; in this case, however, it would, we think have been better to have placed the horticultural genera by themselves in an appendix, thus avoiding the resetting of the volume when these have to be revised. We note that the Orchid and Grass genera are grouped under those headings, each name being also separately indexed, with a cross-reference to the group.

The book is much more than a mere list: the columns abound in notes which will be of interest to the botanist as well as to the horticulturist. Thus under *Ageratum* we find, "The plants known to gardeners as *Ageratum* are in a state of great confusion botanically. They apparently include species of the genera *Ageratum*, *Alomia* and *Eupatorium*"; under *Lycium barbarum*, 'The true *L. barbarum* and *L. europæum* are probably not in cultivation; the plants sold under these names are usually *L. halimifolium* or *L. chinense*"—this being so, it seems unfortunate to have "standardised" the vernacular name as "Barbary Matrimony-Vine": under *Mahonia japonica*, "The name has been commonly applied to *M. Bealei*; the true *M. japonica* of botanists is not in the trade." If this group is separated from *Berberis* as a genus, the name under the American Rules is *Odostemon*—the names under these Rules, when differing from those adopted are given as synonyms. The derivations of odd horticultural names are sometimes given: thus, we read that "The name Peegee, as a colloquial abbreviation of [*Hydrangea*] *P.*(*aniculata*) *G.*(*randiflora*) is firmly established in the trade as the only common name of this plant."

It would be easy to prolong this notice, but enough has been said to show that the work is the result of much care and labour; how far it will attain its object only time will show. If we may judge from the commendation which appears at the head of the circular of its contents it is assured of an enthusiastic reception: "Standardized Plant Names," the paragraph runs, "is a cracker-jack—all that we have expected. This book will help us a lot along the way. I expect it to be about the most useful book in my office. It may not be any better than the Bible, but I will probably consult it oftener.—Frank A. Waugh, Amherst, Mass."

We ourselves are as ignorant of what a cracker-jack may be as Mr. Micawber confessed himself with regard to gowans, but it is clearly a term of superlative appreciation.

Permeability. By W. Stiles, Sc.D. Reprinted from the *New Phytologist*, vols. xx.–xxii. 1921–3. Wheldon and Wesley 8vo, pp. 296. Price 12/6 net.

This book contains a very valuable store of information on more subjects than the title might suggest. The author explains, indeed, in the introductory chapter that he intends to deal not only with permeability in the strict sense, but also with other factors controlling the movements of substances in plants. In the second chapter he discusses, mainly on orthodox lines, the structure of protoplasm, and emphasizes its complex and heterogeneous nature. The succeeding chapters deal with the pure physico-chemistry of surface phenomena, diffusion, the permeability of membranes and osmotic pressure. A large part of this convenient digest forms a necessary basis for the later discussions of botanical problems: and even if certain portions of the mathematical treatment seem to stray rather far from the living plant, yet the botanist may well be glad to have them on his shelf to refer to in an hour of need.

The next chapters bring us back to botanical topics, dealing with the chemistry of the cell-wall, and the question whether there exist round cells, plasmatic membranes—in the sense of surface layers with semi-permeable properties different from those of the rest of the protoplasm (p. 72). On this latter point much interesting evidence is presented, tending to show that there exist in certain cases visibly distinct limiting layers round protoplasts, and also that in some cases the distribution of solutes inside and around cells really does make it necessary to consider them as osmotic cells surrounded by semi-permeable membranes. But the latter evidence, as the author himself points out, is only relevant in the case of non-vacuolated cells, since the osmotic behaviour of vacuolated cells may depend on semi-permeable properties of the protoplast as a whole. Nor, for that matter, is the evidence for visible limiting layers relevant, since it is not shown that it is these that are semi-permeable. To go further; it may well be urged that the primary and important physiological question is after all to what extent the cell functions simply as an osmotic mechanism, and that it is a secondary question on what part of the protoplast the necessary semi-permeable properties depend. This long and interesting chapter might then have been divided under other headings.

Chapter 9 deals with the "water-relations of the plant cell." An exposition of the different pressures to be considered in a tissue of osmotic cells is similar to that given by Ursprung and Blüm in various papers. As methods for the measurement of the "osmotic pressure of the cell," the old plasmolytic method and the newer "plasmometric" method of Höfler are described. Only the latter, however, gives the osmotic pressure of the normal cell, since the former gives its osmotic pressure at incipient plasmolysis (O_g of Ursprung and Blüm). Reference is made to various researches tending to show a gradient in "osmotic pressure" (by which is usually meant O_g) from lower to higher parts in trees, and also to the much more important demonstration by Ursprung and Blüm of an upward gradient in "suction-pressure" (which equals osmotic value of normal cell minus its turgor-pressure) in the beech. Such a gradient is the only one which the upward movement of water should lead us to expect, since it is the inverse of the gradient in free energy of the water. A gradient in "osmotic pressure" is not necessary. Briefly mentioned is also the important find by the same authors of a marked break in this gradient of suction-pressure, between the innermost cortical layer of the root with high suction-pressure and the endodermis with low. This means that here some different mechanism must be at work: its nature is, however, left undecided.

The remainder of the book, which deals with the rate of passage of solutes into and out of cells, and the equilibrium finally obtained, is perhaps the most attractive part and the most originally set forth. Here the author can often quote from the researches of himself and collaborators. He strongly emphasizes that the rate at which a solute enters a cell depends not only on the permeability of the cell, but also on the concentration gradient under which it is moving, and

hence indirectly on its fate within the cell. For if on entering the cell, it is continually combined and removed from solution, the concentration gradient will be maintained, but otherwise not. No doubt this point has often been neglected, but the author seems hardly justified when he goes on to criticise, partly on this ground, the important work of Fitting on the rate of intake of salts by living cells. Fitting's method is essentially to estimate the rate of entry of a salt into the cells of a plasmolyzed tissue by observing the rate of deplasmolysis; and this rate of entry is taken as indicating the permeability of the cell. An important finding is that the permeability to a salt is at first high, but soon falls off. The author objects that, as the salt enters, the equilibrium point will be approached, and that this will suffice to explain the falling off in rate of entry. But during Fitting's short observation-times, the total amount entering is very small. Thus with external solutions of round about ·12 GM. KNO_3, it was found that during the first hour ·0075 GM entered the cell, during the 2nd hour ·0025 GM only (Fitting, 1915, fig. 2, p. 22). The entry of such small amounts of salt cannot be enough to cause an approach to anywhere near the equilibrium ratio of external and internal concentrations. In various other passages too, Fitting's laborious and careful researches seem to be set aside too lightly.

From experiments by Nathansöhn and Meurer, it is calculated by Stiles and Kidd that with tissues immersed in fairly strong solutions of salt, a final equilibrium is commonly reached in which the concentration of salt in the cells is lower than its concentration in the solution. It is reasonable here to reverse the author's criticism of Fitting and to ask whether this result is not more probably due to a fall in the permeability of the cells, rather than to the attainment of a state of equilibrium, as the author supposes. It is, indeed, not explained in what way an equilibrium can be supposed to obtain in vacuolated cells with the internal concentration still lower than the external. The author is to be congratulated on having produced a review of the subject so rich in contents and interest.

R. Snow.

Rhododendrons and the Various Hybrids. Second Series. By J. G. Millais. With 17 Coloured Plates by Miss Beatrice Parsons, Miss Winifred Walker, and Miss Lilian Snelling; 14 collotype plates and numerous illustrations from photographs. 4to. 16×12 in. Cloth, pp. xii, 265. £10 10*s.* net. Longmans, Green & Co.

In our volume for 1918 (pp. 26–28) we reviewed at some length the work of which the second volume is now before us, and to the notice there given we must refer the reader for a general estimate of this handsome book—equal in every respect to its predecessor and in one detail even superior, for certain typographical flaws to which we then called attention find little place in the present volume.

The most striking feature of the book is the testimony it bears to the astonishing advance which has been made in our knowledge of the genus to which it is devoted—mainly due to the researches of Mr. George Forrest and Captain Kingdon Ward, the result of whose earlier collecting, up to 1916, with that of E. H. Wilson and Dr. Henry, was embodied in the preceding volume. Mr. Forrest's collections of 1917–22, and Captain Ward's of 1919–22 are here included with those resulting from the explorations of Reginald Farrer, unhappily terminated by his death on Oct. 16, 1920, on the frontier range between Burma and China. A special chapter is devoted to a full account of the recent discoveries of these investigators, by whom "an immense amount of exploration has been effected in Western China and in the Tibetan marches and N.E. Burma .... Something like 400 new species from these areas, mostly described by the late Sir J. [I.] Bayley Balfour, Prof. W. W. Smith, G. Forrest, Kingdon Ward and Reginald Farrer, have been added to our list; whilst large numbers await descriptions." The whole number of species of *Rhododendron* is estimated by Mr. Millais at over 670; but he is inclined to think that several of those described by Balfour "are merely natural hybrids," and himself claims to have produced them by artificial crossing. In his Introduction, indeed, the author is even more sweeping: "We know to-day that hundreds of Rhododendrons have been described as species when they are nothing more than local forms of one plant"; he himself has "tried to steer a middle course." He expresses special indebtedness to the "initiation and enterprise" of Mr. J. C. Williams, of Caerhays Castle, Cornwall, who employed Mr. Forrest as a collector and has been generous in distributing the new species secured by him. Mr. Williams's great experience finds due recognition in the chapter on Hybrid Rhododendrons, in which, with the late Sir Edward Loder and Mr. Gill, he is said to "have practically exhausted and run the whole gamut of crosses likely to prove exceptional"; the list of hybridisers and of the hybrids for which each is responsible occupy six pages. There is a special account of the Japanese Azaleas which have lately assumed prominence in our gardens, largely due to the investigations of Mr. E. H. Wilson on behalf of the Arnold Arboretum; these "remained practically unknown to Britain and America until 1916."

The greater part of the volume is occupied by a list, in double columns, of "Rhododendron Species and Hybrids," with full descriptions and references; it is arranged alphabetically, and, although we can quite understand that this may be the more convenient plan for most of those who will use the book, it may be regretted that the intention of providing a key to the species, which was quite impossible at the time when the first volume was in course of preparation, has not been carried out. This, however, it would hardly be reasonable to expect in a work which is primarily of horticultural interest, and in view of the great increase of species, which will evidently continue, would indeed be premature. Something in the way of systematic arrangement is done by grouping together under series the names of the species belonging to each—*Maddeni, lapponicum, stramineum,*

ovatum, and the like —we note under the last that the original species found by Fortune in 1844 and described by Planchon in 1854 seems now to have been lost to cultivation. Although, as has been said, primarily horticultural, one notices in turning over the pages much of botanical interest—such, for example, as the notes on *R. indicum* (p. 160) and *R. lapponicum* (p. 169), *R. obtusum* (p. 197, with a long account of the "*Kurume* Azaleas") and others.

Mr. Millais's Introduction is largely concerned with the question of Nomenclature, as to which his attitude is conservative; "Doubtless Mr. E. H. Wilson is perfectly correct in calling the old well-known *R. ledifolium* by the name of *R. mucronatum* . . . . but the question is, will the gardening people accept it?" (p. v). His view as to the results of the Vienna Congress, at which were "plenty of German and Austrian professors and not a few from other countries" is interesting at a time when British, Irish, and Colonial botanists have met in council to suggest a revision of some of the decisions there arrived at. "What actually happened," after Vienna, he tells us, was that "each and all of those learned men," having agreed to conform closely to the laws of priority, "went home, and when they wrote new books and profound treatises on their pet subjects totally ignored the conclusions of that conference"; this "only shows that Man is an individualistic animal and hates being dictated to, especially by foreign Scientists." We did not know that things were as bad as that, and can only hope that the conclusions of the future Congress, to which those of the British gathering will be submitted, will secure greater acceptance.

We must not close our notice of this handsome volume without a reference to the numerous and excellent illustrations, which add greatly to its value and attractiveness. At a time when our parks and private gardens are showing so advanced an appreciation of the decorative value of shrubs in general—a subject to which a chapter is given—and of Rhododendrons in particular, Mr. Millais's work cannot fail to obtain the welcome which it deserves.

BOOK-NOTES, NEWS, ETC.

An addition to the already long list of American periodicals is made by the Marsh Botanical Garden of Yale University, which is issuing a series of "Publications." The first of these—a monograph of "Connecticut's State Flower," *The Mountain Laurel* (*Kalmia latifolia* L.), considered as a forest plant—is by P. L. Buttrick, Secretary of the Connecticut Forest Association, and is a very complete and interesting account of the plant in its various economic aspects. In a series of chapters the author describes the growth and habitats of the plant and the trade in its foliage, which in the Christmas season is very extensively employed in house decoration—so much so that its collection has been restricted by the so-called "Laurel Law," which lays down certain provisions; its growth for the market is advocated, and "there seems no reason why it should not be featured in our public parks." The name "laurel" was applied to the *Kalmia* from the form of its leaves, which resemble those of the true Laurel—the latter, by the way, is not so restricted in its growth with us as Mr. Buttrick seems to suppose when he says it "has been known as *a greenhouse plant* in England for centuries": the earlier name, "Spoonwood," given by the Indians from its use in making simple eating implements, has almost passed away. The Mountain Laurel, according to Mr. Buttrick, was first mentioned by Captain John Smith in his *General Sketch of Virginia* (1624); the earliest account of it appeared in Plukenet's *Mantissa*, p. 49 (1700); it is figured in his *Amaltheum* (t. 379, fig. 16), and specimens are in his herbarium (Herb. Sloane, 93, f. 100, 94, f. 180).

The *British Mycological Society Transactions* (vol. ix. pt. 4) contains several papers of interest. M. Wilson and F. C. Ford-Robertson write on "A new species of *Monochætia*" (*M. Cryptomeriæ*) found on fallen leaves of *Cryptomeria japonica*, fully describing its cultural characters; C. H. Cunningham describes the development of *Gallacea Scleroderma* (Cke.) Lloyd, a monotypic genus from New Zealand which closely resembles *Hysterangium*; H. R. Briton-Jones records his observations on eight strains of *Rhizoctonia Solani*, some of which are easily distinguishable macroscopically, though when examined microscopically they cannot be separated by any observable character; K. W. Braid, writing on *Fistulina hepatica* and hollow, stag-headed oaks, suggests that the attacks of the fungus may be responsible for the well-known malformation; R. Paulson records observations on "Tree Mycorrhiza," stating that the association with the fungus begins in the case of the birch almost immediately after germination; and that there are indications that in times of severe drought, when much mycorrhiza has been destroyed, certain trees lose vitality and become specially subject to attacks from microfungi; J. S. Bayliss-Elliott and O. P. Stansfield give the life-history of *Polythrincium Trifolii* Kunze, which includes a conidial stage (*Polythrincium*), a pycnidial stage (*Sphæria Trifolii* Pers.), and an ascopore stage (*Dothidella Trifolii*, n. sp.); F. T. Brooks supplies a semi-popular paper on "Epidemic Plant Diseases," and the late Sir H. C. Hawley, of whom the number contains an obituary notice, has a note on 'The Flora of a Blackbird's Nest,' which by the courtesy of the editors we hope to print later.

The *Journal of the R. Horticultural Society* (vol. xlix. pt. 2; July) contains two papers by Dr. Daydon Jackson of special interest: one, on "Botanical Illustration from the Invention of Printing to the present day," was read by the author before the Linnean Society in April 1923, and is briefly epitomised in this Journal for that year (p. 181): the other is the long-desired "History of the Compilation of the *Index Kewensis*"—this, by permission of the Council of the R. H. S. and of the author, we propose to reproduce. The part also includes a paper on "The Flora of the Upper Irrawaddy," by Captain F. Kingdon Ward, in which we notice several *nomina nuda*;

and an interesting description of "Some Pyrenean Plants at Home," by Sir Arthur P. Hort; Mr. W. A. Dowson contributes an account of "A New Disease of Sweet Peas" to which the name "*Cladosporium album*, sp. nov." is given—it would seem on somewhat slight grounds, as the diagnosis is "*Cladosporium herbarum* (Pers.) Lk. simile sed album." "Book Reviews" (10 pp.) and "Notes and Abstracts" (26 pp.), with other papers and reports, make up an unusually interesting number.

Two fascicles of *British and Irish Charophyta* have recently been issued by Mr. James Groves and Canon G. R. Bullock-Webster, and may without hesitation be regarded as among the most satisfactory exsiccata ever issued. The beautiful specimens, for the preparation of which the Canon is mainly responsible, are well mounted and, because of their fragility, provided with protective covers of paper so transparent as to permit the labels to be easily read and the habit of the plants to be studied. There are twenty-one sheets in each fascicle, including examples of new species and varieties mostly described in this Journal in recent years. Only 25 sets are available for distribution; and the price for the two fascicles is two guineas.

F. M. Essig (University of California Publications in Botany, vii. no. 14) describes "The Morphology, Development, and Economic Aspects of *Schizophyllum commune* Fries"—a plant of great biological interest upon which much has been written. According to the author the segments of the mycelium and the spores are regularly binucleate. During development the hymenium primordium arises in an apical cavity, thus differing from all other Hymenomycetes so far studied. The "gills" arise upon the surface of an apical depression due to tensions set up by unequal rates of growth; the "lamellæ" are such by analogy only, being the edges of smooth hymenial areas: *Schizophyllum* consequently should be placed in the family Thelephoraceæ. The mycelium is found only in small amount in infected wood; it can grow upon fresh, and, under very favourable conditions, living wood. Natural infection takes place through some injured or weakened part of the tree. The plant is usually associated with other parasitic fungi, which probably do most of the damage attributed to *Schizophyllum* but escape attention due to the longer time necessary for them to produce fruit bodies.

In connexion with the 'St. George' Expedition (see p. 156), botanical collections have been made in Madeira, Trinidad, Panama, the Galapagos, and the island of Gorgona off the west coast of Colombia. These are being worked out at Kew by the botanist to the Expedition, Mr. Riley, who has returned to England on medical advice. The Madeira plants have already been named, and the first and second sets have been presented by the Scientific Expeditionary Research Association to Kew and the British Museum respectively. Very little was previously known of the flora of Gorgona, and the collection from that island should prove of great scientific importance.

Rush Whips. The following, headed "A Survival," appeared (unsigned) in the *Evening News* of Aug. 26: "In the country lanes near Edgware, where now the voice of the builder is heard in the land, I met an old, old man. He was selling those rush plaited whips which I have not seen since my childhood. 'I'm the last man that makes 'em,' he said, 'I've been making 'em for twenty-five years. People go on buying 'em; they say they reminds 'em of their boyhood! Yes, twopence each, sir!'"

The London Naturalist for 1923 (L. Reeve, 3*s.*) contains an account of the plants met with during the four excursions of the London Natural History Society, of which it is the organ, to Chiselhurst, Box Hill, Epping Forest, and Effingham and Wisley; the most interesting plant mentioned is "a form of *Campanula rotundifolia* with corollas divided at its base into five narrow strap-shaped segments, several plants being found in one area." One species has been added to the northern portion of the Society's area and twenty-three to the southern.

The *Bulletin de la Société Botanique de France* (tom. lxxi. parts 3, 4; March, April) contains: "Homologies de la feuille chez les Graminées," by P. Bugnon; "Dimorphisme sexuel des Fleurs," by L. Blaringhem (*Lychnis vespertina* and *L. Flos-cuculi*; 2 plates); "Les *Symplocos* d'Extrême-Orient," by A. Guillaumin; "Dévelopement vasculaire dans *Helianthus annuus* var. *uniflorus*," by G. Bouvrain; "Le Vacuome chez les Eugléniens," by P. Dangeard; *Bizolnua* (Sapindaceæ) et *Augouardia* (Cæsalpineæ), genn. nov.); "Rubigeneuses hétéropodes," by L. Mugnier; "Monographia Crocyniarum," by the Abbé Hue.

The *Kew Bulletin* (no. 7) contains "Notes on the Flora of Patos"—a small uninhabited island 1¼ miles long, "attached to the Colony of Trinidad and Tobago and situated in the Gulf of Paria,"—by R. O. Williams; 27 species are enumerated, 9 of them Cacti (4 pl.); "Fresh-water Algæ of the West Falkands," by Mrs. E. F. Vallentin; and the first part of a paper "On the Flora of the Gallipoli Peninsula," by W. B. Turrill.

The *Bulletin of the Torrey Club* (Aug.) contains "Studies of *Tortula* as represented in Southern Arizona," by E. B. Bartram; "The Talipot Palm at Peradeniya," by W. Seifriz; "Algæ of Bermuda and the Bahamas," by M. A. Howe.

Lieut.-Col. A. T. Gage, late Director of the Botanical Survey of India and Superintendent of the Calcutta Garden, has been appointed Librarian and Assistant Secretary to the Linnean Society.

We regret to record the death at the age of 86 of Mr. Charles Bailey, M.Sc., F.R.S., which occurred on September 14th at his residence at St. Marychurch, Torquay, and of Mr. George Webster at York, aged 73, of whom fuller notices will follow in due course.

"FLORA LONDINENSIS."

[Reprinted from *Punch* of July 23 by the special permission of the Proprietors of *Punch*.]

WHEN my eyes are fairly weary of this London of to-day
I withdraw five battered folios all marbled black and grey
From their station on my bookshelves, and I read the world away

In the company of CURTIS, prince of botanists, whose word
Was the last on London's flora in the reign of GEORGE THE THIRD,
When he lived at Lambeth Marshes . . . Yes, I know it sounds absurd

But the flowers and CURTIS flourished there, the Thames was bright with Sedge,
Not a crumpled wall at Putney but had Stonecrop on its ledge;
There was Traveller's Joy at Lewisham along the turnpike hedge.

Then Toadflax throve on Temple walls and Lilies slipped their sheath
In Lord MANSFIELD's little pinewood on the way to Hampstead Heath,
And the copses out at Croydon had white Violets beneath.

Not a day went by for CURTIS without some botanic thrill,
He found Teasels down at Deptford and "on Moulsey Hurst" a Squill,
And he plucked a Twayblade Orchis from the turf of Shooter's Hill.

For him the Chelsea Kingcups blew, for him the Mushrooms stood
In the pasture-lands of Islington this side of Hornsey Wood;
You can't pluck Cress on Hounslow Heath, of course, but CURTIS could.

At times "within sides of old wells" he found a Hart's-tongue fern,
And every year at Battersea he watched the brief return
Of the Poppies whose "fugacity" aroused his quaint concern.

And now his London too is fled, there's scarce a petal's trace
Of the Thames-side flowers that flourished in his Georgian year of grace,
Only weed on weed of brick-work that has over-run its place.

Yet if you can harbour CURTIS (and the elbow-room he claims
Speaks itself of ampler ages) take him down and read the names
Of his blossoms and their habitats, until your fancy flames

With gable-ends and gravel-pits and lanes that gain the down,
And rushy streamlets close at hand and sylvan hills to crown
A city almost suburbless, a country-girdled town.

ADDITIONS TO THE SCOTTISH SPHAGNA.

BY J. A. WHELDON, M.Sc., A.L.S.

IN the *Synopsis of European Sphagna* (1917), prepared for the British Bryological Society by the writer, an effort was made to indicate all the species, varieties, forms, and subforms then known to occur in the British Isles. During its preparation it was noticed how few reliable records there were for some of them from the Scottish counties. Since then a few enthusiastic collectors have sent me specimens from time to time, and the object of this paper is to show some of the results of their exertions. During the war, when Sphagnum came into prominence as a dressing for wounds, the Scottish bogs supplied vast quantities for this purpose, and some of the collectors sent me a few varieties of interest, which were new to Scotland or to Great Britain.

It is unfortunate that bryologists, both Scottish and English, with a few exceptions, are attracted so much by the rich Alpine cormophytic Flora that they show little inclination to visit the alder and willow swamps, the lowland peat bogs and marshes, to which some of the rarer sphagna seem to be restricted. So that it is not possible to give any reliable indication of the actual distribution, either altitudinal or horizontal, of any of the species, although we possess a few data as to the ascending limits of some of them.

The present list is designed to supplement the comital numbers of the *Synopsis*, and they are nearly all of them additional to those shown in that work. All those included have passed through my hands with the exception of *S. subtile*, and probably over 95 per cent. of them are represented in my collection of British Sphagna by voucher specimens. An asterisk is prefixed to the names of those which are believed to be new records for Scotland, although in a few cases these may have been already mentioned in the Bryological or other Society's Reports, or in periodical literature. But these duplications are not numerous. Forty species are accepted in the list, and one (*S. Franconiæ*) is at present excluded as somewhat doubtful. In the *Synopsis* thirty species were admitted for Scotland, and one (*S. platyphyllum*) regarded as requiring confirmation. When the *Census Catalogue of British Mosses* was published in 1907 some plants now ranked as species were treated as varieties, and *vice versa*, but, so far as one may estimate, that catalogue would show about 30 species for Scotland if reduced to present standards. I have seen only one Scottish species which does not occur in England, viz. *S. Lindbergii*, though probably *S. balticum* should be added to it, as English examples have not been recently found.

Species found in England, Scottish specimens of which have not yet reached me, are the following:—*S. riparioides* W.; *S. riparium* Angstr.; *S. Torreyanum* Sulliv.; *S. obtusum* W.; *S. Holtii* W.; *S. hercynicum* W.; *S. bavaricum* W.; *S. armoricum* and *S. hakkodense* W. & Card. These are all plants of comparatively low levels, few of them ascending to 1000 ft. in their recorded stations.

The number of records by the Rev. D. Lillie, of Watten (marked L.), and Mr. D. R. Robertson, of Dundee (marked R.), denote how enthusiastically they have helped to fill the gaps in our knowledge of the Scottish Sphagna, and my special thanks are due to them for their generous help. Thanks are also due to the other collectors whose names are quoted in the list without abbreviation. The contributions of my companion on many excursions, Mr. Albert Wilson, are indicated by Wi. and my own by Wh.

It may be finally remarked that the Sphagna of no Scottish vice-county are completely worked out, unless it be that of Caithness, where the Rev. D. Lillie has collected so assiduously. So that any botanist may easily add to our knowledge by taking up a few of the specimens met with on his quest for plants of other groups.

S. FIMBRIATUM Wils. var. VALIDIUS Card. f. *spectabile* W.* subf. *squarrulosum* H. Mull. 77. *Moses.* 108. *L.* *subf. *anocladum* Eat. & Fax. 104. *McArthur.* 109. *L.*—f. *compactum* W. 76. *Dallmann.* 112. *Gasking.*

*var. INTERMEDIUM Russ. 112. *Gasking.* f. *densum* Wh. 85. *R.*

*var. CONCINNUM W. (=*arcticum* Jens.). 85. *R.*

S. GIRGENSOHNII Russ. var. MICROCEPHALUM W. 105, 108. *L.*

var. GRACILESCENS Grav. 81. *Miss D. Bate.* 88. *Binstead.* 90. *R.*

*var. SQUARROSULUM Russ. 107. *L.*

var. STACHYODES Russ. 73. *W. West.* 90. *R.* 105, 107. *L.*

S. RUSSOWII Warnst. var. GIRGENSOHNIOIDES Russ. f. *virescens* Russ. 70, 90. *R.*—f. *flavescens* Russ. 85. *R.*

var. PŒCILUM Russ. 90. *West.* 108, 109. *L.*

S. FUSCUM v. Klinggr. var. ROBUSTUM W. f. *fuscescens* W. 78. *Archer.*—*f. *pallescens* W. 98. *Wi. & Wh.* New to Britain.—*f. *virescens* W. subf. *anocladum* W. New to Britain. 78. *Archer.*

var. MEDIUM Russ. f. *fuscescens* W. subf. *heterocladum* W. 96. *Wi.* 107, 109. *L.* subf. *anocladum* W. 90. *R.* 107, 109. *L.* subf. *orthocladum* W. 107, 109. *L.*—f. *pallescens* W. 78. *Archer.* 92. *Wi. & Wh.* 109. *L.*

S. WARNSTORFII Russ. *var. CARNEUM W. (v. *strictiusculum* Roth). 87. *Wi.* 90. *R.*

var. PURPURASCENS Russ. (v. *elegans* Roth.). 90. *R.* 96. *Wi.* 105. *L.*

var. VIRESCENS Russ. 96. *Wi. & Wh.*

var. VERSICOLOR Russ. 88. *Binstead.*

S. RUBELLUM Wils. var. VIRIDE. 76. *Dallman.* 102. *Gilmour.* 109. *L.*—*f. *pallidoglaucescens* W. 105. *R.*

var. FLAVUM Jens. 105, 111, 112. *L.* *f. *quinquefarium* W. 88. *Dixon.* 105. *L.*

var. RUBESCENS W. 87. *Wi. & Wh.* 108. *L.* 112. *West.*

var. PURPURASCENS W. 78. *Archer.* 88. *Wi. & Wh.* 90. *West.* 94. *Wi. & Wh.* 107. *L.*

var. VERSICOLOR W. 76. *Dallman.* 78. *Archer.* 112. *Gasking.*—*f. *immersum* (Schlieph.) W. 105. *R.*

var. SORDIDUM W. f. *immersum* W. 78. *Archer.* 81. *West.* 90. *R.* 107, 108, 109. *L.*—f. *densum* Wh. J. Bot. 1921, 185. 96. *Wi. & Wh.* 108, 109. *L.* 111. *Grant.*

S. SUBTILE W. var. PULCHELLUM W. 88. *Binstead.*

S. ACUTIFOLIUM Ehrh. var. VIRIDE W. f. *heterocladum* W 85. *R.* 105. *L.*—*f. *dasycladum* W. 75. *Armitage.* 90. *R.* 109. *L.*—*f. *orthocladum* W. 70. *R.*

var. PALLESCENS W. *f. *heterocladum* W. 90. *R.* 105. *L.*

var. RUBRUM Brid. *f. *drepanocladum* W. 78. *Archer.* 81. *West.* 88. *Rilstone.* 96. *Armitage.* 98. *Wi. & Wh.*—f. *heterocladum* W. 78. *Archer.* 88. *Rilstone.* 96. *Wi. & Wh.*—*f. *orthocladum* W. 90. *R.* New to Britain.

var. VERSICOLOR W. f. *venustum* Wheld. 87. *Wi.*—*f. *deflexum* W. 90. *R.*—*f. *densum* Wheld. 90. *R.* 98. *Wi. & Wh.* 105. *R.* 108. *L.*

var. FLAVORUBELLUM W. 85, 90. *R.* 91. *Sim.* 98. *Wi. & Wh.*

var. FLAVESCENS W. 73. *West.* 98. *Wi. & Wh.* 109, 111. *L.*

*var. OBSCURUM W. 109. *L.*

S. QUINQUEFARIUM W. var. VIRIDE W. f. *mastigocladum* Wh. 105. *L.*—f. *heterocladum* W. 85. *R.* 89. *Wi. & Wh.* 105. *L.* 112. *Gasking.*—*f. *gracilescens* W. 90. *R.* 105. *L.*—*f. *brachyanocladum* W. 85. *R.*

*var. FLAVUM W. f. *heterocladum* W. 105, 107, 111. *L.*

var. ROSEUM W. 85, 90. *R.* 105. *L. & R.* *f. *speciosum* W. 70. *R.*

var. VERSICOLOR W. *f. *drepanocladum* W. 90. *R.* 109. *L.*—f. *heterocladum* W. 90. *R.*—*f. *orthocladum* W. 90. *R.*—f. *dasycladum.* 85. *R.*

*var. PALLENS W. f. *drepanocladum* W. 105. *L.*

S. PLUMULOSUM Roll. emend Wtf. var. VIRIDE W. *f. *laxum* W. 75. *Armitage.* 109. *L.*—f. *griseum* W. 74. *Wi.* 105. *L.*

var. PALLENS W. f. *laxifolium* W. 108. *L.*—*f. *pungens* Wh. 105. *L.* 112. *Grant.*—*f. *strictum* W. 109, 112. *L.* New to Britain.

var. CÆRULESCENS Schlieph. 98. *Wi. & Wh.* 105, 108, 111. *L.*

var. LILACINUM Spruce *f. *orthocladum* W. 78. *Archer.*—f. *compactum* W. 74. *Wi.* 105, 109, 111. *L.* 110. *Braithwaite.*—f. *delicatum* Wheld. 105. *L.*

var. PURPUREUM W. 96. *Russell.* *f. *gracile* W. 105. R.

var. VERSICOLOR W. *f. *validum* W. 105. *Macvicar.* 109. *L.*—f. *tenellum* W. 75. *Armitage.* 90. *R.* 100. *Travis.* 109. *L.*—f. *ascendens* W. 70. *R.* 73. *West.* 76. *Dallman.* 108. *L.* 110. *West.*

var. FLAVOFUSCESCENS W. 73. *West.* 109, 111. *L.*

*f. *gracile* f. nov. Multo gracilior, capitulis minutis et subrotundis. Planta mollis, habitu *S. amblyphyllo* var. *parvifolio* f. *tenui* simile. Rami expansi tenues plus minusve divaricati vel reflexi, paulatim attenuati. A small and delicate form, occurring in rounded cushions. Rothiemurchus Forest (v.c. 96). *Wi. & Wh.* It also occurs on Calf Island (v.c. 71). *Hartley & Wh.*

var. OCHRACEUM W. *f. *immersum* W. 88. *T. H. Russell.*—*f. *congestum* W. 88, 98. *Wi. & Wh.* 91. *Sim.* 105. *R.* 112. *Gasking.*—f. *orthocladum* Wheld. 105. *L.*

*S. TENERUM Sull. 81. *Miss D. Bate.* 90. *Mrs. F. Bryan* (per W. R. Sherrin). New to Britain.

S. MOLLE Sull. var. MOLLUSCOIDES W. f. *heterophyllum* W. *subf. *typicum* Wheld. 109. *L.* subf. *tenerum* W. 91. *J. Sim.*

S. COMPACTUM DC. *var. SQUARROSUM Russ. f. *densum* Card. 73. *McAndrew.* 95. *Armitage.*

var. SUBSQUARROSUM W. *f. *strictum* W. 108, 109. *L.*—*f. *divaricatum* W. 105, 111. *L.*—*subf. *fuscescens* W. 70. *R.* 88. *Braithwaite.* 107, 109, 111. *L.*

var. IMBRICATUM W. f. *capitatum* W. 94. *Wi. & Wh.*—f. *obscurum* W. 105, 107, 109. *L.* 112. *West.*—f. *densum* W. 105. *L.*

S. SQUARROSUM Pers. var. SPECTABILE Russ. f. *patulum* W. *Braithwaite.*

var. SUBSQUARROSUM Russ. *f. *elegans* Russ. 90. *R.*—*f. *gracile* Russ. 105, 109. *L.*—*f. *molle.* 109. *L.* 111. *Grant.*—*f. *densum* Russ. 105, 109, 111, 112. *L.*—*f. *hydrophyllum* W. 109. *L.*

var. IMBRICATUM Schimp. *f. *strictum* W. 90. *Robertson.* This yellowish-green dasyorthoclade form is new to Great Britain. It is quite distinct in habit from our other forms of var. *imbricatum*, which, so far as I have seen them, all fall under forms *silvaticum* or *pycnocladum* Wheld.

S. TERES Angstr. var. SUBTERES Lindb. 75. *Armitage.* 109. *L.*

var. IMBRICATUM W. *f. *gracile* W. 70. *R.* 75. *Armitage.* 90. *R.* 96. *Armitage.* 109. *L.*—*f. *compactum* W. 88. *R.* 105. *L.*

S. LINDBERGII Schimp. *var. MICROPHYLLUM W. 112. *L.*

S. AMBLYPHYLLUM Russ. var. MESOPHYLLUM W. *f. *sylvaticum* Russ. 94, 96. *Wi. & Wh.* 109. *L.*—*f. *albescens* W. 96. *Wi. & Wh.*—f. *molle* Russ. 109. *L.*—[f. *Renauldii* W. 107, 108. *L.* These are somewhat doubtful and need confirmation.]

var. PARVIFOLIUM W. (*S. brevifolium* Röll.) f. *tenue* W. subf. *capitatum* W. 100. *Travis.* 107, 109. *L.* subf. *brachycladum* W. 96. *Wi. & Wh.*—*f. *Warnstorfii* (Jens) W. 109. *L.*

S. BALTICUM Russ. 107. *L.*

*S. PULCHRUM W. var. FUSCOFLAVENS W. *f. *brachyhomalocladum* W. 109. *L.*—*f. *brachyanocladum* W. 108. *L.*

S. RECURVUM P. de Beauv. *var. ROBUSTUM Breidl. *f. *fuscescens* W. 107, 109. *L.*

var. MAJUS Angstr. f. *silvaticum* Russ. 90. *R.* 96. *Wi. & Wh.* 105. *L.* 107. *R.* *subf. *deflexum.* 107. *R.*—f. *subundulatum* W. 96. *Wi. & Wh.* 105, 108, 109. *L.*—f. *sphærocephalum* W. 109. *L.*

var. PARVULUM W. *f. *viride* W. 75. *Armitage.* 88. *Wi. & Wh.* 90. *R.*—*f. *flavescens* W. 75. *Armitage.* 107, 109. *L.*—f. *pallens* W. 109. *L.*

*S. FALLAX v. Klinggr. *var. MICROPHYLLUM W. 96. *Wi. & Wh.* *var. LAXIFOLIUM W. 90. *R.* *var. SCHULTZII W. 76. *Dallman.*

*S. SERRATUM Aust. var. SERRULATUM W. 105, 107, 109. *L.*

S. CUSPIDATUM Ehrh. var. FALCATUM Russ. f. *molle* W. *subf. *eurycladum* W. 109. *L.* *subf. *tenellum* W. 75. *Armitage.* 109. *L.* subf. *capitatum* Wheld. 96. *Wi. & Wh.* 105, 109. *L.*—f. *rigidum* W. subf. *pungens* W. 96. *Wi. & Wh.* 109, 112. *L.* subf. *gracile.* 104. *C. A. Briggs.*

var. SUBMERSUM Schimp. f. *crispatum* W. 109. *L.* *subf. *pallens* W. 109. *L.*—f. *rigescens* W. *subf. *robustum* W. 105. *R.* 109. *L.* *subf. *densum* Ingh. & Wheld. 75. *Armitage.* 88. *Wi. & Wh.* 111. *L.*

var. PLUMOSUM Schimp. *f. *remotum* W. 90. *M. Duke* (per W. R. Sherrin).

S. MOLLUSCUM Bruch. var. VULGATUM W. f. *robustum* W. 105. *R.* 108, 109, 110, 111. *L.*—f. *compactum* W. 75. *Armitage.* 105, 108, 109. *L.*—f. *gracile* W. 109. *L.* *var. SUBERECTA (Grav.). 109. *L.* 111. *Grant.*

S. OBESUM W. *var. MASTIGOCLADUM W. 109. *L.*

*var. HEMIISOPHYLLUM W. 109. *L.*

*var. INSOLITUM W. f. *parvifolium* Wheld. 75. *Armitage.*

[S. FRANCONIÆ W. var. ROBUSTUM W. 109. *L.* Specimens somewhat unsatisfactory and so doubtful.]

S. SUBSECUNDUM Nees var. TENELLUM W. f. *brachycladum* W. 109. *L.*

var. INTERMEDIUM W. 109. *L.*

var. LANCEOLATUM W. *f. *humilis* W. 105. *L.*

S. INUNDATUM W. var. OVALIFOLIUM W. *f. *brachycladum* W. 75. *Armitage.* 88. *Wi. & Wh.* 105. *L.*—f. *densum* W. 111. *Grant.*—*f. *subfalcatum* W. 105, 109. *L.*—f. *laxifolium* W. 85. *R.* 105. *L.*—*f. *brachyanocladum* W. 111. *Grant.*

*var. LANCIFOLIUM W. *f. *falcatum* Schlieph. 105. *L.*—*f. *submersum* W. 109. *L.*

*var. DIVERSIFOLIUM W. *f. *rufescens* W. 90. *R.* New to Britain.—*f. *fuscescens* W. 108, 109. *L.*

S. AURICULATUM Schimp. var. OVATUM W. *f. *brachycladum* W. 75. *Armitage.* 108, 109. *L.*—f. *rufescens* W. 105. *L.*—f. *variegatum* W. 105, 111. *L.*—*f. *pungens* W. 88. *Wi. & Wh.* 105. *L.*

*var. CANOVIRESCENS W. 109. *L.* *var. SUBMERSUM W. 105 *L.* *var. LAXIFOLIUM W. 105. *R.* 109. *L.*

S. AQUATILE W. *var. MASTIGOCLADUM W. 105. *R.* *var. SANGUINALE W. 105. *L.* *var. SUBFUSCUM W. 109, 112. *L.*

S. CONTORTUM Schultz (*S. laricinum* Spruce. *S. curvifolium* Wils.).

*var. MAJUS C. Jens. f. *laxifolium* W. 90. *R.*

*var. GRACILE W. f. *falcatum* W. subf. *fuscescens* W. 88. *Dixon.* 93. *Hunt.* 109. *L.*

*S. PLATYPHYLLUM W. var. LAXIFOLIUM W. f. *monocladum* W. 109. *L.*

S. CRASSICLADUM W. var. DIVERSIFOLIUM W. *f. *inundatum* W. 109. *L.*

var. MAGNIFOLIUM W. *f. *laxissimum* W. 75. *Armitage.*

var. INTERMEDIUM W. f. *ovalifolium* W. *subf. *breviramosum* W. 85. *R.*

*S. CAMUSII W. var. PLUMOSUM W. 109. *L.*

S. RUFESCENS Nees et Hornsch. var. MAGNIFOLIUM W. f. *rufidulum* W. 88. *Russell.* 96. *Wi. & Wh.* 105, 106, 109. *L.* subf. *densiramosum* W. 105, 109. *L.*—*f. *bicolor* W. 105, 109. *L.*—f. *albescens* W. 75. *Armitage.* 85, 90. *R.* 88. *Wi. & Wh.* 109. *L.*—f. *virescens* W. 109. *L.*—*f. *uliginosum* W. 109. *L.*—*f. *fluitans* W. 109. *L.*—*f. *luteofuscum* W. 105. *L.*

*var. PARVULUM W. f. *fuscescens* W. subf. *intortum* W. 75. *Armitage.* 88. *Wi. & Wh.* 109, 111. *L.* subf. *gracile* W. 109. *L.* subf. *pulchrum* W. 109. *L.* *subf. *densissimum* W. 109. *L.*—f. *canovirescens* W. 109. *L.*

*S. TURGIDULUM W. var. IMMERSUM. 109. *L.*

var. LAXIFOLIUM W. 109. *L.* var. BREVIRAMEUM W. 105. *R.* var. INSIGNITUM W. 109. *L.* var. SORDIDOFUSCOATRUM W. 105. *R.* 108. *L.* var. FULVUM W. 111. *L.*

S. IMBRICATUM Russ. var. CRISTATUM W. *f. *glaucescens* W. 86. *Archer.* New to Britain.—*f. *spectabile* Wheld. 88, 96. *Wi. & Wh.*—f. *congestum* W. 107, 109. *L.* 110. *J. Smith.*—f. *fusceseens* W. 78, 83. *Archer.*

*var. SUBLÆVE W. 88. *Wi. & Wh.*

*var. AFFINE W. f. GLAUCESCENS W. (*S. turfaceum* W.). 85. *R.*—f. *condensatum* Wheld. (in Rep. Brit. Bry. Soc. 1924, p. 55). 73. *McArthur.* 90. *R.*

S. PAPILLOSUM Lindb. var. NORMALE W. f. *majus* Grav. *subf. *elegans* Wheld. 88. *Wi. & Wh.* 105. *R.* 107, 109. *L.* *subf. *subfuscum* Wheld. 90. *West.* 96. *Russell.* 105, 111. *L.*—*f. *squarrosulum* Ingh. & Wheld. subf. *neglectum* Ingh. & Wheld. 107. *L.*—f. *brachycladum* W. *subf. *pallescens* Wheld. 88. *Whitehead.* 85, 90. *R.* 105. *L.* 112. *Gasking.* subf. *flavofuscum* Wheld. 78, 83. *Archer.* 92. *Gasking.* 105, 108, 109, 111. *L.* 110. *West.*—f. *confertum* W. *subf. *pallidum* Wheld. 92. *Gasking.* 105, 109. *L.* subf. *fuscoluteum* Wheld. 70. *Russell.* 75. *Armitage.* 90. *West.* 88, 96. *Wi. & Wh.* 105, 108, 109. *L.* 110, 112. *West.* *subf. *flagelliferum* Wheld. 109. *L.* 110. *West.* subf. *inundatum* Wheld. 75. *Armitage.*

var. SUBLÆVE W. f. VALIDUM W. subf. *pycnocladum* W. 105. *R.* *subf. *fuscescens* W. 96. *Russell.*—*f. GLAUCOVIRENS Schlieph. 76. *Dallman.* 88. *Meldrum.* 105, 108, 109. *L.*—*f. *breviramosum* W. subf. *heterocladum* W. 88. *R.* 90. *West.* *subf. *orthocladum* W. 70. *R.* 109. *L.*—f. *compactum W.* 75. *Armitage.* 105, 112. *L.*

S. CYMBIFOLIUM Ehrh. var. GLAUCESCENS W. f. *squarrosulum* Pers. subf. *deflexum* W. 105. *L.*—*f. *brachycladum* W. 96. *Wi. & Wh.*

var. PALLESCENS W. 85. *R.* 105, 109, 111. *L.* f. *laxum* W. 85. *R.* 96. *Wi. & Wh.* 109. *L.*—*f. *squarrosulum* Wheld.

Planta plerumque gracilis, 5–8 cm. alta. Ramorum fasciculi subremoti, rami patuli divaricati breviter acuminati; folia eorum vel erecte patentia vel valde squarrosa. Near Opinan, Gairloch. *W. Ross.* (105.) *R. R. Robertson.*—*f. *confertum* Wheld. 85. *R.* 88. *Russell.* 109, 112. *L.*

var. FLAVESCENS W. 107, 108. *L.*

var. FUSCESCENS W. 70, 90. R. 105. *L.*

*var. ATROVIRIDE Schlieph. 90. *R.* This fine plant is, I believe, new to Great Britain; I have, however, a previous record for Ireland (*vide* Canon Lett's "Irish Sphagna in *Irish Naturalist*," 1923, p. 61).

S. SUBBICOLOR Hampe var. SUBCARNEUM W. 75. *Armitage.* 105. *R.*

var. FUSCESCENS Russ. 75. *Armitage.*

S. MEDIUM Limpr. var. VIRESCENS W. *f. *immersum* W. Nr. Penicuick. 78. *Archer.* New to Great Britain.—*f. *abbreviatum* W. 83. *Archer.*—*f. *squarrosulum* W. 78, 83. *Archer.* New to Great Britain.

yar. PURPURASCENS W. *f. *immersum* W. 78. *Archer.* New to Great Britain.—*f. *congestum* W. 75. *Armitage.* 78. *Archer.* 105, 108, 109. *L.*—*f. *abbreviatum* W. 81. *Miss D. Bate.*

var. ROSEUM W. f. *squarrosulum* W. 78, 83. *Archer.*—*f. *abbreviatum* W. 78, 83. *Archer.* 109. *L.*—f. *congestum* W. 75. *Armitage.*

var. VERSICOLOR W. f. *compactum* Wheld. 83. *McArthur.* 96. *Wi. & Wheld.* 109. *L.*—f. *brachyorthocladum.* 78, 83. *Archer.* 96. *Wi. & Wheld.*

var. OBSCURUM W. 105. *L.* f. *fuscescens* W. 107. *L.* *subf. *dasybrachycladum* W. 108. *L.* New to Britain.

UNWARRANTED CHANGES IN GENERIC NAMES.

By T. A. SPRAGUE, B.A., F.L.S.

MR. O. A. FARWELL (Papers Mich. Acad. Sc. 1923, iii. 91) replaces *Phrynium* Willd. (Marantaceæ) by *Narukila* Adans. Under International Rules, however, *Phrynium* Willd. is a *nomen conservatum* and *Narukila* is a *nomen abortivum*, being "coextensive with the Linnæan *Pontederia*," which Adanson (Fam. ii. 593) cited as a synonym. Mr. Farwell (*op. cit.* 92) rejects *Heteranthera* Ruiz et Pav. (a *nomen conservatum*) in favour of *Phrynium* Loefl. (Iter, 178), but the latter is invalid, as it was published *in synonymy*. He applies (*op. cit.* 91) the name *Pontederia* L. to the genus *Monochoria*, on the ground that Linné's description of *Pontederia* in Gen. Pl. ed. 5, 140, was based on *P. hastata* (*Monochoria hastata*), as regards the characters "capsula trilocularis" and "semina plurima." Reference to Gen. Pl. ed. 1, 102, and Hort. Cliff. 133, however, makes it perfectly clear that the type-species of *Pontederia* L. was not *P. hastata* but *P. cordata*.

PONTEDERIA †. Sagittariæ similis *Moris.* iii. s. 15, t. 4. f. 8, *vide* HM. iv.: 44. communicante D. *Gronovio* (Gen. Pl. ed. 1,

102; 1737).—The species collected by Banister in Virginia, published by Morison, and communicated to Linné by Gronovius was *P. cordata* L. The word "vide" in the interpolated reference to H[ortus] M[alabaricus] called attention to Rheede's figure of Carim-gola without definitely citing it as a synonym of *Pontederia*. In Hort. Cliff. 133 Linné had a single species *Pontederia floribus spicatis* also based on *Sagittariæ similis planta palustris Virginiana, spica florum cærulea* (Banister MS.) Moris., with additional references to Petiver and Plukenet, all these references being synonyms of *P. cordata*. Linné added the remark "Hujus generis videtur Carim-gola Hort. mal. ii. p. 91, t. 44."

Thus it is evident that in 1737 he gave the new generic name *Pontederia* to the species subsequently named by him *P. cordata*, and that he was *uncertain* whether Carim-gola (*P. hastata*) was congeneric or not. This effectually disposes of Mr. Farwell's contention that *P. hastata* was the type-species of *Pontederia*.

The four changes in generic nomenclature proposed by Mr. Farwell are as follows:—

(1) PONTEDERIA L. emend. Farwell *vice* MONOCHORIA Presl.
(2) UNISEMA Raf. *vice* PONTEDERIA L.
(3) PHRYNIUM Loefl. *vice* HETERANTHERA Ruiz et Pav.
(4) NARUKILA Adans. *vice* PHRYNIUM Willd.

Fortunately, as shown above, all these changes are contrary to the International Rules. Furthermore, Nos. (1), (2) and (3) are also contrary to the Type-basis Code, to which Mr. Farwell apparently adheres in other cases, *e.g.* in the adoption of the generic names *Meibomia* and *Allionia*, and the acceptance of tautonyms.

Narukila Adans. (Fam. ii. 54, 581) was effectively published according to the American Code (1907), since the generic name *Narukila* is associable with the previously published binominal, *Pontederia ovata* L., as both Adanson and Linné cited *Naru-kila* Rheede Hort. Malab. ii. t. 34 as a synonym. The Type-basis Code (1921) requires a "definite reference to at least one previously published binomial" (Art. 2 *c*). Does a non-binary citation in common with a previous author, as in the case of *Narukila*, fulfil this requirement or not?

GEORGE CLIFTON, R.N.
(1822–1913).

I AM somewhat surprised that, so far as can be ascertained, no mention has been made in any botanical journal of the demise and career of George Clifton, who passed away at his residence, Northwood, Eastbourne, on August 12th, 1913, in his ninety-first year.

The son of Marshall Waller Clifton, F.R.S., and one of a family of sixteen, in early life he entered the Royal Navy, serving as Midshipman on board H.M.S. "Bellerophon," and being present at the blockade of Naples and Alexandria; also in 1839–40 taking part in the bombardment of Syrian ports, notably Acre and Beyrout, when

he received both the naval and Turkish medals in recognition of his services.

In 1851 Clifton proceeded to Australia, and settled near Fremantle, in the Western Province, being appointed Head of the Water Police, and also Governor of the Convict Prison at Rothnest Island, about nine or ten miles from the mainland, and situated nearly opposite to Fremantle. His sojourn there lasted eleven years, and, in 1864, on the recommendation of Sir Edmund G. Henderson, he was offered and accepted the important Governorship of Portland Prison, which office he held for nineteen years, finally retiring into private life in 1883. In 1853 he married a daughter of J. S. Roe (1797–1878), at that time Surveyor-General of Western Australia, in which capacity he did much to promote the knowledge of the flora, and celebrated his diamond wedding in February 1913. Very shortly after this he passed away; his funeral took place at Fulham, where he was buried.

His scientific attainments found full play during his sojourn near Fremantle. He had previously become very interested in marine botany, and upon the arrival of W. H. Harvey in 1854, intent upon amassing material for a work upon the Algæ of Australia, its western shores and seas *more particularly* being as yet almost unexplored, the two at once fraternized and joined forces, the results of which are evident in the first volume of the *Physiologie Australia*. This work was begun in 1858, and ended with the fifth volume in 1863; during the whole of that time Clifton was assiduously engaged in dredging many Algæ of consummate interest. The dedication of the first volume runs:—

"To GEORGE CLIFTON, Esq., R.N., of Fremantle, West Australia, an acute observer and successful collector of Algæ, this first volume is inscribed in pleasant memory of our boating and dredging excursions, and as a grateful acknowledgment for liberal supplies of well selected specimens, by his friend and Fellow-Student, WILLIAM HENRY HARVEY."

Clifton is commemorated by Harvey (*op. cit.* ii. t. 100; 1859) in the beautiful genus of Florideæ, *Cliftonia*—"in honour of George Clifton, Esq., R.N., the indefatigable and successful explorer of the Algæ of Western Australia": the plant had been discovered by Clifton in the previous year at Garden Island, off Fremantle. Later, in the preface to vol. v. (1863), Harvey pays a further tribute to Clifton, "whose name occurs so frequently throughout the volumes and in the *Synopsis* [and to whom] I am indebted for some thousands of beautifully preserved specimens, including many species collected by no one else. His contributions commenced in 1854, while I was resident in Western Australia, and have been regularly continued, at short intervals, up to the present time. Three new genera, *Cliftonæa*, *Bindera*, and *Encytholia*, besides many new species, prove the zeal and success with which Mr. Clifton has conducted his researches." It will be noticed that the spelling of the commemorative name has been altered; this is thus explained by Harvey in a note to t. 279, where another species is figured—"Originally published as *Cliftonia*; now

altered to *Cliftonæa*, in order to distinguish it from *Cliftonia*, Banks." A large number of species described by Harvey and J. G. Agardh also bear Clifton's name.

After his return to England I cannot find that Clifton paid further attention to Botany. In 1889–90, at which period he was residing at Putney, he presented to the British Museum his collection of Australian Algæ, amounting to nearly 600 species.

J. Cosmo Melvill.

RUMEX OBTUSIFOLIUS L. × R. PULCHER L.

By J. E. Little.

This hybrid occurred in some quantity in 1923 on Windmill Hill, Hitchin, with the parent species, and has been distributed to both Exchange Clubs. Material will be found (Ref. No. 561) in Hb. Mus. Brit. and several other public herbaria. I have had it under constant observation for a year. My attention was first drawn to it by the root-leaves, of which the blades, while in some respects recalling those of *R. obtusifolius*, were smaller (up to 18·5 cm. long and 8 cm. broad), of a duller less vivid green, narrower, more oblong, more obtuse, more rarely subacute, with cordate base, nearly flat, slightly crenate-undulate on the margin. In May the coloration of the leaves is entirely green, and lacks the red usually present along the upper surface of the midrib of *L. obtusifolius*. The petioles are less deeply furrowed, about as long as the lamina. The root is long and stout, dividing a little below the crown into several branches, which ultimately produce erect flowering stems up to 75 cm. high, unbranched in at least the lower third of their length, bearing leaves much larger and broader than those of *R. pulcher*. The upper portion of the flowering stem divides into long divaricate or deflexed branches like those of *R. pulcher*. In *R. obtusifolius* the stem, petioles and nerves of the leaves are plentifully covered with stout papillate emergences. These appear in the hybrid, though hardly to an appreciably greater extent than in *R. pulcher*. The panduriform contraction of the lamina does not always appear in *R. pulcher*, and I think not at all in the hybrid. The unopened anthers are white. The fruiting segments closely resemble those of *R. pulcher*, as does the tubercle; I should describe them as elongate-triangular rather than oblong (*R. pulcher* itself varies in this respect), one being slightly longer. The nut is, when dry, 2·0–2·5 mm. long, its faces ovate with a short acute tip, bright chestnut, polished and shining, broader than in *R. obtusifolius*, but to me indistinguishable from that of *R. pulcher*. The nuts are well-filled, and the hybrid appears to be a fertile one, whereas *R. obtusifolius* × *sanguineus* var. *viridis*, Wallington Hall, Norfolk, distributed through the Watson Exchange Club, 1923, a hybrid between two different groups, was entirely sterile.

On July 12, 1922, I gathered from the roadside near Portfield Cemetery, Chichester, with Prebendary R. J. Burdon, a plant to which I should now ascribe the name *R. obtusifolius* × *pulcher*, as the stems near the nodes were slightly and the nerves rather strongly papillate. The habit was that of the hybrid as described above.

To sum up:—The Hitchin form of the hybrid has much of the facies of *R. pulcher*, but differs in its taller erect stem and its larger radical and broader cauline leaves, and appears to correspond with Borbás's description of *R. ogulinensis* (Magy. bot. lapok, 1904, 49), which runs:—"*R. obtusifolium* refert foliis inferioribus latioribus majoribus que sed ramis magis divaricatis; persigonii foliá interiora callis solitariis bene evolutis, apicem versus minus producta, rigidius aristato-dentata, ± foveolato-reticulata ut in *R. pulchro*." The same description with a slight verbal variation, is repeated in Reichb. Ic. xxiv. 48.

I am indebted to Mr. E. G. Baker for help in determining these rather puzzling plants.

THE FLORA OF A BLACKBIRD'S NEST.

By (the late) Sir H. C. W. Hawley, Bart.

(Reprinted by permission from Trans. Brit. Mycol. Soc. ix. 239.)

A very young visitor brought in to me the other day a blackbird's nest of this year's building [1923], and opportunity was taken to examine the material. Quite a number of Pyrenomycetes were found to be in fruit. Other families were conspicuous by their absence. The short list is perhaps of some interest as showing what species were in fruiting condition on August 15th, after a very dry summer. It should be stated to the credit of the blackbird as a collector that several of the species had not been noted in the locality before.

Mycosphærella maculiformis (Pers.) Schroet. on leaves.
Leptosphæria microscopica Karst. on grass leaf.
L. Doliolum (Pers.) Ces. & de Not.
L. rubicunda Rehm. on herbaceous stem. Spores 27–30 × 2·5–3 μ. Grove (Journ. Bot. 1912, p. 49) says 20 × 2·5 μ, on *Conium*; I have a specimen on umbelliferous stem from Gloucestershire with spores 25–40 × 3·5–4·5 μ, second cell from above swollen. Winter says 45 × 2·5–3 μ. Probably all one species.
L. derasa (B. & Br.) Auersw. on *Senecio Jacobæa*.
Pleospora herbarum (Pers.) Rabh.
P. infectoria Fuck. on grass stem.
Ophiobolus tenellus (Auersw.) Sacc. on stem of *Galium* sp.
Gnomonia inclinata (Desmaz.) Auersw. on horse-chestnut leaf.
G. cerastis (Riess) Ces. & de Not. on *Acer campestre* peduncle.
Rhytisma acerinum (Pers.) Fr.
Vermicularia Dematium (Pers.) Fr. on woody stem.
V. trichella Fr. on ivy leaf.
Periconia pycnospora Fres. on stem.

NEW PLANTS FROM CENTRAL AFRICA.

By R. D'O. Good, E. G. Baker, and C. Norman.

The following notes are based on a collection of plants made by Dame Alice and the Misses E. and C. Godman in Uganda, December 1923–March 1924. The collection, which is now in the British Museum Herbarium, consists of some 370 specimens from five distinct localities, namely: 1. Entebbe region, 100 specimens; 2. Bugalla Island, Sesse, Victoria Nyanza, 45 specimens; 3. Mbarara district, Ankole Province, 45 specimens; 4. Buhungi, Kigesi district on the borders of Uganda, Tanganyika and the Belgian Congo, 70 specimens; 5. Ruwenzori Mountains, 110 specimens.

The collection from Ruwenzori affords valuable additional material of many of the endemic forms collected by Scott Elliott and Wollaston. In particular, it includes material of a new genus of *Umbelliferæ* which is here described. This is not the first record for the plant, which was collected by Scott Elliott in 1893 but not identified. The collection from Buhungi is of particular interest, since that region appears to be little known botanically. Most of the novelties described here are from this district.

The Northern temperate element so characteristic of collections from the mountains of Tropical Africa is well marked and conspicuous by the occurrence of *Linnæa borealis*. This was found at Lutobu in the Mbarara district at an elevation of 6000 ft. under conditions which point to it being of natural origin there. The main distribution of this plant is Northern circumpolar; in Europe it is found throughout the northern countries and in the alpine region. There seem to be no records of it further south, so that its discovery at the equator is of considerable interest, and forms a striking addition to those characteristically Northern temperate plants which are also found on the mountains of Tropical Africa.

Uebelinia kigesiensis R. Good, sp. nov. *Herba* annua parva foliosa semi-decumbens; *caulibus* striatis sparse pilosis; *foliis* sessilibus late ovatis acutis ad basin leviter connatis, utrinque glaberrimis, marginibus apiculati-denticulatis; *floribus* pedicellatis pedicellis hirsutis ætate leviter elongatis; *calyce* 5-fido, 10-nervo, lobis triangulatis acutis, nervis et marginibus loborum setulosis; *corolla* alba, petalis 5, anguste spathulatis obtusis, basi connatis; *staminibus* 10; *ovario* glabro, stylis 5 liberis coronato; *capsula* calyce persistenti æquante, suborbiculare; *seminibus* subreniformibus, utrinque subcompressis, minute tuberculatis, nigris.

Hab. Buhungi, Kigesi District. 7500 ft. No. 237. "Flowers white, semi-decumbent. Marshy ground."

Internodes 2–3 cm.; leaves 1–1·25 cm. long by about 1 cm. broad; pedicels in the flowering state about 7 mm. long, slightly longer in fruit; petals 6 mm. long.

Closely allied to *U. spathulæfolia* Hochst., an Abyssinian species, but at once distinguishable by the shape of the leaves, by the longer pedicels in the flowering state and by the black seeds.

Crotalaria (*Sphærocarpæ*) **kigesiensis** Bak. fil., sp. nov. *Caulis* erectus, ramosus, rami virgati sparse pubescentes; *stipulæ* minimæ; *folia* remota, trifoliolata, foliolis angustis lanceolatis vel lineari-lanceolatis, sparse pubescentibus 12–15 mm. longis, 3–4 mm. latis; petiolo communi 8–12 mm. longo; *flores* pallide lutei in racemos laxos dispositi; *calyx* 6 mm. longus dentibus tubo longioribus; *vexillum* circa 10 mm. longum et latum; *carina* dorso angulo recto curvata, 12 mm. longa; *ovarium* lineare, hirtum; *legumen* ignotum.

Hab. Masaka-Mbarara, 5000 ft. No. 160. "Red sandy soil, long grass. Flowers light yellow; 2–3 ft."

This is allied to *C. cernua* Schinz, but the bend in the carina is not so near the base. The leaves are rather remote and the leaflets narrow. The plant, which is 2–3 ft. high, has light yellow flowers.

Lathyrus hygrophilus Taub. var. angustifolius Bak. fil., var. nov. *Caulis* tenuis sparsissime pilis vestitus; *stipulæ* sagittatæ persistentes; *folia* unijuga, foliolis lineari-lanceolatis 3–4 cm. longis, 4–5 mm. latis; *flores* solitarii albi, ±13–15 mm. longi; *calyx* 7–8 mm. longus; *vexillum* externe glabrum; *legumen* ignotum.

Hab. Buhungi, 7500 ft. No. 233.

"Bamboo forest edge. Flowers white, climbing, 3–4 ft."

Vigna abyssinica Taub. var. ugandensis Bak. fil., var. nov. *Caulis* volubilis; *foliola* oblongo-lanceolata pubescentia; *pedunculi* 6–8-flori; *calyx* 4–5 mm. longus dentibus superioribus in unum coalitis; *vexillum* ±12 mm. longum ±18 mm. latum; *legumen* maturum non visum.

Hab. Litobu, 6000 ft. No. 158.

"Grey sandy soil, long grass. Climbing shrub about 1 ft. high. Flowers blue."

Differs from type principally in the more numerous flowers and much broader vexillum.

Rubus Doggettii C. H. Wright var. ovatifolius var. nov., R. Good. *Folia* pinnatim 3–5-foliolata; *foliolis* subsessilibus ovatis longe acutis ad basin rotundatis, irregulariter serratis, utrinque glabris; *sepala* lanceolata longissime acuminata; *petala* emarginata, paullo quam sepala breviora.

Hab. Ruwenzori, 7–8000 ft. No. 297.

Differs from the type in the leaflets, which are broadest at the base and taper to a long acute tip, in the sepals which have a long fine tip and are rather longer than the petals, and in the narrower stipules.

Pseudocarum Norman, gen. nov. (e tribu *Ammineārum*).

Calycis dentes obsoleti; *petala* omnino integra discus in stylopodiis parvis conicis productus; *styli* longiusculi reflexi; *fructus* a latere leviter compressus; *carpella* 5-gona; *juga* primaria prominentia, acuta, æqualia; *vittæ* (nullæ?) vel indistinctæ; *semen* subteres, haud excavatum.

Herba scandens; *folia* bi- vel tri-ternata; *petiolo* volubili, ad basim vix vaginante; *umbellæ* multiradiatæ; *bracteæ* nvolucri et involucellorum numerosæ conspicuæque; *flores* albi?

Apparently allied to *Carum*, but differing in the strongly developed and acute ribs of the fruit, in the entire petals, and in the numerous and large bracts to involucre and involucel. The climbing habit is believed to be unique in the family.

Pseudocarum clematidifolium Norman, sp. nov. *Herba* glabra, petiolis scandens; *caule* terete ramoso; *foliis caulinis*, bi- vel triternatis, nervis reticulatis, petiolo volubili; *foliolis* petiolatis, lanceolatis, cuspidatis, marginibus valde dentatis, dentibus acuminatis, sæpe uncinatis; *foliolo* terminali maximo; *umbellis* amplis, radiis 10–20, crassiusculis; *bracteis involucri* oblongis, obtusis, conspicuis; *involucellorum* iis similibus, sed minoribus. *Fructu* oblongo, uno mericarpio sæpe obsoleto; *jugis* primariis acutis, æqualibus; *vittis* invisis, petalis indivisis, lanceolatis.

Ruwenzori Expedition 1893–94. Kivata, 6–9000 ft. Scott Elliott No. 7677 (in Herb. Mus. Brit.); Ruwenzori Mts., 1924; Kichuchu, 9–10,000 ft. Heath Forest. Misses Godman No. 308. "2–3 ft. high; weak-stalked flower—semi-climbing plant."

Principal measurements: *leaflets* 3–7 cm. × 1·5–2·5 cm.; *umbel rays* up to 7 cm.; *bracts* of involucre ±1 cm.; of involucel ±5 mm.

This very remarkable plant has been twice collected on Ruwenzori. Scott Elliott's specimen, owing to bad pressing, rather conceals than discloses the climbing habit, which would account for its having been hitherto overlooked. The Misses Godmans' specimen shows the climbing habit well. Both specimens, unfortunately, are without radical leaves, but Scott Elliott's has a few fruits believed to be ripe, and the Misses Godmans' specimen has good flowers.

Dipsacus kigesiensis R. Good, sp. nov. *Herba* erecta; *caule* angulato glabro aculeato; *foliis* radicalibus non visis, foliis caulinis sessilibus serrato-dentatis lanceolatis attenuatis acutis, ad basin longe cuneatis et integris, raro lobulo laterali, utrinque hispidis, subtus nervis minute aculeatis, marginibus hirsutis; *pedunculis* aculeatis, supra pilosis; *foliis* involucralibus linearibus acutis minute hirsutis reflexis; *squamis* receptaculi suborbicularibus carinatis apice abrupte et longe acuminatis recurvis pilis brevissimis instructis; *corolla* extus pubescente quam squamæ receptaculi leviter longiore.

Hab. Buhungi, Kigesi District. 7–8000 ft. No. 189. "Red soil, open country in marsh."

Lower leaves not seen, upper leaves up to 10 cm. by 3 cm., sometimes with a lateral lobe at the base; heads about 2·5 cm. across. Involucral bracts up to 1·5 cm. long; scales of the receptacle 5–6 mm., recurved at the tip, rather shorter than the expanded corollas.

Closely related to *D. pilosus* L. and *D. pinnatifidus* Steud. From the former it differs in the shorter broader reflexed scales, which are not ciliated, and its more hairy leaves. From the latter it differs in the sessile stem leaves strongly cuneate at the base, and again in the receptacle scales. Engler, in Bot. Jahrb. xix. 1895, has described a var. *integrifolius* of *D. pinnatifidus*; the authenticated specimen of this variety which I have seen (Volkens 967) agrees entirely with the type of *D. kigesiensis*, except that the receptacle

scales are rather more hairy on the edge. In the following short clavis, which illustrates the relationships of these various forms, I have considered *D. pinnatifidus* var. *integrifolius* Engl. as falling under my *D. kigesiensis*.

Stem leaves connate at the base ..... *D. pinnatifidus* Steud.
Stem leaves cuneate at the base.
  Receptacle scales ciliated, longer than the corollas ..... *D. pilosus* L.
  Receptacle scales not ciliated, equal to or shorter than the corollas (*D. pinnatifidus* var. *integrifolius* Engl.) ..... *D. kigesiensis* R. Good.

Anagallis kigesiensis R. Good, sp. nov. *Herba* glabra reptans; *caulibus* tenuibus glaberrimis; *foliis* oppositis breviter petiolatis integerrimis lanceolatis vel ellipticis acutis, utrinque glaberrimis subtus pallidioribus; *floribus* solitariis in axillis longe pedicellatis; *pedicellis* filiformibus glabris, foliis æquantibus, in fructu reflexis; *calyce* profunde 5-fido, lobis linearibus acutis 1-nervis; *corolla* profunde 5-fida lobis lanceolatis ellipticis sub-emarginatis, quam lobi calycis duplo longioribus; *filamentis* planis ad basin late expansis, quam petala dimidio brevioribus; stylo fastigato filamentis æquante.

Hab. Buhungi, Kigesi District. No. 214; 234 is conspecific. "Flower white, semi-decumbent. 6 inches long."

Leaves up to 1 cm. by 5 mm. Pedicels about 1 cm. long; calyx lobes 2·5 mm. Corolla white, lobes 5 mm. long.

Very similar and closely related to *A. ruandensis* Knuth & Mildbraed, but altogether a smaller and more compact plant; it also differs in the shape of the leaves.

SHORT NOTES.

STATICE v. LIMONIUM. Mr. Sprague's paper (p. 267), touching upon the respective merits of the generic names *Statice* and *Limonium* and the plants to which they should apply, seems to show clearly that our Sea Lavenders should, strictly speaking, come under the latter genus. Whilst agreeing with the soundness of Mr. Sprague's exposition, I cannot help endorsing heartily Mr. Pugsley's view (p. 277) that a sound practical course would be to retain *Statice* and *Armeria* for Sea Lavenders and Thrifts respectively as *nomina conservanda*. As regards our British Sea Lavenders, the species stand, under *Limonium*, as enumerated in the *London Catalogue*, ed. 10, 1908, but the following changes appear necessary among the plants recently discussed in these pages:—

Statice minuta Linn.	*Limonium minutum* Fourr.
forma *puberula* C. E. S. (J. Bot. 1915, 242).	forma *puberulum* comb. nov.
var. *microphylla* Boiss.	var. *microphyllum* comb. nov.
var. *dissitiflora* Boiss.	var. *dissitiflorum* comb. nov.

S. acutifolia Reichb. var. *obtusifolia* Rouy.	*L. acutifolium* comb. nov. var. *obtusifolium* comb. nov.
S. asterotricha C. E. S. (J. Bot. 1917, 33).	*L. asterotrichum* comb. nov.
S. anfracta C. E. S. (J. Bot. 1922, 345).	*L. anfractum* comb. nov.
S. vestita C. E. S. (J. Bot. 1923, 97).	*L. vestitum* comb. nov.

Both J. Fourreau (in Ann. Soc. Linn. Lyon, xvii. 141; 1869) and Maire and Petitmengin (in Bull. Soc. Sci. Nancy, sér. 3, ix. fasc. iv. 428; 1908) adopt the genera *Limonium* and *Statice* for Sea Lavenders and Thrifts respectively.—C. E. Salmon.

Epilobium Lamyi F. Schultz in Berkshire. This local species is not mentioned for Berkshire in Druce's *Flora* (1897) nor in his Additions (Report B. E. C. 1918). Mr. J. W. White has determined as this plant a dried specimen gathered by the late Anthony Wallis at Reading in 1916.—C. E. Salmon.

"Huzbush." Can anyone identify this name, which occurs in *The Pipers of the Market Place*—a novel by "Richard Dehan" (Clotilde Graves)—p. 265, ". . . . the *huzbush* growin' by the door, as were nobbub a Queen's nosegay; no rose that ever blowed, I thowt, could ha' a sweeter smell"? The scene of the story is laid in Hertfordshire, but the speaker came from the West Midlands. The name is not in the *Dictionary of English Plant-names*, nor in its MS. Supplement, which has attained considerable dimensions, nor do I find it in *The English Dialect Dictionary*. In the same book I find "the herbage starred with yellow *fritillary* in June"; this, however, is probably merely a misnomer, though I do not know for what: "Marsh *Mallow*," meaning Marsh Marigold, occurs in *The Thames* by Mortimer Menpes (p. 32), and I have seen it elsewhere.—James Britten.

REVIEWS.

Manual of Cultivated Plants: a Flora for the Identification of the most common or significant Species of Plants grown in the continental United States and Canada for food, ornament, utility, and general interest, both in the open and under glass. By L. H. Bailey. New York and London: Macmillan, 1924. Cloth 8vo, pp. 851. Price 31*s.* 6*d.*

By the publication of this *Manual*, Professor Bailey has made his debtors not only botanists but horticulturists and the crowd of people who, without claim to be either, nevertheless take an intelligent interest in plants and are desirous of obtaining information about those commonly met with in cultivation. Intended, as it is, especially for the United States and Canada, its scope renders it almost equally useful for plant-lovers in this country, who will be well advised to add it to their library, however limited that may be.

The value of the book lies largely in the fact that it is "not a compilation, but is written new. . . . It has required the growing of very many of the species and the assembling of a considerable herbarium collection. So far as possible, the diagnoses in the book are drawn or verified from the specimens themselves." It includes 3665 species (with varieties) and 1246 genera in 170 natural families. "Horticultural varieties, even those bearing Latin names," are excluded; "the identification of these constitutes quite another problem, and one that is essentially yet new." Although the purpose of the book is to describe the species most commonly cultivated, there are also included many plants "not offered by dealers nor appearing in printed lists [which] are in cultivation in old premises and private gardens, and are likely to be exchanged from hand to hand"; "species of rather recent introduction that promise to be acquisitions but which are not yet well known"; and "certain species of great historic interest that should be known as a matter of general knowledge," including food-plants and "such things as are frequently grown in economic collections." It may be noted that "throughout the work the author has had the devoted aid of his daughter, Ethel Zoe Bailey, on both the botanical and editorial sides, as well as in the development of the herbarium on which so much of the enterprise is based."

The purpose of the *Manual* being thus defined, there follow Sections on "The Herbarium"; "Terms and Names," including a full glossary; "Authorities for the Binomials"; "The Vegetable Community"; and a "Key to the Families as represented in this Manual." In the descriptive portion of the work, in which the arrangement of Engler and Prantl is followed, the account of the family is followed by that of the genera and species, for each of which a key is provided; the descriptions include notes on the derivation of the names with indication of their pronunciation, and of the region from which the plants come. The International Rules of Nomenclature are observed; "the original orthography is followed in the name unless there is evidence of misprint or error." Thus *Malcomia* and *Mathiola* are retained—a practice adopted many years ago in this Journal but subsequently abandoned—on the ground that their author, Robert Brown, "was a critical student, and his spelling of these generic names must be accepted as intentional." The principle laid down is, we think, sound, but Brown's Latin was not always unimpeachable (*cfr.* Journ. Bot. 1922, p. 179). We note that the generally disused practice of putting a comma between the name and authority is retained in the *Manual*.

The English names, when given, are mostly such as are in actual popular use, although some appear to be manufactured—"Cardinal Larkspur" (*Delphinium cardinale*), for example, seems to have stepped out of a novel, and "Sweet William Catchfly" (*Silene Armeria*) has an Elizabethan sound; and it may be doubted whether such names as "Stokes Aster" for *Stokesia* are really used. Many are identical with our own for the same plants, or analogous with them; some, however, are strange—*e.g.*, "Baby's Breath" "(also

erroneously applied to *Galium Mollugo*)" for *Gypsophila paniculata* and "Youth-and-Old-Age" for *Zinnia elegans*: a glance through the pages reveals many more, not all of which are included in the index.

It would be impossible to notice adequately in these pages a work which suggests and indicates so many points of interest; one or two which occur to us while turning over the pages may be noted. The *Gramineæ* afford many instances of the treatment of species of historic and economic interest to which the introduction refers—*e. g.* in *Triticum*, *Avena*, *Zea*, *Holcus*, etc. Taking the last as an example, the description of the genus is followed by a note: "The forms are very many, and the botanical origin of them unknown. The generic name, even, is in dispute: they may be included in the large genus *Andropogon*; or if separated, they may take the name *Sorghum*, which was used in pre-Linnean times and was taken up by some post-Linnean botanists; or they may reside in *Holcus*, to which Linnæus clearly assigned them." Four species are given—the two well known of Linnæus—*H. halepensis* and *H. Sorghum* and two (*H. sudanensis* and *H. virgatus*), described by Dr. Stapf under *Sorghum*. *H. halepensis*, "probably Mediterranean, but now widely scattered and naturalized," was "introduced into the U.S. by William Johnson of Ala, and Gov. Means of S. C."—hence it bears the popular names of "Johnson-grass" and "Means Grass." Under this Prof. Bailey places seven varieties which were originally described as species; the first, var. *saccharatus* (*H. saccharatus* L.) is defined as "a heterogeneous series in descriptive botanical characters, but constituting a cultural group, grown for the sweet juice from which sirup is made." It may be well to point out that the names of these and of other apparently new combinations (or "transfers," as he prefers to call them) which occur here and there throughout the book were published by Prof. Bailey in *Gentes Herbarum*, fasc. 3, pp. 132–136, and hence date from Oct. 1923, the year of its publication. Our well-known *Holcus lanatus* appears as *Northolcus lanatus* Nash; "sometimes written *Northoholcus*, but this is not the original spelling." Its American vernacular name is "Velvet-Grass."

The attribution of *Arundinaria Falconeri* to "Benth. & Hook." (it should in any case be Hook. f.) is a remnant of the bad Kew tradition followed in the first volumes of the *Index Kewensis*, to which we ventured to call attention when reviewing the first volume of that work in this Journal for 1893 (p. 316)—a tradition happily departed from in the Supplements. Gamble (in Fl. Brit. Ind. vii. 383) attributed the name to "Benth. in Gen. Plant. iii. 1208," but later and more correctly (in Ann. Bot. Gard. Calc. vii. 20) adopted it as his own, and it stands thus in Ind. Kew. Suppl. 2, p. 18.

The genera *Rosa* and *Rubus* receive very full treatment, 31 species of the former and 28 of the latter being described, with much information of interest. We note that *Rosa Banksiæ* is stated to have been "described from plants from the garden of Sir Joseph Banks," but according to Brown's MS. description, reproduced textually (though without his name) in Ait. Hort. Kew. ed. 2, iii. 258 (1811), the plant came from Kew Gardens—the date "July 17, 1811," is entered on the MS.; the figure in Bot. Mag. t. 1954 (1818) was "from a specimen communicated from her Ladyship's seat at Spring-Grove." The Roses usually known as *R. multiflora* are in great part referred to *R. cathayensis* Bailey, which was established by him as a distinct species in Gent. Herb. i. 29. The *Rubi* have been more fully treated by Prof. Bailey in *Gentes Herbarum*, part 5, a notice of which will be found in this Journal for March, pp. 83–6.

The Loganberry appears as *R. loganobaccus*—a name first published in Gent. Herb. p. 155, where there is an interesting account of the origin of the plant—a supposed hybrid of *R. ursinus* Cham. & Schlech., one of the Pacific coast blackberries, and *R. Idaeus*—communicated by Judge Logan of Santa Cruz, California, whose name it bears and in whose garden it originated in 1883. "No one may yet say what the loganberry is, but it represents a dominating race and one that cannot be referred to any of the wild Pacific dewberries or blackberries without considerably enlarging the diagnoses of them and perhaps beyond the probabilities of their natural variation." In contrast with the treatment of these genera may be noted that of *Cratægus*, in which *C. Oxyacantha* and *C. monogyna* remain undivided. The Linnean genus *Spiræa* is split up in accordance with more recent monographers; our British species are referred to *Filipendula* as *F. Ulmaria* Maxim. and *F. hexapetala* Gilib.; the earlier name, *F. vulgaris* Hill (Brit. Herb. 24 (1756)), is not entitled to recognition, the binominals in that work being merely accidental.

The temptation to continue this running commentary is well nigh irresistible; it is almost literally true to say that there is no page of the volume which does not afford matter of interest or suggest points for comment.

A very useful book upon our common English cultivated plants might be produced by taking the *Manual* as a basis for information which could be conveyed in somewhat amplified form; the treatment, here so admirably condensed, would suggest the lines for such a work. Prof. Bailey has himself supplied more detailed information with regard to certain genera—*e. g.* in the history of the cultivated Brassicas (Gentes Herbarum, vol. i. part 2) and in *Some Cultivated Rubi* (part 5) already referred to; the *Standard Cyclopedia of Horticulture*, which appeared under his editorship, should also be consulted: it would have been helpful if, in instances such as those mentioned, the author had given references to the place of publication of his more detailed investigations.

A word must be said in praise of the typography and general arrangement of the volume. The type, though in the descriptive portions small, is very clear, and the matter is admirably arranged; we note with pleasure that the spaces at the headings of the pages are fully utilised, the order and the genus under each being indicated; there is also an excellent index, which includes both Latin and English names. Useful figures are given of the "structures" of the principal families. We know of few works in which both matter and manner are so completely satisfactory.

A Monograph of the British Desmidiaceæ. By W. and G. S. West. Volume V. by Dr. Nellie Carter. Ray Society, 1923. Pp. xxi, 300. Plates 129–167.

The publication, after an interval of eleven years, of the fifth and last volume of Messrs. West's Monograph is an event which will be cordially welcomed by all who are interested in the study of Algæ. It is probably not generally appreciated to how large an extent this excellent work has stimulated the study of Desmids, but there is no doubt that it has borne rich fruit not only in this country but also on the continent, as testified to by the numerous papers in the last decade or so, of which the *British Desmidiaceæ* forms the basis; no other recent systematic work on Algæ reaches the level attained in the monograph. Dr. Nellie Carter, to whose labours the present volume is largely due, had no very easy task to maintain the high standard of the first four, but one can unreservedly congratulate her on its successful achievement. Having almost continuously for many years past made use of the earlier volumes, the writer feels in a position to state that there is no falling off in this fifth volume either in style of treatment or in the accuracy of the subject-matter. Practically the entire letter-press is Dr. Carter's own work, and although the life-long experience of the Wests is lacking, the author has clearly made a very careful study of the relevant species, and her critical remarks on several of them are very much to the point. A very large number of the figures are copies of G. S. West's drawings, but it would be impossible to distinguish those for which Dr. Carter is responsible, were such not indicated by an asterisk. It is to be regretted that, as in the earlier parts, some of the figures on occasional plates are unduly small (*e.g.*, upper half of Pl. 155).

Three-quarters of the volume deals with the genus *Staurastrum* (begun in Vol. IV.), the few British filamentous Desmids occupying the remaining pages. The genus *Staurastrum*, probably one of the most recently evolved among Desmids, is one of peculiar difficulty, since the lines of demarcation of several of the species are very hard to fix. Dr. Carter's treatment of some of these difficult forms (e. g. *S. gracile* and *S. paradoxum*) is admirable and will doubtless be helpful to students of the group; the writer doubts, however, if the difficulties can be really removed until the taxonomy of Desmids is looked at from a different angle to what it is at present. The index, which covers all the five volumes, appears thoroughly reliable. There are a number of typographical errors which would seem to be more the fault of the printer than of the author.

F. E. Fritch.

BOOK-NOTES, NEWS, ETC.

The *Bulletin of the Torrey Bot. Club* for September contains a paper by P. A. Rydberg on "Some Senecioid Genera," in which *Cacalia* L. is considered, and the genera *Psacalium* Cass. (13 spp., 2 new), *Pericalia* Cass. (4 spp.) and *Mesadenia* Raf. are re-established for plants mostly placed in *Cacalia*. J. K. Small describes "Plant Novelties from Florida," many of which are evidently of great interest—among them a *Tradescantia* (*T. roseolens*, "the fragrance of whose flowers, which resembles that of tea roses, fills the air in the neighbourhood of the plants." Five new genera are described: *Dentoceras* (Polygalaceæ), *Deeringothamnus*—"named for Charles Deering, generous patron of the Sciences and the Arts"—(Annonaceæ); *Sanidophyllum* (Hypericaceæ), *Litrisa*—"an anagram of *Trilisa*"—(Eupatorieæ), and *Ammopursus* (Compositæ), "related to *Laciniaria*" (*Liatris*).

In the *Botanical Gazette* (Sept.) R. Holroyd discusses the "Morphology and Physiology of the Axis in *Cucurbitaceæ*" (3 pl.); "L. E. Rhine the "Divergence of Catalase and Respiration in Germination"; Robertson continues his observations on the relations between "Flowers and Insects"; H. Lisk writes on the "Cellular Structure of Tendrils"; E. G. Campbell on the "Nitrogen Content of Weeds"; E. M. Round on "Correlation of Fossil Floras of Rhode Island and New Brunswick"; and S. R. Bose describes three new species of Bengal *Polyporaceæ* (with figures).

Science Progress for October contains, in addition to Dr. Salisbury's useful review of recent researches in botany (which includes a summary of Longley's important papers on *Rubus* and *Cratægus* in the *American Journal of Botany*), an interesting paper by H. Mace, entitled "Passive Resisters?" wherein some aspects of the struggle between animals and plants are discussed. The editor, Sir Ronald Ross, contributes a lively "proconnary" between Statesman and Scientist on "The Encouragement of Discovery."

George Webster, who died at his residence at York at the beginning of August, was born on June 22, 1851, at Aldborough, near Boroughbridge, in the same county. As traveller for Messrs. Backhouse & Sons, of York, and in other connexions, he had many acquaintances in various parts of the world whom he interested in mosses and hepatics and who sent him numerous specimens, in the determination of which he was greatly interested. These included gatherings from S. Africa, N. India, New Zealand, S. Australia, and the Solomon Islands, one or two of the mosses from the last locality proving new to science. His friendship with the late M. B. Slater, of Malton, brought him into communication with Spruce; through the former, who was Spruce's executor, Webster became possessed of a number of mosses which had from time to time reached Spruce from various parts of the world and had remained unnamed. These he made it his task to get determined, and in this connexion was at

one time a frequent visitor to the Kew Herbarium. Webster had been for more than thirty years a member of the York Field Naturalists' Society, of which he was at one time president, and had recently devoted much time to the botanic garden connected with the Yorkshire Philosophical Society.

In the *Orchid Review* for October Mr. Henry Mousley continues the interesting notes on the underground development of *Spiranthes cernua* and *S. Romanzoffiana* to which we referred on p. 127. The number also contains a paper on "The Non-Symbiotic Germination of Orchid Seeds in Belgium," by Drs. G. & M. Ballion, of the Botanical Laboratory of Ghent University.

Three more *Contributions from the Gray Herbarium of Harvard University* have reached us—two of them reprinted from *Rhodora*, whence comes also Dr. Robinson's interesting biographical sketch (with portrait) of Miss Mary Anna Day (1852–1924), for thirty-one years librarian of the Gray Herbarium. No. LXXI. contains "Notes on North American Scutellarias" by C. W. Penland; 17 species and some new varieties are described, with two plates showing the nut-glands of various species. No. LXXII. includes papers, all by M. L. Fernald, on *Polystichum mohrioides*; on "The Dwarf Antennarias of N.E. America (*A. vexillifera* and *A. Peasei* spp. n.; 1 pl.); on "E. American Representatives of *Arnica alpina* (*A. Griscomi* sp. n.; 1 pl.); on "Some Senecios of Eastern Quebec" (1 pl.); and on "New or Re-studied Plants of E. America," in the course of which various changes of nomenclature are shown to be necessary. In No. LXXIII. Dr. Robinson continues his papers on Tropical American *Eupatorieæ*, with descriptions of many new species; Ivan M. Johnson describes new plants from Portuguese West Africa, and a new species of *Euplassa* (*Proteaceæ*), to which genus he transfers numerous plants from other genera with resultant "comb. nov.," and continues his "Studies in the *Boraginaceæ*"; two new genera, *Microcaryum* and *Oreogenia*, are based respectively on *Eritrichium pygmæum* Clarke and *E. Munroi* Clarke.

Reproductions of the collection of prints of old gardens which was made by the late Sir Frank Crisp, with his notes upon them, have been published by Mr. John Lane in a six-guinea volume entitled *Mediæval Gardens*. The book has been edited by his daughter, Mrs. Paterson, who has arranged the notes and selected the illustrations.

The *Essex Naturalist* (xxi, pt. 1; Sept.) contains the first part of what promises to be a useful and interesting paper by Mr. T. A. Dymes "On Collecting and Curating [the word is new to us] Fruits and Seeds for the Study of Local Dispersal"; and an account of the "Dedication of Hatfield Forest"—"the munificent gift of the late Edward North Buxton, and of members of his family, to the people of Essex and of England," which was handed over on May 10 by his son, Mr. Gerald Buxton, to Viscount Ullswater as representing

the National Trust, of which he is a Vice-President. A portrait of the donor and an account of his previous work in securing Epping and Hainault Forests for the public is also given.

The *Bulletin of the New York Botanic Garden* (vol. xii. no. 45; Sept. 13) is mainly occupied by "A Review of the Fossil Flora of the West Indies with Descriptions of New Species," by Arthur Hollick, illustrated by 15 plates; the number also contains a paper on "Hemlock [*Tsuga canadensis* Carr.] and its Environment," by the Hemlock Committee of the Garden.

We have received from the Publications Committee of the Institute of Brewing a copy of the *Collective Index* of the Journal of the Institute from 1911 to 1923, with a request that we would review it in our columns. Neither the nature of the publication nor its contents affords material for a detailed notice: but we gladly bear witness that as an Index it is evidently exhaustive and carefully done. Such entries as "Ascobacterium," "Aspergillus," "Helminthosporium" and the like, with "Barley" and "Hop," under which are grouped the various diseases whereto these important crops are subject, sufficiently indicate the comprehensive nature of the publication. The index is compiled by Mr. W. H. Bird, Secretary of the Institute, and is published by Messrs. Harrison and Sons of St. Martin's Lane.

The *Contributions from the U.S. National Herbarium* (vol. xx. pt. 13) are entirely from the pen of Dr. S. F. Blake; they include a revision of the American species of *Rinorea* (*Alsodeia*); 39 species, 5 of which are new; descriptions of numerous new species of various families from Venezuela; and the establishment of a new genus, *Hemibaccharis* (Compositæ Baccharidinæ), separated from *Baccharis* and allied genera on various grounds; it includes 15 species, most of them already described under *Baccharis*, but 6 of them new. Each paper is accompanied by figures in which no details are given.

In the *Journal of the Department of Agriculture* (Pretoria) for June, Mr. V. A. Putterill treats at length of the "Vrotpootjee or Take-all" of Wheat (*Ophiobolus cariceti* Sacc.), illustrating his paper with numerous figures; another Wheat disease, "Covered Smut" (*Tilletia Tritici*) and the methods of treating it is discussed by Mr. G. F. Puttick.

The third and fourth series (1*s.* each) of the cards illustrating British Flowering Plants published by the British Museum (Natural History) show a marked improvement on the earlier issues. The figures of each plant are accompanied by dissections, and the colouring on the whole is very satisfactory; but is it not rather absurd and an unnecessary expense to print "Post Card" and the usual instructions on the reverse side of the card? Each packet contains a brief account of the British Flora, followed by a description of the plants included; the absence of the authority for the Latin names gives them a somewhat unscientific appearance. The Strawberry and

Dropwort (series 3) and the Fritillary and Hawthorn (series 4) may be noted as especially satisfactory.

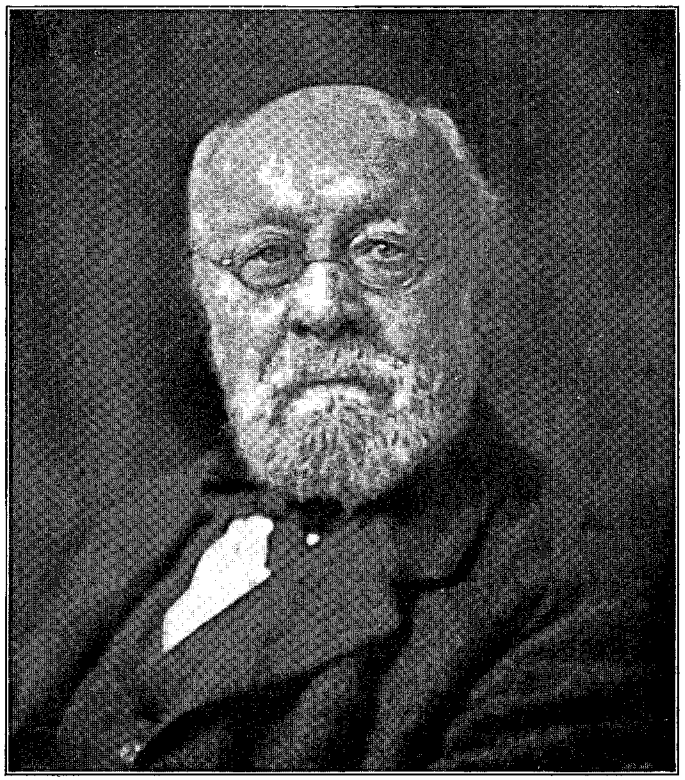
THE new Session of the Linnean Society opened on October 23 with the Fellows' Annual Dinner, which took place at Stewart's Restaurant, followed by a Reception by the President, Dr. A. B. Rendle, in the rooms of the Society. A large number of Members and their friends were present. Some interesting exhibits were shown in the Library, and during the evening Lt.-Col. A. T. Gage, who has been appointed Librarian and Assistant-Secretary, gave a short lecture, illustrated by photographic lantern-slides, on the Calcutta Botanic Garden, of which he was until recently the Superintendent.

PROFESSOR A. C. SEWARD, Master of Downing College and Professor of Botany in the University, has been appointed Vice-Chancellor of the University of Cambridge.

WE regret to announce the death on October 7, at the age of 80, of Dr. William Botting Hemsley, F.R.S., formerly Keeper of the Herbarium and Library at the Royal Gardens, Kew.

Our readers will learn with deep regret that the long association of Mr. James Britten with the 'Journal of Botany' was ended by his sudden death on Wednesday, October 8th. His name appears in the list of contributors to the first volume (1863), and he was Editor from 1880 to the time of his death.

DR. A. B. RENDLE, Keeper of the Department of Botany, British Museum, is at present taking charge of the *Journal*, and a definite announcement as to its continuation will be forthcoming in the next number. All communications should be sent to Dr. Rendle at the British Museum (Nat. Hist.), Cromwell Road, London, S.W.7.



JAMES BRITTEN.

(1846–1924.)

(With Portrait.)

An eminent botanist, referring to the obituary notice in the *Times* of October 10, commended its value as an epitome of Mr. Britten's life-work, but added "that wasn't the Britten we knew." I wish to put on record, if possible, a sketch of the life and work of the man who has been a familiar figure to many British botanists for forty years or more. There are British botanists whose personal knowledge of our friend covers more years than does my own; but, none, I think, whose association has been, botanically, so constant and so intimate. "When you come to write my biography, I hope you will bear in mind—," he would say. I did not think the time to fulfil his wish would come at so short notice. On Tuesday morning he paid one of his frequent visits to the Museum, discussed with me one or two things for the *Journal*, retold a couple of his stories (they bore repetition, for he told them well) anent the workings of Providence, and went off in good spirits at the prospect of a visit to Ireland at the end of the week. The next day he, literally, fell asleep.

I first met Britten in October 1888. I had come up to the Museum to report myself to Mr. Carruthers as the successful candidate for the vacancy in the Department of Botany caused by Mr. Ridley's departure for Singapore. Mr. Carruthers took me down to be introduced to the Director, Professor Flower, and as we crossed the Hall we met Mr. Britten, who explained that he was leaving early to attend a meeting.

Then, as now, the Assistants in the Great Herbarium worked in their respective bays or at the large central tables, and we were thrown very much together. In the earlier days relations were, I fear, sometimes a little strained between Britten and myself; but I soon began to appreciate him better, and to realize that even five years at Cambridge had not exhausted all that was to be learnt in Botany, and that Britten embodied a vast amount of knowledge of which I had scarcely an inkling. He had a good eye for plants and a wonderful memory, and would often "visualize" a specimen which he had seen in such and such a position in the herbarium, and thus suggest a name for a puzzling specimen. He rarely used a lens or dissected a flower, and he declared that he could never see anything down a microscope. When in the mood he worked rapidly, and would get through a great deal of useful herbarium work in a short time. Of the modern side of Botany he professed to have no knowledge, and he gave the impression of not having had any definite botanical training. He had a good knowledge of British plants, and in his younger days was a keen field-botanist. He would mention species familiar to him as a boy on the riverside at Chelsea before the days of the Embankment, and recall plants found in walks along the Thames between Kew and Isleworth, sometimes in the company of Professor Daniel Oliver, during the short period of his service in the Kew Herbarium. He had great respect and, I think, affection

for Professor Oliver. Before entering Kew he was for a time at High Wycombe, where the medical studies to which reference has been made in several obituary notices were prosecuted. Between 1865 and 1869 he worked on the *Flora of Buckinghamshire*, and published a preliminary list in 1867, and also supplementary notes and lists in the *Naturalist* and the *High Wycombe Natural History Magazine*. An exhaustive *Flora* of the county was contemplated, but was not carried out. He also supplied lists of plants of several counties to *White's History and Directory*. While at Kew (1869–1871) he prepared an account of the South African Crassulaceæ for the *Flora Capensis*, which Oliver was editing. This was his most important piece of purely taxonomic work; his interests lay more on the bibliographical side; he was a book-man in the broadest sense. His *Bibliographical Notes* scattered through the pages of the *Journal* are an invaluable exposition of the relation between the early collections in the Banksian Herbarium and contemporary botanical literature, and he prided himself on having brought to the notice of botanists the great wealth of material in these collections. This work was especially appreciated by American workers, as some of the earlier American collections were the subject of his notes. During the latter period of his service at the Museum, and subsequently, he worked at a history of the Sloane Herbarium, and it is to be regretted that this remains unfinished.

He also edited a volume of illustrations of Australian plants, collected by Banks and Solander during Captain Cook's first voyage (1768–71); these were copied from the original drawings prepared under Banks's supervision for the illustration of the great work on the Botany of the voyage, which was never published. The *Dictionary of English Plant Names*, compiled, with Robert Holland, for the English Dialect Society (1886), remains by far the best book on the subject, and the *Biographical Index of English and Irish Botanists*, brought out in conjunction with G. S. Boulger (1893–1908), is an invaluable work of reference. Partly owing to a mishap to the publisher's stock this has long been out of print, and, although a large amount of material for a new edition had been accumulated for some years and we discussed publication at intervals, Britten could never make up his mind to undertake it.

His greatest contribution to botanical work was his editorship of the *Journal of Botany*. After Henry Trimen left the Museum, in 1879, to take the Directorship of the Peradenyia Gardens, Britten was for a short time acting editor, Trimen still retaining responsibility for the *Journal*. But this was found inconvenient, and Britten soon assumed sole charge, and held it up to the time of his death. He had contributed to the *Journal* from its start under Dr. B. Seemann. in 1863; a list of rare and exotic plants at Kew Bridge appears under his name in Vol. I.

The Jubilee of the *Journal* and of Britten's association as contributor and editor was celebrated by a pleasant gathering in 1913, at which the editor was the guest of his botanical friends.

During the sixty-one years of its existence the *Journal* has filled a distinct place in British Botany. It has been the organ of publi-

cation of much of the work done in the Department of Botany, and also the most important medium for botanists interested in the British flora. In later years botanical nomenclature has been a subject of frequent discussion.

Dr. Otto Kuntze's attempt to apply the principle of priority to its utmost limit, expressed in his *Revisio generum Plantarum* (1891–98), made botanical nomenclature a field of often bitter conflict, into which Britten entered with zest—it was the kind of thing he loved. At first he sided with Kuntze; he felt, like many others, that it was the only logical position, and the plea of convenience did not appeal to him. The outcome of the movement was the discussion of the rules of nomenclature at the Vienna Congress in 1905 and the elaboration of the "Vienna Code." We prepared together the answers to the *Texte Synoptique*, which formed the basis of discussion; Britten's consent to the list of *Nomina conservanda* was given very grudgingly, and I do not think he ever came to like it. He had hoped to attend the Congress, but was prevented. Shortly afterwards we prepared together a *List of British Seed Plants and Ferns*, with a view of testing the working of the New Code; the result illustrated the difficulties of formulating and interpreting a set of Rules. Recently Britten had been a helpful member of the Committee on Nomenclature appointed to prepare a series of resolutions for consideration by the Imperial Botanical Conference last July.

Britten joined the Museum Staff in 1871. William Carruthers had recently succeeded J. J. Bennett as Keeper of the Department of Botany, and Henry Trimen was his Assistant.

It would have been hard to find two men of more different temperament than Britten and Carruthers, but they had one trait in common—they were both fighters. There were episodes in connection with the conduct of the Linnean Society in Britten's younger days in which Carruthers took an active part; and there were Royal Commissions in which eminent botanists figured, and which, if they did nothing else, left a legacy of embittered feeling and unhealthy rivalry; and in these and their sequelæ Britten played an important part.

Britten's recollections of the Department in the old days in Great Russell Street were interesting and amusing, and his history of the Department, as he had known it, including memories of quaint visitors and episodes, would have been good reading if it had been written.

After his retirement in 1909, when he had completed forty years' service as a Civil Servant, Britten was a very frequent visitor to the Museum, ostensibly for the work of the *Journal*; but he retained his interest in the Department, and his readiness to help—and criticize—in matters within his knowledge was a great asset to his former colleagues. He also continued his work on the early collections, the results of which appeared in the *Journal* from time to time, and in the *Journal of the Linnean Society* he recently published an account of *Some early Cape Botanists and Collectors* (1920).

Britten joined the Linnean Society in 1870, and in his younger days frequently attended the evening meetings. But, so far back as I can remember, he rarely sat through a meeting; a chat with his friends in the tea-room had greater attraction for him. In pre-war days the meetings were at 8 o'clock, and tea was served in an adjoining room after nine. He did not often take part in the discussions, but when he did he spoke well, and his remarks were always to the point. He never served on the Council, but had been a very useful member of the Library Committee. At the Commemoration of the Centenary of the Death of Sir Joseph Banks, held at the Society in June 1920, he gave an interesting account of Sir Joseph's botanical work. It was his boast that he had discovered Banks as a botanist, and not merely a collector and patron of the Science.

Britten was born in Chelsea (May 3, 1846), and was educated privately. He rarely referred to his boyhood except in reference to the finding of some interesting plant, and one felt that his life was not that of the ordinary boy and that his interests did not lie in the direction of sport or manual work. I never heard him refer to any kind of sport, and he professed a total ignorance of the use of tools. But he must have been a tremendous reader, and his entry into the Roman Catholic Church at the age of twenty-one probably closed a period of mental and spiritual disturbance. That his adopted Church could have found no more devoted disciple is shown by the tributes to his life and work in the Catholic press, where he was described as the most active Catholic layman, and on hearing of his death Cardinal Bourne at once offered a Requiem Mass at the Westminster Cathedral. A tribute to his work for his adopted Church was the conferment of the Knighthood of St. Gregory in 1897, followed in 1917 by promotion to Knight Commander. He was buried at Isleworth Cemetery, and many older and newer botanical friends paid their last respects to his memory at the grave-side and at the service which preceded it at the Church of our Lady of Sorrows in the little river-side town.

He lived at Isleworth during the two years he spent at Kew, and began there his social work among the boys, which he continued in Southwark, where he had a comfortable old house in West Square off the St. George's Road. The Boys' Club which he started in Southwark has developed into an important permanent institution. He was also interested in local affairs, and was for a time a member of the "Vestry"; he would amuse his colleagues at the Museum with unofficial reports of the meetings. And he was a keen politician; intensely devoted to the cause of Ireland—it was quite impossible to discuss the subject with him. It is reported that he got into trouble through over-zealous participation in the Fenian movement; for a Civil Servant must be discreet in his expression of political opinions. He was interested in Music and Art, and had spent many holidays in Italy. In his younger days he often went abroad with the Toynbee Hall parties, but I believe he had never travelled beyond Southern Europe. His well-stored and retentive memory, keen sense of humour, and ready wit made him an excellent companion. At

times he was a little difficult, but those who knew him well got on with him best. His was the kind of temperament for which a waste-paper basket, mental and material, is required, to receive communications which are best discarded straight away and forgotten; there were plenty that were worth preserving. Many of the present generation of British botanists gratefully remember help and guidance received from the Editor of this *Journal*; he would take endless trouble to reduce an apparently hopeless contribution to a condition fit for publication, and the Editor was not to blame if the result did not altogether meet with the contributor's approval. For seven years he edited *Nature Notes* for the Selborne Society, and his capacity as an editor was also recognised and highly appreciated in his Church.

Some years before his retirement from the Museum he left London and took a house at Brentford, where he lived until his death. He was what folks would call a confirmed bachelor, and he was far too busy ever to feel lonely. I think his home-life was happy; he would refer gratefully to his faithful old housekeeper, and he had numerous friends, botanical and otherwise, among whom he visited, or with whom he would spend a holiday. It is not easy to conceive a life more fully occupied than his or one holding a greater variety of interests; nor could one imagine an easier death, a painless passing while still enjoying comparative vigour of mind and body.

A. B. RENDLE.

NOTE.—The portrait is from one taken about two years ago, kindly lent by Mr. Harold Britten.

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THE BOTANICAL NAME OF THE QUINCE.

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

Three different names have been adopted for the Quince in the four editions of Schinz and Keller's *Flora der Schweiz—Cydonia vulgaris* Pers. (ed. 1, 2; 1900, 1905), *C. oblonga* Mill. (ed. 3; 1909), and *C. maliformis* Mill. (ed. 4; 1923). This instability in nomenclature is due primarily to the rejection of tautonyms under Art. 55, 2°, of the International Rules (see Journ. Bot. 1924, 41–47). But for that unfortunate provision, the combination *Cydonia Cydonia* (L.) Pers. would have been adopted for the Quince, and no trouble would have arisen. Even now, stability has not been attained: we must revert to *C. oblonga*, as there is no valid reason for replacing it by *C. maliformis*. Schinz and Thellung (Vierteljahrsschr. Nat. Ges. Zürich, lx. 355; 1915) based their acceptance of *C. maliformis* on Art. 46, which provides that when an author unites two groups bearing names of the same date, and adopts one of the names, his choice cannot be modified by subsequent authors. But there is no evidence that G. Beck, who adopted the name *C. maliformis* for the Quince (Fl. Nieder-Österr. ii. Abth. 1, 710; 1892), united *C. oblonga* with it—neither he nor any of the authors whom he cited mentioned *C. oblonga*. The fact that he described the fruit as globose or pyriform is immaterial: the recognition of varieties or forms with pyriform fruits does not necessarily imply that he had identified these with *C. oblonga* or *C. lusitanica*. The first author who united *C. oblonga* and *C. maliformis* and chose one of these names appears to have been C. K. Schneider (Ill. Handb. Laubholzk. i. 654; 1906), who adopted *C. oblonga*, which is therefore the name to be accepted under Art. 46.

Cydonia oblonga Mill. Gard. Dict. ed. 8, n. 1 (1768).
Pyrus Cydonia L. Sp. Pl. 480 (1753).
Sorbus Cydonia Crantz Stirp. Austr. ii. 57 (1763).
Cydonia Cydonia Pers. Syn. ii. 40 (1807).
C. maliformis Mill. *op. cit.* n. 2.
C. lusitanica Mill. *op. cit.* n. 3.
C. vulgaris Pers. *op. cit.* 658.

C. communis Loisel. in Duhamel Traité des Arbres, ed. 2, iv. 135, t. 36 (1809).
C. europæa Savi Tratt. Alb. Tosc. ed. 2, i. 99 (1811).
C. sumboshia Buch.-Ham. ex D. Don Prodr. Fl. Nep. 237 (1825).
Pyrus sumboshia Spreng. Syst. iv. Cur. Post. 196 (1827).
Cydonia silvestris Risso Hist. Nat. Prod. Eur. Mérid. ii. 296 (1826).
C. microcarpa Risso, *op. cit.* 298.
Pyrus tomentosa Roxb. Fl. Ind. ed. 2, ii. 512 (1832).
Cydonia tomentosa K. Koch Hort. Dendrol. 180 (1853).
C. umbato M. Roem. Syn. iii. 218 (1847).
C. pyriformis Hort. ex M. Roem. *op. cit.* 217.
Pyrus oblonga, *P. maliformis*, *P. lusitanica* Hort. ex Steud. Nomencl. 670 (1821), pro. syn.

An imaginary "*Cydonia piriformis* Medic. Gesch. 80"—apparently copied, without verification, from K. Koch Dendrol. i. 221 (1869)—was included in the *Index Kewensis*. Per contra both *Cydonia Cydonia* (L.) Pers. and *C. microcarpa* Risso were omitted, though the former combination, attributed to Karsten [1880–83], was included in Suppl. 1. The incorrect reference "*C. europæa* Savi Tratt. Alb. Tosc. 90" was doubtless derived from DC. Prodr. ii. 638 (1825). *Cydonia lobata* Bosc in Encycl. Méthod., Agric. vii. 306 (1821), was cited in *Index Kewensis* from p. 662, where the name does not occur, and was reduced to *Pyrus Cydonia*. Bosc's account is as follows:—"*Cydonia lobata* Bosc. De l'Amérique septentrionale. . . . . Le Coignassier lobé tient le milieu entre ce genre et celui des néfliers, mais ses feuilles et ces fleurs rapprochent davantage du premier. Je n'ai pas encore vu ses fruits en maturité, quoiqu'il fleurisse abondamment tous les ans, parce qu'ils tombent peu de temps après la floraison. On le multiplie par le greffe sur épine. Il tient fort bien sa place dans les jardins paysagers, qu'il orne, surtout lorsqu'il est en fleurs. Je l'ai trouvé dans les pepinières de Versailles, et je l'ai répondu autant que possible, pendant le temps ou je les ai dirigées."

THE HARPIDIOID HYPNA OF HEREFORDSHIRE.

By Eleonora Armitage.

Purchas and Ley's *Flora of Herefordshire* was published in 1889, and "Additions" followed in 1894 and 1908. So much taxonomic work has been done with the Harpidia since the first date that the nomenclature of the *Flora* is considerably in need of revision, and there are many later finds to be added to the list.

The late Mr. E. Cleminshaw was kind enough to put aside several old packets of Harpidia from the Ley Herbarium when he was arranging the mosses for the University of Birmingham. These were lent to me for a time, and I submitted them to Mr. J. A. Wheldon, who has kindly corrected some errors in naming, and also brought the names up to date. The mosses were then returned to the University Herbarium. It will be seen later that two forms must be removed from v.c. 36.

During several past years Mr. Binstead and myself have visited any areas in this dry county likely to contain Harpidia; and have revisited most of the old sites, often refinding the plants. The destruction of Vallets Wood, Pembridge, some years ago gives a historical interest to some of the Rev. J. F. Crouch's early records. Including our new finds, we have now a total of about thirty forms for the county. Many of these recent gatherings have passed through the Moss Exchange Club, and nearly all have been seen and named by Mr. Wheldon and a few by the late Mr. Ingham. For his ever-ready help I tender my thanks to Mr. Wheldon.

The arrangement and nomenclature follow those of Mr. Wheldon's "Key to the Harpidioid Hypna," published in the *Naturalist* in 1921 and 1922; this work was mainly founded on the researches of Renauld and Loeske.

In the list the numbers preceding the enumeration of the localities are those of the botanical districts of the *Flora*. Those who collected the plants are indicated by initials, L., Ley, B., Binstead, A., Armitage. I have put apart, for local use, a representative selection of voucher specimens from my Herbarium.

Limprichtia intermedia (Lindb.) Loeske. Bogs and marshes, rare. 2. Howle Green, A. [also as *Hypnum Cossoni* L.]. 13. Bell Orls, Dorstone, L. [as *H. vernicosum*].

forma *vera* Sanio, 14. Cefn Hill, B. and A.

[*L. vernicosa* (Lindb.) Loeske must be removed from the Herefordshire list; Mr. Wheldon found the plant to be *L. intermedia*.]

L. revolvens (Swartz) Loeske. Bogs and marshes, rare. 13. Wormbridge Common, A. 14. Olchon Valley, B., Olchon Gully, A., Cefn Hill, B. [Recorded by L. (Fl. Heref.) from Llanthony and Ffwddog Hill, both in Monmouthshire.]

Sanionia uncinata (Hedw.) Loeske. Grassy hillsides, rare. 11. Knill. [Vallets Wood, Pembridge, Crouch; locality destroyed.] 14. Olchon Dingle, A (Malvern Hills, A., but only on the Worcestershire side).

Cratoneuron glaucum (Lam.) Braithw., subspecies *C. commutatum* (Hedw.) Roth. On dripping rocks, generally calcareous, and in springs, occasional. 1. Garway Hill, L. 2. Dropping Well, Great Doward, *c.fr.*, L. Hope Mansel, L., B., and A. Bishopswood, *c.fr.* L. Coppett Hill, L. 3. Broadmoor Common, L. Haugh Wood, A. 4. Stifford's Bridge, L. Malvern Hills, L. Colwall, Miss Raper. 5. Tedstone Delamere, Rev. T. S. Lea. 6. Dewdales Hope, L. 7. Clehonger, L. 8. Dinmore and Westhope Hills, L. 9. Kimbolton, L. 11. Lyonshall, Crouch. 12. Whitney, L. Eardisley, B. 13. Bredwardine, *c.fr.*, L. Moccas, L. 14. Cusop, L., *c.fr.* Crib yr Garth, *c.fr.*, A. By Olchon Brook, *c.fr.*, L.

var. *fontanum* Wheldon, light green, lime-encrusted. 2. Calcareous spring, Oxlade, Howle Hill, A. Great Doward, A. 5. Tufaceous rocks by Whitbourne and Sapey brooks, A. 13. Petrifying spring, Deepwood, Moccas, A.

Subspecies *C. falcatum* (Brid.) Wheldon. Spring-heads and rills, uncommon, fruit very rare. 1. Garway Hill, L., a small form, approaching subspecies *gracilescens* (Schimp.) Wheldon. 2. Coughton Marsh, *c.fr.*, L. Doward bog, L., B., and A. 3. Haugh Wood, L. Calcareous spring, Pentaloe brook, B. 4. Ragged Stone hill and Brand Lodge, Malvern Hills, L. 5. Damp spot on Bromyard Down, A. 10. Combe Moor, A. 11. Kingswood, Boswell and Crouch. 12. Shobdon Marsh, Boswell and Crouch. 13. Bell Orls, Dorstone, L., B., and A. 14. Black Mountains and Cusop Dingle, L. Crib yr Garth, *c.fr.*, A. Black Hill and Olchon Dingle, A. Craswall, *c.fr.*, B.

var. *alpinum* Wheldon, fuscous-yellow above, passing to brown and black below, leaves imbricate, circinate-secund, acumen longer. 14. Prill Dingle, A.

[*H. falcatum* var. *virescens* Schimp., now called *Cratoneuron irrigatum* (Zett.) Wheldon, for which three localities are named by Ley (Fl. Heref. p. 437), must be omitted for v.c. 36; this is a northern plant and does not occur with us.]

Drepanocladus aduncus (Hedw.) Roth. Pools and damp depressions, rare. 2. Pool at Ashe, L. 3. Devereux Pools, L. 7. Pit near Dinmore Station, L. Pool, Wareham, L. Pool, Allensmore, L. 10. Kinsham, B. [Vallets Wood, Pembridge, Crouch, extinct.] 14. Blaen Olchon and moorland, Black Mountains, L.

var. *gracilescens* (Schimp.) Wheldon. 3. Pool bed, Sollershope, L. Devereux Pools, Woolhope, B.

D. polycarpus (Bland.) Warnst. 3. Sollershope, L., Devereux Pools, B. 7. Larport, Mordiford, B. 10. Combe Moor, B.

var. *intermedius* Schimp. 2. Pool, Pengethly, L. 3. Pool, Checkley Green, B. Devereux Pools, B.

forma *laxifolius* Sanio, Meadows, Mordiford, B.

D. pseudofluitans (Sanio) Warnst. subspecies *paternus* Sanio. 3. Checkley Green, B.

forma *gracilis* Ren. 10. Small marsh, Byton, B. 13. Pool, Moccas Park, B.

subspecies *aquaticus* Sanio, forma *fluitans* Warnst. 11. Pool in quarry, Knill, L.

Warnstorfia fluitans (Dill.) Loeske. Pools and damp spots, rather rare. 1. Gamber brook, Tretire, L. 2. Pool, Warren Wood. L. Small pool bed, Sellack, L. (now lost). 8. Osiery, Kinnersley, L. 10. Cowley Pool, Deerfold Forest, L. 11. Moseley Mere, L. 12. Old brickfield near Kinnersley, L. 14. Olchon brook, L. [Recorded in Fl. Heref. from the Monmouthshire part of the Hatterel Hill.]

Section (*a*) *paludosa*. var. *Jeanbernati* Ren. 3. Devereux Pools, B.

forma *elata* Ren. et Arnell. 14. Black Mountains, B.

var. *setiformis* Ren. 14. Black Mountains, B.

[var. *atlantica* Ren. 11. Vallets Wood, Pembridge, Crouch, extinct.].

Section (*b*) *falcata*. var. *falcata* Schimp. 11. Very small, in damp depression, drying up, on top of Hergest Ridge, A. "A starved state," J. A. W. 14. Summit of Black Mountains, A. Cefn Hill, B.

W. exannulata (Gümb.) Loeske. Meadows and bogs, rare. 3. May Hill, L. 14. Hatterel range, L.

var. *pinnata* Boul. 3. May Hill, H. H. K. and A. 14. Olchon head, A. Black Mountains, B.

forma *acuta* Sanio. 11. Kingswood, Kington, Crouch. 14. Blaen Olchon and Black Mountain moorland, L.

var. *stenophylloides* Ren. 1. Welsh Newton Common, L. 12. Crowther's Pool, B. 14. Head of Olchon Stream, A. Black Mountains, B. Cefn Hill, B.

W. serrata (Lindb.) Wheldon var. *Mildei* (Ren.) Wheldon. 14. Springs beyond Olchon head, B.

W. stenophylla (Wils.) Wheldon. 12. Pentre Gove, A.

var. *falcifolia* (Ren.) Wheldon. 11. Moseley Mere, Kington, A.

LA GASCA IN ENGLAND.

In this Journal for 1908 (pp. 163–170) Dr. Druce and myself gave such information as was then available as to the connexion of this Spanish botanist with England. While staying lately with Mr. Groves, I came across a book which contained information additional to that which was published in the Journal relative to La Gasca's stay in this country; and although it includes little of importance, it may be worth while to put it on record.

The book—"Dos Noticias Históricas del . . . D. Antonio José Cavanilles y D. Mariano La Gasca y Segura . . . por el Dr. Eduardo Reyes Prósper"—was published in Madrid in 1912; a copy is in the Library of the Linnean Society. The portion devoted to La Gasca, of whom a portrait is given, occupies pp. 210–251; it gives a very appreciative account of La Gasca's life and botanical qualifications, based upon the memoranda of those personally acquainted with him. The date of his birth at Encinacorva, Zaragoza, is given as Oct. 5th, 1776; he was a pupil of Cavanilles, and took a medical degree at Madrid in 1805. The account contains much information about his botanical contemporaries, but I propose to confine myself to the passages which relate to his stay in England, and the reception accorded to him here; these should be read in connexion with the account in this Journal already indicated. It may be noted that the graphic description by J. A. Schultes of his meeting La Gasca in Lambert's herbarium in 1824, quoted from Bot. Misc. i. in Journ. Bot. 1908, p. 169, is cited by Señor Prósper as written by "the eminent botanist, Hooker." A note by Prósper throws some light on Schultes' remark that La Gasca "cast a glance full of sorrow and indignation upon some packages which belonged to the herbarium of Ruiz and Pavon"; Señor Prósper says that "during his stay in London [La Gasca's] noble character experienced bitterness and annoyance in learning that the unfortunate and eminent Jose Pavon had had to send his rich herbarium to Lambert, and apply what it brought to his own subsistence and to save from death a son persecuted for political opinions."

I have availed myself throughout of the translation of Prósper's

work made for Mr. Groves by his friend Señor John Velasco; but I have not quoted this textually, as the English of the translation is not always idiomatic. Señor Prósper's information was largely derived from Dr. A. Yáñez, an "eminent Spanish botanist" and warm personal friend of La Gasca, at whose funeral, and subsequently at the Academy of Science and Arts of Barcelona, he delivered a eulogium which was published in that city in 1842.

La Gasca arrived in London from Gibraltar in 1824, and was cordially received: "The consideration which was lavishly bestowed upon him by all classes of English botanists of note softened the rigours of his emigration. The generous Lambert, the venerable [William] Anderson, the celebrated Robert Brown, the savants Smith, Lindley, Bentham, Hooker, David Don, Webb, and others, heaped upon him evidences of their high appreciation. The London Pharmaceutical Society [The Society of Apothecaries], at the instance of the learned Anderson, permitted him to sow in the Chelsea Garden the Umbelliferæ and Graminaceæ with which he was much occupied. . . . Smith, who had a real affection for La Gasca, proposed him for a Chair in a North American University. The eminent R. Brown suggested that he should write the *Flora Græca* from the materials that Sibthorp had collected, but he did not start on this work, which was done by a compatriot of Sibthorp. Lastly, an English botanist, who in his travels had gathered together a large herbarium of Oriental plants, engaged La Gasca to classify them; and as the scientific work of that nation is splendidly paid for—as is well known—the poor emigrant, with what his labour brought in, transported from Spain to London his family, from whom he had been separated for two years.

"When receiving him among its members, the Royal (*sic*) Linnean Society of London conferred on La Gasca gratuitously the title of membership, exempting him from entrance fee and annual subscription; and this distinction, so highly honorific, was conferred upon him in consequence of the eminent services which he had given to the science of plants."

When La Gasca came to London he brought with him a "Herbarium Pictum" in six folio volumes containing 1,383 coloured figures of plants, "well designed and preserved," mostly of European plants, with the Linnean and Tournefortian names. They were executed at the order of Miguel Barnades, a professor at the Madrid Garden, author of a Spanish flora which remained unpublished. The Herbarium was bought by La Gasca in 1820, for the sum of 30,000 reals (=£300 sterling), and La Gasca, in a letter published by Prósper, offered it to the Duke of Bedford for £250; there is no evidence that the letter was acknowledged.

The climate of London not suiting his health, La Gasca left England for Jersey in 1831, where he remained until August, 1834; he arrived at Barcelona at the end of the year after a stay in Paris. He then went to Madrid, where he obtained the appointment of a committee of professors charged with the direction and the administration of the Museum of Natural Sciences: of this he became President. It became necessary for him to seek a milder climate, and

he went to Barcelona at the end of 1838. Here he became the guest of the Bishop of Barcelona, in whose episcopal palace he remained until his death on June 23 of the following year. "The Bishop of Barcelona, the Town Council of that city, the personages and cultured Societies, and especially the Academy of Arts and Sciences, contributed to his burial, and the obsequies were worthy of the great man of science and worthy patriot." JAMES BRITTEN.

Some additions may be made to the foregoing from the records of the Linnean Society. In the Smithian correspondence there is a Latin letter from La Gasca to Smith, dated 9th November, 1826, addressed from 25 Camden Place, Camden Town, of which the following is an abstract:—

"An exile from my country and deprived of everything I possessed, with my wife and four [quatuorque] children needing education, as hostages, it occurred to me last summer to prepare a *Hortus siccus londinensis* and to issue it quickly. I have therefore diligently got together no small number of London plants. I have nearly completed the first fasciculus of 25 plants, which could be issued at the end of this month. But a short time ago it occurred to me that these plants should be collated with the herbaria of Linnæus and your own, and I beg the favour of this. In a day or two a small packet will be sent, containing 52 London plants; with it I will send the second fasciculus of Mexican plants edited by my friend La Llave, and with him, Lexarza. I trust you will accept these and return me an answer whether my plants are the same as those you have described in your golden *English Flora*. . . . Your most obedient, Mariano La Gasca."

A long account will be found in Loudon's *Gardener's Magazine*, ii. (1827, 220–221), of the projected *Hortus*; the editor was evidently anxious to help the refugee. The author's preface to the *Hortus* and a transcription of the labels accompanying the specimens are given by Dr. Druce in the notice of La Gasca in this Journal for 1908 (pp. 164–169).

After the death of Smith in 1828, it was suggested that La Gasca might edit the rest of the *Flora Græca*, but Lindley was selected to bring out the last three volumes.

The English botanist alluded to by Señor Prósper, as having gathered a large herbarium of Oriental plants and engaged La Gasca to "classify" them, can, I think, only point to Nathaniel Wallich, who arrived in London in 1828 with his large herbarium, and might possibly have engaged La Gasca to sort the plants before getting other botanists to work up special groups, such as Kunth, Meissner, Bentham, and A. de Candolle.

La Gasca wrote a series of articles which appeared in Loudon's *Gardener's Magazine* thus: "Sketches of the Botanical, Horticultural, Agricultural, and Rural Circumstances of Spain," vols. i. (1826) 235–249; ii. (1827) (title changed: "On the Gardening and Botany of Spain") 393–399; iv. (1828) 65–76.

The following letter gives fuller information about La Gasca's

election than the Minute-book of the Society, which is silent on the matter. His name appears in the annual lists from 1831 to the time of his death, without any address, possibly for fear of political vengeance. He was elected on December 20, 1831, his certificate being signed by Robert Brown, Edward Forster, W. J. Burchell, N. Wallich, Francis Boott, Wm. Anderson, R. H. Solly, N. B. Ward, John J. Bennett, and others—an assemblage of names which sufficiently indicates the warmth of his reception by English botanists :—

"9 George Street,

"S^{nt}. Heliers (Jersey), 20. January 1832.

"My dear Sir

"It is only four days ago that I had the pleasure of receiving your much esteemed letter of the 22^{d} last informing me of the honor, which the Linnean Society of London has been pleased to confer on me by my election as a Fellow of that highly distinguished Body : and I beg you will convey to the same my most sincere thanks for so marked and gratifying distinction, assuring them that admist [*sic*] all my misfortunes nothing could be more satisfactory to me than to have obtained a title at which it has always been my ambition to aspire since the first time I resolved to devote myself exclusively to the natural sciences, and particularly to Botany. It grieves me however to see my ardor, once indefatigable, now much debilitated from the effects of my long and uninterrupted sufferings, altho no exertions will ever be wanting on my part to endeavour to correspond in a proper manner to the high honor bestowed on me on this occasion. I feel also deeply grateful to the Council for the favour of exempting me from the payement [*sic*] of Fees both annual and for admission : and renewing my assurance that it will be always my anxious study to render myself worthy of their esteem and consideration

"I have the honour to be

"My dear Sir

"Your most obed^{t}. humble Servant

"[signed] Mariano La Gasca.

"To J. E. Bicheno, Esq^{e} Secretary to the Linnean Society."

[*Linn. Soc. Archives.*]

B. Daydon Jackson.

BIOGRAPHICAL NOTES.

By the late James Britten.

The following notes, from sources of value, are a continuation of those published in this Journal for 1904 (pp. 294–302), and, like them, are derived from sources not likely to be consulted by botanists in search of botanical information :—

Adam Afzelius (1750–1837).

[The following is from the Travels of Rev. E. D. Clarke (1769–1821) vol. vi. pt. 3, sect. 2, pp. 174–5 (1823).]

"The morning after our arrival [at Upsala] (November 14 [1799])

we waited upon Mr. Afzelius in his apartments in the Palace. He had been during ten years engaged in foreign travel ; and was at this time unpacking his collection, which consisted of natural curiosities from Africa and other distant regions which he had visited .... As Mr. Afzelius had been in England, and was in Cambridge but a short time before we set out upon this expedition, he seemed to be well aware of the striking contrast which a comparison of the two Universities must necessarily afford ; and said to us : 'You must not expect to find everything here upon the same footing as in England ; we have neither the same funds nor the means of exciting an equal degree of emulation among our students.'"

Patrick Browne (c. 1720–90).

In the Linnean Society's library is an 8vo MS. "Fasciculus Plantarum Hiberniæ" dated 1788, the history of which is given in the Banksian correspondence at Kew. Writing to Banks from Castlebar, co. Mayo, Sept. 8, 1787, Browne says : "I have just now by me a Flora Hibernica, having travelled at different times thro many parts of y^{e} kingdom, but infirmities and having no assistance renders it a poor catalogue, not above 600, or thereabout. A Sanicula [probably *Pinguicula grandiflora*] and few others now expected." In Banks's copy of his reply he says "I should advise you by all means to offer your Flora Hibernica to the Provost of the College of Dublin, and you are welcome if you choose it to tell him that I advised you to do so. I have had some conversation with him on the subject of an Irish Flora and yours tho' not yet perfect might under the title of Fasciculus form a beginning well worthy the notice of a body who wish to encourage the increase of science in Ireland"

John Covel (1638–1722).

Master of Christ's College, Cambridge. (See Dict. Nat. Biogr. xii. 354.) During his chaplaincy to the British Embassy at Constantinople (1670–77) Covel paid much attention to botany, although no collections of plants by him are known to exist. In Sloane MS. 4003, ff. 2–6, are drawings of four Turkish plants with full descriptions : 3340, ff. 325–327 contain descriptions of fifty plants, transcribed from his MSS. by Petiver ; these often give the date of observation, the locality, and other details showing Covel to have been an accomplished botanist. The letters to Sloane and Petiver (Index, p. 126) contain nothing of botanical interest.

Middleton.

Can any information be obtained about a surgeon of this name, of whom I only know what is given in the following quotations from descriptions of *Œnothera odorata* Jacq. (*Œ. undulata* Ait.) ?

"Crescit ad Champion river in Patagonia .... Omnes in hoc volumine descriptæ plantæ patagonicæ ab illustri Middleton in loco natali detectæ fuerunt, earundemque semina ab egregio Gulielmo Forsyth cum filio meo ineunte anno 1793 communicata." Jacq. collect. v. 107 (1796).

"The present species was first raised in Europe in 1790, from a

collection of seeds made by the surgeon of a merchant ship at Port Desire (a harbour on the eastern coast of Patagonia), frequented by vessels on their passage to the Pacific Ocean. Sir Joseph Banks purchased the parcel which was brought home, and presented a part to Professor Jacquin, by whom our plant has been figured in the *Transplantarum rariorum*, and its history given in his *Collectanea*, where the native place is said to be on the banks of Champion river; a river unknown to Geography." Bot. Reg. ii. 147 (1816).

There are specimens, presumably from Middleton, in the British Museum Herbarium from Port Desire—the types of *O. undulata* Hort. Kew. ed. 2. ii. 34—and others labelled "Hort. Kew. 1791. Semina a Port Desire."

Benjamin Robertson (†1800).

[The setting aside of Robertson's will is well known, but the details concerning it are given by Haworth (*Miscellanea Naturalia*, p. 190: 1803). Sims (Bot. Mag. t. 760) refers to Robertson as being "so much attached to the science of Botany as to intend leaving his garden for the use of the public; but through some informality in the instrument, the will was set aside, and his intention of course frustrated"; Smith in Rees (s.v. Sibthorp) says his "ill-made will was set aside by the law of the land."]

"This gentleman's enthusiasm in favour of the science of Botany was infinitely greater than is generally understood. He not only made and kept up a Botanic Garden upon a select, liberal, and judicious plan, during his life; but absolutely left by Will (drawn by a counsellor of eminence, and duly executed by himself) the whole of his extensive property, except a few legacies, to seven trustees (of which number I had the honour to be the third); with complete and absolute power and authority for them to appropriate the whole of it, to *the establishment and continuance of a permanent Botanic Gardens* upon a scale of immense magnitude; by the name of the 'Stockwell Botanic Garden.' This Will, however, unfortunately for the sciences of Botany and Horticulture, was never permitted to be carried into effect; but was declared formally, after a very short hearing by the Lord Chancellor Eldon, to be *null and void, as to the bequest of the garden*. In consequence of which the whole of the testator's property, except some inconsiderable legacies, reverted to his heirs-at-law.

"Mr. Robertson commenced life in circumstances, and with property, of the most humble kind. He inherited nothing from his relatives or friends; but by a well-planned, patient, and assiduous adherence to his mercantile and other concerns, acquired a fortune of very great magnitude; and died in the month of December 1800, unmarried, and without issue, at an advanced age; without altering or revoking the above will." A. H. Haworth, *Miscellanea Naturalia*, p. 190 (1803).

Stillingfleet, Bute, and Hill.

[The following extracts are from the *Letters of Thomas Gray*, edited by D. C. Tovey, vol. ii. pp. 199–201 (London, 1904). The notes on Bute and Hill appear as footnotes to the text, in which the reference to Stillingfleet appears.]

Benjamin Stillingfleet (1702–71).

"I have lately made an acquaintance with this Philosopher, who lives in a garret here in the winter, that he may support some near relations, who depend upon him, he is always employ'd and always cheerful, and seems to me a very worthy honest Man. His present scheme is to send some Persons properly qualified to reside a year or two in Attica to make themselves acquainted with the climate, productions, & natural history of the country, that we may understand Aristotle & Theophrastus, &c. who have been heathen-Greek to us for so many ages. This he has got proposed to Ld Bute (1), who is no unlikely person to put it in execution, being himself a Botanist, and having now in the press a new System of Botany of his own writing in several volumes, the profits of which he gives to Dr. Hill (2) (the Inspector) who has got the place of Master-Gardiner at Kensington, reckon'd worth near 2000£ a year, there is an odd thing for you!"

Gray to Wharton, London, Jan. 31, 1761.

Earl of Bute (1713–92).

(1) "Walpole, who, like Gray, was a contemporary of Bute's at Eton, says that he 'studied simples in the hedges about Twickenham.' He seems to have pursued the natural sciences in the island of Bute, before he emerged to be groom of the stole to Frederick, Prince of Wales. I know nothing of his volumes on botany; but Walpole writes to Zouch, Jan. 3, '61—'Bodies of Sciences, that is, compilations and mangled abstracts, are the only saleable commodities.... Would you believe that Dr. Hill earned fifteen guineas a week by working for wholesale dealers? he was at once employed on six voluminous works of Botany, Husbandry, etc., published weekly.' Here Croker notes that Hill's were among the first works in which scientific knowledge was put into a popular shape by the system of number publishing."

John Hill (1716–75).

(2) "Poor Dr. Hill was supposed to have defended Walpole's *Catalogue of Royal and Noble Authors* against the strictures of the *Critical Review*; the gross flattery of the defence disgusted Walpole (*Short Notes of my Life*, February 10, 1759, and letter to Gray, Feb. 15 of that year). Walpole to Zouch (*l. c. supra*) writes: 'I am sorry to say this journeyman is one of the first men preferred in the new reign: he is made gardener of Kensington,' etc. Croker says that the emoluments of the place were much less than £2,000 a year."

Caleb Threlkeld (1676–1728).

"Lately there is come out at Dublin a Synopsis Stirpium Hibernicarum by one Caleb Threlkeld, who hath been pleased to treat me in an uncivil manner & that without any reason. His arguments & his skill in Botany are so very poor that it will be hardly worth y[e]

while to meddle with such a Botanist, though I shall find means to vindicate myself &c. If you should go to Ireland pray inquire & send me word what sort of a Mann it be & do not take notice of an acquaintance with me. I do not doubt att all but you will find a great many new things there & make ashamed this Botanist, who in his whole Catalogue hath but one plant that hath not been known to grow there, viz. Pseudostachys Alpina C. Bauh. and that out of observation of another man."

Dillenius to S. Brewer, Aug. 19, 1727 (MS. in Bot. Dept.).

SHORT NOTE.

CARNARVONSHIRE SPHAGNA. The following Sphagna were found in Cwm Idwal last September. They have been named by Mr. W. R. Sherrin, A.L.S., and are mostly new to v.c. 49; two have not been recorded from Britain before:—*Sphagnum rubellum* Wils. var. *rubescens* W.; *S. plumulosum* Roll. var. *versicolor* W. forma *ascendens* W., Cwm-y-Glo; *S. compactum* DC. var. *subsquarrosum* W. forma *densum* W.; *S. squarrosum* Pers. var. *spectabile* Russ. forma *elegans* W.; *S. cuspidatum* Ehrh. var. *submersum* Schimp. forma *rigescens* W. subf. *densum* Ingh. & Wheld.; var. *plumulosum* Schimp.; *S. molluscum* Bruch var. *vulgatum* W. forma *compactum* W.; *S. hercynicum* W., a form new to Britain, stem-cortex resembling that of var. *Binsteadii* Wheld., but a smaller, more highly-coloured plant; *S. auriculatum* Schimp. var. *ovatum* W. forma *rufescens* W. subf. *subsimplex* W. (found by Holt at Llanberis); *S. bavaricum* W. var. *mesophyllum* W. var., new to Britain; the small stem-leaves on this plant are wider than long.—ELEONORA ARMITAGE.

REVIEWS.

The Roses of Britain. By Lt.-Col. A. H. WOLLEY-DOD. London: Taylor and Francis, 1924. Post 8vo, pp. 112, Wrapper. 5*s.* net.

STUDENTS of our native flora will welcome this authoritative account of British Roses from the pen of Col. A. H. Wolley-Dod, whose earlier contributions on the same subject, published as Supplements to this Journal for 1908, 1910, 1911, and 1920, have already made him well known as an ardent and able worker on one of our most difficult genera. As the author's views have been modified since the publication of his last work, the present contribution may be regarded as an expression of his matured opinions gained from an experience extending over twenty years. To quote the words of its sub-title, the book gives "Detailed descriptions of the Wild Roses known to grow in the British Islands, with notes on their peculiarities and affinities, and on their comital distribution."

Recent cytological studies tend to show that the baffling polymorphy of most British roses is due to hybridity, and that very few true species remain. "The result," writes Col. Wolley-Dod (p. 3), "is that they run into every conceivable form . . . . no hard-and-fast line exists between any of our Series, Subseries, Species, or varieties." That the naming of roses presents real difficulties is known to every botanist who has tried it, and more than one rhodologist in the past adopted the plan of referring specimens, not to precise varietal names, but to the aggregate species or group to which they belonged, a procedure which seems to have followed the discovery that "authors' types or specimens named by them often differ from their descriptions in the very features which they emphasise therein" (p. 4). Despite the difficulties, the author of the present work deals with 17 species, 110 varieties, 48 forms, and 26 hybrids. The species are distributed among four sections of the genus which are here called Series, an unusual use of the name. Of these definitions are given at p. 7. Since the large section CANINÆ, which stands as SERIES IV., occupies seventy pages of the book, it would have been an advantage if the leading features of its three Subseries had also been given at the outset.

The names of species and hybrids, all of which bear pseudo-specific names, are numbered 1 to 43 and are printed in heavy type. The inclusion of a synoptic table of the aggregate species described would have been a useful guide to the contents of the book, while a clavis for their determination would have proved helpful, since the analytical keys placed at the end of the work are for the determination of varieties and forms and can be used only when the specific name is known.

The varieties and forms of the several species—the former in heavy type, the latter in small capitals—are divided into groups where their number demands such sub-division. Of *R. canina* L. forty-seven varieties and forms are described, and of *R. dumetorum* Thuill. twenty-two, while their boreal derivatives, *R. glauca* Vill. and *R. coriifolia* Fr. have eight and fifteen respectively. It is clear from the author's remarks that the number of names under the last two species might be increased, as it undoubtedly would be, if the same attention were given to variations in leaf-serration, pubescence, shape of fruit, etc. While no new species are described, a number of new varieties and forms (six under *R. dumetorum*) are included. The descriptions of most of these have already appeared in a paper by the author in this Journal for July (pp. 202–209). The majority of the names, however, are those employed by earlier writers, Déséglise and others, who in many cases used them as specific names. To allow them to stand as such would have resulted in a long list of species of the "micro" order. Col. Wolley-Dod, rightly, we think, has preferred to reduce them to the rank of varieties or forms; this has necessitated the frequent use of "comb. nov.," which appears about seventy-seven times.

Along with the names adopted the author gives those synonyms

he has been able to verify, with references to the place of publication. These references are not always easily followed. Thus, at p. 77, under *R. mollis* Sm., occurs

> "(*b*) var. **pseudo-rubiginosa** comb. nov. *R. pseudo-rubiginosa* Lej. Fl. Spa, 1, 229 (1811). *R. mollissima* var. *pseudo-rubiginosa* Baker, *l. c.* xi. 214 (1869). *R. arduennensis* Crép. in Bull. Acad. Roy. Belg. 2nd ser. xiv. 101 (1862)."

The reference to Baker is, of course, not in Fl. Spa, but can be found only by turning back to p. 68, where under *R. coriifolia* var. *pruinosa* comb. nov. there appears the last mention of that author's paper in Journ. Linn. Soc. xi. (1869).

It is not possible to enter into any details regarding the plants described, the position accorded to some of them, or the opinion expressed by the author as to their status. But, in spite of some uncertainty surrounding the name, the group Subcaninæ of *R. glauca* seems to have received rather scant treatment. It is merely mentioned; yet there occur in Scotland undoubted forms of *R. glauca* having reflexed sepals which do not appear referable to any other group.

But it is in his treatment of the hybrids that the author makes a notable departure from the views of the older botanists. Fourteen of the twenty-six stand to his name. Smith's *R. involuta* has generally been regarded as a complex series of forms of Spinosissimæ × Villosæ parentage, many of which have received varietal names. These, and *R. involuta* itself, are now segregated under pseudo-specific names, while some of them are transferred to other hybrid groups. Of the new hybrids described some must be difficult to determine, such as × *R. Shoolbredi* W.-Dod, which is regarded as *R. mollis* × *omissa* var. *suberecta*. For two somewhat different plants, both believed to be *R. spinosissima* × *mollis*, two new names are introduced, viz., × *R. scotica* W.-Dod and *R. mayoensis* W.-Dod. Again, two hybrids, both referred to the parentage *spinosissima* × *omissa* var. *suberecta*, have been distinguished as × *R. Barclayi* W.-Dod and *R. borealis* W.-Dod. No doubt some of the forms of the *involuta* aggregate are peculiar and may deserve distinctive names, but it would have been better to have employed names not already in use, both *scotica* and *Barclayi* having been adopted for *sub-species* of the group *R. Afzeliana* Fr. by Almquist and Traaen, whose descriptions appeared in this Journal for 1913, p. 127.

The book is very free from typographical errors, although at p. 89 leaflets of *R. tomentosa* var. *Brittoni* W.-Dod are described as "very large, often 1¾ in. long by ⅛ in. wide." It is to be regretted that page headings are not used to convey useful information instead of the rather tiresome reiteration of "The Roses of Britain."

J. R. MATTHEWS.

Fruit and Flowers: an Introduction to Botany. By CONSTANCE GARLICK. Illustrated from Nature by MARGARET FULLER. Demy 8vo, cloth, pp. 406. London: The C. W. Daniel Company. Price 21*s.*

"THE purpose of this book"—which has a rather startling "jacket," representing "the Assyrian Wind-God introducting pollen"—"is to bring favourite plants, wild and garden, under observation from as many points of view as possible"; "to make each plant a centre of interest in itself." After the briefest possible account of the parts of a flowering plant, Miss Garlick therefore starts off at once with descriptions of plants, the only sort of arrangement being the grouping under the seasons of the year; it will thus be seen that the book is hardly what would be generally considered as "an introduction to Botany," though it is an excellent way of getting folk to be interested in individual plants. Technicalities are as far as possible avoided, but the descriptions are very full and careful, showing that the author, who was at one time teacher of nature-study in the University College School, has examined for herself the plants she describes. Besides the actual descriptions, attention is directed to matters not usually found in popular books: thus under the Scarlet Runner, the first in the volume, there is a description of the cushions at the base of the leafstalk; the method of climbing of the White Jasmine is described; under *Impatiens glandulifera* there is a full account of the fertilisation and the dispersion of the seeds; and so on.

Miss Margaret Fuller's illustrations are a noteworthy feature of the book, both in number and character and in the various aspects in which the parts of the plants are presented. Thus the leaves of the Scarlet Runner, which appear on three plates are shown n numerous positions, and the details of the flower are also given. But we do not understand the arrangement of the figures of details—the whole plant is not drawn; these usually occupy but a portion of a plate, over which they are scattered in a haphazard manner; the figures of Cabbage flowers, for example, which occupy two plates, could quite easily have gone on one. They show a vast amount of conscientious and careful work and an acquaintance with the life-history of the plant; the floral dissections would have been more useful had they been somewhat enlarged.

Both in text and illustrations the book is a welcome change from the usual popular botany book; its originality extends to a certain want of care in detail; thus the Latin names are often omitted, and the names of families are seldom given. Very rarely we note matter for correction: thus we are told that "a labiate is also named *Eschcholtzia* in honour of the senior Dr. Eschcholtz," but the name of the labiate is *Elsholtzia* and commemorates J. S. Elsholtz. But the volume, as a whole, is as accurate as it is interesting.

[J. BRITTEN.]

The Cultivated Evergreens: a Handbook of the Coniferous and most important Broad-leaved Evergreens planted for Ornament in the United States and Canada. Edited by L. H. BAILEY. 4to, pp. xvi, 434; 48 plates, 97 text-illustrations. London: Macmillan, 1923 Price 3*s.* 6*d.* net.

THIS admirably printed volume, issued under the competent editorship of Prof. L. H. Bailey, is the work of several authors, each a recognized expert in the section committed to his care. It chiefly appeals to horticulturists, who have long been in need of such a book; it is fifty-five years since *The Book of Evergreens*, by Josiah Hooper, which was for long indispensable, was published in New York; "a half century has brought us into a new atmosphere; the knowledge of insects has vastly increased, and the science of plant pathology has come into being."

The volume is divided into four parts: I. The place and care of Coniferous Evergreens grown for ornament; II. The kinds of cultivated Conifers in North America; III. Certain Broad-leaved Evergreens; IV. Inventory of Woody Evergreens grown in North America. The parts are divided into chapters dealing with various branches of the subjects indicated; thus in the first, the cultivation and propagation of Conifers, their adaptation to different regions, their place in the landscape, and their diseases and injuries are discussed in detail at considerable length; in part III. the evergreens other than conifers are similarly treated. It is, however, with parts II. and IV. that the botanist will be principally interested; these are in the capable hands of Mr. Alfred Rehder, of the Arnold Arboretum, whose many valuable contributions on the botany of woody plants will be familiar to readers of the journal of that institution.

The Systematic Enumeration of the Conifers begins with a short introduction, in which the nomenclature is dealt with and the arrangement explained. The International Rules of Botanical Nomenclature are followed and have been strictly applied, but in cases in which the name adopted in the Official Catalogue of *Standardized Plant Names*, of which we hope shortly to publish a notice, differs, "that name is given as an alternative and may be used instead of the name considered correct under the International Rules by those who prefer to follow that Catalogue." For horticultural purposes, all subdivisions of species are designated "varieties"; "in general usage this term is often dropped and the varietal name directly joined to the specific name, although this is not strictly correct. No attempt has been made to substitute new names for combinations like *Chamæcyparis pisifera* var. *plumosa aurea*; such names are retained for horticultural purposes and placed in quotation marks to indicate that the writer does not consider them botanical combinations." We note that the comma separating the trivial from the generic name is retained throughout. The descriptive portion begins with a key to the genera, each of which is supplied with one to the species; the descriptions are, as might be expected, full and careful, with a brief but useful citation of synonymy; the varieties enumerated are in some cases very numerous; it would be interesting to compare those under *Taxus baccata* with those in Messrs. Dallimore and Jackson's *Handbook*, lately reviewed in these pages; we note by the way that the neglect to utilise the page-headings, to which we called attention when noticing the *Handbook*, also obtains here.

"The number of Broad-leaved Evergreens which attain to the size of trees is very limited, and moreover they are slow in growing, even to a small size." The genera represented are *Buxus*, *Osmanthus*, *Mahonia*, *Berberis*, *Ilex*, *Pieris*, *Leucothoë*, *Kalmia*, and *Rhododendron*, and with much ingenuity these are brought into one Key. A useful "inventory" or "check-list" of woody evergreens brings the volume to a close, save for the excellent one-alphabet index.

A word must be said about the excellent illustrations, both plates and in the text; the former, from photographs, are largely of specimens in the Arnold Arboretum, which has also supplied most of the material for the figures in the text, all prepared specially for this work. [J. BRITTEN.]

BOOK-NOTES, NEWS, ETC.

AT the meeting of the Linnean Society on November 6, Mr. E. G. Baker exhibited a specimen sent by Dr. J. A. Voelcker, which consisted of a big woody tuber about 75 cm. in circumference, collected at P.O. Chania Bridge, British East Africa. The tuber had thrown out some slender shoots, which bore flowers but no leaves. The shoots resemble those of *Vigna Kotschyi* Schweinf., which Dr. De Wildeman places in the genus *Liebrechstia*. The flowers were of a regular papilionaceous character, but examination showed the style to be that, not of *Vigna* but of *Dolichos*, being terminal with penicillate hairs. The nearest ally found either in the collections at the Natural History Museum or at Kew was *Dolichos Oliveri* Schweinf., from Southern Abyssinia, but it was advisable to wait for the development of leaves before making a final decision as to the species. Dr. Dalziel remarked that if the plant should prove to be *Dolichos Oliveri*, the existence of a tuber in that species has been overlooked. Several tuber-bearing Leguminosæ have been confused with the most conspicuous example—that is, *Dolichos pseudopachyrhizus*, widely spread in Africa. There are some eight to ten African species with thickened roots, usually a simple spindle-shaped swelling or a rather stout woody rootstock; only two or three seem to have a really large tuber—namely, *D. pseudopachyrhizus*, a S.W. African species called *D. Seineri*, and the simple-leaved species *D. simplicifolius*. As to edible quality, there is *D. esculentus*, a wild tuber of the Congo region, but none of the others are edible and none are cultivated; they have rather a tendency to a poisonous quality, some having a coloured resinous juice with medicinal applications. The plant may prove to be a new species, or, like so many others, may be found to be the widely-distributed *D. pseudopachyrhizus*.

Two papers were read—one by Mr. W. H. Pearsall and Dr. W. H. Pearsall, F.L.S., "Phytoplankton of the English Lakes," the other by Dr. B. M. Griffiths, F.L.S., "Studies in the Phytoplankton of the Lowland Waters of Great Britain: the Phytoplankton of Shropshire, Cheshire, and Staffordshire." Dr. Pearsall said that detailed examination of the phytoplankton in eleven of the larger

English Lakes has shown that these lakes fall into three groups according to their plankton types: (1) those with green algæ dominant, (2) those with *Dinobryon* dominant, (3) those with diatoms and Myxophyceæ dominant. Three tests have been used to substantiate these facts—the distribution of the species according to their maximum *abundance* in the various lakes, their *constancy* in various samples from the same lake, and the average percentage of the phytoplankton in the various lakes. The classification of the lakes on the basis of their phytoplankton agrees very exactly with their classification according to physical characters, water analyses, and rooted vegetation, as previously established.

Dr. Griffiths said that his investigation comprised some twenty-three bodies of water in Shropshire, Staffordshire, and Cheshire. Most of the smaller lakes and pools of the Lowlands of England were artificial, but many of those of Shropshire and Cheshire were natural. These natural waters frequently showed "water-bloom," due to a prodigious development of blue-green algæ. The algal flora of the district was poor in desmids, but rich in Protococcales, Myxophyceæ, and Bacillarieæ. There was a characteristic desmid, *Staurastrum paradoxum* var. *biradiatum*. One new desmid, a species of *Closterium*, a remarkable twisted form, was found in Marbury Mere. The Peridinian, *Ceratium hirundinella*, very commonly occurred, and often in great abundance. In general, these Lowland waters resembled those of the European plain and differed from the lakes of the British mountain areas.

Mr. Charles Turner sent for distribution a number of slides of material from Redes Mere, Cheshire, showing the algæ causing the "breaking" of the meres, or water-bloom. Amongst the algæ were *Aphanizomenon flos-aquæ*, a sp. of *Anabæna*, *Eudorina elegans*, and *Microcystis æruginosa*.

British Mycological Society. The November meeting was held at University College on the 15th ult. Dr. C. A. Pratt gave an account of the staling of cultures of *Fusarium* by the production of sodium bicarbonate; Dr. W. Robinson described the experimental conditions controlling growth and reproduction in *Sporodinia*; Mr. W. J. Dowson recorded the occurrence of a new die-back of Rambler roses caused by *Gnomonia Rubi*; Mr. A. W. Exell described the structure of the hymenium in *Stereum hirsutum* and *S. purpureum*, and the President, Mr. J. Ramsbottom, showed various lantern-slides and exhibits relating to the mycologists of the last century.

Imperial Botanical Conference. At a recent meeting of the executive committee which was reappointed to consider the resolutions passed at the Conference in July, it was decided to proceed at once with the publication of a Report of the work of the Conference. The Hon. Secretary, Mr. F. T. Brooks, kindly agreed to act as editor of the Report, which will be issued in due course by the Cambridge University Press.

Journal of Botany.—Arrangements as to continuation: subscribers and readers are referred to the notice on the third page of the wrapper.

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DR. H. O. FORBES'S MALAYAN PLANTS.

INTRODUCTORY NOTE.

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

A systematic account of Dr. Forbes's New Guinea plants was published as a Supplement to the *Journal of Botany* for 1923. As stated in the introduction to that paper, Dr. Forbes also made extensive collections, mainly in Java (**J.**) and Sumatra (**S.**), during 1878 to 1883, and the present Supplement gives an account of these. I have again to express regret that the collections could not be worked out at the time of purchase by the Museum, and that the credit due to Dr. Forbes for his pioneer-work of botanical exploration in the Malayan Archipelago has been long deferred. In order to indicate the importance of Dr. Forbes's work, a reference to the original description has been given in the case of species which have been described since the date of his collecting.

The information as to habit, colour of flowers, &c., is taken from the collector's notes. Dr. Forbes has given an account of his itinerary in his *Naturalist's Wanderings in the Eastern Archipelago*, which contains also a list of the plants from Timor.

The staff of the Department of Botany has devoted considerable time to the determination of the collections during the past few years, and, in addition, help has been given by Miss S. Greves (Myrtaceæ), Mr. Cecil Norman (Menispermaceæ), and Mr. H. N. Ridley (Monocotyledons).

I am again indebted to the courtesy of the Editor of the *Journal of Botany* for facilities for publication.

POLYPETALÆ.

By E. G. Baker, F.L.S.

Ranunculaceæ.

Clematis smilacifolia Wall. **S.**; Tarratas, base of Mt. Tengamoes, Lampongs, 200 ft. 1788. **J.**; Malawar, Preanger, 6000 ft. 1112.—C. Leschenaultiana DC. **J.**; Malawar; Goenoeng Wayang, 5000–6000 ft. 641, 855. "Areui gontong."

Ranunculus diffusus DC. **J.**; Tjisang kooi, Goenoeng Malawar, Preanger, 3380–6000 ft. 814, 1004.

Dilleniaceæ

Tetracera silvestris Ridl. in Journ. Roy. As. Soc. Str. Br. liv. 8. **S.**; Moeara Mengkoelem, Palembang, 105–120 ft. 3028, 3079. Tree or shrub; flowers white; fruit yellowish-green. T. fagifolia Bl. 3090. Slender climber; flowers white, but pale yellow, due to the stamens.

WORMIA OBLONGA Wall. **S.**; Goenoeng Dempo, Palembang, 6000 ft. 2355*a*.

DILLENIA SCORTECHINII Ridl. *l. c.* 7. **S.**; Soeka-Radja, forest N. of R. Roepit, Palembang, 500 ft. 2974. Large tree; flowers in bud green, open generally yellow, colour derived from bright yellow stamens; perianth green.

MAGNOLIACEÆ.

MICHELIA MONTANA Bl. **S.**; above Lake Ranau, Palembang, 2000 ft. 2124. Very large tree; fruit thick, cylindrical, green spotted with white.—M. CHAMPACA L. **J.**; Pasir Orai, Kosala, Bantam, 1500 ft. 345. Large tree ±80 ft.; flowers emit a powerful fragrance and are worn by Malay women in their hair. The wood, bark, leaves and roots are used for various purposes, and medicinally in the native pharmacopœia.

TALAUMA MUTABILIS Bl. **S.**; foot of Mt. Besagi, Krohe, 3000 ft. 1987. Small tree ±30 ft.; fruit large, pink-red in colour. Penanggoengan, 800 ft. 1771*e*. Shrub ±4 ft.; flowers large, cream-white. **J.**; Mt. Gobas, Preanger; Lebak-Djaha, Kosala, Bantam, 2800–5000 ft. 406, 1094. Tree ±25 ft.; flowers cream-white. "Tjampaka-oetan."—T. FORBESII King in Journ. As. Soc. Beng. lviii. 372 (1889). **S.**; Mt. Tengamoes; Mt. Besagi, Lampongs, 3500–7000 ft. 1863, 2204, 2066. Large climber; fruit green. Erect shrub ±3 ft.; flowers white with large buds, very fragrant. Small tree ±8 ft.—T. ELEGANS Miq. **S.**; Soeka-Radja, R. Roepit; Mt. Dempo, Palembang, 300–6000 ft. 2946, 2349. Tree ±30 ft.; flowers large green or white, very fragrant.

KADSURA SCANDENS Bl. **J.**; Mt. Malawar, Preanger, 5000 ft. 801*a*. Climber.

ANNONACEÆ.

UVARIA PURPUREA Bl. **S.**; Lampongs, Mt. Tengamoes, 3000 ft. 1828*a*. Climber of moderate size; flowers lake-red.—U. HIRSUTA Jack. **S.**; Batoe-Pantjeh, R. Moesi, Palembang, 300 ft. 2688. Climbing shrub of moderate size; flowers dark lake, buds pubescent.—U. CONCAVA Teys. & Binn. **S.**; Penanggoengan, Lampongs, 600 ft. 1730, 1730*a*. Climber on high tree; flowers dark lake.—U. LOBBIANA Hk. f. & T. **S.**; Palembang, 600 ft. 2798.

CYATHOCALYX OBTUSIFOLIUS Becc. & Scheff. in Ann. Jard. Buitenz. ii. 6 (1885). **S.**; Tandjong-Ning, Palembang, 600 ft. Base of Kaba volcano, 2000 ft. 2757, 2885. Moderate or large tree; flowers very pale green; fruit very dark green.

ARTABOTRYS SUAVEOLENS Bl. **S.**; Ayer Angat, Palembang, 2000 ft. 2864*k*. Moeara Mengkoelen, R. Moesi, 400 ft. 3111. Climbing shrub; fruit green. "Aroi-kiladja-lulakki."

DREPANANTHUS RAMULIFLORUS Maingay. **S.**; Soeka Radja, Palembang, 300 ft. 2913. Tree 60 ft. high; flowers pale yellow on stems of thick branches.

UNONA DASYMASCHALA Bl. **S.**; Soeka Radja, Palembang. 2994*a*. Kotta Djawa, Lampongs, 600 ft. 1310. Flowers in bud in

corkscrew bunches, pods scarlet.—U. DISCOLOR Vahl. **S.**; Forest N.E. of Goenoeng-Trang, Lampongs, 200 ft. 1490*a*. Palembang, 900 ft, 2578*a*. Small tree or shrub; fruit in moniliform pods green or scarlet. "Pagar alam."

POLYALTHIA CLAVIGERA King in Journ. As. Soc. Beng. lxi. 60 (1892). **S.**; near Penanggoengan, Lampongs, 550 ft. 1638. Tandjong-Ning, Palembang, 500 ft. 2752. Large tree, 48–50 ft.; flowers in bud greenish-grey, covered with silky pubescence, cream-yellow when open; fruit light yellow, growing in bunches on stem.—P. LITTORALIS Boerl. Cat. Hort. Bogor. 1899, 34. **S.**; Forest N.E. of Goenoeng-Trang, Kotta Djawa, Lampongs, 700 ft. 1389, 1490*b*. Shrub 3–10 ft.; fruit red.—P. SIMIARUM H. f. & T. **S.**; Hills N.W. of Goenoeng-Trang, Lampongs, 400 ft. 1536. Large tree; fruit in scarlet bunches. "Kayoe Bamban."—P. GLOMERATA King in Journ. As. Soc. Beng. lxi. 61 (1892). **S.**; Tandjong Ning, Palembang, 500 ft. 2804. Large tree; flowers from green to light yellow, growing on stem.

Polyalthia Kingii Bak. fil., sp. nov. *Arbor*; *ramulis* teretibus, novellis rufo-pubescentibus; *foliis* ellipticis vel elliptico-obovatis vel oblongis, apice acuminatis superne præter costam demum glabris, nervis lateralibus utrinque 12–14 arcuatis, laminis 10–15 cm. longis, 4–7 cm. latis, petiolo pubescente 4–6 cm. longo præditis; *floribus* lateralibus; *pedunculis* brevibus sæpius 2-floris, pedicellis longioribus, rufo-pubescentibus, bracteatis; *bracteis* semi-amplexicaulibus, extus rufo-pubescentibus; *sepalis* extus rufo-pubescentibus; *petalis* late linearibus, rufo-pubescentibus, 20–25 mm. longis; *staminibus* 1·5 mm. longis; *ovariis* in specimine nostro vix evolutis, parviusculis; *carpellis* maturis ignotis.

S.; Hills S.W. of Goenoeng-Trang, Penanggoengan, Lampongs, 400–600 ft. 1556, 1760. Large tree; flowers yellow, fleshy, fragrant.

Allied to *P. simiarum* H. f. & T. Distinguished by the leaves, elliptical or elliptical-obovate, with 12–14 lateral nerves, inflorescence lateral; peduncles short, generally 2-flowered, petals broadly linear, rufo-pubescent.

Polyalthia (EUPOLYALTHIA) **subsessilifolia** Bak. fil., sp. nov. *Arbor*; *ramulis* teretibus; *foliis* oblongis vel oblongo-oblanceolatis nervis utrinque inconspicuis tenuibus apice acutis, lamina 9–15 cm. longa, 3–6 cm. lata petiolo brevissimo suffultis; *floribus* axillaribus fasciculatis, fasciculis 1–4-floris; *pedicellis* pubescentibus, brevibus vel mediocribus; *sepalis* crassiusculis; *petalis* exterioribus oblongo-lanceolatis, crassiusculis extus sericeis ±13 mm. longis; *staminibus* numerosis ±1 mm. longis; *ovariis* oblongis biovulatis stigmate claviformi pubescente; *carpellis* maturis globosis +2-spermis.

S.; Penganggoengan, Hills N. of the Goenoeng-Trang, Lampongs, 400–600 ft. 1577, 1643, 1702. Large tree; flowers cream; fruit in rough green capsule with purple cheeks; seeds bright vermilion.

Allied to *P. subcordata* Blume. Leaves oblong, petioles very short; outer petals oblong-lanceolate, about 13 mm. long; fruits small, subglobose, slightly pubescent at first, then glabrous, ±11 mm. in diameter, stipe 10–15 mm. long.

ANAXAGOREA LUZONENSIS A. Gray. **S.**; Lampar, Palembang, 600 ft. 2608. Small tree, 8 ft. high; flowers white, very fragrant.

Goniothalamus (EUGONIOTHALAMUS) **Forbesii** Bak. fil., sp. nov. *Frutex*; *ramis* cortice griseo tectis; *foliis* oblongis vel oblongo-oblanceolatis, apice breviter acutis apice ipso obtusis basi cuneatis, nervis utrinque 16–20 ante marginem arcuato-unitis, lamina 27–30 cm. longa, 6·5–9·0 cm. lata, petiolo 1–2·5 cm. longo suffultis; *floribus* solitariis supra-axillaribus; *sepalis* ovatis acutis 15–17 mm. longis, 12–13 mm. latis; *petalis* exterioribus crassiusculis fere 20 mm. longis et 8 mm. latis, *petalis* interioribus minoribus; *staminibus* numerosis; *stigmate* clavato; *carpellis* ±4 mm. longis.

S.; Penanggoengan, Lampongs, 540 ft. 1644*a*, 1661*b*. Shrub 4–8 ft.; flowers greenish yellow.

A close ally of *G. Kunstleri* King, with broad ovate sepals and solitary supra-axillary flowers.

G. KUNSTLERI King in Journ. As. Soc. Beng. lxi. 2, 73 (1892), var. nov. TOMENTOSA Bak. fil. *Frutex*; *foliis* et ramis dense pubescentibus, lamina 12–17 cm., longa 5–7 cm. lata; *petiolis* ±15 mm. longis tomentosis.

S.; Kotta Djawa, Lampongs, 600 ft. 1346. Large shrub 12 ft.; flowers fleshy, downy and very fragrant; fruit red.

G. PRAINIANUS King, *l. c.* 72. King placed 3172 from **S.** as closely allied to this species. **S.**; Moeara Mengkoelem, Palembang, 400 ft. 3172. Tree 16–18 ft.; fruit pale green or pale yellow with a tinge of pink.—G. MACROPHYLLUS H. f. & T. **S.**; Kotta Djawa, Penanggoengan, Lampongs, 54–280 ft. 1378, 1370*b*, 1758*a*. Shrub 4–6 ft. or climber spreading far; flowers white or greenish yellow; fruit in umbellate heads green or pale orange.—G. SUMATRANUS Miq. **S.**; Batoe Pantjeh, R. Moesi, Palembang, 650 ft. 2676. Small shrub; fruit from green to blue-black passing through light red.

OROPHEA HEXANDRA Bl. **S.**; Mt. Siminoeng, Paoe, Palembang, 3000–4000 ft. 2133, 2536. Tree 12 ft. in height; flowers greenish yellow flushed with pink; fruit green turning to light red. "Banitan," "Koeol."

MITREPHORA RETICULATA Hook. fil. **W. J.**; Pasir Orai, Kosala, 3200 ft. 1171. Large tree. "Sigam-badak," "Ki-ladja."—M. OBTUSA Bl. **W. J.**; Tjibadui, Kosala, 2700 ft. 488. Tree; the native name of "Ki-pajong," umbrella tree, is given to this species from the way the inner row of petals, cohering at the tips, covers the essential organs; outer petals orange with light red lines, the inner row coloured with faint red lines.—M. RUFESCENS Ridley in Kew Bull. 1912, 385. **S.**; Kotta Djawa, Lampongs, 700 ft. 1420. Small tree ±4 ft.; flowers pure white.

POPOWIA NERVIFOLIA Maingay. **S.**; bank of R. Moesi, Palembang, 600 ft. 2625. Large shrub; fruit green. Tandjong Djati, Paoe, Palembang, 1700–5300 ft. 2108, 2528. Tree; flowers green; fruit very young, pale green with whitish pubescence giving it a white aspect; when maturer, green.—P. RAMOSISSIMA H. f. & T. **S.**; Tandjong Ning, Palembang, 500 ft. 2790, 2747. Large tree; flowers cream with tinge of russet-brown.

MELODORUM PISOCARPUM Hook. f. **S.**; Boekit Tinggi, S.W. of Paoe, Palembang, 3500 ft. 2182. Moderately large climber; fruit turning from green to light red.—M. PARVIFLORUM Scheff. **S.**; Tandjong Ning on R. Bliti, Palembang, 600 ft. 2827. Large climber; flowers in bud pale green covered with a grey silky pubescence.

XYLOPHIA SCORTECHINII King, var. nov. LONGEPETIOLATA Bak. fil. *Ramuli* cortice nigrescente obtecti; *foliis* ovalibus vel ovali-ellipticis discoloribus superne præter costam impressam glabris petiolo pubescente 18–20 mm. longo suffultis; *floribus* axillaribus fasciculatis fasciculis pauciflоris, pedicellis bracteatis 10–15 mm. longis; *sepalis* ovatis; *petalis* 30–38 mm. longis ab ungue excavato in limbum angustum ±2·5 mm. latum attenuatis; *staminibus* ±1·5 mm. longis; *carpellis* maturis 18–20 mm. longis, 13–15 mm. latis, plurispermis. **S.**; Penganggoengan, Lampongs, 500–600 ft. 1648, 1714. Large tree; flowers cream-white; fruit dark green.

Leaves oval or oval-elliptical, rather large, with well-marked lateral nerves (especially on the underside); petals linear, flat, fusco-tomentose, 30–38 mm. long; pedicels with a small amplexicaul bract near the middle; mature fruit slightly grooved, rather longer than broad.

PHÆANTHUS SUMATRANUS Miq. **S.**; near Soeka Radja, Palembang, 800 ft. 2911. Small tree, 10 ft.; flowers yellowish cream.

MENISPERMACEÆ.

(BY CECIL NORMAN, F.L.S.)

TINOSPORA CRISPA Miers. **S.**; Goenoeng Tengamoes, Lampongs, 3000 ft. 1831. Moderate climber; fruit passing from yellow to bright scarlet.

TINOMISCIUM PETIOLARE Miers. **S.**; Forest W. of Hoedjong village, Krohe, 4000 ft. 1937. Soeka Radja, Palembang, 350 ft. 2964*a*. Climbing shrub; flowers very pale green in great profusion along the stem; fruit from dark green to golden yellow.

LIMACIA VELUTINA Miers. **S.**; Moeara Mengkoelem, R. Rawas, Palembang, 500 ft. 3044. Large climber; fruit bluish green.

STEPHANIA CORYMBOSA Miq. **W. J.**; Pengelengan, Preanger, 5000 ft. 991.—S. CAPITATA Spreng. **S.**; in great forest Penanggoengan, Lampongs, 900 ft. 1678. Moderate climber; fruit dark green.

CYCLEA KORTHALSII Diels. **S.**; Banks of R. Moesi, between Lampar and Batoe Pantjeh, Palembang, 600 ft. 2622*a*. Climbing shrub; fruit very pale green in clusters.

CAPPARIDACEÆ.

CAPPARIS PANICULATA Ridley in Journ. Fed. Malay States Mus. x. 2, 129 (1920). **S.**; Penanggoengan, Lampongs, 900 ft. 1719*a*, 1696. Climbing shrub; flowers in bud lake-purple; fruit bluish green.

CRATÆVA RELIGIOSA Forst. **S.**; R. Rupit, nr. Troesan Village, Palembang, 200 ft. 3013. Tree ±35 ft.; flowers white, very large stamens.

Violaceæ.

Viola arcuata Bl. **J.**; Pengelengan, Preanger, 5000 ft. 1098.—V. serpens Wall. **J.**; Goenoeng Malawar, by Tjineroean, Preanger, 4400–7500 ft. 818, 1046, 1135 *b*.—V. malvina Ridley in Journ. F. M. S. Mus. viii. pt. 4, 15 (1917). **S.**; Mt. Besagi, 5000 ft.; Mt. Dempo, 6700 ft. 2368, 2078 *b*. Herb with creeping stolons; flowers purple-blue.

Alsodeia echinocarpa Korth. **S.**; Tandjong Ning, Palembang, 8004 ft. 2754. Large tree; flowers with calyx green, corolla cream-white.—A. dasycaula Miq. **S.**; Hills S.W. of Paoe, Palembang, 3500 ft. 2507 *a*, 1419.—A. floribunda King in Journ. As. Soc. Beng. lviii. 2, 406 (1889). **S.**; Penanggoengan, Lampongs, 600 ft. 1719. Shrub ±8 ft.; fruit deep black.

Bixaceæ.

Scolopia Roxburghii Clos. **S.**; Mt. Karangnata, Napal-Litjin, R. Rawas, Palembang, 900 ft. 3105. Small tree, 2 ins. diam. at 4 ft. from ground; fruit light green.

Flacourtia rukam Zoll. & Mor. **S.**; Paoe, Palembang, 3800 ft. 2324. Large tree; fruit bright green with polished surface. Ayer Angat, at base of Kaba Volcano, 2000 ft. 2877. Tree 15 ft.; fruit bright green. **J.**; Tjibadui, Bantam, 2300 ft. 545. Shrub; fruit turns from green to black.—F. inermis Roxb. **J.**; nr. Tjisankoei, Preanger, 4600 ft. 1206 *a*. Tree; fruit scarlet.

Hydnocarpus ilicifolia King in Ann. Bot. Gard. Calc. v. 2, 130 (1896). **S.**; Hills S.W. of Goenoeng Trang; Kotta Djawa, Lampongs, 400–700 ft. 1555, 1399. Large tree; flowers light green; fruit jet-black, velvety. **J.**; Preanger. 1159, *fide* King.—H. Curtisii King in Journ. As. Soc. Beng. lix. 119 (1890) var. nov. sumatranus Bak. fil. *Arbor*; *ramulis* teretibus; *foliis* oblongo-lanceolatis, coriaceis, apice acuminatis; petiolulis quam in typo longioribus, 10–15 mm. longis; *ovario* griseo-tomentoso. **S.**; R. Rawas, Moeara-Mengkoelem, Palembang, 600 ft. 3184. Large tree; flowers white or yellowish white.

Ryparosa cæsia Bl. **S.**; Ayer Angat, foot of Kaba Volcano, Mt. Dempo, Palembang, 2000–4700 ft. 2271, 2271 *a*, 2213, 2878.—R. cæsia Bl. var. nov. sumatrana Bak. fil. *Arbor*; *foliolis* 15–20 cm. longis, 4–5 cm. latis, petiolis 1·5–2·5 cm. longis; *pedicellis* 8 mm. longis; ab typo differt pedicellis longioribus, et foliis angustioribus. **S.**; lower slopes of Mt. Dempo, Palembang, 4000 ft. 2340. Tree 25–30 ft.; flowers in racemes, corolla-segments yellow but general colour green from the prominence of the stigma and calyx.—R. javanica Kurz in Koord. & Valet. in Meded. Lands Plantent. xxxiii. 11 **S.**; Foot of Kaba volcano, 2000 ft. 2887.

Taraktogenos Kunstleri King *l. c.* 122. **S.**; Moeara Mengkoelem, 2000 ft. 3033, 3163 *a*, 2977. Tree 40 ft.; flowers green-white.

Pittosporaceæ.

Pittosporum ferrugineum Ait. **S.**; Boekit Tinggi, nr. Paoe, Palembang, 3800 ft. 2460. Tree slender, 40 ft. high; fruit small, dark green.

Polygalaceæ.

Polygala pulchra Chodat in Mem. Soc. Phys. Gen. xxxi. 100 (1893). **S.**; Mt. Tengamoes, Lampongs, 5200 ft. 1858. Small erect shrub; flowers (in bud) purple-pink.—P. venenosa Juss. **S.**; Hills S.W. of Goenoeng-Trang, Lampongs; Boekit-tadjam S.W. of Paoe Village, 400–3300 ft. 1446 *a*, 1500 *a*, 1531 *a*, 1544 *b*, 2183. Herbaceous shrub; flowers pale yellow with orange or lake-red lip; fruit scarlet. "Ki-toe toengkal goenoeng." **J.**; Tjilaki, Pengelengan, Preanger; Kosala, Bantam, 2000–4600 ft. 424 *a*, 539 *a*, 605, 953 *a*. Erect herb with creeping stolon.

Xanthophyllum sumatranum Miq. **S.**; nr. Hoedjoeng Village, Afdeeling Krohe (Bencoolen), 3000 ft. 2030. Tree 25–30 ft.; fruit dark green.—X. paniculatum Miq. **S.**; R. Rupit, Palembang, 800 ft. 3011. Small tree; flowers in bud pale yellow, corolla yellowish white with orange markings on inside of petals, pedicels rich reddish yellow.—X. affine Korth. **S.**; Tandjong Ning, R. Moesi, Palembang, 600 ft. 2800. Large tree; flower in bud fulvous-grey, pedicels light cream with a tinge of yellow.—X. eurhynchum Miq. **S.**; Soeka-Radja, R. Rupit, Palembang, 500 ft. 2964. Small tree, slender; fruit gamboge-green.—X. vitellinum Bl. **J.**; Kosala, Bantam, 2000 ft. 327. Small tree ±14 ft.

Xanthophyllum Forbesii Bak. fil., sp. nov. *Arbor* magna ad *X. densifloram* Chodat accedens; *ramulis* cortice lutescente obtectis; *foliis* oblongis vel elliptico-oblongis papyraceis, apice acuminatis, basi subcordatis, nervis lateralibus tenuibus utrinque 4–5, lamina 12–15 cm. longa, 1·5–5·0 cm. lata, petiolo brevissimo, 2–3 mm. longo suffultis; *racemis* 2–3 cm. longis; *pedicellis* 3–5 mm. longis pubescentibus; *floribus* puniceo-albis, in toto 14 mm. longis; *sepalis* interioribus paullo majoribus ±5 mm. longis; *petalis* 5, liberis, 4 subæqualibus, carina cymbiforma, 12–13 mm. longia; *staminibus* subliberis; *ovario* pubescente, sursum in stylum elongatum et incurvum attenuato; *fructu* ignoto. **S.**; in great forest at Penanggoengan, Lampongs, 350 ft. 1671. Large tree; flowers pinkish white.

Characterised by the oblong or oblong-elliptical acuminate leaves with very short petioles, the racemes of pinkish-white flowers, the carina 12–13 mm. long.

Trigoniaceæ.

Trigoniastrum hypoleucum Miq. **S.**; R. Rawas, forest nr. Moeara-Mengkoelem, Palembang, 1500 ft. 3039. Small tree ±15–20 ft.; flowers yellow or light orange.

Caryophyllaceæ.

Stellaria media L. **J.**; path-side in ascent of Wayang Volcano, Preanger, 5200 ft. 844.

Hypericaceæ.

Cratoxylon polyanthum Korth. **S.**; nr. Soeka-Radja, R. Rupit, Palembang, 300–800 ft. 2993. Large tree 30–40 ft.; flowers in bud lake-red, expanded much paler red tinged with purple.—

C. PENTADELPHUM Turcz. **S.**; Bigin-telok, R. Rawas, Palembang, 500 ft. 3248. Large tree 6 ft. in circumference; fruit dark green with faded purple cheeks.

HYPERICUM JAPONICUM L. **J.**; Goenoeng Bodas, nr. Malawar, Preanger, 3000 ft. 1128. Near the hot lakes.

GUTTIFERÆ.

GARCINIA FORBESII King in Journ. As. Soc. Beng. lix. 2, 162 (1890). **S.**; Moeara Mengkoelem, Napal Litjin, R. Rawas, R. Rupit, Palembang, 500–700 ft. 2936, 3152, 3161. Large tree ±40 ft. high and 3–6 ft. in circumference at 4 ft. from the ground; flowers in bud scarlet; fruit very pale delicate green.—G. GRIFFITHII T. And. **S.**; Soeka-Radja, R. Rupit, Palembang, 500 ft. 2994. Small tree 10 ft.; flowers in bud pink, mahogany-brown when opened.—G. MANGOSTANA, L. **S.**; Moeara Mengkoelem, R. Rawas, Palembang, 500 ft. 3065. Small tree ±8 ft.; calyx rich cream-colour with tinge of lake, corolla deep lake.—G. DULCIS Kurz. **J.**; Buitenzorg, 800 ft. 1164. Large trees; fruit light yellow. "Tjeuri," "Moeundeung."—G. NIGRO-LINEATA Planch. **W. J.**; Tjibadui, Bantam, 2700 ft. 490. Large tree; fruit light yellow. "Tjeurie." **S.**; nr. Batoe Pantjeh, R. Moesi, Palembang, 300 ft. 2697. Slender tree 30–35 ft.; fruit (immature) green, (ripe) red. "Kandis." The fruit eaten by natives, and the leaves used as a vegetable.—G. ROSTRATA Benth. & Hk. f. **W. J.**; Pasir Orai, Kosala, Bantam, 2700 ft. 297. Tree ±29 ft., diameter 6 in.—G. PICRORRHIZA Miq. **W. J.**; 571 *a*, 598.—G. PERRANGIANA Pierre. **S.**; Moeara Mengkoelen, R. Rawas, Palembang, 1000 ft. 3029 *a*. Small tree ±30 ft.; flowers bright orange with lake and orange calyxes.

CALOPHYLLUM PULCHERRIMUM Wall. **S.**; Tandjong-ning, on R. Moesoe-oeloe, Palembang, 5000–6000 ft. 2756, 2872. Large tree; flowers white on longish pedicels.—C. INOPHYLLUM L. **S.**; Tarratas, sea-level. 1803. Tree; long branches; flowers white rose-like; fruit (as seen) light green, yellow when ripe.—C. GRIFFITHII T. And. **S.**; Bigin-telok; Moeara Mengkoelem on R. Rawas, Palembang, 500–600 ft. 3069, 3220 *a*. Great tree, or slender 8 ft.; fruit pale green.

TERNSTRŒMIACEÆ.

ADINANDRA DUMOSA Jack. **S.**; Mt. Besagi, Krohe, 5700 ft. 2053 *b*.

A. MACRANTHA Teys & Binn. **S.**; R. Rawas, Moeara Mengkoelem, 500 ft. 3191. Large tree; flowers yellowish white with prominent brown stamens. **W. J.** 591. Large tree.

EURYA GLABRA Bl. **J.**; Goenoeng, Tjipanas, Bantam, nr. Buitenzorg, on Mt. Salak, 800–5000 ft. 110, 1229. Large shrub. "Kitjabe." **S.**; Napal Litjin, on R. Rawas, Palembang. 3116. Shrub; flowers greenish white; fruit light green.—E. ACUMINATA DC. **S.**; Mt. Tengamoes, Lampongs, 7100 ft. 1879. Erect bushy shrub; fruit blue-black. Hoedjoeng, Lampongs. 1941. Small tree; flowers greenish cream-coloured. Mt. Dempo, Palembang,

9000 ft. 2445. Shrubby tree; flowers white; fruit blue-black. "Lampi-Lampi."—E. ACUMINATA DC. var. EUPRESTA Korth. **S.**; Soeka-Radja on R. Rupit, Palembang, 800 ft. 2982. Large shrub; fruit pale yellow with ruddy cheeks.—E. RETICULATA Korth. **S.**; Mt. Dempo, 7700 ft. 2393. Erect shrub, crisp; flowers very small, white.

ACTINIDIA CALLOSA Lindl. **S.**; Mt. Dempo, Palembang, 5500 ft. 2434. Climbing shrub; fruit pale green with grey spots. **J.**; Tjilaki, Preanger, 4700 ft. 816, 891 *a*. Large tree. "Soeren."

SAURAUJA XYLANTHA Stapf ex Bak. fil. in Journ. Bot. lvi. 162 (1918). **S.**; Lake Ranau. 2130. Small tree; flowers white.—S. REINWARDTIANA Bl. **J.**; Bantam. 54. Tree with white flowers and reddish-pink hairs. "Kileho Konneng."—S. FEROX Korth. **S.**; on mountain E. of village of Tandjong Djati on Lake Ranau, 3000 ft. 2150. Small tree; flowers white; fruit green in closed calyx.—S. CUSPIDELLA Miq. **S.**; Mt. Besagi, 2000 ft. 2054 (partim). Shrub ±5 ft. Mt. Simminung and hills round Lake Ranau, 4200 ft. 2127, 2132 *a*, 2137. Large shrub or small tree; flowers white.—S. DASYANTHA De Vries. **S.**; foot of Mt. Kaba, 3000 ft. 2848. Great tree; flowers in bud white, corolla brownish grey when open, tips of stamens silky brown; fruit green with persistent white calyx. "Kayeo pallau."—S. HIRTA Bl. **S.**; Mt. Besagi, 2000 ft. 2054 (partim).—S. FORBESII Bak. fil. in Journ. Bot. lvi. 164 (1918). **S.**; Mt. Dempo, Passoemah, 3500 ft. 2325. Small tree 24–30 ft.; flowers white; fruit green when gathered. Paoe, Palembang. 2335 *a*. Small tree; leaves green, glancing with pale undersides, mid-rib green; fruit edible. "Ingingo." Ayer Angat. Hot springs on Mt. Kaba, 2000 ft. 2858. Large shrub; mid-ribs of leaves green; flowers white; fruit thickly covered with strong, bristly, faded lake-red hairs.—S. SUMATRANA Bak. fil. *l. c.* **S.**; Goenoeng Tengamoes, Lampongs, 1500 ft. 1840. Small tree; flowers white.—S. NUDIFLORA DC. var. SUMATRANA Bak. fil. *l. c.* 165. **S.**; in great forest S. of Lampongs. 1480. Tree 18–20 ft.; flowers white. "Kileho putih." Mt. Dempo, Passoemah. 2527 *a*. Large tree; leaves with prominent rough veins and mid-rib. Mt. Besagi, 2000 ft. 2054 *m*, 2054 *p*. Shrub—5 ft.; fruit green. Ayer Angat on Mt. Kaba, 2000 ft. 2863. Large tree ±50 ft.; flower-buds white, corolla rich scarlet-pink, rim white tinged with pink; branches and stems loaded with flowers. Hoedjong, Lampongs. 2053 *c*. **J.** 1053, 1050. "Kileho badak," "Kileho boeloe."—S. TRISTYLA DC. var. SUMATRANA Bak. fil. *l. c.* **S.**; Tandjong Ning, R. Blitri, Palambang, 600 ft. 2822 *a*. Large tree (when grown); fruit (gathered from small tree +14 ft.) green on branches and stems. "Kayee silooh." Tandjong Ning. 2802 *a*. Large shrub.—S. DEMPOENSIS Bak. fil. *l. c.* 166. **S.**; Mt. Dempo, 5300 ft. 2262. Small tree with long branches; leaves with lake-red mid-ribs; flowers rose-pink. Mt. Dempo, 4000 ft. 2228. Large tree; flowers greenish with light red on the calyx. Mt. Dempo, 5500 ft. 2260. Small tree with long branches; leaves long, mid-rib green; flowers rose-pink or white. Numerous trees of this species on mountain-side up to at least 5500 ft.—S. TRICHOPODA Bak. fil. *l. c.*

167. **S.**; Goenoeng Trang, 600 ft. 1468. Small erect tree; flowers white; fruit green. "Kileho."—S. SQUAMULOSA Koord. & Valet. in Meded. Lands Plantent. xvi. 268 (1896) ex descript. **J.** 1438.—S. CAULIFLORA DC. **J.**; Kosala Hills, 1800 ft. 313. The sap of the "Kileho" species is drunk by the natives as a cure for diarrhœa and dysentery.

SCHIMA NORONHÆ Reinw. **J.**; Mt. Malawar, Preanger, 5600 ft. 959*d*. Tree. "Pouspa." Tjisangkoei, Preanger, 5000 ft. 1072 *a*. Large tree. **S.**; Mt. Dempo, Palembang, 7300 ft. 2421. Large tree; fruit in brown capsules.

PYRENARIA VILLOSULA Miq. ex descript. **S.**; Moeara Mengkoelem, Palembang, 400 ft. 3024. Tree ±40 ft.; flowers yellowish cream-white, stamens rich orange. "Kandis Boeroeng."—P. LASIOCARPA Korth. **J.**; Goenoeng Bodas, Mt. Malawar, Preanger, 4000 ft. 1081. Small tree.—P. KUNSTLERI King in Journ. As. Soc. Beng. lix. 2, 200 (1890). **S.**; nr. Hoedjoeng, foot of Mt. Besagi, Krohe, Goenoeng Arab, nr. Paoe, Palembang, 3000–4000 ft. 1947, 1968, 2479. Large tree; flowers rose-like and white; leaves coriaceous; fruit apple-like, green when unripe, yellow when ripe.—P. ACUMINATA DC. **S.**; Bukit tinggi, Paoe, Passumah, 3500 ft. 2470 *b*. Tree ±29 ft.; fruit light green with orange tinge. 2191. Tree with soft hairy leaves; fruit oblong, green; seeds dark brown. Forest Hoedjoeng, Lampongs; on slopes of Mt. Besagi, Bencoolen, 3000 ft. 1913. Tree; flowers white; fruit green turning to purplish black, Soeka Radja, on R. Rupit, Palembang, 800 ft. 2973. Erect shrub; fruit light green.—P. SERRATA Bl. **S.**; Bukit tinggi, Paoe, Passumah, 4000 ft. 2464. Tree ±50–60 ft.; flowers white, rose-like.—P. WRAYI King *l. c.* 201. **S.**; Tandjong-djati on Lake Ranau, Palembang, 1700 ft. 2109. Fruit bright green.

GORDONIA EXCELSA Bl. var. MACROCARPA Koord. & Valet. **S.**; on Dempo Volcano. 2435. Large tree, very hard wood; flowers 3½–4 in. wide, cream-white, very fragrant; fruit capsular.—G. IMBRICATA King *l. c.* 204. **S.**; Goenoeng Tengamoes, 6800 ft. 1875. Small tree, straggling branches; flowers large, rose-like.—CAMELLIA THEA Link. **S.**; Mt. Besagi, Bencoolen, 4000 ft. 2053 *i*, 2053 *j*.

DIPTEROCARPACEÆ.

DIPTEROCARPUS VALIDUS Bl. **S.**; between Soeroelangoen and Loeboe Mas, Palembang, 300 ft. 3019. Large tree; flowers in bud yellowish green, open rich lake inside with pale line on outside of petals which otherwise are cream-yellow. Heavy odour. "Lagan."—D. HASSELTII Bl. **S.**; Moeara Mengkoelem, Palembang, 450 ft. 3196. Large tree; fruit with pink wings.

SHOREA THISELTONI King var. FORBESII Brandis, in Journ. Linn. Soc. xxxi. 77 (1895). **S.**; R. Roepit, Soeka Radja, Palembang. 2952. Large tree; the corollas fall in a continuous shower, covering the ground with a brilliant scarlet carpet whence arises a heavy and oppressive odour. Said to flower only once in three years; oil obtained from the flowers. "Sekawana," "Sekawang." Tandjong Ning, Palembang, 600 ft. 2815. Stamens yellow, pollen discharged

efore buds open. "Kayoe geloegoer." S. BRACTEOLATA Dyer. **S.**; R. Rawas, Moeara Mengkoelem, 500 ft. 3050. Very large tree; flowers pinkish cream-yellow, rose-pink or rainbow-purple inside; green bracts.—S. LEPROSULA Miq. **S.**; Soeka Radja, R. Roepit, Palembang, 500 ft. 3001. Immense tree, circumference at 10 ft. above ground, 10 ft. 11 in.; flowers pale yellowish-white; fruit light green with yellowish woolly pubescence. "Maratti," "Dammar Koeyoeng." From bark wall-work of dwellings is made, prahus are constructed from stem, and the dammar is burned in native lamps.

PARASHOREA STELLATA Kurz. **S.**; between Soeroelangoen and Loeboe Mas, Palembang, 300 ft. 3021, 3022. Great tree; fruit pale whitish green enveloped in lovely pink accrescent calyx. "Timaloen." Loaded with fruit, provides a fine spectacle of colour as if loaded with flowers. **S.**; R. Roepit, Palembang, 400 ft. 3012. Moderate tree, about 30 ft.; corollas bright yellow, small stamens with hair-like appendages, very fragrant. "Sekawang trena."

HOPEA MULTIFLORA Brandis *op. cit.* 60. **S.**; Soeka Radja, on Boekit Tjermin, Palembang, 900 ft. 2917. Great tree; flowers in bud pale whitish green. Produces the "dammar tjengal itam."—H. GRIFFITHII Kurz var. PEDICELLATA Brandis *op. cit.* 69. **S.**; Bigin Telok, R. Rawas, Palembang, 300 ft. 3205. Large tree 4 ft. in circumference; flowers pale yellowish white with pale orange edges to corolla lobes.—H. MENGAWARAN Miq. **S.**; Bigin Telok, R. Rawas, Palembang, 450 ft. 3210 *a*.

ANCISTROCLADUS EXTENSUS Wall. var. PINANGIANUS King. **S.**; Moeara Mengkoelem, R. Rawas, Palembangs, 500 ft. 3099. Moderately large climber; fruit deep green within five wings which are green or flushed with pink.

MALVACEÆ.

SIDA ACUTA Burm. **J.**; Mt. Waringin, Preanger, 5000 ft. 708. Leaves used in medicine. "Sadagori," "Daun Sasapo."—S. RHOMBIFOLIA L. **S.**; Gedong-Tetahan, Lampongs, 450 ft. 1261.

URENA LOBATA var. TOMENTOSA Miq. **J.**; Preanger, Tjisangkoei, 5000 ft. 607; the seeds adhere with great persistance to garments, etc. "Psempoeroetan," "Poeloetan."

HIBISCUS TILIACEUS L. **J.**; Mt. Malawar, Preanger, 6000 ft. 1028 *c*.—H. MACROPHYLLUS Roxb. **W. J.**; Kosala Hills, 2000 ft. 531. Tall tree.—H. SURATTENSIS L. **S.**; under great forest Kotta-Djawa, Lampongs, 500 ft. 1421 *a*. Thorny climber; flowers yellow.—H. ABELMOSCHUS L. **W. J.**; Pasir-Orai, Kosala, Bantam, 2200 ft. 567. "Ganimat."

THESPESIA POPULNEA L. **S.**; Lampongs, Bay of Semangka, sea-level. 1808. Small tree; flowers rose-purple and pale yellow.

BOSCHIA GRIFFITHII Mast. **S.**; R. Rawas, Palembang, Moeara-Mengkoelem, 6000 ft. 3068. Large tree, circumference at 4½ ft. from the ground, 8 ft.; flowers orange, showing pink when more mature owing to the colour of the stamens.

STERCULIACEÆ.

STERCULIA LONGIFOLIA Vent. **S.**; Mt. Tengamoes, Lampongs, 1500 ft. 1836 *d*. Shrub ±6 ft.; fruit green with purple lower ridges. "Hantap."—S. FERRUGINEA R. Br. **S.**; Passumah, Mt. Dempo, Palembang, 6000 ft. 2359. Erect shrub ±5 ft.; flowers reddish pink.—S. FULGENS Wall. **S.**; margin of R. Warkau, Palembang, 1000 ft. 2105. Large tree; flowers deep salmon-pink; foliage elegant. The tree laden with blossoms is a charming object.—S. ENSIFOLIA Mast. **S.**; fresh on lower slopes of Kaba Volcano, Palembang, 2000 ft. 2855. Tree ±25 ft.; fruit in pods which turn from dark green to scarlet.—S. KUNSTLERI King in Journ. As. Soc. Beng. lx. 2, 65 (1891). **J.**; Pengalengen, Preanger, 1200 ft. 1163. Small tree; flowers greenish white, with lake centres. **S.**; Mt. Dempo, Palembang, 4000 ft. 2231. Small tree; flowers greenish white.—S. FORBESII Warb. in Fedde Repert. xix. 121 (1923). **S.**; Batoe-Pantjeh, R. Moesi, Palembang, 600 ft. 2679. Large tree; flowers greyish white on pink pedicels giving a sheen of pink. **S.** (allied, but fruit different); between Loeboe-Mas and Moeara Mengkoelem, R. Rawas, Palembang, 300 ft. 3023. Large tree; fruit bright lake-scarlet, seeds rich glossy-black, becoming brown when germinating, young fruit pale green with lake-red sides. "Kaloempoeng."—S. MEGISTOPHYLLA Ridley in Journ. Fed. Malay States, viii. 21 (1917). **S.**; Kaba Volcano, Palembang, 5500 ft. 2904 *a*. 1749. Small shrub with beautiful broad foliage; flowers in bud reddish purple with reddish-purple pedicels, expanded, pale straw-colour; fruit very pale peach-green with lake markings and streaks. "Galoepang."—S. RUBIGINOSA Vent. **S.**; Kotta Djawa, Lampongs, 300 ft. 1434. Large tree; flowers rose-coloured.

HERITIERA LITTORALIS Dryander. **S.**; Coasts of Bantam. 1182.

KLEINHOVIA HOSPITA Linn. **S.**; Bingin on R. Roepit, Palembang, 480 ft. 3016. Medium-sized tree; flowers pink with the carina-tip light orange, fruit 5 pale green pods with central placenta. "Tomah."

HELICTERES HIRSUTA Lour. **W. J.**; Genteng, Bantam, 1500 ft. 45. Tree, 8–10 ft.; flowers purple; fruit oblong, green.

PTEROSPERMUM JAVANICUM Jungh. **S.**; Penanggoengan, Lampongs, 550 ft. 1657. Large tree; fruit dark green pods. "Kayoe-bayoe."—P. BLUMEANUM Korth. **S.**; R. Rawas. 3113 *k*.

MELOCHIA CORCHORIFOLIA L. **W. J.**; Genteng Labak, Bantam. 43.—M. VELUTINA Wall. ex Bedd. **S.**; Paoe, Palembang, 3200 ft. 2546. Small tree; flowers red-pink. Kotto Djawa, Lampongs, 600 ft. 1343. Tree ±30 ft.; flowers light purplish pink. "Kimissi."

BUETTNERIA ANGULATA Bl. **S.**; Kotta Djawa, Lampongs, 400 ft. 1373. Scandent on great forest trees; fruit dispersed, thorny.

COMMERSONIA ECHINATA Forst. **W. J.**; Tjiladaheun, Kosala, Bantam, 1500 ft. 437. Large tree; flowers white, produced in great profusion. **S.**; Hoedjoeng, Lampongs, Goenoeng Meraksa, Palembang, 900–2000 ft., 2577 *a*. 1942. Small or large trees; flowers white; fruit green.

ABROMA ANGUSTA L. f. **W. J.**; R. Tjiladaheun, Kosala, Bantam, 1460 ft. 408. Small shrub or small slender tree. "Tjitjanki." **S.**; Hills N. of Goenoeng Trang, 600 ft. 1582. Shrub ±12 ft.; flowers light lake-red; fruit green, capsular.

LEPTONYCHIA GLABRA Turcz. **S.**; Hills N.W. of Goenoeng Trang, Lampongs, 450 ft. Under deep shade of high forest. 1458, 1531. Small shrub ±4 ft.; flowers green, with light yellow stamens; fruit in pods grey; seeds black with bright scarlet aril in part. Banks of R. Goerga, Lampar; by R. Bliti nr. Tandjong Ning, 500–600 ft. 2616, 2743. Small tree or shrub; flowers very pale green; fruit in green pods with bright scarlet seeds.

TILIACEÆ.

Grewia Henrici Bak. fil., sp. nov. *Arbor* ad *G. latifoliam* Masters accedens; *ramulis* teretibus; *foliis* majusculis obovatis vel oblongo-obovatis, basi rotundatis, apice subtruncatis costa nervisque subtus pilis sparse vestitis, nervis lateralibus utrinque 5–6 secundariis ab primariis sub angulo fere recto abeuntibus, lamina 15–20 cm. longa, 10–12 cm. lata, petiolo 10–13 mm. longo suffultis; *cymulis* foliis multoties brevioribus; *sepalis* cinereo-pubescentibus, oblanceolatis; *petalis* angustis linearibus, sepalis brevioribus, pubescentibus; *staminibus* numerosis; *ovario* hirto; *fructu* ignoto. **S.**; Bingin on R. Rupit, Palembang, 500 ft. 3014. Small tree; flowers pale greenish yellow, with bright golden stamens.

Grewia sumatrana Bak. fil., sp. nov. *Arbor* vel frutex ad *G. antidesmæfoliam* King accedens; *ramulis* teretibus; *foliis* papyraceis oblongo-lanceolatis vel elliptico-lanceolatis, apice acuminatis, nervis lateralibus tenuibus, utrinque 8–10, lamina 10–13 cm. longa, 3–4 cm. lata, petiolo pubescente, ±5 mm. longo suffultis; *cymulis* 1–3 cm. longis, foliis brevioribus; *sepalis* extus hirsutis, crassiusculis, 6–7 mm. longis, angustis; *staminibus* sepalis brevioribus, antheris parvis, filamentis filiformibus; *ovario* globoso hirsuto, stylis filiformibus; *fructu* ignoto. **S.**; Batoe Pantjeh, R. Moesi, Palembang, 300 ft. 2684. Small tree; flowers in bud pale greenish white, tinted with pink when open. R. Bliti, Tandjong Ning, Palembang, 600 ft. 2840. Tall shrub or small tree; floral envelopes pale green, stamens bright orange. "Kayoe Saboet." Differs from *G. antidesmæfolia* King by its thinner leaves, rather closer lateral nerves, and stellate pubescence below.—G. MICROCOS L. **W. J.**; near Boeloetjen Village, Bantam. 440. Small tree. "Drowak."

G. LAURIFOLIA Hook. **S.**; Moeara Mengkoelem, R. Rawas, Palembang. 500 ft. 3146. Tree diameter 12 in. at 4 ft. from ground; fruit green. Margin of R. Roepit, Soeka Radja, Palembang, 800 ft. 3005. Small tree; flowers pale yellow with conspicuous orange stamens.

ECHINOCARPUS SIGUN Bl. **J.**; Tjisangkoei, Preanger, 5000 ft. 1071. "Katebe."

ELÆOCARPUS FLORIBUNDUS Bl. **J.**; Goenoeng Endoet, Bantam, 3000 ft. 68. Large tree. "Hanau." E. GANITRUS Roxb. **J.**; Tjilaki, Preanger, 4700 ft. 897. Small tree; flowers yellowish-

white, crowded together on the branches.—E. OBTUSUS Bl. **J.**; Goenoeng Poentjak Tjatjing, Preanger, 5000 ft. 833. Small tree; flowers white on stem; usually 1 or 2 of the fruits mature, more rarely, 4.

E. ACRONODIA Mast. **J.**; Goenoeng Wayang in the crater, 6000 ft. 842. Flowers pale white. Pengelengan, Preanger. 1030 *a*, 1027 *a*, 1024 *a*. Tree; flowers pale white. Mt. Malawar, Preanger, 6000 ft. 808. Tree; fruit in bunches dark green.—E. STIPULARIS Bl. **S.**: Tandjong Djati, Palembang, 1700 ft. 2116. Large tree; flowers white; fruit green. Goenoeng Arab nr. Paoe, 4000 ft. 2478. Large tree; flowers white in great profusion on alternate branchlets; fruit green, globular. **S.**; Soeka Radja, R. Rupit, Palembang, 800 ft. 2989 *a*.—E. SUBMONOCERAS Miq. **S.**; Hills S.E. of Goenoeng Trang, Lampongs, 450 ft. 1608. Tree ±40–50 ft.; flowers in spikes in axils, white in bud.

Elæocarpus celebesianus Bak. fil., sp. nov. *Arbor*; *ramulis* novellis pubescentibus; *foliis* papyraceis oblongo-obovatis vel ovatis, apice obtusis vel sub-acutis, basi cuneatis, nervis lateralibus subtus prominentibus, utrinque 9–10, costa tomentosa, lamina 8–11 cm. longa, 3–4·5 cm. lata, petiolo pubescente, 12–15 mm. longo, suffulto; *floribus* minutis in racemis multifloris, 8–10 cm. longis dispositis pedicellis hirtis; *sepalis* triangularibus, acutis ±2 mm. longis, extus hirtis; *petalis* circ. 2 mm. longis, apice in laciniis fissis; *disco* crasso 5-lobato; *ovario* hirto 3-loculari, loculis pauci-ovulatis; *fructu* in sicco nigrescente, glabro, circ. 1 cm. longo. Celebes. 1185 *a*. Ex Hort. Bogor. **J.** Tree characterised by the small flowers in many-flowered racemes; allied to *E. rivularis* Vieill. from New Caledonia.

GONYSTYLACEÆ.

GONYSTYLUS FORBESII Gilg in Engl. & Prantl, Pflanzenfam. Nachtr. i. 232 (1909). **S.**; Moeara Mengkoelem, R. Rawas, Palembang, 500 ft. 3078. Great tree, circumference at 5 ft. from ground, 4 ft. 10 in.—G. BANCANUS Baill. **S.**; Moeara Mengkoelem, R. Rawas, Palembang, 600 ft. 3136. Tree 5 ft. in circumference at 5 ft. from the ground, about 40 ft. high; flowers pale yellow or yellowish-green.

LINACEÆ.

ROUCHERIA GRIFFITHIANA Planch. **S.**; Moeara Mengkoelem, R. Rawas, Palembang, 450 ft. 3083. Climbing shrub; flowers lake-red.

REINWARDTIA TRIGYNA Planch. **J.**; Tjineroean, Preanger, 5000 ft., 780 *a*. Mt. Malawar, 5300 ft. 1137.

MALPIGHIACEÆ.

ASPIDOPTERYS CONCAVA A. Juss. **S.**; Soeka Radja, Palembang, 500 ft. 2941. Large climber; fruit very pale green, almost white.

OXALIDACEÆ.

DAPANIA RACEMOSA Korth. **S.**; Penanggoengan, Lampongs, 550 ft. 1712. 600 ft. 1724. Moderate climber; fruit light green, pointed.

RUTACEÆ.

EVODIA TRIPHYLLA DC. **S.**; Mt. Dempo, Palembang, 3800 ft. 2322. Large tree; flowers small, white. "Kayoe reboeng."—E. NERVOSA Koord. & Valet. in Meded. Lands Plantent. xvii. 208 (1896). Tandjong Ning, R. Bliti, Palembang, 700 ft. 2763. Moderate tree; fruit very dark green, capsule's seeds black.

ZANTHOXYLUM SCANDENS Bl. **J.**; Goenoeng Malawar, Preanger, 6000 ft. 1001.—Z. OVALIFOLIUM Wight. **J.**; Goenoeng Poetjak Tjatjing, Preanger, 5800 ft. 838. Tree. "Sintok."

FAGARA RHETSA Roxb. var. PARVIJUGA Koord. & Valet. **S.**; Penanggoengan, Lampongs, 550 ft. 1707. Large thorny tree; flowers yellowish green; fruit green with purple flush. "Kayoe tanoh."

TODDALIA ACULEATA Pers. **S.**; Mt. Dempo, Palembang, 5800 ft. 2532. Large thorny climber; flowers yellow.

GLYCOSMIS PENTAPHYLLA Corr. **J.**; Goenoeng Tiloe, Bandoeng, Preanger, 2000–6000 ft. 1213, 1215. Shrub. G. MALAYANUS Ridley in Journ. As. Soc. S. Br. lxxv. 12 (1917). **S.**; Kotta Djawa, Lampongs, 285–290 ft. 1368, 1441. Shrub or small tree, 15 ft.; flowers white or greenish. Ayer Angat, forest round base of Kaba Volcano, 2000 ft. 2865. Tall slender tree; flowers green, 2–4 pale lake ovaries develop from each flower.

MICROMELUM PUBESCENS Bl. **J.**; Pengelengan, Preanger, 2600–4000 ft. 985. **S.**; Kotta Djawa, Lampongs, 300 ft. 1425. Small tree, 30 ft.; fruit green, oblong. Goenoeng Trang, Lampongs, 400 ft. 1524. Small tree, 8 ft. or erect shrub; flowers white. Hills N.E. of Goenoeng Trang, 600 ft. 1585 *a*. Small tree, 16 ft.; fruit green. "Kayoe Rangso." Nr. Bingin on R. Rupit, Palembang, 3015. Small tree; fruit passes from yellowish green to light orange. "Radoebruang." **S.** 1225.

CLAUSENA EXCAVATA Burm. **S.**; Batoe Pantjeh, Tandjong Ning, R. Bliti, Palembang, 400–600 ft. 2658. Small tree or small shrub; flowers small, white, fruit pale green.

LUVUNGA SCANDENS Ham. **S.**; Goenoeng Dempo, Palembang, 4500 ft. 2319. Moderate climber; flowers white and fragrant; fruit dark green. **J.**; nr. R. Tjisangkoei, Preanger, 4500 ft. 606. Climbing shrub; stem with claw-like appendages; fruit dark green. "Areui Koekoehoelang."—L. ELEUTHERANDRA Dalz. **S.**; Goenoeng Dempo, Palembang, 5000 ft. 2276. Moderate climber; flowers (in bud) white. Tandjong Ning, R. Bliti, Palembang, 600 ft. 2736. Large climber; fruit very dark green, glandular-dotted and pitted, 2·5 cm. by 2·0 cm. Goenoeng Dempo, Palembang, 8000 ft. 2417. Shrub ascending on other plants by its branches; fruit scarlet. "Pringot." Hills N.E. of Goenoeng Trang, 560 ft. 1564. Shrub or small tree ±8 ft.; fruit very dark green. Goenoeng Meraksa, R. Lintang, Palembang, 850 ft. 2591. Large climber; fruit very dark green. **J.**; Goenoeng Tjampea, Preanger, 1800 ft. 1194. Climber; fruit red.

PARAMIGNYA ARMATA Oliv. **S.**; under great forest in hills above Goenoeng Trang, Lampongs, 500 ft. 1466. Large thorny climber; flowers white.

Atalantia Roxburghii Oliv. **S.**; Moeara Mengkoelem, R. Rawas, Palembang, 500 ft. 3168. Erect shrub $2\frac{1}{2}$ ft.; fruit dark green.

Simarubaceæ.

Brucea sumatrana Roxb. **S.**; Gedong Tetahan, Lampongs, 400 ft. 1276. Erect shrub; flowers inconspicuous; fruit green. "Ampadoe." Employed in native pharmacopœia.

Eurycoma apiculata A. W. Benn. **S.**; Soeka Radja, R. Rupit, Palembang, 8000 ft. 2939. Small shrub 4 ft.; fruit light green.

Ochnaceæ.

Gomphia sumatrana Jack. Hills to E. of Goenoeng Trang under great forest, 800 ft. 1472. Erect shrub; flowers yellow; fruit green with accrescent scarlet calyx. Penanggoengan, Lampongs, 850 ft. 1776 *a*. Erect shrub 4 ft.; fruit green on a large pale scarlet disc, with pale scarlet accrescent calyx. On slopes above R. Rawas, Moeara Mengkoelem, Palembang, 420 ft. 3055 *a*. Small tree or large shrub; flowers yellow with orange-red stamens.

Burseraceæ.

Icicaster Planchoni Ridley (*Santiria Planchoni* A. W. Benn.). **S.**; Tandjong Ning, on R. Bliti, Palembang, 500 ft. 2773. Large tree; flowers in bud green and faded pink.

Canarium nitidum A. W. Benn. **S.**; Soeka Radja, R. Roepit, Palembang, 800 ft. 2991. Tree ±25 ft.; fruit large, green with lilac "bloom."—C. commune L. **J.**; nr. Buitenzorg. 1208. **S.**; 6. High tree. In gardens near villages.—C. subtruncatum Engl. in DC. Monog. Phan. iv. 109 (1883). **S.**; in great forest Tandjong Ning, R. Bliti, Palembang, 600 ft. 2809. Large tree; fruit bright green with blue flush. "Kadoengdoeng assam."—C. patentinervium Miq. **S.**; Batoe Pantjeh, R. Moesi, Palembang, 400 ft. 2191 *a*, 2671. Great tree; fruit light green.

Santiria Beccarii Engl. *l. c.* 162. **S.**; Moeara Mengkoelem, Palembang, 600 ft. 3093, 3209. Tree; fruit bright yellow flushed with lake.—S. oblongifolia Bl. **S.**; Tandjong Ning, Palembang, 600 ft. 2981, 2769. Large tree; fruit green.—S. lævigata Bl. **S.**; Tandjong Ning, Palembang, 600 ft. 2775, 3045. Large tree.—S. fasciculata A. W. Benn. **S.**; Moeara Mengkoelem, Palembang, 800 ft. 3160.

Santiria Forbesii Bak. fil., sp. nov.

Species ad *S. longifoliam* King accedens. *Frutex*; *ramis* validis glabris; *foliis* 4–5-jugis, 20–35 cm. longis, interstitiis interjugalibus 5–6 cm. longis, foliolis pergamaceis oblongis vel oblongo-obovatis, sæpius 20–24 cm. longis, sæpissime 3·5–5·0 cm. latis, rarius 6·5 cm. latis, proximalibus minoribus, apice acuminatis, acumine 15 mm. longo, instructis, basi cuneatis, petiolulis 6–10 mm. longis, nervis numerosis 12–17 ante marginem curvatis; *paniculis* foliis longioribus laxissimis, pedicellis strictis 2–3·5 mm. longis; *calyce* brevi lobis triangularibus glabris; *petalis* ignotis; *drupis* ovoideis in sicco nigrescentibus glabris, 12–14 mm. longis.

S.; Moeara Mengkoelem, Palembang, 500 ft. 3070. Erect shrub, ±3 ft.; fruit crimson-lake.

Characterised by the oblong or oblong-obovate acuminate leaflets with 12–17 lateral nerves, somewhat shining above, and the long very lax panicle, the pedicels being 2–3·5 mm. long.

Santiria longepaniculata Bak. fil., sp. nov. *Arbor*; *foliis* ±bijugis; *foliolis* parviusculis, glabris superne nitidis, ellipticis vel oblongo-ovatis, apice longe acuminatis, basi cuneatis, nervis lateralibus utrinque 7–8, arcuatis, lamina 8–9 cm. longis, 3·4–4·5 cm. latis, petiolulis 12–15 mm. longis; *panicalis* foliis longioribus, multifloris; *pedunculis* pedicellisque puberulis; *floribus* minutis; *calyce* 1 mm. longo, puberulo, æqualiter trilobo; *petalis* ovato-orbicularis, 3 mm. longis, staminibus carnosis, disco conspicuo, stylo breve; *fructu* ignoto.

S.; Bank of R. Rawas, nr. Moeara Mengkoelem, Palembang, 2000 ft. 3025. Tree ±40 ft.; flowers pale green.

Allied to *S. fasciculata* Benn., differing in the smaller leaflets and longer acumen.

Meliaceæ.

Dysoxylum alliaceum Bl. **J.**; Preanger. 988 *a*.—D. Lobbii DC. var. nov. sumatranum Bak. fil. *Arbor* alta; *foliis* oblongis, apice cuspidatis, basi inæquilateraliter rotundatis, 15–23 cm. longis, 55–56 cm. latis, utrinque pubescentibus; *floribus* paniculatis; *calyce* 1·5–2 mm. longo; *petalis* 4·5–6 mm. longis; *antheris* 8, 0·75 mm. longis; *disco* cupuliformi; *stigmate* crasso. **S.**; Penanggoengan, Lampongs, 835 ft. 1640. Large tree; flowers in long spikes, whitish. Differs by the leaflets being pubescent on both sides, and longer than in the type.—D. excelsum Bl. **S.**; in deep forest nr. Hoedjoeng, Krohe, 3100 ft. 1955. Tree 15 ft.; flowers white, on short pedicels on stem of branches.—D. arborescens Miq. **S.**; Goenoeng Tengamoes, Lampongs, 3000 ft. 1818. Tree ±40 ft.; fruit pale green.—D. laxiflorum Bl. **J.**; Kosala, Bantam, 2000 ft. 341. Great tree; fruit 4-locular; seeds orange and black.—D. nutans Miq. **J.**; Mt. Waringin, Tjisangkoei, Preanger, 4500 ft. 804 *a*, 975 *b*. Small tree. Tjibolang, Preanger, 3000 ft. 1113. Mt. Malawar lower slopes, Preanger, 5400 ft. 1054. Moderate tree; flowers white; foliage soft and silky. "Pigitan monyet." Preanger. 1041 *a*.—D. densiflorum Miq. **J.**; Mt. Malawar, Preanger, 5700 ft. 1217. Tree.

Dysoxylum (*Eudysoxylum*) **brachypodum** Bak. fil., sp. nov. *Arbor* ad *D. ramiflorum* Miq. accedens; *ramis* argyllaceis; *foliis* paucijugis, foliolis majusculis, pergamaceis superne præter costam glabris apice acuminatis, nervis lateralibus utrinque 14–16, 25 cm. longis, 7–8 cm. latis, petiolis tomentosis, brevissimis; *racemis* cauliforis, brevibus, paucifloris, 4–5 cm. longis; *calyce* extus pubescente, usque ad medium lobatis; *petalis* angustis adpresse sericeis, calyce conspicue longioribus, 17 mm. longis, tubo staminco fere glabro; *ovario* extus densissime hirsuto, 4-loculari, loculis biovulatis; *fructu* subgloboso, demum fere glabro, ±25 mm. longo et lato; *pedicellis* fructiferis, 15–20 mm. longis.

S.; Tandjong Djati, on Lake Ranau, Palembang, 1700 ft. 2098 *a*. Large tree; flowers white, on stem of tree. Mt. Tengamoes, Lampongs, 3000 ft. 1823. Large tree; fruit yellow, on tree-trunk.

Allied to *D. ramiflorum* Miq. and *D. caulostachyum* Miq. The noticeable features are the flowers, large for the genus; the few-flowered short inflorescence; the staminal tube 17 mm. long; the very hirsute ovary.

Dysoxylum lasiophyllum Bak. fil., sp. nov. *Arbor* magna; *foliis* 4–5-jugis, foliolis ellipticis vel oblongo-ellipticis, apice subacuminatis, subtus insigniter pubescentibus, nervis lateralibus, subtus conspicuis, utrinque 13–16, petiolulis 3–4 mm. longis, lamina 15–18 cm. longa, 6–7 cm. lata; *inflorescentia* paniculata, paniculis quam folii dimidium brevioribus; *calyce* cupuliformi breviter dentato, extus pubescente; *petalis* 4, extus pubescentibus; *tubo* stamineo circ. 1 mm. longo; antheris 8; *ovario* hirsuto; stylo crasso, stigmate crasso, terminali; *fructu* ovoideo-pyriformi, 3·5–4 cm. longo, 4–4·5 cm. lato, seminibus 18–20 mm. longis.

S.; Kotta Djawa, Lampongs, 350 ft. 1374. Great forest tree; fruit purplish orange. The staminal tube is free. The leaflets are densely pubescent beneath. Allied to *D. interruptum* King.

CHISOCHETON DIVERGENS Bl. **S.**; in virgin forest, Tandjong Ning, Palembang, 600 ft. 2723. Large tree; flowers small, white, in massive trusses, very fragrant.

Chisocheton sumatranus Bak. fil., sp. nov. *Arbor*; *ramis* novellis, cinereo-puberulis; *foliis* 3–4-jugis, foliolis ellipticis vel oblongo-ellipticis, petiolulatis, apice acuminatis, basi cuneatis, glabriusculis, nervis lateralibus 7–10, lamina 10–12 cm. longa, 3–4 cm. lata; *paniculis* angustis, elongatis, ramis lateralibus abbreviatis; *calyce* extus pubescente, levissime dentato, vix 1 cm. longo; *petalis* 4 angustis, extus cinereo-pubescentibus, ±5 mm. longis; *tubo* stamineo extus et intus pubescente, 4 mm. longo; *disco* cupuliformi; *ovario* pubescente, loculis uniovulatis, stigmate terminali, crasso.

S.; Paoe, Palembang, 5000 ft. 2278. Large tree; flowers white, in trusses.

Allied to *C. philippinus* Harms. The calyx is short, there are 4 strap-shaped petals 5 mm. long, and the staminal tube is free and laciniate at the apex.

Chisocheton dempoensis Bak. fil., sp. nov. *Arbor* alta; *ramulis* teretibus; *foliis* imparipinnatis, 2–4-jugis cum impari, foliolis elliptico-lanceolatis vel ovato-lanceolatis, apice sæpius acuminatis, apice ipso obtusis utrinque glabris, basi cuneatis, costa subtus conspicua, lamina 5–8 cm. longa, 18–25 mm. lata, petiolulis 3–5 mm. longis; *floribus* circa 5 mm. longis, albis, pedicellatis, pedicellis 2–4 mm. longis, in paniculas digestis; *calyce* 1–1·25 mm. longo, dentibus acutis; *antheris* intra marginem tubi insertis, stylo erecto; stigmate capitato; *ovario* hirto; *fructu* ignoto.

S.; Mt. Dempo, 4000 ft. 2229. Large tree; flowers white.

Allied to *C. sumatranus* Bak. fil. Differs from *C. lasiogynus* Boerl. & Koord. in the much smaller calyx etc. The inflorescence is paniculate, and the outside of the staminal tube hairy, the lateral

nerves of the leaves are slender and inconspicuous, and there are 4 petals, the total length of the flowers is 5 mm.

AMOORA ROHITUKA W. & A. **S.**; Penanggoengan, Lampongs, 1000 ft. 1734. Large tree; flowers in bud, cream-yellow.

AGLAIA PALEMBANICA Miq. **S.**; Goenong Trang, Lampongs, 400 ft. 1464, 1465. Large shrub, or small tree ±13 ft.; flowers in bud very yellow; fruit yellowish green.—A. FORBESII King in Journ. As. Soc. Beng. lxiv. 2, 68 (1895). **S.**; Moeara Mengkoelem, Palembang, 2500 ft. 3179. Small tree; fruit turning from green to pale yellow.—A. MEMBRANIFOLIA King *l. c.* 75. **S.**; Penanggoengan, Lampongs, 300 ft. 1679. Large tree; flowers small, greenish. Penanggoengan, Lampongs, 900 ft. 1772. Small tree ±12 ft.; fruit in large bunches, pale bright green covered with pale grey pubescence or epidermis.—A. HETEROCLITA King *l. c.* 78. **S.**; hills S.W. of Goenoeng Trang, Lampongs, 400 ft. 1558. Large tree; fruit pale grey, but with dark green below pubescence.—A. ARGENTEA Bl. **S.**; Kotta Djawa, Lampongs, 300 ft. 1305, 1355 *a*. Small tree ±20 ft. with leaves white on underside; flowers inconspicuous, passing from green to greenish white.—A. LEUCOPHYLLA Miq. **S.**; in virgin forest, Tandjong Ning, R. Moesi, Palembang, 600 ft. 2724. Large tree; flowers in bud yellow, having strong aurantiaceous fragrance.—A. TENUICAULIS Hiern. **S.**; Goenoeng Trang, Lampongs, 400 ft. 1588. Shrub ±4 ft., covered with reddish woolly pubescence; fruit, as seen, green.—A. ODORATISSIMA Bl. **W.J.**; Tjibadui, Kosala, Bantam, 2750 ft. 227 *a*. Large tree; flowers inconspicuous, yellowish on axillary racemes. "Peurries." Forma foliolis majoribus. **S.**; Moeara Mengkoelem, R. Rawas, Palembang, 500 ft. 3150, 3150 *a*. Small tree ±35 ft.; flowers white or orange, very small. Kotta Djawa, Lampongs, 300 ft. 1307. Small tree ±24 ft.; flowers inconspicuous, greenish white. **J.**; R. Tjisankui, Preanger, 4000 ft. 867 *a*. Small tree. "Kokosan Monjet."

AGLAIA (*Euaglaia*) ODORATISSIMA Bl. var. nov. FORBESII Bak. fil. *Arbor*; *foliis* 1–2-jugis cum impari, foliolis ovatis vel obovatis vel breviter acutis, nervis lateralibus tenuibus haud prominulis, lamina 6–10 cm. longa, 4–5·5 cm. lata, superne glabris, foliolis junioribus subtus microscopice cinereo-pustulatis, petiolulis 3–5 mm. longis; *panicula* multiflora, minute rufo-furfuracea; *floribus* petalis concavis, circ. 1·5 mm. longis; *antheris* 5, intra marginem tubi insertis; *fructu* ignoto. **S.**; Kotta Djawa, Lampongs, 400–700 ft. 1337, 1405. Tree ±20 ft.; flowers inconspicuous, greenish white. The leaves are 1–2-jugate, the leaflets when young minutely cinereous-pustulate below, but when older are almost glabrous; the flowers are minute and pedicelled, there are 5 anthers. Differs from the type by the shape of the leaflets.

Aglaia kabaensis Bak. fil., sp. nov. *Arbor* ad *A. palembanicam* Miq. accedens; *ramulis* stellato rufo hirsuto; *foliis* 2–3-jugis cum impari, foliolis oblongo-obovatis, oblanceolatis, subtus præcipue ad costam stellato-pubescentibus, superne demum glabris, apice acuminatis, basi cuneatis, nervis lateralibus utrinque 13–16 paralellis marginem

versus arcuatis, petiolis brevibus, lamina 8–16 cm. longa, 4–6 cm. lata; *paniculis* ramosis, sæpe 10–12 cm. longis; *calyce* rufo-hirsuto; *floribus* non bene evolutis; *fructu* pyriformi, 16–20 mm. longo, 12–17 mm. lato, extus rufo-pubescente.

S.; foot of Kaba Volcano, Palembang. Sine no.

Aglaia longepetiolulata Bak. fil., sp. nov. *Arbor* alta ad *A. oligophyllam* Miq. accedens; *foliis* sæpissime 2-jugis cum impari, foliolorum lamina præter nervos costamque glabra, ovata vel elliptico-ovata, basi cuneata, apice acuta, nervis lateralibus utrinque 8–10, parallelis, subtus conspicua, costa lepidota, 10–16 cm. longa, 5–8 cm. lata, petiolulis lepidotis, 2–3 cm. longis; *floribus* ignotis; *fructu* globoso, extus cinnamomeo-pubescente, 15–17 mm. diam biloculari, seminibus siccitate nigrescentibus, 10–12 mm. longis, 8–9 mm. latis, pedicellis fructiferis, 2–4 mm. longis.

S.; in virgin forest, Penanggoengan, Lampongs, 600 ft. 1647. A large tree; fruit light red.

Allied to *A. oligophylla* Miq., from which it differs by the much longer petiolules.

Aglaia pyricarpa Bak. fil., sp. nov. *Arbor* ad *A. latifoliam* Miq. accedens; *ramis* cortice rufescente tectis; *foliis* 2–4-jugis cum impari, rhachi 10–12 cm. longa rufescente, foliolis cuneato-obovatis vel cuneato-ellipticis, petiolulatis nervis lateralibus parallelis utrinque 13–15, lamina subtus dense lepidota, 12–15 cm. longa, 4·5–8 cm. lata, petiolulis 8–10 mm. longis, interstitiis interjugalibus 3–5 cm. longis; *inflorescentia* fructifera ±2 cm. longa; *fructu* forsan 4-loculari, magno pyriformi, 5–6·5 cm. longo, 4–4·5 cm. lato, externe cinnamomeo-lepidoto, pedicellis crassis, seminibus 2·3–2·5 cm. longis, ±15 mm. latis, siccitate nigrescentibus.

S.; Lampongs, 3900 ft. 1977 *a*, 2279. Flowers scarlet or orange; fruit purplish.

An aberrant member of the genus, noticeable on account of its very large pyriform fruit.

AGLAIA ASPERA Teysm. & Binn. var. nov. SUMATRANA Bak. fil.

Arbor (?) ramis fere glabris; *foliis* majusculis, 6-jugis, petiolatis foliolis oblongis apice acuminatis, basi inæquilateraliter cuneatis, superne glabris, subtus lepidotis nervis lateralibus 13–15 parallelis, laminis 15–18 cm. longis, 4·5 cm. latis; *paniculis* amplis multifloris; *fructu* ignoto.

S.; Perangoengan, Lampongs. 1668.

HEYNEA SUMATRANA Miq. **S.**; Goenoeng Meraksa, Palembang, 750 ft. 2574. Tree 20 ft.; fruit in long purplish-red spikes.—H. TRIJUGA Roxb. **J.**; Goenoeng Waringin, Preanger, 4500 ft. 1216.

CEDRELA SINENSIS A. Juss. **J.**; Mt. Gede, nr. Buitenzorg, 5200 ft. 1209. Tall tree. "Soerian." Supposed to have been introduced originally, and spread naturally. **S.**; Paoe, Palembang, 3500 ft. 2193. Large tree; flowers in bud, small, white; fruit greenish grey. C. FEBRIFUGA Bl. var. VERRUCOSA C. DC. **S.**; forest on Kaba Volcano, 3500 ft. 2881. Large tree; fruit pale green.

CHAILLETIACEÆ.

CHAILLETIA SUMATRANA Miq. **S.**; Tandjong Ning, R. Bliti, Palembang, 600 ft. 2781. Moeara Mengkoelem, Palembang, 500 ft. 3149, 3176. Long slender climbing shrub; flowers very small, white; fruit pale sea-green. Goenoeng Trang, Lampongs, 600 ft. 1588 *a*. Moderate climber; leaves large, prominently 3-nerved; fruit green, in umbelliferous heads.

OLACACEÆ.

OCHANOSTACHYS AMENTACEA Masters. **S.**; forest on bank of R. Rawas, nr. Moeara Mengkoelem, Palembang, 420–500 ft. 3086, 3194. Tree 35–40 ft.; flowers small, greenish yellow tinged with pink.

CTENOLOPHON PARVIFOLIUS Oliver. **S.**; Soeka Radja, R. Rupit, Palembang, 800 ft. 3002. Large tree, very hard wood, circumference at 5 ft. from ground, 5 ft. 8 in.; fruit pale pink. 2818. Large tree; fruit immature, pale green flushed with pink, a reddish brown. "Kayoe Lornot."

LEPIONURUS SYLVESTRIS Bl. **S.**; in virgin forest, nr. Goenoeng Trang, Lampongs, 400 ft. 1571. 1596 *a*. Thorny shrub; flowers in catkins, light yellow.

STEMONURUS SECUNDIFLORUS Bl. **J.**; Pasir Orai, Kosala, 2700 ft. 590. Shrub.

GOMPHANDRA NYSSIFOLIA King in Journ. As. Soc. Beng. lxiv. 2, 112 (1895). **S.**; Tandjong Ning, R. Bliti, 500 ft. 2808. Large forest tree; fruit very pale pink.—G. COMOSA King *l. c.* 114. **J.**; nr. Pengelengan on hills, Preanger, 4500 ft. 784.

GONOCARYUM LONGE-RACEMOSUM King *l. c.* 120. **S.**; Soeka-Radja, R. Roepit, Palembang, 600 ft. 2957. Small tree, about 12 ft. high. Fruit dark green.

PLATEA EXCELSA Bl. **J.**; Pasir Orai, Kosala, Bantam, 2600 ft. 583. Large tree; fruit scarlet. "Kibonteng."

PHYTOCRENE BRACTEATA Wall. **S.**; Tandjong Ning, R. Bliti, Palembang, 500 ft. 2784. Great climber; flowers in large trusses of gamboge-green colour.

Phytocrene Forbesii Bak. fil., sp. nov. Species ad *P. macrophyllam* Bl. accedens, differt foliis tenuioribus etc. *Rami* sulcati; *foliis* ovatis nunc sublobatis nunc integris, alternis, basi cordatis, subtus ochraceo-tomentosis, 15–17 cm. longis, 10–14 cm. latis, 5–7-nervis, petiolis 7–9 cm. longis, pilis longiusculis, sparse vestitis *inflorescentia* 20–25 cm. longa, 2–3 cm. lata, e ligno vetere orta, pedunculo brevissimo, capitulis 8–11-floris, cinereo-villosis 4–5 mm. diam.; *calycis* segmentis 4–5, triangularibus; *filamentis* liliformibus, antheris 0·5 mm. longis; *fructu* ignoto.

J.; Tjampea, nr. Pengelengan, Preanger, 1800 ft. 1219. Large climber.

The leaves are either entire or lobed. The spikes of inflorescence are very dense, and the bracts do not protrude as in *P. bracteata* Wall. and *P. porphyrea* Stapf. Differs from *P. macrophylla* Bl. in the thinner leaves etc.

Strombosia rapaneoides S. Moore, sp. nov. *Arbor*? glabra; *ramulis* teretibus, crebro foliosis, cortice olivaceo-fusco cinctis; *foliis* petiolis 5 mm. longis, ovato-oblongis, obtusis, basi obtusis vel rotundatis, coriaceis, minute pustulatis, in sicco griseis, 7–12 × 3–5 cm.; *floribus* in fasciculos sessiles pulvinatos digestis; *pedicellis* tenuibus, 1 mm. longis vel paullulum ultra; *calycis* segmentis rotundatis, 4 mm. longis; *petalis* oblongis, obtusis, intus puberulis 2 mm. longis; *antheris* ovoideis 3 mm. longis; *ovario* ½-supero vix 1 mm. diam.; *stylo* crassiusculo, 3 mm. longo.

S.; Penanggoengan, Lampongs, 900 ft. 1749.

Aquifoliaceæ.

Ilex triflora Bl. var. Horsfieldii Loes. (*I. Horsfieldii* Miq.). **J.**; Preanger. 1000 *a*. **S.**; Kaba Volcano, Palembang, 6000 ft. 2901. Erect shrub; fruit green.—I. sumatrana Loes. in Nova Acta Acad. Caes. Leop. lxxviii. 233 (1901) ex descript. **S.**; Mt. Besagi, Krohe, 7000 ft. 2045. Sprawling shrub ±4 ft.; fruit blue-black, exuding dark purple juice.—I. pleiobrachiata Loes. *l. c.* 87. **J.**; Lebak Jaha, Kosala, 2500 ft. 376. Tree, 50 ft. Tjibadui, Kosala, 2700 ft. 441. Large tree; flowers inconspicuous; wood finely marked with dark lines, excellent for furniture.—I. spicata Bl. **S.**; Mt. Dempo, Palembang, 6100 ft. 2559. Great tree; flowers very small, greenish white in alternate axillary spikes.

Celastraceæ.

Euonymus javanicus Bl. **J.**; Mt. Poetjak-Tjatjing, Preanger, 5000 ft. 831, 833 *k*. Small tree. **S.**; stream side nr. Goenoeng Trang, Lampongs, 400 ft. 1621. Small tree with long branches; flowers gamboge-yellow, petals feather tipped; fruit in deep salmon-coloured capsules, seeds black with yellow arillus. Above Lake Ranau, Palembang, 2000 ft. 2115. Penangoengan, 1738 *a*, 1715 *b*. Large tree; flowers white; fruit in lake-red capsules, seeds black with yellow arillus. Beautiful object when loaded with fruit.

Lophopetalum oblongum King in Journ. As. Soc. lxv. 350 (1896). **S.**; Penanggoengan, Lampongs, 600 ft. 1733. Large tree; flowers small, cream-yellow.

Celastrus racemulosa Hassk. **J.**; Mt. Waringin, Preanger, 4700 ft. 921.

Kurrimia paniculata Wall. **S.**; Moeara Mengkoelem, R. Rawas, Palembang, 500 ft. 3131. Tree ±35 ft. circ. at 4 ft. from ground, 3 ft.; flowers very minute, pale straw-colour. Between Napal Litjin and Moeara Mengkoelem, R. Rawas, Palembang, 600 ft. 3151. Great tree, presenting a magnificent dome of white flowers, but the foliage inaccessible until felled. Tandjong Ning, Palembang, 600 ft. 2816. Large tree; flowers very small, pale yellow. "Kayoe Bemban." 2832. Gigantic tree; fruit light or dark green. "Sipoh." Soeka Radja, R. Rupit, Palembang, 300 ft. 2944. Great tree; fruit light red.—K. pulcherrima Wall. **J.**; Pasir Orai. Kosala, Bantam, 2500 ft. 566. Large tree; fruit (unripe) dark green, oblong, (ripe) red; the fruit raceme has frequently a slender terminal barren branchlet.

Perrottetia alpestris Loes. in Engl. & Prantl Naturl. Pflanzenfam. iii. 5, 220 (1892). **J.**; Goenoeng Malawar, Preanger, 5000–5200 ft. 1005, 766 *a*. Shrub. "Ki-pi-iet." **S.**; foot of Mt. Besagi, Krohe, 3000 ft. 1950. Small tree, ±6 in. diam.; flowers very minute, in alternate cymes, greenish-coloured; fruit purplish red, or faded lake. Hoedjoeng, Krohe, 3000 ft. 1989. Small climbing shrub; flowers white.

Salacia oblonga Wall. **J.**; Goenoeng Tjampea, Preanger, 4000 ft. 1172.—S. prinoides DC. **S.**; spirit-specimen 32.

Hippocratea indica Willd. **S.**; 2681. Small tree; flowers minute, pale greenish yellow.

Rhamnaceæ.

Ventilago leiocarpa Benth. **S.**; R. Rawas, Bigin Telok, Palembang, 350 ft. 3251. 400 ft. 3203. Climbing shrub; flowers numerous and inconspicuous, yellowish green; fruit bright green.

Zizyphus elegans Wall. **S.**; Karangnata hill, R. Rawas, Palembang, 450 ft. 3137. Large climbing shrub; flowers green with orange centres, slightly pungent odour.

Gouania javanica Miq. **S.**; Godong Tetahan, Lampongs, 357 ft. 1263. Tree; flowers minute, pale greenish yellow. Forest nr. Goenoeng Meraksa, Palembang, 750 ft. 2594 *k*. Climbing shrub; flowers small, greenish yellow. Soeka Radja, R. Rupit, Palembang, 900 ft. 2933 *a*. "Akar Pait." Tandjong Ning, Palembang, 600 ft. 2758. Large climber; fruit turns from green to lake-scarlet or black.

Ampelidaceæ.

Vitis Kunstleri King in Journ. As. Soc. Beng. lxv. 2, 396 (1897). **S.**; margin of Lake Ranau, Palembang, 1700 ft. 2097. Climber; fruit green with reddish-grey pedicels.—V. coffeæcarpa Teysm. & Binn. **J.**; Mt. Salak, nr. Buitenzorg, 2000 ft. 1161. Scandent shrub.—V. coriacea Miq. **S.**; Kotta Djawa, Lampongs, 285 ft. 1344. Large climber; fruit unripe, green, ripe, orange. 300 ft. 1348. Large climber; leaves purple beneath; flowers inconspicuous, greenish white; fruit orange.—V. flexuosa Thunb. **S.**; slopes above Lake Ranau, 2000 ft. 2082. Climber; fruit in bunches, green.—V. furcata Laws. **S.**; bank of Lamatang, nr. Paoe, Palembang, 3542 ft. 2534. Climber; fruit very pale green.

Ampelocissus spicigera Planch. in DC. Mon. Phan. v. 2, 406 (1887). **S.**; Tandjong Ning, Palembang, 650 ft. 2831. Large climber; fruit in long thyrse, green.

Pterisanthes polita Laws. **S.**; Soeka Radja, on R. Rupit, Palembang, 900 ft. 2996 *a*. Slender climber; fruit green on scarlet disks.

Tetrastigma Hookeri Planch. *l. c.* 428. **S.**; side of tributary of R. Lintang, nr. Goenoeng Meraksa, Palembang, 750 ft. 2586. Large climber; fruit dark green dotted with white.

Parthenocissus semicordata Planch. var. Scortechinii King. **J.**; Preanger, 4700 ft. 823. Pengelengan, Preanger. 983.

Cissus cerasiformis Planch. var. Wallichii King (sub *Vitis*).

S.; bank of Lintang, Goenoeng Meraksa, Palembang, 800 ft. 2583. Large climber; fruit purple-pink. Hot Springs, foot of Mt. Kaba, Palembang, 2000 ft. 2861 *a*. Climbing shrub; fruit pink-purple. **J.**; bank of Tjiladaheun, Kosala, Bantam, 1450 ft. 480. Scandent shrub.—C. GENICULATA Bl. **S.**; Mt. Tengamoes, Lampongs, 6700 ft. 1890. Large climber. Penanggoengan, Lampongs, 600 ft. 1781. Large climber; flowers in bud; fruit pale greenish white. **J.**; Lebak-Jaha, Bantam, 2100 ft. 292. Terrestrial creeper.—C. DISCOLOR Blume. **S.**; Lake Ranau, Palembang, 1869 ft. 2092. Climbing shrub; leaves variegated above, dark purple beneath; flowers light yellow.—C. ADNATA Roxb. **J.**; Pengelengan, Tjibolang, Preanger, 2000–3000 ft. 1036, 1111. Scandent shrub; flowers small, inconspicuous.—C. MOLLISSIMA Wall. **S.**; Mt. Karangnata, Napal-Litjin, Palembang, 800 ft.. 3112. Extended scandent shrub; fruit greenish white.

LEEA JAVANICA Blume. **J.**; Tjibandong, Kosala, 7000 ft. 421. Small tree in aftermath of felled forest. Used in native pharmacopeia. "Kitoewa"; "Soelangkar." **J.**; Preanger. 892 *k*.—L. SAMBUCINA Willd. **S.**; under deep forest, Goenoeng Trang, Lampongs, 400 ft. 1447 *a*. Shrub; flowers pale yellow; fruit passing from green through red to blue-black. "Anda mali." **J.**; Kosala Kramat, Bantam, 2000 ft. 536. Erect shrub; flowers in pale red umbels attractively conspicuous, petals with appendages.—L. SUNDAICA Miq. **S.**; Gedong-Tetahan, Lampongs, 400 ft. 1246. Large shrub; flowers dingy purple. Growing under great forest, Kotta Djawa, Lampongs, 800 ft. 1395. Tall slender tree; flowers white. "Gindamati."—L. ACULEATA Bl. **S.**; Goenoeng Trang, Lampongs, 400 ft. 1525. Shrub 5 ft. with long straggling branches; flowers small, lake; fruit passing from green to black.

Leea Forbesii Bak. fil., sp. nov. *Frutex* ad *L. saxatilem* Ridley affinis; *foliis* simplicibus, ovatis, apice subacuminatis, chartaceis, nervis lateralibus 8–10, adscendentibus, lamina glabra, 10–14 cm. longa, 6–8 cm. lata, petiolo 4–6 cm. longo, suffultis; *floribus* cymosis, pedunculis pedicellisque pubescentibus; *alabastris* globosis; *calycis* dentibus 5; *petalis* 5; cum tubo stamineo connatis, tubo stamineo brevi antheris 1 mm. longis; *baccis* 3–4-locularibus, glabris, siccitate rugosis.

S.; Penanggoengan, Lampongs, 5835 ft. 1637. Herb; creeping root; flowers white; fruit turning from dark purple to dark red.

A shrub with simple leaves and short cymes.

SAPINDACEÆ.

ALLOPHYLLUS SUMATRANUS Bl. **S.**; Mt. Dempo; Hills above Lake Ranau, Palembang, 2000–4000 ft. 2219, 2225, 2132. Shrub or small tree; flowers small, white.—A. GLABER Boerl. **J.**; Preanger, Mt. Malawar, 3200 ft. 1174. Small tree.—A. FULVINERVIS Bl. **S.**; Kotta Djawa, Lampongs, 300 ft. 1411 *a*. Small tree, ±16 ft.—A. JAVENSIS Bl. **S.**; Mt. Besagi, Krohe, 5500 ft. 1999. Large tree, wood very hard. **J.**; Pasir Orai, Kosala, Bantam, 2300 ft. 478. Small tree. Flowers in white trusses.—A. SCANDENS Ridley in Journ. Roy. As. Soc. Straits Br. lxxv. 26 (1917). **S.**; Kotta Djawa, Lampongs, 700 ft. 1401. Small tree, ±12 ft.; flowers small, white.

APHANIA MONTANA Bl. **S.**; Penanggoengan, Lampongs, 550 ft. 1709 *a*. Flowers very pale green. Mt. Tengamoes, Lampongs, 3000 ft. 1821. Shrub 8–10 ft.; fruit red.

LEPISANTHES ANGUSTIFOLIA Bl. ex descript. **J.**; Goenoeng Waringin, Preanger, 4500 ft. 1187. Tall tree. "Kilalaijoe."—L. LAMPONGA Radlk. in Rec. Bot. Surv. India, iii. 345 (1907). **S.**; Penanggoengan, Lampongs, 600 ft. 1700. Small climber; fruit light green.

Lepisanthes Forbesii Bak. fil., sp. nov. *Arbor*; *foliis* multifoliolatis, rhachi hirsuta, foliolis oblongis, insiguiter inæquilateralibus acuminatis, apice ipso obtusis, basi cuneatis, margine undulatis, nervis lateralibus utrinque 9–11, lamina 10–15 cm. longa, 25–30 mm. lata, petiolulis rufo-hirsutis, 3–5 mm. longis; *racemis* 4–9 cm. longis, e ligno vetere ortis, pedicellis brevibus, rhachi cinereo-hirsuta; *calyce* 5 mm. longo, pubescente, disco annulari pubescente, ovario sessile, pubescente, 4-loculari, loculis 1-ovulatis; *fructu* in sicco nigrescente, extus pilis crassis sparse munito, 8 mm. longo, 5 mm. lato.

S.; R. Rawas, Moeara Mengkoelem, Palembang, 600 ft. 3087. Small tree; fruit very dark green on stem.

Distinguished from *L. montana* Bl. and *L. Blumeana* Koord. & Valet. by its unequal-sided leaflets.

OTOPHORA ALATA Bl. **J.**; Buitenzorg. 1160.—O. IMBRICATA Bl. **S.**; Penanggoengan, 600 ft. 1717. Large tree; flowers small, cream-yellow; fruit red. "Toengoean bisa."—O. FRUTICOSA Bl. **J.**; Buitenzorg. 1170. Large tree; fruit dark red.

XEROSPERMUM BRACHYPHYLLUM Radlk. *l. c.* 348. **J.**; Tjibadui, Kosala, 2700 ft. 452. Tjilaki, Preanger, 4700 ft. 896. Large tree; fruit eaten.—X. CYLINDROCARPUM Radlk. *l. c.* 348. **S.**; Tandjong Ning, Palembang, 500 ft. 2715. Large tree; fruit cylindrical, covered with small conical spines, green.- X. TESTUDINEUM Radlk. in Fedde Repert. xviii. 340 (1922). **J.**; Goenoeng Waringin, Preanger, 4500 ft. 1216 *a*. "Ki-pipi." Tjibadui, Kosala, Bantam, 2600 ft. 528. Large tree. "Eggel." "Tjongol monjet." **S.**; Soeka Radja, R. Rupit, Palembang, 400 ft. 2918. Fruit passing from dark green to yellow.

Nephelium Forbesii Bak. fil., sp. nov. *Arbor*; *foliis* alternis exstipulatis, foliolis 1–2-jugis, utrinque glabris oblanceolatis vel oblongis rarius latioribus, nervis lateralibus utrinque 10–12 erecto-patulis subtus prominulis, lamina 12–16 cm. longa, 3·5–5·0 cm. lata, rarius latiora, petiolulis 3–4 mm. longis; *inflorescentia* paniculata multiflora; *calycis lobis* ovatis extus pubescentibus; *staminibus* disci intus insertis centricis exsertis, filamentis filiformibus, antheris parvis 0·50 mm. longis; *stylo* erecto apice trifido lobis recurvatis; *fructu* ignoto.

S.; Hill N. of Goenoeng Trang, Lampongs, 400 ft. 1592. Tree ±40–50 ft., flowers white. Allied to *N. glabrum* Noronha.

The following numbers are closely allied to the above, but differ

slightly in leaf-form and colour of flower:—1625, flowers greenish white, with narrower leaves; 1637 *a*, flowers lake-coloured; 1669, flowers yellow and lake with broader leaflets.

N. SUBFALCATUM Radlk. *l. c.* 353. **S.**; R. Rawas, Moeara Mengkoelem, Palembang, 600 ft. 3092. Large tree 3½ ft. in girth at 5½ ft. from the ground; fruit dark blue.—N. MALAIENSE Griff. **S.**; R. Rupit, Soeka Radja, Palembang, 5600 ft. 3010. Tree 20–30 ft.; flowers white, corolla fringed, rich honey odour.—N. DASYNEURON Radlk. *l. c.* **S.**; Tandjong Ning, R. Bliti, Palembang, 600 ft. 2842.—N. GLABRUM Noronha. **S.**; Bigin Telok, R. Rawas, Palembang, 300 ft. 3225. Large tree, circumference at 4 ft. from ground 5½ ft.; fruit dark bluish green with white dots. Moeara Mengkoelem, R. Rawas, Palembang, 600 ft. 3085. Young fruit flushed with faded purple.

POMETIA TOMENTOSA Kurz. **S.**; Moeara Mengkoelem, R. Rawas, Palembang. 450 ft. 3192. Large tree. "Kasai."

Pometia Forbesii Bak. fil., sp. nov. *Arbor*; *foliis* imparipinnatis trijugis cum impari, foliolis oblongis vel ellipticis, costa superne impressa, glabris, basi cuneatis apicem versus attenuatis, foliolis distantibus 12–15 cm. longis, 5–5·5 cm. latis, petiolulis 4–5 mm. longis suffultis, interstitiis interjugalibus 3–5 cm. longis, paribus proximalibus minoribus 8–9 cm. longis; *floribus* pedicellatis parvis racemosis regularibus; *calyce* parvo cupulari; *petalis* delapsis; *staminibus* 5, antheris parvis; *ovario* hirto, 3-lobo, stylo elongato; *fructu* ignoto.

S.; Tandjong Ning, R. Bliti, Palembang, 600 ft. 2825. Large tree; flowers rich yellowish cream, fragrant; calyx white flushed with pink; pedicels lake-pink.

Guioa Forbesii Bak. fil., sp. nov. *Arbor*; *ramulis* ferrugineo-vel fusco-pubescentibus; *foliis* 4–5-jugis, rhachi alata, interstitiis interjugalibus 15–30 mm. longis, foliolis inæquilateraliter oblongis vel elliptico-oblongis, apice acuminatis basi late cuneatis, subtus sordide pubescentibus petiolulis brevissimis, lamina 5–9·5 cm. longis; *paniculis* spiciformibus axillaribus pedunculis pedicellisque pubescentibus; *sepalis* ovatis pubescentibus; *petalis* insigniter ciliatis; *filamentis* circ. 1 mm. longis, antheris 0·3 mm. longis; *disco* annulari; *fructu* ignoto.

S.; R. Goerga, Lampar, Palembang, 600 ft. 2617. Large tree; flowers small, white.

Differs from *G. pleuropteris* Radlk. in the longer acuminate leaflets.

ARYTERA LITTORALIS Bl. **S.**; R. Moesi, Palembang, 500 ft. 2624. Small tree; fruit light green.

MISCHOCARPUS SUMATRANUS Bl. **S.**; Goenoeng Arab, Paoe, Palembang, 4000 ft. 2475. Large tree; flowers small, white.

PARANEPHELIUM XESTOPHYLLUM Miq. **S.**; virgin forest. Penanggoengan, Lampongs, 600 ft. 1641. Hill Bokoe, Napal Litjin, R. Rawas, Palembang, 300–500 ft. 3166, 3170. Large tree; flowers greenish white; fruit covered with grey-pink rugosities; ground-colour green.

TURPINIA SPHÆROCARPA Hassk. **S.**; Tandjong Ning, 600 ft.; 2742. Ayer Angat, foot of Kaba Volcano, Palembang. 2873. Hills above Lake Ranau, Palembang, 2000 ft. 2119. **S.**; Goenoeng Arab, Paoe, Palembang, 4000 ft. 2480. Small or large tree; flowers in bud yellow; fruit green with grey blotches on long branching spikes.

BALSAMINACEÆ.

By Sir J. D. Hooker.

[We are indebted to the Director of the Royal Botanic Gardens, Kew, for permission to publish these descriptions transcribed from the late Sir Joseph Hooker's MS. in the Kew Herbarium.]

Impatiens albo-rubra Hook. f., sp. nov. *Herba* humilis, caule simplice erecto 1·5 dm. longo, basi repente, superne pubescente, inferne nudo. *Folia* 7·5–10 cm. longa, alterna, longe petiolata, ovato-vel oblongo-lanceolata, acuta vel acuminata, crenata setulis interjectis minimis, vel integerrima setulis marginata, membranacea, supra setulis adspersa, subtus pallida, pubescentia, basi acuminata in petiolum gracilem 2·5–7·5 cm. longum puberulum eglandulosum angustata; nervis utrinque costæ 7–8; glandulæ stipulares nullæ. *Pedunculi* breves, graciles, pubescentes, uniflori, pedicellis brevibus, bracteis minutis. *Flores* parvi, albidi, vexillo rubro-purpureo. Sepala 2, ovato-lanceolata, acuminata, 6 mm. longa, membranacea, pilis flaccidis, pubescentibus. *Vexillum* orbiculare, cuspidatum, costa dorso incrassato. Alæ longe stipitatæ, 23 mm. longæ, angustæ; lobus basalis obcordato-spathulatus; distalis duplo major, stipitata, anguste dolabriformis, dorso late exsculpto; auricula dorsalis parva. *Labellum* cymbiforme, pilosum, acuminatum, basi calcare minuto incurvo auctum. *Filamenta* brevia, gracilia; antheræ parvæ, didymæ. *Ovarium* lente curvum.

S.; Mt. Siminoeng, Palembang, 4500 ft., 2143. Erect herb with creeping stem. Flowers whitish with purplish-red vexillum. I have seen only one flower of this very distinct but inconspicuous species.

Impatiens dempoana Hook. f., sp. nov. *Herba* glaberrima ramulis gracilibus rigidis nudis vel cicatricosis. *Folia* 0·5–1 dm. longa, alterna, longe petiolata, membranacea, ovato- vel oblongo-lanceolata, acuminata, subcrenulata vel setuloso-serrata, basi nuda vel 2-glandulosa, in petiolum gracilem 2·5–7·5 cm. longum nudum angustata; nervis utrinque 8–10, gracilibus; glandulæ stipulares pulvinatæ? *Flores* parvi, solitarii, longe pedicellati, maculati; pedicelli 5–7·5 cm. longi, gracillimi, basi bractea ovata membranacea aucta, ceterum nuda. *Sepala* 2, ovato-oblonga, rotundata, acuta vel cuspidata, 8–10 mm. lata, nervis utrinque 6–10 gracilibus. *Vexillum* obovatum vel cuneiforme, apice rotundatum intrusum vel bilobum; costa dorso basin versus tumida, apice mucrone recurvo aucta. *Alæ* 2–3 cm. longæ, arcte connatæ; lobi basales stipitati, obovato-rotundati stipitibus falcatim incurvis; distales illis subæquilongi vel breviores, oblongi, marginibus dorsalibus connati, apicibus liberis obtusis vel excisis; auricula dorsalis obscura. *Labelli* limbus cymbiformis, 1·5 cm. longus, ore acuto; calcar limbo brevius,

incurvum, crassum, apice obtusum vel inflatum. *Filamenta* elongata, linearia; antheræ oblongæ, obtusæ. *Ovarium* rectum, acutum.

S.; Mt. Dempo, 5000 ft. 2267, 2467 in Herb. Hort. Calcutt.; 2107 *a* in Mus. Bot. Berol.

Stout erect herb, 1½–2 ft. high; flowers rose-pink, marked with lake-brown in the interior and with light orange on throat of vexillum.

The sepals vary considerably in form, being orbicular in 2467 and one specimen of 2267, and ovate-oblong in the other specimen of the latter number. The spur of the lip in 2467 and one specimen of 2267 is inflated, in the other simple. The distal lobes of the wings vary greatly in size.

Impatiens Forbesii Hook. f., sp. nov. *Fruticulus* glaberrimus, caule simplice 1–2 pedali basi crasso elongato radicante superne gracile. *Folia* 7·5–12·5 cm. longa, alterna, elliptico-elongata vel ovato-oblonga, acuminata, crenulata setulis interjectis, membranacea, basi integerrima in petiolum gracilem nudum vel pauci-glandulosum 2·5–5 cm. longum angustata, nervis utrinque costæ 7–10 gracilibus; glandulæ stipulares nullæ. *Pedunculi* 2·5–7·5 cm. longi, graciles, patuli, pauciflori. *Flores* inter minores, subumbellatim dispositi, campanulati, pedicellis 1·25 cm. longis filiformibus; bracteæ ovatæ, acuminatæ, deciduæ. *Sepala* 2, late ovata vel rotundata, acuta vel cuspidata, 6–7-nervia. *Vexillum* cucullatum, dorso medio gibbo rotundato auctum, costa apiculata. *Alæ* breves, late stipitatæ, ad 20 mm. longæ, angustæ; lobus basalis parvus, rotundatus; distalis dolabriformis; auricula dorsalis protrusa. *Labellum* infundibulare, in calcar gracile incurvum limbum æquans constrictum, ore acuminato. *Filamenta* gracilia, 7 mm. longa; antheræ mediocres. *Ovarium* fere rectum, apice acuminato incurvo. *Capsula* 15 mm. longa, stipitata, longe rostrata, polysperma. *Semina* orbicularia, compressa, subrugulosa pallida.

S.; Mt. Dempo, Palembang, 3700–3800 ft. 2218, 2544 *b*. Flowers white, marked with lake in the interior. Hoedjoeng, Lampongs, 2700–3000 ft. 1900. Flowers bright yellow.

The young leaves have very minute scattered hairs on the upper surface. No. 2158 from Mt. Siminoeng, 3000 ft., may be a variety or different species, having stout glandular petioles and peduncles, with larger bracts, the flowers being noted as "yellow with lake."

Impatiens heterosepala Hook. f., sp. nov. *Herba* glaberrima, caule 1·5–4·5 dm. longo simplice erecto vel basi incrassato repente radicante. *Folia* 2·5–10 cm. longa, alterna, petiolata, elliptica, oblonga vel obovata, acuminata, grosse setoso-serrata, membranacea, basi longe integerrima in petiolum gracilem nudum 1·25–5 cm. longum angustata; nervis utrinque costæ 3–5; glandulæ stipulares nullæ. *Pedunculi* 2·5–5 cm. longi, gracillimi, erecti, 1–3-flori. *Flores* inter minores, subumbellatim dispositi, pedicellis capillaribus; bracteæ lineares, persistentes. *Sepala* 2, heteromorpha, aliis anguste loriformibus acutis 10–13 mm. longis falcatis, aliis 8 mm. longis lineari-oblongis acuminatis sigmoideo-curvatis 5-nervis. *Vexillum* cucullatum, orbiculare, dorso medio tumidum. *Alæ* breves, latiores quam longæ, sessiles; lobus basalis flabelliformis; distalis minor, supra basalem geniculatim inflexus, anguste dolabriformis; geniculo in auriculam dorsalem elongatam clavatam rectam vel decurvam producto. *Labellum* parvum, saccatum, calcare geniculatim inflexo erecto limbum labelli æquante, ore horizontali acuto. *Filamenta* 7 mm. longa, gracilia; antheræ parvæ. *Ovarium* angustum, apice acuminato incurvo. *Capsula* immatura longe graciliter pedicellata, longe rostrata.

S.; Mt. Dempo, Palembang, 7800 ft. 2377.

Flowers pale yellow or orange, with bright lake-red on vexillum.

Very different from any other species known to me in the extraordinary variability in form of the sepals of different specimens, from narrowly strap-shaped, nearly half an inch long and one-nerved, to less than one-third of that length and oblong, with a costa and lateral nerves. These differences occur between two altogether similar specimens on the same sheet. The form of the small wings is very curious, the distal lobe arching over the larger basal one and protruding dorsally at the curvature a long stout auricle.

Impatiens lonchocarpa, Hook. f., sp. nov. *Herba* pedalis, erecta, caulibus e basi repente erectis gracilibus strictis simplicibus longe nudis, apices versus foliatis. *Folia* pauca, 5–7·5 cm. longa, alterna, obovato- vel elliptico-lanceolata, acuta vel acuminata, crenata, setulis interjectis minutis vel nullis, basi integerrima, in petiolum gracilem 2·5–3·75 cm. longum nudum vel pauciglandulosum longe angustata, supra glabra; nervis utrinque costæ 5, subtus nervulisque pubescentibus; glandulæ stipulares nullæ. *Pedunculi* graciles, elongati, erecti, pilosi, uniflori (?); pedicelli graciles; bracteæ paucæ, lineares. *Flores* inter minores, flavi. *Sepala* 2, lineari-oblonga, 10 mm. longa, acuta, pilosa, 3-nervia. *Vexillum* cucullatum, pilosum, dorso medio gibbum. *Alæ* stipitatæ, 23 mm. longæ; lobus basalis rotundatus, majusculus, distalis triplo major, late dolabriformis; auricula dorsalis parva. *Labelli* limbus cymbiformis ad 12 mm. longus, acutus, pilosus; calcar gracile, acutum, lente incurvum, limbo æquilongum. *Capsula* 18 mm. longa, longe stipitata, dein turgida et in rostrum spiniforme rectum pungens desinens. *Semina* magna, orbicularia, compressa, 3 mm. diametro, glabra.

S.; Mt. Dempo, Palembang, 6500 ft. 2552 *a*. Flowers yellow. Nearly allied to *I. pyrrhotricha* Miq., but leaves narrower, glabrous above, flowers not half the size; sepals narrow, 3-nerved; limb of lip cymbiform; capsule straight with a long stipes, stout spiniform beak, and large seeds.

I. JAVENSIS var. GLABRA Miq. J.; Pengelengan, Preanger, 2500 ft. 1025. Leaves glaucous beneath.—I. PYRRHOTRICHA Miq. S.; Mt. Dempo, Palembang, 3500–4500 ft. 2255 *a*. Erect herb; flowers bright yellow. This plant growing in masses forms bright patches of colour in the dull monotonous green of the forest.—I. CHONECERAS Hassk. J.; Tjibolang, Preanger, 470 5200 ft. 935, 1109. Erect, or with creeping stem. Mt. Malawar, Preanger, 6200 ft. 1028.

Sabiaceæ.

Meliosma glauca Bl. **J.**; Mt. Malawar (lower slopes). Preanger, 3000 ft. 1218. Shrub about 6 ft. high.—M. lanceolata Bl. **J.**; Pasir Orai, Kosala, Bantam. 3000 ft. 596. Small tree; flowers in large terminal trusses. Mt. Salak, nr. Buitenzorg, 2000 ft. 1185.—M. nitida Bl. **S.**; Mt. Dempo, Palembang, 4500–6500 ft. 2449, 2499, 2352. Mt. Besagi, 3500 ft. 1970. Tree 25–30 ft.; fruit bright lake-scarlet. Boekit Tinggi, near Paoe, Palembang, 3500 ft. 2208. Tree 40–50 ft.; fruit green. Sumatra. 2454 *a*.—M. angulata Bl. ex descript. **S.**; foot of Mt. Besagi, Krohe, 3200 ft. 2036. Small shrub with spreading branches; flowers white, very fragrant.—M. confusa Bl. var. nov. laxior Bak. fil. *Ramuli* pubescentes; *foliis* alternis pinnatis 2–4-jugis cum impari, foliolis lateralibus ovato-oblongis apice acuminatis basi late cuneatis margine serratis, 10–17 cm. longis, 7–8 cm. latis, petiolulis 5–8 mm. longis, foliolis terminalibus obovatis vel oblongo-obovatis omnibus subtus præcipue ad costam rufo-pubescentibus; *paniculis* elongatis foliis longioribus, ramis lateralibus patentibus, rhachi rufo- vel fusco-tomentosa; *floribus* parvis; *sepalis* minutis imbricatis; *petalis* 3 exterioribus concavis orbicularibus; *drupis* ignotis.

S.; great forest Tandjong Ning, R. Bliti, Palembang, 600 ft. 2794. Moderate tree; flowers in bud light red.

Anacardiaceæ.

Buchanania acuminata Turcz. **S.**; Palembang, forest near R. Rupit, W. Soeka-Radja, 500 ft. 2938 *a*. Tree about 30 ft.; flowers in massive heads, white.

Bouea macrophylla Griff. **S.**; R. Rupit, Palembang, Soeka-Radja, 800 ft. 2986. Small tree; fruit rich yellow and plum-like, eaten.

Mangifera Kermanga Bl. **S.**; Bigin Telok, 500 ft. 3198. Tree 40–50 ft.—M. Griffithii Hook. f. **S.**; Tandjong Ning, R. Bliti, Palembang, 490 ft. 2746. Large tree; flowers in bud pale greenish white.

Gluta coarctata Hook. f. **J.**; Pengelengen, Preanger, 1200 ft. 1169. Great tree, exudes an excoriating sap. "Rengas-djahat." "Dahoe."

Campnosperma Wallichii King, Fl. Malay Penin. 793 (1893). **S.**; R. Rawas, Palembang, Moeara-Mengkoelem, 1000 ft. 3030. Great tree; flowers small, yellowish green; sap extremely irritating.

Semecarpus heterophylla Bl. **S.**; Lampar, bank of R. Moesi, Palembang, 500 ft. 2627. Large tree; flowers minute and white, flower-buds cream-yellow; the sap produces excoriation of the skin. "Rengas."

Connaraceæ.

Connarus gibbosus Wall. **S.**; edge of great forest, hills S.W. of Goenoeng Trang, Lampongs, 450 ft. 1452. Small tree; flowers in bud reddish; pods red. "Kayoe merah."

Rourea concolor Bl. **S.**; Moeara Mengkoelem, R. Rawas, Palembang, 450 ft. 3169. Large climber; fruit cream-yellow flushed with scarlet-pink.—R. volubilis Merr. in Philipp. Gov. Lab. Bur. xxvii. 36 (1905). **S.**; Lampar, Moesi River, Palembang, 500 ft 2062. Small climber; fruit (as seen) light green. "Ba-blimbing."

Agelæa Wallichii Hook. fil. **S.**; Goenoeng Meraksa, Linting River, Palembang, 800 ft. 2589. Pods bright scarlet; seeds black with yellow arillodes.—A. Diepenhorstii King in Journ. As. Soc. Beng. lxvi. 2, 20 (1897). **S.**; Kotta Djawa, Lampongs, 300 ft. 1313. Fruit in short stumpy pods, pink-red. 1386. Leaves dark green, glabrous.

Leguminosæ.

Crotalaria semperflorens Vent. **J.**; Tjisoepan, Preanger, 3000 ft. 1123. Shrub; flowers large, rich, yellow. "Ki-tjatjankir."—C. ferruginea Grah. **J.**; Tjisankoei, Preanger, 4500 ft. 1076. Shrub spreading; flowers yellow; fruit on long stalks. "Ki-tja-tjangan."

Millettia nivea Dunn in Journ. Linn. Soc. xli. 189 (1912). **S.**; R. Rupit, Palembang, 300 ft. 2916 in Herb. Kew.—M. sericea Benth. **S.**; Karangnata Hill, R. Rawas, Palembang, 900 ft. 3103 *a*. **J.**; Kosala, Bantam, 1000 ft. 73. "Kakatjangan."

Fordia stipularis Dunn *l. c.* **S.**; Soeka Radja, R. Rupit, Palembang, 500 ft. 2948. Small shrub +5 ft.; flowers purple; fruit in green pods.

Adinobotrys atropurpureus Dunn *l. c.* 197. **S.**; Lampar, R. Moesi, Palembang, 600 ft. 2623. Tree, 3 ft. in circumference; flowers dark red. "Kayoe-oedjan," "Maribоeng." R. Moesi, forest E. of Batoe Pantjeh, 600 ft. 2664. Very great tree; flowers dark lake; fruit in large green pods.

Desmodium heterophyllum DC. **S.**; Lampar, margin of R. Moesi, Palembang, 520 ft. 2632. Creeping shrub; flowers lilac; fruit in pods turning from green to black.—D. polycarpum DC. **S.**; Gedong Tetahan, Lampongs, 400 ft. 1256. **J.**; Genteng, Lebak, Bantam, 500 ft. 27. Flowers purple.—D. ormocarpoides DC. **J.**; R. Tjiberang, Genteng, Bantam. 96. Growing in wet rice fields. "Kakatjambangan."

Uraria crinita Desv. **S.**; Gedong Tetahan, Lampongs, 350 ft. 1237. Erect herbaceous shrub.

Phylacium bracteosum Benn. **S.**; Kotta Djawa, Lampongs, 300 ft. 1436.

Centrosema Plumieri Benth. **S.**; Lake Ranau, Palembang, 500 ft. 2599. Slender climber; flowers white with broad band of lake or magenta on petals.

Clitoria Ternatea L. **J.**; Hort. Bogor. 1230 *c*.

Erythrina ovalifolia Roxb. **S.**; Lake Ranau, Palembang, 1700 ft. 2095. Large tree; flowers dark lake-scarlet, growing in numbers in shallow water.

MUCUNA BIPLICATA Teysm. & Binn. **S.**; R. Moesi, Palembang, Batoe-Pantjeh, 500 ft. 2649. Large climber; flowers blue or purple-blue.

MUCUNA (Citta) OVALIS Bak. fil., sp. nov. Species ad *M. biplicatam* Teysm. & Binn. accedens. *Caulis* volubilis pro genere robustus demum glaber; *foliis* trifoliolatis, foliolis terminalibus oblongo-ovatis apice rotundatis vel subacutis superne glabris subtus pilis vestitis, 11–13 cm. longis, 8–9 cm. latis, nervis lateralibus 6–7, foliolis lateralibus inæquilateralibus 11–13 cm. longis, 8–10 cm. latis, basi leviter subcordatis, foliolorum terminalium petiolulis ±4 cm. longis lateralium 4–5 mm. longis, petiolo communi 6–7·5 cm. longo suffultis; *inflorescentia* multiflora corymboso-racemosa; *bracteis* 3–4 cm. longis pilis urentibus vestitis; *calycis lobis* campanulatis dentibus lanceolatis; *carina* recta apice sursum curvata ±5 cm. longa; *legumine* 12–15 cm. longo, 3·5–5 cm. lato, transverse lamellato pilis urentibus vestito plurispermo.

S.; Kota-Djawa, Lampongs, 300 ft. 1417. Long climber; flowers isabelline white with flush of purple; fruit in flat, hairy pods suggesting bristly skin-brushes.

CAJANUS INDICUS Spr. **S.**; Krohe, Hoedjoeng, 2500 ft. 1958. Shrub about 6 ft.; flowers yellow; fruit in green pods. "Hiries"; "Katjang gedeh."

DALBERGIA FORBESII Prain in Journ. As. Soc. Beng. lxx. 2, 61 (1901). **S.**; Bigin Telok, R. Rawas, Palembang, 300 ft. 3216. Climbing shrub; fruit in bright green pods.—D. TAMARINDIFOLIA Roxb. **S.**; Batoe Pantjeh, R. Moesi, Palembang. 2694 *a*. Scandent shrub; flowers white.

DERRIS THYRSIFLORA Benth. **J.**; Pasir Orai, Kosala, Bantam, 2300 ft. 600. "Ki-Tjaang."—D. ELLIPTICA Benth. **S.**; Lampongs, S. of village of Goenoeng Trang, 387 ft. 1623. Rather slender climber; flowers pink.

KUNSTLERIA FORBESII Prain ex King in Journ. As. Soc. Beng. lxvi. 111 (1897). **S.**; Bigin Telok, R. Rawas, Palembang, 400 ft. 3241. Climber; flowers in bud dark lake; open, very deep lake-red, almost black, basal parts lake-purple.

PONGAMIA GLABRA Vent. **S.**; shores of Semangka Bay, Lampongs. 1809.

ORMOSIA SUMATRANA Prain ex King *l. c.* 150. **S.**; Lampar, R. Moesi, Palembang, 800–900 ft. 2648, 2592. Large tree; flowers pinkish white; seeds scarlet. "Koepang."

PELTOPHORUM FERRUGINEUM Griff. **S.**; Lampar, R. Moesi, Palembang. 500 ft. 2626. Fairly large shrub; flowers white.—P. DASYRACHIS Griff.; R. Rawas, Boekoe Hill, Napal-Litjin, 700 ft. 3163. Great tree, 7 ft. in circumference at 7 ft. from the ground; flowers white flushed with pink.

CASSIA NODOSA Ham.; Penanggoengan, Lampongs, 400 ft. 1748. Very tall tree; flowers rose-red. "Boeng-boeng-dalam."—C. JAVANICA Linn. **S.**; Gedong-tetahan, Lampongs, 400 ft. 1275. Great tree; flowers yellow. "Pantjoe-doelan."—C. MIMOSOIDES Linn. **S.**; Palembang, Mt. Arab, 3500 ft. 2484. Small shrub; flowers yellow; fruit in green pods with purple band in the centre.—C. LÆVIGATA Willd. **J.**; 694. Shrub, flowers yellow.

KOOMPASSIA MALACCENSIS Maingay. **S.**; R. Rawas, Moeara Mengkoelem, Palembang, 700 ft. 3056. Long climber; calyx gamboge-green with rust-brown pubescence, corolla isabelline white, style jet-black.

BAUHINIA TOMENTOSA Linn. **S.**; Penanggoengan, Lampongs, 600 ft. 1703. Climber; flowers scarlet.—B. ALBO-LUTEA Prain *l. c.* 181. **S.**; Penanggoengan, Lampongs, 600 ft., 1684 *a*. Climber; flowers yellow.

CÆSALPINIA BONDUC Roxb. **J.**; Preanger. 1230 *a*. "Seratahu." Penanggoengan, Lampongs, in the great forest, 835 ft. 1785. Large climber, thorny; flowers yellow. "Oentjoelassoe."—C. NUGA Ait. **S.**; Tarratas, Lampongs, sea-level. 1806. Moderate climber, thorny; flowers yellow.

ADENANTHERA FORBESII Gagnep. in Lecomte, Not. Syst. ii. 61 (1911). **S.**; Soeka-Radja, Palembang, 800 ft. 3006. Tree about 50 feet, very hard wood; flowers yellow, fragrant, with light red stamens.

LEUCÆNIA GLAUCA Benth. **S.**; Lampar, Palembang, 500 ft. 2633. Shrub or small tree; flowers white. "Pitta malakka."

ACACIA FARNESIANA Willd. **J.**; Kosala Hills, Bantam, 1550 ft. 541. Shrub and small tree; cultivated in villages; perfume made from flowers; women wear them in their hair.

ALBIZZIA MYRIOPHYLLA Benth. **J.**; Mt. Malawar, Preanger, 2500 ft. 1210. Considerable tree.

PITHECOLOBIUM FASCICULATUM Benth. **J.**; Tjibadui, Kosala, Bantam, 2800 ft. 436. Large tree; leaves beaten up in water used as a lather for the hair. **S.**; R. Roepit at Soeka-Radja, Palembang, 500 ft. 2935. Small tree ±35 ft.; flowers very small, green.—P. BUBALINUM Benth. **S.**; Tarratas near sea-level, 1801. Tree about 30 ft.; fruit in dark green pods.—P. LOBATUM Benth. **S.**; Moeara Mengkoelem, R. Rawas, Palembang, 450 ft. 3051. Tree 45 ft. Pods have a disagreeable odour. "Djiring." **S.**; Goenoeng Trang, Lampongs, 387 ft. 1519. Small tree; flowers small white.—P. ANGULATUM Benth. **S.**; R. Rawas, Palembang, 500 ft. 3202. Moderate tree 12 in. in diameter at 4 ft. from the ground; flowers white; pods green.—P. CLYPEARIA Benth. **J.**; Tjilaki, Preanger, 4700 ft., 1200 *b*.

ROSACEÆ.

PARINARIUM COSTATUM Bl. **S.**; Tandjong Ning, R. Bliti, Palembang, 600 ft. 2837. Large tree with beautiful foliage.

PYGEUM GRISEUM Bl. **J.**; Pengelengan, Preanger, 5000 ft. 991.—P. MACROPETALUM Koehne in Engl. Jahrb. li. 198 (1913). **S.**; Mt. Dempo, Palembang, 6000 ft. 2354 *a*; also 2343 ex Koehne *l. c.* Large trees; flowers white flushed with red, pedicels pink; tree profusely loaded with flowers.—P. PARVIFLORUM Teysm. & Binn. **J.**; Tjilaki, nr. Pengelengan, Preanger, 4500 ft. 901. Large tree.

Pygeum glabri olium Bak. fil., sp. nov. *Rami* juveniles lenticellosi teretes; *foliis* lanceolatis vel oblongo-lanceolatis apice acuminatis basi rotundatis nervis lateralibus inconspicuis, 10–13 cm. longis 3·5–4·5 cm. latis, utrinque glabris, petiolo 7–8 mm. suffultis, costa

subtus prominente; *racemis* solitariis vel ternis 2–2·5 cm. longis rhachi tomentosa; *floribus* pedicellatis, pedicellis ±2 mm. longis; *cupula* turbinata; *antheris* minutis; *drupa* mihi ignota.

S.; rocky bank of R. Saling, nr. Tandjong Ning, Palembang, 700 ft. 2728. Small tree; flowers with fallen corollas have general yellow colour from the stamens and the prominent stigmas.

This differs from *P. lamponganum* Miq. in the shape and apex of the leaves, which are gradually narrowed to a long slender acumen.

Pygeum viride Bak. fil., sp. nov. *Rami* teretes lenticellosi; *foliis* subcoriaceis oblongis vel ellipticis apice acuminatis apice ipso obtusis costa subtus prominente, lamina e basi acuta, 12–15 cm. longa, 4–5 cm. lata, petiolo 18–20 mm. longo suffultis; *racemis* fasciculatis 4–5 cm. longis apice densiflоris; *cupula* externe tomentosa tuberculata; *floribus* pedicellatis, pedicellis 2–4 mm. longis, tomentosis; *petalis* hirtis; *staminibus* numerosis antheris minutis filamentis filiformibus; *stylo* erecto, stigmate terminali; *drupa* mihi ignota.

S.; Ayer Angat, Base of Kaba Volcano, Palembang, 3000 ft. 2876. Tall tree of moderate thickness ±12 in. diameter; flowers pure white with grey stamens, very fragrant. "Bitussan."

RUBUS ROSÆFOLIUS Sm. J.; Pengelengan, 3000–4500 ft. 1024. 603. "Beberetehan." Mt. Malawar, Preanger, 6000 ft. 1001 *d*. Pasir Orai, Kosala, 2900 ft. 547. S.; N.E. of Hoedjoeng Village, Krohe, 3100 ft. 2026. Shrub with long spreading and ascending branches; flowers white; fruit passes through light orange to scarlet.—R. ANGULOSUS Focke in Bibl. Bot. lxxii. 90 (1909). S.; Kotta Djawa, Lampongs, 700 ft. 1398. Rambling shrub in dry waste places; flowers white; fruit scarlet.—R. GLOMERATUS Bl. J.; Pengelengan, Preanger, 4500 ft. 745. "Hareu-eus." S.; on banks of R. Moesi, by Lampar, Palembang, 650 ft. 2604. Straggling and climbing shrub; fruit very dark red.—R. HASSKARLII Miq. S.; Mt. Tengamoes, Lampongs, 5600 ft. 1857. Spreading and long-armed climber; flowers white; fruit scarlet.—R. ELONGATUS Sm. S.; Goenoeng Trang, Lampongs, 387 ft. 1614. Shrub, with climbing arms; flowers white, sepals pale purple; fruit passing through green to scarlet and to dark purple-black; berries glossy.—RUBUS LINEATUS Reinw. forma floribus minoribus. J.; Mt. Malawar, Preanger, 7000 ft. 963. Tall shrub; flowers white; foliage with white silky under sides, upper sides dark green.

PYRUS GRANULOSA Bertol. S.; Mt. Besagi, Krohe, 6000 ft. Mt. Dempo (summit), 12,500 ft. Palembang. 2376. 2050. Mt. Besagi, Krohe, 7000 ft. Tree 10–14 ft.; fruit green.

PHOTINIA NOTONIANA W. et A. J.; Kosala hills, Bantam, 2000 ft. 220. Mt. Waringin, Preanger, 4800 ft. 960 *a*.

SAXIFRAGACEÆ.

DICHROA FEBRIFUGA Lam. J.; Kosala, Bantam, 2000 ft. 558 *a*. Flowers in conspicuous heads. Pengelengan, 4000–5000 ft. 737, 972 *a*. Shrub. Included in native pharmacopœa. "Giegiel." S.; Penanggoengan, Lampongs, 835 ft. 1771 *a*. Small erect shrub; flowers dark blue.—D. CYANITIS Miq. S.; hills S. of Goenoeng

Trang, 450 ft. 1476. Also 1699. Tall erect shrub; flowers pale blue; fruit dark blue.—D. LATIFOLIA Miq. J.; Mt. Malawar, Preanger, 4400 ft. 930. Shrub; flowers blue. Under shade of great forest.

HYDRANGEA OBLONGIFOLIA Bl. J.; 947. Near Pengalengan, Preanger. 1027 *b*.

POLYOSMA LONGE-PEDICELLATA King in Journ. As. Soc. Beng. lxvi. 303 (1897). Foot of Mt. Besagi, Krohe, 3000 ft. 2037. Mt. Dempo, 5500 ft. 2250. Erect shrub or small tree; flowers white; fruit green, flushed with faded purple.—P. MUTABILIS Bl. S.; Tandjong Ning, R. Bliti, Palembang, 600 ft. 2729. Tree.—P. BRACHYANTHA Merr. Wai, Amboina; 500 ft. 3288. Moderate tree. Flowers pure white, very fragrant.

HAMAMELIDACEÆ.

ALTINGIA EXCELSA Noronha. J.; Tjilaki, Preanger, 4700 ft. 1201.

HALORAGACEÆ.

GUNNERA MACROPHYLLA Bl. S.; Kaba Volcano, Palembang; 6000 ft. 2903. Shrubby herb, inflorescence in spike.

RHIZOPHORACEÆ.

BRUGUIERA RHEEDII Bl. S.; Tarratas, Lampongs, sea-level. 1797. Tree about 25 ft. Flowers red-purple; fruit long, dark brown.

CERIOPS CANDOLLEANA Arn. Amboina; 1230 *g*, ex Hort. Bot. Buitenz.

RHIZOPHORA MUCRONATA Lam. J.; 1230 *g**.

CARALLIA CONFINIS Bl. var. LATIFOLIA Miq. S.; forest E. of Soeka Radja, R. Rupit, Palembang, 700 ft. 2983. Great tree; flowers small, greenish yellow. A variety with oblong-obovate leaves.

GYNOTROCHES DRYPTOPETALUM Bl. S.; Karang-Nata hill, R. Rawas, near Napal-Litjin, 700 ft. 3148. Large tree, circumference at 4 ft. from ground 4½ ft.; flowers small, white; fruit from green to lake or faded scarlet. Forest E. of Soeka Radja, R. Rupit, Palembang, 500 ft. 2975. Tree ±50 ft. Flowers and fruit green.

COMBRETACEÆ.

TERMINALIA CATAPPA L. S.; Tarratas, Lampongs, sea-level. 1800. Tree 25–30 ft.; flowers very small, greenish. Very fine timber; bark and leaves used as dye and in native medicine.—T. CITRINA Roxb. var. MALAYANA Clarke. S.; in virgin forest nr. Tandjong Ning, R. Saling, Palembang, 500 ft. 2707. Large tree ±50–60 ft.; flowers greenish, in trusses.

COMBRETUM PUNCTATUM Bl. J.; side of Tjisoeroeli, Preanger, 4400 ft. 919. Shrub, with spreading branches. C. EXTENSUM Roxb. S.; hills N. of Goenoeng Trang, Lampongs, 600 ft. 1575. Scandent shrub; flowers yellowish white. C. ACUMINATUM Roxb. S.; margin of R. Rawas, nr. Bigin Telok, Palembang, 350 ft. 3250. Large tree, circumference at 4 ft. from ground 7 ft.; fruit bright green.

MYRTACEÆ.

By S. GREVES.

Aphanomyrtus Forbesii Greves, sp. nov. *Arbor* parva; *ramis* tenuibus gracilibus teretibus cortice brunneo obtectis, *ramulis* ultimis tetragonis ciliatis; *foliis* ovato-lanceolatis apice valde acuminatis basi cuneatis ±8 cm. longis 2·5–3·5 cm. latis in sicco supra griseo-viridibus costa impressa subtus pallidioribus costa conspicua utrinque glabris venis inconspicuis ±30 et 1 mm. inter se distantibus ad ·5 mm. a margine cum vena intramarginali conjunctis, margine microscopice ciliata, petiolo 3–4 mm. longo piloso; *floribus* brevissime pedicellatis in cymis paucifloras in axillis nodosis sessilis digestis; *pedicellis* 1–2 mm. longis; *calycis tubo* 2 mm. longo infundibuliformi, lobis 1 mm. longis.

S.; forest near Ayer-Angat, foot of Kaba Volcano, 2000 ft. 2889. Small tree ±10 ft.; flowers very small and white.

Allied to *A. rostrata* Miq., but differs in the nature of the inflorescence and the size of the flower.

A. rostrata Miq. **S.**; Soeka-Radja, R. Roepit, Palembang, 500 ft. 2965 *a*. Small shrub; flowers white, fruit light red.

EUGENIA, Section *Jambosa*.

Eugenia amboinensis Greves, sp. nov. Arbuscula *ramis* et *ramulis* gracilibus teretibus cortice brunneo obtectis glabriusculis; *foliis* ovato-lanceolatis basi cuneatis 13–15 cm. longis 5–6 cm. latis supra castaneis costa impressa subtus pallidioribus costa et venis conspicuis utrinque glabris venis ±18 et ·8–1 cm. inter se distantibus cum vena marginali 2–3 mm. a margine conjunctis, petiolo 0–3 cm. longo 2 mm. crasso rugoso; *floribus* magnis in cymas laxas paucifloras e ligno ramulorum ortis; *pedunculis* 5 cm. longis pedicellis 1·5–3 cm. longis quadrangulatis; *calycis tubo* 1·5 cm. longo turbinato extus striato et rugoso lobis rotundatis extus punctulatis ·7 cm. longis 1 cm. latis; *petalis* 4 magnis albis 1 cm. longis 1·8 cm. latis extus punctulatis margine scarioso undulato.

Amboina; Paso ±200 ft. 3267. Large shrub; flowers in bud white. Upper leaves sessile, lower ones with long petioles.

Allied to *E. javanica* Lam., but differs in the inflorescence and shape of the flower.

Eugenia dempoensis Greves, sp. nov. *Arbor* 5–6 metralis; *ramis* et *ramulis* gracilibus teretibus cortice brunneo obtectis glabriusculis; *foliis* lanceolatis acuminatis basi cuneatis 13–16 cm. longis 5–6 cm. latis supra griseo-viridibus costa impressa subtus pallidioribus costa et venis conspicuis utrinque glabris venis ±12 et 5–9 mm. inter se distantibus cum vena marginali 3–4 mm. a margine conjunctis, petiolo ·8–1·2 cm. longo 2 mm. crasso rugoso; *floribus* magnis in cymas laxas paucifloras e ligno ramulorum ortis; *pedunculis* 1 cm. longis, pedicellis 1–1·5 cm. longis punctulatis; *calycis tubo* ±1 cm. longo infundibuliformi extus rugoso lobis rotundatis extus punctulatis 2 parvis 3–4 mm. longis 8 mm. latis 2 magnis 8 mm. longis 1 cm. latis; *petalis* 4 magnis albis extus punctulatis.

S.; forest-base of Mt. Dempo, 4500 ft. 2527. Tree 18–20 ft.; leaves with intramarginal vein; flowers in large buds, white.

Allied to *E. pendens* Duthie, but differs in the longer petiole, the position of the inflorescence, and the larger flowers.

E. DENSIFLORA Duthie. **J.**; Preanger, 4430 ft. 912. Tjibadui, Kosala, Bantam, 2700 ft. 453. Fruit dark purple. "Kopo-lalai." Amboina; Wai, seaside. 3295. Large tree; flowers large and white. "Djamboe ajer mawar."—E. JAMBOS Linn.; Kotta-djawa, Lampongs, 300 ft. 1385. Shrub under great forest, ±8 ft.; flowers (in bud) white; fruit (young) green. Hills north-west of Goenoeng Trang, Lampongs, 400 ft. 1549. Large shrub or small tree ±12 ft.; flowers white. Begin-telok, R. Rawas, Palembang, 300 ft. 3201. Flowers white; calyx reddish-purple.—E. MOLLIS King, in Journ. As. Soc. Beng. lxix. 2, 516 (1901). **S.**; Hills south of Goenoeng Trang, Lampongs, 450 ft. 1475. Large tree, flowers white. Type at Calcutta. No specimens seen.—E. PENDENS Duthie. **S.**; Kotta-Djawa, Lampongs, 285–500 ft. 1335, 1377. Tree or shrub; flowers on stems and branches, white; fruit bluish-purple round top. Djamboe utan.—E. TETRAPTERA King. **S.**; Soeka-Radja, R. Roepit, Palembang, 500 ft. 2950. Small tree; flowers in bud, white.

EUGENIA, Section *Syzygium*.

E. ACUMINATISSIMA Kurz. **S.**; Penanggoengan, Lampongs, 550 ft. 1662. Large tree, fruit white with flush of purple-pink. Mt. Dempo, Palembang, 8–10,000 ft. 2385. Tree small, rather bushy; dark green glancing foliage, fruit green flushed with pinkish-purple, becoming later rusty brown. Soeka-Radja, R. Roepit, Palembang, 800 ft. 2990 *a*. Great tree, fruit light green. "Tjapi-ringoetan."—E. BENJAMINA King, *op. cit.* 536 (1901). **S.**; Mt. Besagi, Krohe; 7000 ft. 2046 in Herb. Kew. Shrub ±6 ft.; fruit green with light red cheeks or grey and apple-like. E. BERNARDI King, *op. cit.* 545 (1901). **S.**; Tandjong-djati on L. Ranau, Palembang, 1780 ft. 2139. Large tree; fruit from green to pale purple when ripe.—E. CAUDATA King. **S.**; Soeka-Radja, R. Roepit, Palembang, 700 ft. 2920. Tree ±25 ft.; fruit with remnants of corolla attached, green.—E. CHLORANTHA Duthie. **S.**; near Mocara Mengkoelem, R. Rawas, Palembang, 500 ft. 3098. Small tree; corolla dehiscent, but stamens give rich pink colour to flowers.—E. CORYMBIFERA Koord. & Val. var. FORBESII Greves var. nov. A typo differt ob inflorescentias et laterales et terminales et calycis limbum omnino edentatum. **S.**; Kotta-djawa, 300 ft. 1322. Small tree ±30 ft. 5 in. in diameter; flowers white; fruit (as seen) green.—E. CYMOSA Lam. **J.**; Tjisangkoei, Preanger, 4500 ft. 1075. Large tree. "Ki-seureum."—E. DURA Merr. in Philipp. Journ. Sc., Bot. xi. 24 (1916). **S.**; Mocara Mengkoelem, R. Rawas, Palembang, 500 ft. 3120. Tree ±35 ft. Fruit pale green.—E. GRATA Wight. **S.**; side of R. Roepit, Palembang, 800 ft. 2929. Small tree; fruit (immature) green, "Djelam Djamboe." Mocara Mengkoelem;

R. Rawas, Palembang, 500 ft. 3147. Great tree, circumference at 4 ft. from ground ±7 ft.; flowers white.—E. JAMBOLANA Lam. J.; Tjisoeroeli; Preanger, 4400 ft. 815, 868. Large tree. "Solamandjing." Goenoeng Bodas, Preanger, 5000 ft. 1089. Small tree, 12–18 ft.; fruit lake-red. S.; Tandjong-Ning, R. Bliti, Palembang, 600 ft. 2826, 2842 (in part.). Large tree; flowers white, flushed with rose. "Pialin-ayam." Fruit much eaten by Malays.

E. kabaensis Greves, sp. nov. *Arbor* parva; *ramis* teretibus cortice brunneo obtectis; *ramulis* teretibus glabriusculis; *foliis* ovato-lanceolatis apice acuminatis basi cordatis 30–39 cm. longis 14–19 cm. latis in sicco supra castaneis costa impressa subtus pallidioribus costa maxime conspicua utrinque glabris venis conspicuis 30–40 et 8–10 mm. inter se distantibus ad 3–5 mm. a margine cum vena intramarginali conjunctis, petiolo 1·5–2 cm. longo rugoso; *floribus* adhuc valde crudis in cymas compactas multifloras laxe paniculatas 6–15 cm. longas digestis ramis e basi tumido supra-axillare oriundis patentibus circ. ·6 et 1–4 cm. longis, pedicellis 1 mm. longis; *calyce tubo* ·5 cm. longo turbinato extus punctulato, lobis ·3 cm. longis.

S.; Ayer-Angat, foot of Mt. Kaba, Palembang, 2500 ft. 2891 *a*. Small tree ±6 ft.; flowers in bud.

Allied to *E. pergamentacea* King, but differs in the venation of the leaf, the longer petiole, and in the evidently smaller, more numerous flowers.

E. LEPIDOCARPA Wall. S.; virgin forest, Tandjong Ning, R. Bliti, Palembang, 600 ft. 2755 *a*. Tree; flowers white.—E. LONGIFLORA F. Vill. J.; Tjibadui, Kosala, Bantam, 2800 ft. 428. Large tree; flowers white. "Reungrang."—E. MINUTIFLORA Miq. S.; Karangnata Hill, R. Musi, Palembang, 700 ft. 3125. Small tree, fruit (as seen) small, lake-red.—E. POLYANTHA Wight. S.; Moeara Mengkoelem; R. Rawas. Palembang, 500 ft. 3141, 3158. Tree ±30 ft.; flowers white, fruit whitish-green.—E. PULCHELLA Roxb. S.; Tandjong-Ning, R. Bliti, Palembang, 530 ft. 2745. Large tree; flowers white with dehiscent corollas.

F. siphonantha King. MS. in Herb. Kew, sp. nov. *Arbor* magna *ramis* teretibus cortice brunneo obtectis; *ra mulis* teretibus gracilibus glabriusculis; *foliis* lanceolatis apice acuminatis basi cuneatis 9–12 cm. longis 2–4 cm. latis in sicco supra griseo-viridibus costa impressa subtus pallidioribus costa conspicua utrinque glabris venis inconspicuis circa 30 ad 1 mm. a margine cum vena intramarginali conjunctis, petiolo ·5–·8 cm. rugoso; *floribus* in cymas axillares paucifloras pedunculis ·5 cm. longis et in cymas terminales multifloras pedunculis 4 cm. longis digestis; *calycis tubo* 3–3·5 cm. longo tubiforme valde attenuato extus rugoso lobis 4 semi-ellipticis 1 mm. longis 3–4 mm. latis; *staminibus* ·8–1 cm. longis; *ovario* tubiforme; *stylo* 1·2 cm. longo.

S.; Begin-telok, R. Rawas, Palembang, 300 ft. 3207. Great tree, circumference at 4 ft. from ground 5 ft.; flowers white.

Allied to *E. caryophyllata* Thunb., but differs in having longer and narrower leaves and in the very long attenuate flowers.

E. SUBDECUSSATA Duthie. S.; Tandjong-Ning, R. Bliti, Palembang, 600 ft. 2748. Tree ±25 ft.; fruit pale green. Tandjong-Ning, R. Bliti, Palembang, 6000 ft. 2838 *a*. Large tree; fruit bright green, 3–4 angular. "Djamboe klaro." Moeara Mengkoelem, R. Rawas, Palembang, 600 ft. 3064. Slender tree ±10 ft.; fruit light green. Boekit-Boekoe near Moeara Mengkoelen, R. Rawas, Palembang, 800 ft. 3123. Small tree, fruit dark green.—E. TERETIFLORA Koord. & Val. in Bull. Inst. Bot. Buitenz. ii. 9 (1899); Moeara Mengkoelem, R. Rawas, Palembang. 800 ft. 3035 *a*.—E. ZEYLANICA Wight. S.; Tandjong-Ning, R. Bliti, Palembang, 600 ft. 2749. Large tree.

CHYDENANTHUS EXCELSUS Miers. S.; Tjirmin Hill, nr. Soeka Radja, R. Roepit, Palembang, 700 ft. 2927. Large tree ±50 ft.; fruit in large green capsules. "Rottan tango." Lampar, R. Moesi, Batoe Pantjeh, Palembang, 500 ft. 2597. 2653. Great tree; flowers in bud white, showing numerous bright yellow stamens; fruit dark green, long and quadrangular.

MELASTOMACEÆ.

MELASTOMA MALABATHRICUM L. var. PERAKENSIS King. J.; Tjisoeroeli, Preanger, 4700 ft. 1142 *a*. Shrub with sprawling branches.—M. IMBRICATUM Wall. S.; Mt. Besagi, Krohe, 6500 ft. 2072, 2470 *a*. Sprawling shrub; fruit unripe, green with rough hairs and flushed with purple, ripe, bursting circumferentially, disclosing small seeds on 5 very dark red fleshy septa, column of capsule deeper purple than when unripe. J.; Mt. Malawar, Preanger, 5400 ft. 794 *b*. Shrub. "Harendongtegal."—M. SETIGERUM Bl. J.; Mt. Malawar, Preanger, 6800 ft. 988. Flowers with two stamens longer than others, short indistinct pistil.

OXYSPORA STELLULATA King in Journ. As. Soc. Beng. lxix. 9 (1900). S.; in forest above Moeara Mengkoelem, R. Rawas, 800 ft. 3034. Shrub ±14 ft.; flowers pink in massive heads.

ALLOMORPHIA EXIGUA Bl. S.; in forest above Moeara Mengkoelem, R. Rawas, Palembang, 700 ft. 3062. Large shrub or small tree; flowers white, stamens yellow.

SONERILA TENUIFOLIA Bl. J.; Mt. Endoet, Bantam, 3200 ft. 517 *a*. Under sides of leaves light purple; growing in damp situations in deep shade. "Sempeureum." Goenoeng Wayang, Preanger, 5500 ft. 722. Herb. "Patjar." S.; Mt. Tengamoes, Lampongs, 5000 ft. 1865. Erect herb; flowers pink; beautiful object peeping out from amongst grass and sphagnum.—S. BEGONIÆFOLIA Bl. S.; Mt. Seminoeng, L. Ranau, 3000 ft. 2159. Erect. herb; flowers pink.

MARUMIA ANNULATA Triana. S.; forest at foot of Kaba Volcano, Palembang, 3000 ft. 2853. Moderately long climber, slender, tough and woody; flowers very small and very fragrant.—M. RHODOCARPA Cogn. in DC. Monog. Phan. vii. 550 (1891) S.; Mt. Tengamoes, Lampongs, 3000 ft. 1832. Sprawling climber; flowers pink.

Marumia ciliatiloba Bak. fil., sp. nov. *Frutex* scandens; *ramis* teretibus ad nodos incrassatis; *foliis* ovatis basi cordatis apice breviter acuminatis coriaceis 5–7-nerviis superne glabris subtus fusco-pubescentibus, lamina 10–11 cm. longa, 5–7 cm. lata, petiolo fusco pubescente ±1 cm. longo; *floribus* in cymas laterales et laxas dispositis; *bracteis* margine setoso-ciliatis; *calycis tubo* 15 mm. longo externe pilis apice furcatis vestito lobis margine dense setoso-ciliatis 10 mm. longis; *stylo* elongato tereti; *petalis* externe pubescentibus 15–17 mm. longis; *antheris* elongatis; *ovario* 4-loculari.

S.; Soeka Radja, R. Roepit, Palembang, 600 ft. 3008. Climbing shrub, long branches; flowers white, large, calyx persistent. "Kid-aroe."

Belongs to Cogniaux's series iv. and is allied to *M. pachygyna* Korth. and *M. stellulata* Bl.

DISSOCHÆTA CELEBICA Bl. **J.**; Pasir Orai, Kosala, Bantam, 2800 ft. 460. Creeping and running shrub; brown pubescence underneath leaves. "Harendong badak." Nr. Tjiniroean, Mt. Malawar, Preanger, 4400 ft. 1047. Spreading shrub.—D. LEPROSA Bl. **S.**; Ayer Angat, foot of Kaba Volcano, 3000 ft. 2882 *a*. Climber; flowers rose-pink; fruit turns from green to faded purple. "Plasako."—D. PALLIDA Bl. Amboina. 3287.

ANPLECTRUM DIVARICATUM Triana. **W. J.**; sine no.

MEDINILLA PTEROCAULA Bl. **S.**; Hoedjoeng, Krohe, 3000 ft. 1988. Climbing shrub; fruit dark purple. **J.**; Pasir Orai, Kosala, Bantam, 2700 ft. 370. Ascending shrub; fruit dark purple. "Mandjal."—M. ALTERNIFOLIA Bl. **S.**; Mt. Dempo, Palembang, 6500 ft. 2342. Shrub climbing, epiphytic; flowers white, flushed with pink. M. SPECIOSA Bl. **S.**; Mt. Dempo, Palembang, 4500 ft. 2320. Large shrub; flowers white, flushed with pink, occurring on both stem and branches; fruit light blue, becoming black, on dark scarlet pedicels and peduncles. **J.**; Tjilaki, Preanger, 4700. 891 *d*. Small shrub, both epidendric and terrestrial. Tjisangkoei, Preanger, 4000 ft. 809. Small shrub, terrestrial and epidendric. "Paridjoto" (*Jav.*), "Harendong tjai" (*Sund.*). Pasir Orai, Kosala, Bantam, 3000 ft. 453 *a*. Shrub scandent; flowers white flushed with pink; fruit dark blue; fruit and flowers in contrast, very conspicuous. "Mandjal lakki," "Harendong areui."—M. JAVANENSIS Bl. **S.**; Mt. Tengamoes, Lampongs, 3800 ft. 1860 *a*. Climbing shrub; flowers pale pink,—M. SUCCULENTA Bl. A form with broader leaves than Blume's type. **S.**; nr. Penanggoengan, Lampongs, 600 ft. 1687. Shrub; flowers rose-tinted white, on scarlet pedicels.—M. LAURIFOLIA Bl. **S.**; Mt. Dempo, Palembang, 5000 ft. 2295. Shrub; flowers white flushed with pink. Mt. Besagi, Krohe, 6500 ft. 2064. Shrub 3–5 ft. with far-spreading branches; fruit very cherry-like, being pale green with cheeks of glistening cherry-red. Mt. Tengamoes, Lampongs, 3500 ft. 1860. Scandent shrub; flowers pale pink. **J.**; Tjilaki, Mt. Melawar, Preanger, 6000 ft. 986. "Harendong areui" (*Sund.*). Mt. Wayang, Preanger, 5600 ft. 725. Mt. Waringin, Preanger, 4600 ft. 987. Climbing shrub;

flowers pale purple or rose colour.—M. HASSELTII Bl. **S.**; Mt. Karangnata, nr. Napal Litjin, R. Rawas, Palembang, 800 ft. 3108 *a*. Straggling shrub; flowers watery-white, calyx and pedicels pink, stamens purple, anthers and connective white, pistil white, the short stamens come first out of pockets.

Medinilla verrucosa Bak. fil., sp. nov. *Fruticosa*, caules glabri novelli angulati; *foliis* oblongo- vel elliptico-lanceolatis glabris triplinerviis apice acuminatis brevissime petiolatis, lamina 7–8 cm. longa 25–30 mm. lata, petiolo 1–2 mm. longo; *floribus* 10–12 mm. longis in paniculas terminales dispositis panicularum ramis primariis sub angulo recto abeuntibus; *calyce* glabro in toto 3 mm. longo; *petalis* ±10 mm. longis inæquilateralibus; *staminibus* 10 antheris 3 mm. longis connectivo postice 1-calcarato; *ovario* externe glabro; *baccis* 4–5 mm. longis et latis.

S.; Mt. Dempo, Palembang, 4600 ft. 2292 *a*. Epidendric climber; flowers rose-pink; fruit light red.

Allied to *M. Curtisii* Hook. fil. and *M. javanensis* Bl.; differs from both in the smaller flowers and very short petioles to the leaves. The connective has a dorsal spur. The fruit is warted.

Medinilla sumatrana Bak. fil., sp. nov. *Rami* verrucosi teretes novellis dense fusco- vel rufo-pubescentibus; *foliis* sessilibus oblongis vel ellipticis 5-plinerviis superne glabris apice acuminatis nervis secundariis ab costa sub angulo recto abeuntibus, lamina 7–10 cm. longa 3–4 cm. lata; *floribus* in paniculas laxas et laterales dispositis panicularum ramis pilis vestitis pedicellis gracilibus; *calyce* urceolato in toto ±3 mm. longo; *petalis* 7–8 mm. longis antheris curvatis 3 mm. longis; *baccis* calycis limbo coronatis in toto ±4 mm. longis.

S.; Mt. Dempo, Palembang, 7500 ft. 2414 *a*. Large shrub; flowers white, pedicels faded red; fruit turns from pale green to red.

Ally of *M. Curtisii* Hook. fil. Noticeable on account of the verrucose branches, the sessile leaves and the lax lateral panicles of flowers. The secondary nerves of the leaves are more prominent than in the previous species and the leaves are quite sessile.

POGONANTHERA PULVERULENTA Bl. **S.**; lower slopes of Mt. Siminoeng, nr. Lake Ranau, 2000 ft. 2112. Epidendric shrub; fruit green on purplish-red pedicels.—P. PULVERULENTA Bl. var. nov. LANCEOLATA Bak. fil. *Folia* lanceolata, fere glabra, lamina 10–15 cm. longa 4–5 cm. lata basi cuneata apice longe acuminata, petiolis 2–3 cm. longis. **S.**; hills nr. Ayer Angat, base of Kaba Volcano, Palembang, 2000 ft. 2868 *a*. Epidendric shrub; flowers white with scarlet-pink blush on each corolla-lobe; pedicels lake-scarlet; fruit surmounted by lake-scarlet pistil. Differs from the type by the lanceolate leaves.

ASTRONIA SPECTABILIS Bl. **J.**; Tjilaki, Preanger, 4700 ft. 908, 986 *a*. Trailing shrub; foliage rufous on underside; flowers white.

Pternandra Forbesii Bak. fil., sp. nov. *Frutex* scandens ramis glabris teretibus vel subteretibus; *foliis* brevissime petiolatis demum glabris trinerviis elliptico-lanceolatis apice acuminatis basi cuneatis, lamina 12–15 cm. longa 5–6·5 cm. lata nervis secundariis ab costa sub angulo subrecto abeuntibus; *floribus* ignotis; *cymis* axillaribus pauci-floris; *stylis* gracilibus elongatis; *baccis* ovoideis externe lævibus

±8 mm. longis et latis 4-locularibus multispermis; *seminibus* pallidè brunneis 1·25–1·5 mm. longis.

S.; Bigin Telok, R. Rawas, Palembang, 300 ft. 3219. Large climbing shrub; fruit pale green with white dots. A plant with glabrous, elliptic-lanceolate, trinerved leaves. Flowers are absent, but the fruit is in short cymes, 4-celled, and many-seeded. Allied to *P. capitellata* Jack and *P. cærulescens* Jack.

MEMECYLON CALONEURON Miq. **S.**; R. Moesi, nr. Batoe Pantjeh, Palembang, 300 ft. 2696. Tree ±15–20 ft. Flowers pale blue.—M. INTERMEDIUM Bl. **J.**; Pasir Orai, Kosala, Bantam, 2200 ft. 563 *a*. Small tree; flowers purplish, very fragrant. "Ki-beussi."—M. COSTATUM Miq. **S.**; Hills S.W. of Goenoeng Trang, 388 ft. 1550 *a*. 1442. Shrub erect; fruit from pale scarlet through lake to purple-black. Under great forest.—M. OLEÆFOLIUM Bl. **S.**; R. Rawas, nr. Bigin Telok, Palembang, 500 ft. 3213 *a*. Moderate tree; flowers pale white, the anthers pale yellow. Tandjong Ning, R. Bliti, Palembang, 600 ft. 2835. Large tree; fruit with yellow spots. Soeka Radja, R. Roepit, Palembang, 800 ft. 2990. Shrub ±6 ft. high, 3 in. in diameter; fruit pale green.—M. CŒRULEUM Jack. **S.**; Kotta Djawa, Lampongs, 300 ft. 1352, 1406 *b*. Small tree ±24 ft., flowers in bud purple; fruit green purple-flushed. M. MYRSINOIDES Bl. **S.**; Soeka Radja, R. Roepit, Palembang, 500 ft. 2953. Tree ±25 ft. flowers very minute, bluish white.—M. GARCINOIDES Bl. **S.**; Tandjong Ning, R. Bliti, Palembang, 700 ft. 2735, 2970. Large tree; fruit small, green. Margin of R. Rawas, nr. Moeara-Roepit, Palembang, 300 ft. 3108. Tree ±40 ft. covered with blossom which presents a general colour of pink, due chiefly to the mass being in bud, the individual flowers are rich lilac-purple. "Koemang."

LYTHRACEÆ.

CRYPTERONIA PANICULATA Bl. **S.**; in virgin forest S.W. of village of Goenoeng Trang, Lampongs, Tandjong Ning, R. Bliti, Palembang, 500–600 ft. 1552, 2730, 2738. Large tree; fruit small, green, flushed with faded purple, in long thyrse.

LAWSONIA INERMIS L. **J.**; nr. Tjiniroean, Mt. Malawar, Preanger, 4600–5300 ft. 775, 1137 *a*, Shrub, low-growing amidst grass under shade of *Datura* hedges.

LAGERSTRŒMIA SPECIOSA Pers. **J.**; by R. Tjiladaheun, Kosala, Bantam, 1300 ft. 445. Great tree; flowers lilac. Produces valuable timber. "Woengoe," "Boengoer."

ONAGRACEÆ.

JUSSIEUA ERECTA L. **S.**; nr. Hoedjoeng Village, Krohe, 2874 ft. 2011. Scrubby herb with woody creeping root-stem; flowers yellow; fruit in purplish-green pods. Grows in damp soil. "Birti-birti."

SAMYDACEÆ.

CASEARIA MOLUCCANA Bl. **S.**; margin of R. Rawas, nr. Bigin Telok, Palembang, 300 ft. 3199. Small tree; fruit bright green. "Madang Klapa." This is the same as Teysmann No. 13815, in Herb. Kew, but flowers are required.—C. FLAVO-VIRENS Bl. **J.**;

Pasir Orai, Kosala, Bantam, 2900 ft. 492. Tree; fruit a hard capsule, coriaceous, containing speckled seeds. "Kitakoel."

Casearia Forbesii Bak. fil., sp. nov. Planta *ramulis* teretibus, pubescentibus; *foliis* alternis, ellipticis vel oblongo-ellipticis apice acuminatis basi cuneatis margine serratis, nervis lateralibus 11–13 arcuatis, lamina subtus tomentosa, 18–20 cm. longa, 6–7 cm. lata, petiolis 10–12 mm. longis; *floribus* haud visis; *capsulis* breviter pedicellatis, ellipsoideis 17–19 mm. longis 11–13 mm. latis longitudinaliter costatis in sicco nigrescentibus.

S.; Boekit Tinggi, nr. Paoe, Palembang, 4500 ft. 2454. Shrub or small tree ±12 ft. Flowers very pale gamboge-green, stamens dehiscent; fruit from light gamboge-green to orange.

This species is allied to *C. velutina* Miq. The leaves are tomentose below and the margins markedly serrate; the pedicels are 5–7 mm. long.

PASSIFLORACEÆ.

ADENIA ACUMINATA Kl. **J.**; Pasir Orai, Kosala, Bantam, 2500 ft. 565. Climbing shrub; fruit red, containing seeds on long stalks; eaten by Malays. "Tjanar."

CUCURBITACEÆ.

TRICHOSANTHES TRICUSPIDATA Lour. **S.**; Tandjong Djati, L. Ranau, 1900 ft. 2081. Epidendric climber; fruit scarlet from green to pale orange.

GYMNOPETALUM COCHINCHINENSE Kurz. **J.**; Kosala Hills, Bantam, 1650 ft. 228. Slender climber; flowers white; fruit round, red, and bitter; leaves rough and scalloped. "Lopang pait." Hills N.W. of Goenoeng Trang, Lampongs, 500 ft. 1543. Climber; flowers white; fruit orange.

MELOTHRIA INDICA Lour. **S.**; in great forest, Goenoeng Trang, Lampongs, 600 ft. 1520. Climber; fruit green.—M. AFFINIS King in Journ. As. Soc. Beng. lxvii. 38 (1898); on high bank above Lake Ranau, Palembang, 2500 ft. 2087. Climbing herb; flowers yellow; fruit green becoming scarlet.—M. JAVANICA Cogn. in DC. Monog. Phan. iii. 625 (1881). **S.**; Kotta Djawa, Lampongs, 300 ft. 1438 *a*. Scandent runner; flowers yellow.

BRYONOPSIS LACINIOSA Naud. **J.**; Pengelengan, Preanger, 2000 ft. 1040.

BEGONIACEÆ.

BEGONIA FORBESII King in Journ. As. Soc. Beng. lxxi. 60 (1902). **S.**; Batoe Pantjeh, R. Moesi, Palembang, 800 ft. 266*c*. Low herb on limestone rocks; flowers white. B. ISOPTERA Dryand. **J.**; Mt. Malawar, Preanger, 6200 ft. 786 *a*. Erect herb; flowers white. 5200 ft. 766. Herb with spreading branches; flowers white. By Tjisoerooli, Preanger, 4300 ft. 857 *a*. Herb; flowers white; fruit 3-winged. "Hariang-diock." **S.**; Mt. Tangamoes, Lampongs, 4500 ft. 1850. Erect herb; flowers white. Mt. Dempo, Palembang, 7500 ft. 2379. Herb erect or with decumbent branches and creeping root-stem; flowers white; fruit 3-winged capsule, grey in colour when ripe. Attains great development and luxuriance at about

7900 ft. on the mountains.—B. MOLLIS DC. **J.**; Bantam, Genteng, 500 ft. 41, 42.—B. ROBUSTA Bl. **J.**; Mt. Tiloe and Mt. Malawar, Preanger, 4700–6000 ft. 856, 857, 796 *a*, 1017 *b*. Erect herb.—B. MEGAPTEROIDEA King *op. cit.* 65. **S.**; Mt. Dempo, Palembang, 3700–5500 ft. 2255. Herb with dark green radical leaves on red stems; flowers pure white.—B. MAXWELLIANA King *op. cit.* 66. **S.**; R. Rawas, Karangnata, Napal Litjin, Palembang, 700 ft. 3119 *a*. Herb growing either in soil-less cups in calcareous rocks or in the soil.

Begonia longepetiolata Bak. fil., sp. nov. *Herba* caulibus angulatis; *stipulis* lanceolatis acuminatis; *foliis* longe petiolatis lamina latissime reniformi-quadrata 6–7 cm. longa 9–11 cm. lata e basi palmatim 8–9-nervis margine hinc inde serrato nervis rufo-hirsutis, petiolis 17–21 cm. longis rufo-hirsutis; *inflorescentiis* longe pedunculatis paucifloris (3–4), pedunculis 24–25 cm. longis foliis subæquilongis; *capsula* pedicellis gracilibus circa 1·5 cm. long. insidente, 3-alata glabra in toto 1 cm. longa et cum alis 2 cm. lata, alis subæquilateralibus venosis, 5–7 mm. longis.

S.; Mt. Dempo, Palembang, 7000 ft. 2423 *a*. Herb, lowly with erect habit; flower white, male with 4 petals, female with 3; fruit with 3 wings, becoming grey.

Aspect of *B. megapteroidea* King, but differs in the much more irregular margin of the leaf. The petioles and peduncles of this species are both long; the inflorescence is few-flowered.

FICOIDACEÆ.

MOLLUGO PENTAPHYLLA L. **J.**; 393.

UMBELLIFERÆ.

HYDROCOTYLE JAVANICA Thunb. **J.**; Tjisoeroeli, Preanger, 4400 ft. 936. Herbs with creeping stem. "Dawon sentok," "Doelang sentok."

CENTELLA ASIATICA L. **J.**; by lake near Pengelengan, Preanger, 4500 ft. 673. Herb with creeping stolon.

SANICULA JAVANICA Bl. **S.**; Mt. Dempo, Palembang, 7400 ft. 2402. Erect herb with creeping root-stem; flowers minute, purplish blue. **J.**; Pengelengan, Preanger, 2000 ft. 1020. Mt. Malawar, Preanger, 6000 ft. 820. Small herb; leaves radical; flowers minute.

ARALIACEÆ.

ARALIA MONTANA Bl. **J.**; Tjisoeroeli, Preanger, 4500 ft. 1149. Large prickly shrub. "Balik Soempa."

ARALIDIUM PINNATIFIDUM Miq. **S.**; Boekit Tinggi, Paoe, Palembang, 4000 ft. 2207. Tree; flowers very small, white; fruit green.

PANAX CHINENSIS Bl. **J.**; Pasir Orai, Kosala, Bantam, 3000 ft. 476.

AGALMA HORSFIELDII Seem. **S.**; Mt. Dempo, Palembang, 7200 ft. 2419. Tree 60–70 ft., fruit light green.

Schefflera canaliculata Bak. fil., sp. nov. Species ad *S. subulatam* Seem. et *S. tomentosam* Hassk. accedens. *Arbuscula* vel *frutex*; *ramis* longitudinaliter striatis; *foliis* digitatim compositis foliolis

6 ellipticis vel ovato-ellipticis basi cuneatis apice graciliter acuminatis superne glabris subtus puberulis, lamina 17–20 cm. longa 6–9 cm. lata, petiolulis 18–40 mm. longis, nervis lateralibus utrinque 6–8, petiolo 24–26 cm. longo; *umbellulis* racemosis racemorum ramis lateralibus brevissimis, pedicellis brevissimis; *floribus* in umbellas 8–12 floras dispositis; *ovario* 5-loculari extus longitudinaliter canaliculato; *fructu* ignoto.

S.; Lampar, R. Moesi, Palembang, 500 ft. 2611. Large shrub; flowers in bud deep lake, open yellow. Leaflets 6-foliolate, acuminate. Umbels racemosely arranged; the lateral branches of the raceme very short.

HEPTAPLEURUM LUCIDUM Bl. **J.**; by R. Tjisoeroeli, Preanger, 4000 ft. 887. "Pangang." H. LONGIFOLIUM Seem. **J.**; Kosala, Bantam, 1450 ft. 349. A woody climber. "Toelak-toengkoel."—H. SCANDENS Seem. **S.**; Ayer Angat, Kaba Volcano, 2500 ft. 2893. Climbing shrub, often ascending some distance. Flowers white, but of general yellow colour from prominent stamens. "Kibaroh."

ARTHROPHYLLUM DIVERSIFOLIUM Bl. **J.**; Pasir Orai, Kosala, Bantam, 2800 ft. 279, 470. Erect shrub; flowers greenish.—A. OVALIFOLIUM Miq. **S.**; Mt. Dempo, Palembang, 5800 ft. 2568. Scandent, epidendric shrub; immature fruit green and white-topped.

BRASSAIOPSIS GLOMERULATA O. Kuntze. **S.**; Tjilaki, Preanger, 4600 ft. 886. Moderate tree; fruit in candelabra-like masses. "Pangang."

MACROPANAX DISPERMUS Bl. **J.**; Tjisoeroeli, Tjisankoei, nr. Pengelengan, Preanger, 400–4400 ft. 888, 917, 992. Large shrub or small tree. "Pangang poejoe."

CORNACEÆ.

ALANGIUM SALVIIFOLIUM Wanger. in Engl. Pflanzenreich, Alangiac. 9 (1910). **S.**; Soeka Radja, R. Roepit, Palembang, 800 ft. 2984. Slender tree; fruit passing from green to lake-scarlet. Moeara Mengkoelem, R. Rawas, Palembang, 500 ft. 3173. Large tree; fruit very pale green.—A. BEGONIIFOLIUM Baill. subsp. TOMENTOSUM Bl. **S.**; Tandjong Ning, R. Bliti, Palembang, 600 ft. 2785. Large tree; flowers in bud, rich cream-white opening to pale orange; fruit greenish white becoming cobalt-blue. "Kayoe doe-etteh."—A. UNILOCULARE King in Journ. As. Soc. Beng. lxxi. 77 (1902). **S.**; Tandjong Ning, R. Bliti, Palembang, 600 ft. 2739. Large tree; flowers in bud white; fruit small, bluish green.

MASTIXIA KORTHALSIANA var. TYPICA Wanger. in Fedde Repert. Nov. Sp. iv. 336 (1907). **S.**; Tandjong Ning, R. Bliti, Palembang, in virgin forest, 500 ft. 2744. Large tree; fruit pale blue, with grey, almost white, markings. M. PENTANDRA Bl. **J.**; Tjibadui, Kosala, Bantam, 2700 ft. 400. Small tree. "Ki Tjeler."

NYSSA JAVANICA Wanger in Engl. Pflanzenreich, Nyssac. 15 (1910). **S.**, Ayer Angat, foot of Kaba Volcano, 2000 ft. 2880. Tall tree 45 ft. 18 ins. in diameter; fruit pale green with greyish dots. "Rawe-rawa."

GAMOPETALÆ.

By Spencer Moore, F.L.S.

Caprifoliaceæ.

Sambucus javanica Reinw. **J.**; Mt. Malawar, Preanger, 5400 ft. 797. "Bebesdjaran." **S.**; Hoedjoeng, Lampongs, 2500 ft. 1954. Glands at base of pedicels in opened flowers full of nectar.

Viburnum sambucinum Reinw. **J.**; R. Tjiladaheun, Bantam, 1450 ft. 410. Tree 30–40 ft.; fruit black. Kosala Hill, Bantam, 2000 ft. 539 *c*. Pasir Orai, Kosala, Bantam, 2000 ft. 567 *a*. Tjelaki, Preanger, 4600 ft. 865. "Ki-taai" and "Ki-hoe-oet."—V. lutescens Bl. **J.**; 1023 *a*. Kosala Hill, 1000 ft. 1173. **S.** Hills W. of Goenoeng Trang, Lampongs, 450 ft. 1526. Tree ±30 ft.; fruit purplish lake. Penanggoengan, Lampongs, 400–550 ft., 1629, 1662 *a*. Hoedjoeng, Lampongs, 2800 ft. 1909. Fruit green to purplish red and black. Near Lake Ranau, Palembang, 1700 ft. 2094. Small tree; pendent branches; flowers yellowish white. Mt. Dempo, Palembang, 4000 ft. 2530. "Kajoe Toengoe."—V. coriaceum Bl. **J.**; Mt. Malawar, Preanger, 7200 ft. 954.—V. sumatranum Miq. (ex descript.). **S.**; near Hoedjoeng, Lampongs, 3300 ft. 1909 *a*. A large shrub with white flowers. There is no specimen of this in the London herbaria.

Rubiaceæ.

Sarcocephalus Junghuhnii Miq. **S.**; Batoe Pantjeh, Palembang, 600 ft. 2674. Great tree; fruit brown with short stumpy excrescences; outer layers of wood yellow, inner red.—S. subditus Miq. **S.**; Boekit Tinggi, Palembang, 4000 ft. 2456. Tree ±60 ft. Flowers white.

Adina polycephala Benth. **S.**; Forest S.W. of Goenoeng Trang, Lampongs, 450 ft. 1553. Large tree; flowers minute white. Penanggoengan, Lampongs, 600 ft. 1652.

Nauclea purpurascens Korth. **J.**; Pasir Orai, Kosala, Bantam, 2700 ft. 521. Tree ±30 ft. "Tjang-tjarattan." Tjilaki, Preanger, 4600 ft. 969.—N. pallida Reinw. **J.**; among stones, R. Tjiladaheun, Kosala, Bantam, 1400 ft. 419. Small tree, spreading top. "Tjengkeh tjai."

Nauclea superba S. Moore, sp. nov. *Frutex* elatus scandens; *ramulis* ultimis validis compressis cortice rimoso rubro-griseo obductis glabris; *foliis* magnis petiolo brevi crasso complanato anguste alato insidentibus late ovatis apice subito cuspidato-acuminatis ipso obtusis basi late rotundatis (summis minoribus basi obtusis) pergamaceis utrobique glabris usque 26×15 cm. par ultimum 14×7 cm. costis lateralibus utrinque 12 (foll. summ. modo 7) sub margine arcuatim conjunctis; *capitulis* magnis (6 cm. diam.) solitariis pedunculis 2–6 mm. long. insidentibus; *receptaculo* abunde setifero 2 cm. diam.; *ovario* cylindrico glabro 1·25 mm. long.; *calycis* 5 mm. long. limbo inferne (uti ovarium) brunneo-rubro glabro paucisulcato superne subtilissime griseo-sericeo lobis a basi sat lata filiformibus parte persistenti subulata acuta; *corollæ* glabræ tubo superne ampliato 1 cm. long. inferne ±·5 mm. sub limbo fere 2 mm. lat., lobis ovatis obtusis 1·5 mm. long; *staminibus* inclusis; *stylo* superne incrassato glabro 19 mm. long.; *stigmate* exserto.

S.; near stream in virgin forest, S.W. of Goenoeng Trang, Lampongs, 450 ft. 1473, 1474.

Allied to *N. cyrtopoda* Miq., from which it can be told easily by its flowers with their glabrous (not densely hairy) ovary, their red-brown sulcate calyx-limb, and filiform (not lanceolate) calyx-lobes.

No. 2605 *a* from Lampar, R. Moesi, Palembang, 500 ft., with smaller leaves narrowed at the base, 20×10 cm., the terminal pair only about 8×3 cm. is conspecific.

Nauclea megaphylla S. Moore, sp. nov. *Frutex*? vel *arbuscula*?; *ramulo* ultimo unico viso compresso glabro cortice fusco sulcato obducto; *foliis* magnis (27×15 cm.) petiolatis (pet. 2·5 cm. long.) ovatis breviter acuminatis acumine obtuso basi rotundatis pergamaceis pag. utavis glabris costis lateralibus utrinque 14–16 sub margine solum arcuatis uti costa centralis supra planis subtus optime eminentibus costulis rectis inter sese subdistantibus; *capitulo* solitario 4 cm. diam. pedunculo petiolis fere æquilongo insidente; *ovario* anguste ovoideo compresso glabro 4 mm. long.; *calycis* limbo ovario cylindrico breviore glabro lobis 3 mm. long. persistentibus limbum excedentibus lineari-spathulatis superne griseo-sericeis alibi glabris uti limbus in sicco fuscis; *corollæ* glabræ tubo anguste infundibulari 7·5 mm. long. lobis oblongis obtusis 2–5 mm. long.; *staminibus* inclusis; *stylo* exserto complanato glabro.

S.; without locality and number.

Close to *N. superba*; the calyx serves to distinguish the two: the markedly *Bridelia*-like arrangement of the leaf-nervules of *N. megaphylla* is another easily noticed feature.

Uncaria pedicellata Roxb. **J.**; Koekoehulang. 13. **S.**; Bigin-Telok, R. Rawas, Palembang. 3210. A large climber with flowers gamboge-yellow, smaller than usual. There seems to be much confusion between this and allied species. U. ovalifolia Roxb. **S.**; without number or locality. U. gambir Roxb. **S.**; 2986 *b*. U. gambir Roxb. var. latifolia S. Moore, var. nov. A typo discrepat præsertim ob folia 11–13×8·9 cm. **S.**; Mt. Besagi, Krohe, 6700 ft. 2078. A climbing shrub with reddish flowers, with margins of corolla greenish yellow. Owing to the absence of stipules this naming must be regarded as provisional only. U. glabrata DC. **J.**; Lebak-jaha, Kosala, Bantam, 2700 ft. 343. U. ferrea DC. **S.**; in second-growth near Goenoeng Trang, Lampongs, 400 ft. 1604.

Wendlandia glabrata DC. **J.**; Rioeng-goenoeng, Preanger, 5200 ft. 1202.

Lerchea interrupta Korth. **S.**; Bockit Tinggi, near Proe, Palembang, 3400 ft. 2202 (in part.).—L. spicata Koord. **S.**; Kottadjawa, Lampongs, 300 ft. 1406 *a*. Fruit in long spikes, purple. Hills N. and N.W. of Goenoeng Trang, Lampongs, 400–500 ft. 1519 *b*, 1583 *a*. Shrub; flowers white in long axillary spikes.

Lerchea capitata S. Moore, sp. nov. *Fruticulus* circiter bispithameus; *caule* erecto simplici primo scabriusculo deinde glabro cortice griseo obducto 3–4 mm. crass.; *foliis* lanceolatis acuminatis basi in petiolum gracilem 1·5–3 cm. long. gradatim extenuatis firme membranaceis glabris supra in sicco olivaceis subtus pallidis plerisque 10–16 × 3·5–4 cm. costis lateralibus utrinque 11–12 pag. sup. planis pag. inf. (uti costa centralis) eminentibus; *stipulis* lanceolatis caudato-acuminatis usque 7 mm. long.; *floribus* subsessilibus in capitulum subglobosum pedunculatum (ped. 1·5–2 cm. long.) arcte confertis; *ovario* globoso ·75 mm. long.; *calyce* 1 mm. long. ultra medium in lobos triangulares acutos diviso; *corollæ* albæ extus glabræ intus barbatæ tubo 2 × 1 mm. lobis triangularibus acutiusculis reflexis 1 mm. long.; *staminibus* juxta medium tubum insertis antheris subsessilibus oblongis acutis 1 mm. long.; *stylo* glabro 3 mm. long., stigmatis lobis abbreviatis; *fructu* globoso dicocco calyce persistente coronato 2 × 2 mm.; *seminibus* pluribus minutis.

S.; under the virgin forest. Kotta-djawa, Lampongs, 700 ft. 1392 *a*. No. 1491 *a* from bed of stream, hills N.E. of Goenoeng Trang, Lampongs, is conspecific. The globose capitula afford an easy means of distinguishing this species, apart from peculiarities.

XANTHOPHYTUM FRUTICULOSUM Reinw. **S.**; Goenoeng Trang, Lampangs, 400 ft. 1445 *a*. Low shrub; creeping stem; flowers white.

ARGOSTEMMA BORRAGINEUM, Bl. **J.**; Tjibandong, Kosala, Bantam, 1750 ft. 425. "Gandok." Mt. Poetjak-tjatjing, Preanger, 5000 ft. 1047 *a*.—A. MONTANUM Bl. **J.**; Goenoeng Malawar, Preanger, 4900–5700 ft. 793, 943, 1002. "Reundeu rajas."—A. UNIFLORUM Bl. **J.**; Kosala, Bantam, 1560 ft. 520. **S.**; Goenoeng Besagi, 5500 ft. 1999 *a*. Flowers white. "Pagaga-utan." Boekit Tinggi, Palembang, 3700 ft. 2197. Flowers white.—A. PARVIFOLIUM Benn. **S.**; Mt. Besagi, Krohe, 4000 ft. 2060. Flowers white; conspicuous from its bright yellow stamens.

HEDYOTIS VESTITA R. Br. **J.**; Tjibandong, Kosala, Bantam, 1560 ft. 430. "Kiliwara-mata." Used in the native pharmacopœia.—H. STIPULATA R. Br. **J.**; Mt. Malawar, Preanger, 6000 ft. 819 (in part.).—H. AURICULARIA Linn. **J.**; Kosala, Bantam, 2000 ft. 504 *a*. Used in native pharmacopœia.—H. CORONATA Wall. **S.**; Hills S.W. of Goenoeng Trang, Lampongs, 400 ft. 1448. "Goejoen djamboe."

ANOTIS LESCHENAULTIANA Wight & Arn. **J.**; Mt. Malawar, 6500 ft. 973, 1017 *c*. Growing in large patches in forest shade, like our own *Galium*.

Ophiorrhiza extenuata S. Moore, sp. nov. Verisimiliter *suffrutex*; *caule* ascendente puberulo dein glabro; *foliis* oppositis cujusque jugi similibus vel subsimilibus ovato-lanceolatis breviter acuminatis apice obtusis basi in petiolum gracilem ±2 cm. long. gradatim extenuatis membranaceis usque 9 × 3 cm. (sæpius ±7 × 2·5 cm.) supra in sicco fuscis glabris subtus pallidioribus in costis puberulis costis lateralibus utrinque 8 teneris prope marginem arcuatis; *cymis* terminalibus paucifloris pedunculo tenui subsparsim pubescente folia circiter semi-