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Original Articles.

ON THE STRUCTURE OF THE PITCHER OF *CEPHALOTUS FOLLICULARIS*.

By ALEXANDER DICKSON, M.D., Regius Professor of Botany in the
University of Glasgow.

(TAB. 193.)

[Abstract of a paper read at the meeting of the British Association at
Plymouth, August, 1877.]

In *Cephalotus* there are two forms of leaf :—

1st. Non-ascidiform, with petiole and lamina of ordinary description; and

2nd. Ascidiform, with cylindrical petiole, from extremity of which depends a pitcher, with a lid attached by a broad base to that part of the orifice next the petiole and the main axis. The pitcher here appears to be a pouching from the under surface of the leaf, in this respect differing remarkably from those of *Nepenthes* and *Sarracenia*. It is scarcely safe, in absence of developmental evidence, to dogmatise on the subject; but, as matter of fact, the pitcher-lid in *Nepenthes* and *Sarracenia* springs from that portion of the orifice *farthest* from the axis; while in *Cephalotus*, as above stated, it springs from that portion *next* the axis. In *Nepenthes*, Sir J. D. Hooker has shown that the leaf-apex is represented by a bristle-like process at the back of the hinge of the lid (Fig. 2, *ap*). In *Sarracenia* the lid itself would appear to be the terminal lobe of the leaf. In *Cephalotus*, also, it seems scarcely possible to doubt that the lid represents the terminal lobe of the leaf, and, if so, the pouching, as already said, must be from the lower leaf-surface. The *Cephalotus* pitcher exhibits on its outer surface three well-marked wing-like processes, one median (Fig. 1, *mdv*) placed dorsally (away from the axis), and two lateral directed obliquely. The lid (Fig. 1, *l*) of the pitcher is somewhat concave towards its inner surface, and exhibits strongly-marked ribs branching dichotomously, and connected by transverse smaller veins. It is usually more or less streaked with red, and towards the margin are to be seen, in the areolæ between the veins, translucent spots where the parenchyma is deficient, and which remind one of those on the upper part of the pitcher of *Darlingtonia*. From the outer surface of the lid, from the wing-like ridges, and also from the margins and petioles of the non-ascidiform leaves, more or less elongated pale brown hairs spring of very remarkable structure. The *orifice* of the pitcher is furnished with a cartilaginous corrugated rim produced internally into a

number of inflexed teeth (Fig. 1, *it*), almost exactly as is seen in some species of *Nepenthes*. This corrugated rim is deficient along the line of the base of the lid. Within or below the corrugated rim is a remarkable ledge or shelf extending all round the inside of the pitcher, its free and rather sharp edge projecting downwards into the cavity, and forming as it were an inner orifice: from its probable function, this may be called the *conducting shelf* (Fig. 1, *cs*). Below this the upper two-thirds or three-fourths of the inner surface (Fig. 1, *ugs*) is smooth, glassy, and studded over with glands which no doubt secrete a digestive fluid. At the lower limit of this secreting surface on either side of the pitcher is to be noted a very oblique, somewhat curved linear elevation of the surface; to the naked eye, of a dull reddish brown colour, or almost of a neutral tint (Fig. 1, *lp*). These coloured elevations exhibit a very remarkable glandular structure, and may be designated the *lateral coloured patches*. Below these patches the inner surface of the bottom of the pitcher is smooth and eglandular (Fig. 1, *ds*).

As regards structural details, these may be considered under the following heads:—

A. *Outer Surface of Pitcher and Lid*.—Here occur stomata of ordinary type, and peculiar glands, each consisting of a group of small cells. Each group, as viewed from the surface, is of oval form, two cells forming a central oval, with their line of contact across the short diameter, these two cells being surrounded by four others. Similar six-celled glands are also to be found on the inner surface of the pitcher-lid, on the corrugated rim of the pitcher, and on both surfaces of the non-ascidiform leaves. The most remarkable structures, however, connected with the outside of the pitcher are the pale brown hairs already noted. Each of these is an elongated cell with pointed extremity and a broad truncated base imbedded in a slightly elevated group of epidermis cells. This unicellular hair is solid from the tip to within a half or a third of the distance from the base. The cell cavity thus reduced is bounded by a distinct and highly refractive wall, and the *appearance* is thus presented of one hair encapsulated within another. According to the modern view of cell-thickening by interstitial intus-susception, this would be a remarkable case of the differentiation of the thickened cell-wall into two layers of different character. These hairs are minutely tuberculated on the outer surface.

B. *Inner Surface of Pitcher-lid*.—Here the epidermis-cells are somewhat imbricated from above downwards, and their free walls form slight downward bulgings. The free surfaces of these cells exhibit beautiful ridge-like striæ; and the surface ridging is so arranged as to form little transverse arches between adjacent cells, with concavities directed downwards. These arches, no doubt, constitute obstructive ledges which would oppose the upward passage of an insect. The small glands, already mentioned, which are scattered over this surface might have been supposed to secrete honey for the attraction of insects; but this may be

considered doubtful, seeing that similar glands occur on both surfaces of the non-ascidiform leaves and all over the outside of the pitcher. They are somewhat yellow in colour.

C. *Corrugated Rim of Pitcher*.—The structure here is remarkably like that in *Nepenthes*, the cells being considerably indurated and somewhat elongated, and the surface presenting transverse arch-like ledges extending between adjoining cells. As already mentioned, small six-celled glands occur here.

D. *Conducting Shelf*.—Here the epidermis-cells are produced on their free surface into downward-directed hairs. On the inner surface of the pitcher-lid the downward bulging of the cells has been already mentioned. These bulgings become more and more pronounced towards the base of the lid, and a gradual passage is to be noted from the slight bulgings above to the pronounced hair-like projections on the shelf below. The epidermis-cells of the outer or concealed surface of the shelf are likewise produced into downward-directed hairs, except along the line of reflection (Fig. 1, *x*) from this to the glandular surface of the inside of the pitcher where the hairs come to stand at right angles to the surface. Here each epidermis-cell is seen to be produced in its middle into an acuminate conical hair, from the base of which superficial ridges extend, one to each of the adjoining hairs. The superficial ridges thus map out the surface into triangular spaces, and a most remarkable and beautiful arachnoid appearance is presented. Similar ridges appear to connect the bases of neighbouring hairs on the other portions of the shelf; but from the appression of these hairs, the ridges are not so apparent: and even in the epidermis-cells of the inner surface of the lid the delicate striæ have frequently a tendency to form groups passing from the apex of one cell to those of neighbouring ones.

E. *Upper portion of secreting Inner Surface of Pitcher* (all above the coloured patches). Here the epidermis is covered by a strong glassy cuticula which is apparently elastic, as it is often to be seen rolled back from the subjacent epidermis-cells when it happens to become cracked. The epidermis-cells are moderately thickened with wavy, somewhat indented or crenated, outline. Scattered over this surface are numerous glands of considerable size, each consisting of an ovoid mass of cells (in longitudinal section are seen, say 30 to 40 cells) imbedded in the subepidermal parenchyma, from the cells of which they are to be distinguished by their comparatively dense protoplasm, by the absence of chlorophyll, and often by their smaller size. The small ends of these ovoid glands bulge slightly upon the surface where they are not covered with epidermis. These glands do not appear to have any special relation to the vascular bundles, in this respect differing remarkably from the "peptic" glands of *Nepenthes*.

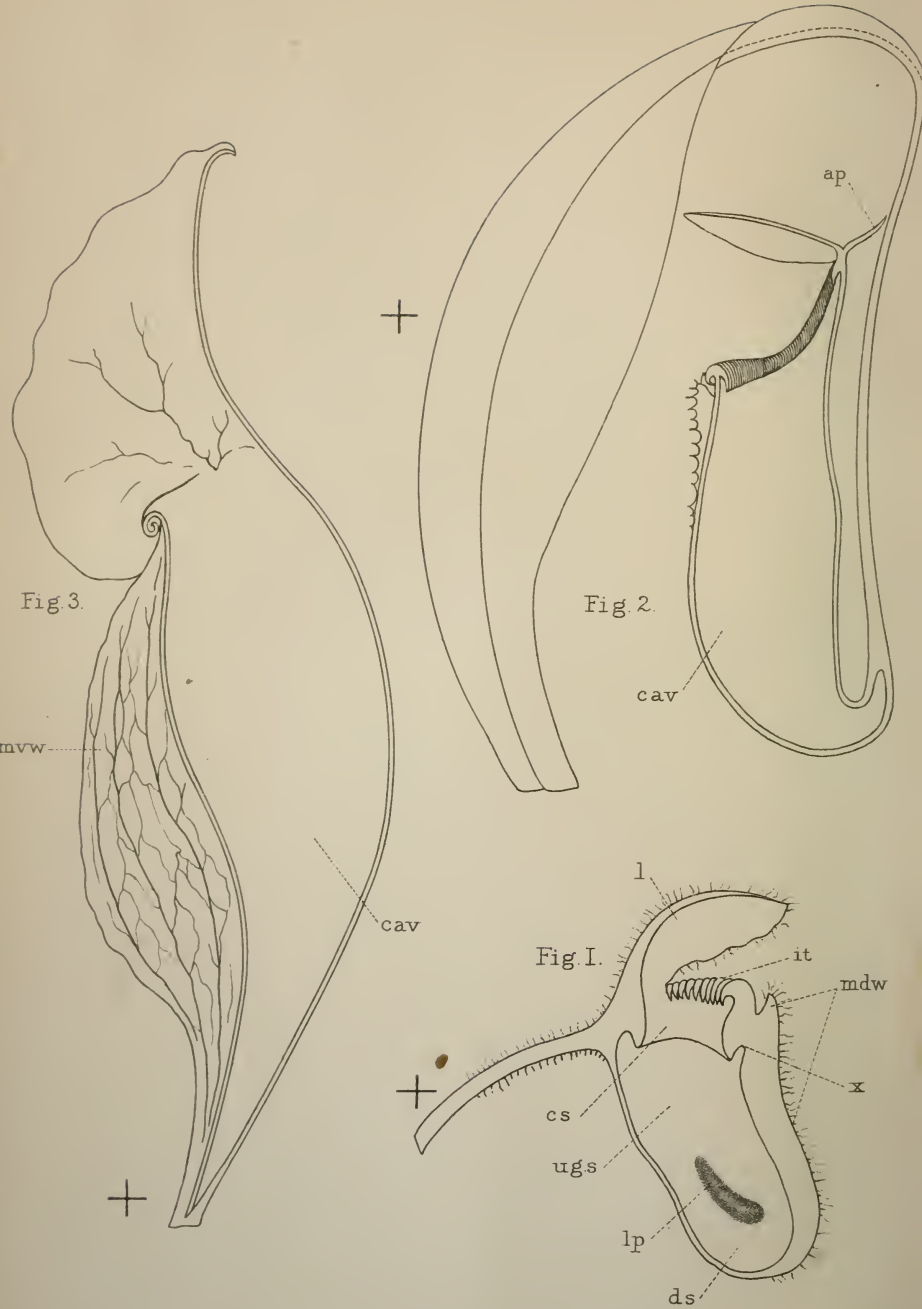
F. *Lateral Coloured Patches*.—These evidently constitute the most specialised portion of the secreting apparatus. The epidermis-cells here are much smaller than those of the upper secreting surface, and, for the most part, are angular instead of wavy in outline. They are filled with deep crimson fluid. Thickly scattered

among these pigment-cells are very numerous oval bodies, each consisting apparently of a central somewhat elevated oval cell surrounded by 2 to 4 others. These bodies are colourless or slightly yellowish, with brilliantly refractive cell-walls, and offer a most beautiful contrast with the deep red ground over which they are studded. Besides the structures above described there are, on the lateral coloured patches, pretty numerous imbedded glands of the same type as those in the upper secreting surface; but, for the most part, of very much larger size, their linear measurement being about double of that of the glands on the upper portion. The small ends of these large glands form bulgings on the surface of the patch, and, as in the glands above, are not covered by epidermis. On surface view the cells at the uncovered apices of the ovoid glands, both on the upper secreting surface and on the lateral patches, present a very remarkable appearance. The cell-walls here are somewhat thickened, and between the adjacent cell-walls are oblong or roundish spaces, filled apparently with oil, which give to the superficial cell network a somewhat beaded appearance. On the coloured patches the epidermis-cells in the vicinity of the uncovered portions of the imbedded glands are more or less wavy in outline and are unmixed with the small oval bodies just mentioned; and their contents exhibit a fine gradation of tints from the palest rose-colour immediately around the exposed part of the gland, which is nearly colourless, to the deep crimson of the common ground-work of the patch. A surface view of the coloured patches affords one of the most exquisite microscopic appearances imaginable. The red-coloured cell-contents here, as well as in other parts of the pitcher, very soon after injury of the cells or treatment by reagents, change to a bright blue.

G. *Surface of the Bottom of the Pitcher*—that part where the insect-prey finds its last resting place—is smooth, eglandular, with wavy epidermis-cells.

POSTSCRIPT. — *Glasgow, November, 1877.* — On announcement of the foregoing results to the British Association, Dr. Lawson Tait, who was present, stated that he also had studied the anatomy of the *Cephalotus* pitcher; and, for the most part, spoke in confirmation of my statements. He further stated the result of experiments performed by him with fluid taken from virgin or unopened pitchers, showing that it exerted a similar digestive action upon animal substances to that exhibited by fluid from *Nepenthes* pitcher, &c. He correctly pointed out what I had not then had opportunity of observing, that in young unopened pitchers the lateral patches (called by him the "*glandular bodies*") are not pigmented. I may here mention that in old pitchers a dark red coloration of a considerable portion of the general inner surface of the pitcher may sometimes be seen. This, perhaps, detracts somewhat from the distinctive significance of the term "coloured" as applied to these patches.

I have further to state that a little previous to the Association meeting I had sent to Sir J. D. Hooker (as it happened, just as he



had started for America) a short account of what I had been doing on this subject. On his return home Sir Joseph replied, and at the same time most generously sent me a number of very valuable notes and sketches, which he had made as early as 1874, of most of the main features exhibited by these pitchers, especially the inner surfaces of the pitcher and lid. I hope to be able to make my acknowledgments more specifically when I publish a more extended memoir, with illustrations.

With regard to the small oval bodies studding the surface of the lateral-coloured patches, I described them at the meeting of the Association in the terms above given, but with a little hesitation owing partly to the want of material and partly to the difficulty I had in obtaining satisfactory sectional views of them. Sir J. D. Hooker, in his Notes, has called them stomata; and certainly they sometimes, especially in young pitchers, are often puzzlingly like them. I have no doubt, however, of the centre of each being filled by a "central cell;" and, from the observations I have made—though these are not yet complete—I am disposed to think that, in a sense, they may be stomata, for the central cell seems to be one bulging up from a somewhat lower level, between the 2-4 peripheral cells of the body which otherwise would constitute a stoma-like opening. If the above surmise be correct, these bodies may be regarded as analogous to the "*Wasser Spalten*" recently described by De Bary, in which case their secretion would probably serve to dilute the other secreted matter; to which an interesting parallel might be found in the dilution of the secretion of the urinary tubules by the water given off from the Malpighian tufts of the kidney.

DESCRIPTION OF PLATE 193. — (In all the figures the position of the main axis is to the left hand, and indicated by a cross +).

FIG. 1. — Longitudinal mesial section of pitcher of *Cephalotus follicularis*; *l*, lid, springing from that portion of the pitcher-margin next the main axis; *it*, inflexed teeth of corrugated rim; *cs*, conducting shelf; *x*, place of reflection of epidermis from outer (concealed) surface of conducting shelf to the upper glandular surface (*ugs*) of the pitcher cavity; *lp*, one of the lateral coloured patches; *ds*, smooth, eglandular, "detentive surface" at bottom of the pitcher; *mdw*, median dorsal wing.

FIG. 2. — Section of pitcher of *Nepenthes* (hybrid form of *N. distillatoria*?). Here the corrugated rim exhibits two ridges, an involute and revolute one: in this case the pitcher is bent up against the tendril-like portion of the leaf, so that the hinge of the lid is next the tendril. In some species the pitcher is bent up against the tendril, so that the hinge of the lid is away from the tendril. In either case, however, the hinge retains its normal position on that side of the orifice furthest from the main axis. *cav*, pitcher-cavity; *ap*, apex of leaf.

FIG. 3. — Section of pitcher of *Sarracenia purpurea*. The rim of the pitcher is revolute. The lid springs from that portion of the orifice furthest from the main axis. *cav*, pitcher-cavity; *mvw*, median ventral wing.

SPICILEGIA FLORÆ SINENSIS: DIAGNOSES OF NEW,
AND HABITATS OF RARE OR HITHERTO UNRE-
CORDED, CHINESE PLANTS.

By H. F. HANCE, Ph.D., Memb. Acad. Nat. Cur., &c., &c.

I.

“Un pays sur lequel nos connaissances sont encore très-bornées, et qui, sous le point de vue de la géographie botanique et des questions qui s’y rapportent, mérite toute notre attention.” (MIQUEL, ‘Journ. de Bot. Néerland.’ i. 85).

Six years ago the writer* expressed a hope that he might shortly be able to give a complete list of all plants not included in the ‘Flora Hongkongensis,’ which had been found in the province of Kwangtung. Further consideration, and especially the circumstance that almost every short excursion from Canton or other cities where foreigners reside leads to the discovery of three or four new plants, has since convinced him that such an enumeration would, after all, be too imperfect to be worth compiling; whilst the opening of several new ports, and the annually increasing facilities for penetrating into the interior of the Empire, encourage the hope that we may soon acquire a far better and more comprehensive knowledge of one of the most interesting Floras which can occupy the attention of botanists. But, although it would be premature to attempt a systematic list of the plants of any one province, the recording from time to time of localities where plants, new either to Science or to the country, have been met with, cannot fail to be useful. As M. Netto observes, “Une liste des végétaux recueillis dans leur pays natal, quelque restreinte et quelque incomplète qu’elle soit relativement à la flore de cette région, est toujours un *gradus ad geographiam botanicam*.”† Collectanea of this nature, based on the researches of a few naturalists or amateurs, have already been given to the world, in the pages of this Journal and elsewhere, by Messrs. Baker, Hemsley, Maximowicz, S. Moore, and others; and the writer feels that in commencing a register of species from time to time received by him, record of whose existence as natives of China might otherwise lie *perdu* in his own herbarium, or in those public or private ones to which he may have been able to communicate specimens, the *dissecta membra* thus gathered together will one day furnish a useful material for the geographical botanist. For, as a distinguished authority on these questions well says:—“Les problèmes si compliqués des centres de création, des migrations des plantes, ne peuvent être éclairés que par une connaissance aussi approfondie que possible des espèces et de leur aire géographique.” ‡

* ‘Journ. Linn. Soc.’ xiii. 98. + ‘Ann. Sc. Nat.’ 5e sér. v. 158.

‡ Boissier, ‘Fl. Orient.’ Préface, p. ii.

Rich as the Chinese Flora undoubtedly still is, it is impossible not to believe that the useless and lamentable destruction of the forests throughout the Empire, which has attracted the attention of all observers,* must have caused the total extinction or excessive rarity of many plants. And, indeed, it seems far from improbable that the diastrous and often-recurring inundations, which are one of the most terrible scourges of the Middle Kingdom, are in part due to this unreflecting devastation.† It may be hoped that, as

* "This nakedness appears to be a universal characteristic of mountain scenery in China, but it is not the fault of the soil or the climate, for wherever the little pines are suffered to rise they show a vigorous growth. The cause of this universal deficiency in forests seems to be the frequency of rebellions that have swept to and fro over the whole Empire like a desolating scourge. In a few days the Chinese can rebuild their low mud-houses, but Nature requires years of continued peace to cover her mountains with forests. and rebellion has followed rebellion too quickly for her to accomplish the ever-recurring task; and, besides, the people do not care to labour much when there is a probability that outlaws will profit by their industry. Yet it is true that they do raise some trees in a few places; but over the wide area that I have travelled not a tenth part of the soil is thus improved that might be, and then the trees are generally cut down before they attain any size; and this in districts whose population is numbered by the hundred thousand, and nearly all living in houses whose walls are of mud, and their rafters and floors the only wood they contain. The old trees occasionally seen in groves around the Buddhist temples, that only owe their preservation to the superstition of the destroyers, show what splendid timber thousands of hill-sides in China might yield." (Bickmore, 'Journ. N. Ch. Br. of Asiat. Soc.' n.s. iv. 1).—Hance, in 'Journ. Linn. Soc.', xi. 455.

"On se sent malheureux de voir la rapidité avec laquelle progresse la destruction de ces forêts primitives, dont il ne reste plus que des lambeaux dans toute la Chine, et qui ne seront jamais plus remplacées. Avec les grands arbres disparaissent une multitude d'arbustes et d'autres plantes qui ne peuvent se propager qu'à leur ombre." (David, 'Journ. de mon. 3e Voy. dans l'Emp. Chinois,' i. 188).

† The writer is aware that the generally received opinion that the destruction of forests reduces the rainfall of a country has been characterised as a popular fallacy by the late Dr. O. Peschel ('Neue Probleme d. Vergleich. Erdkunde,' Leipz. 1870); but a very competent critic,—Mr. Keith Johnston, jun.,—in a review of the book ('Academy,' 1st June, 1871, p. 287) remarks on this assertion, "This conclusion however appears to be a hasty one; and reliable data are yet required to show that forests, by maintaining a lower or more equal temperature, over the lands in which they grow, do not tend to condense the vapours of the rain-bringing winds over these districts, and thus increase their rainfall; and that, conversely, when the forests, and with them the condensing cause, are removed, the more easily heated land allows that vapour to pass which it previously had drawn down upon itself as rain." Humboldt remarks:—"La connaissance de l'étendue des forêts, comparée à la surface nue ou couverte d'herbes et de graminées, est un des éléments numériques les plus intéressants et les plus négligés de la climatologie d'un pays. La rareté ou l'absence des forêts augmente à la fois la température et la sécheresse de l'air, et cette sécheresse, en diminuant l'étendue des nappes d'eau évaporantes et la force de la végétation du gazon, réagit sur la chaleur du climat local." ('Asie Centrale,' iii. 199). Schouw, whilst fully admitting the important climatic influence of forests in the torrid zone, was of opinion that in temperate climates this is, "if not totally deniable, but very slight." ('The Earth, Plants and Man,' 122). His observations on the subject are well worth attention. The whole question has been most lucidly and fully discussed by an illustrious French *savant*, M. Becquerel, in a special work, 'Des Climats, et de l'influence qu'exercent les sols boisés et non boisés' (Paris, 1853); and the reader's attention may be especially directed to the candid and admirable exposition in the 10th chapter, "Des effets du déboisement."

western ideas penetrate amongst the people, a juster conception of the influence of masses of trees on climate will cause a stop to be put to the wholesale and unregulated felling of wood.

When Mr. Bentham published his classical 'Flora Hongkongensis,' sixteen years ago, evidence of the resemblances between the South Chinese vegetation and that of Japan was not abundant, though plainly exhibited in the case of a few striking representative genera or species. But, since then, the close alliance of the Japanese and Chinese Floras has been sufficiently demonstrated by almost all the collections received from points intermediate between the N.E. and S.E. of this Empire, which have likewise shown the extension southwards of many types of the North Asiatic Flora. And a very striking and singularly close affinity exists between the *Glumaceæ* of Ceylon and Southern China, there being many species common to both countries not as yet recorded from elsewhere. It is much to be regretted that so few amateur botanists give details as to the nature of the soil, special localities, or elevations where their collections were made, nor how their plants were associated;—matters even now of much moment, and likely to become more so as phytostatic studies advance.

" Neæ vero terræ ferre omnes omnia possunt.
Fluminibus salices; crassisque paludibus alni
Nascuntur, steriles saxosis montibus ornî,
Litora myrtetis lactissima: denique apertos
Bacchus amat colles, aquilonem et frigora taxi."
('Virg. Georg.' ii. 109).

Mr. Sampson has always been very careful in this respect. Professor Grisebach's 'Spicilegium Floræ Rumelicæ' may be commended as a model of what can be done, in a perfectly compendious way, as to these items of information.

It only remains to add that, after the plan followed in Dr. Cosson's well-known 'Notes sur quelques plantes critiques ou nouvelles de l'Espagne,' the diagnoses of new species in this enumeration, together with their habitats, will be in Latin, and all other critical or discussional observations in the vernacular.

1. *Anemone (Homalocarpus) flaccida*, Fr. Schmidt. Juxta oppidum Chin keang, 1876, coll. W. G. Stronach. This seems in rhizome and every other character quite accordant with Maximowicz and Albrechts' Japanese specimens, and well distinguished from *A. baicalensis*, Turcz. ! of which I have compared an authentic Manchurian example.

2. *Ranunculus fibrosus*, Wall. In graminosis prov. Cantonensis, hinc inde satis vulgaris. Referred in the 'Flora of British India,' together with the North Chinese *R. chinensis*, Bge., to *R. pennsylvanicus*, L.

3. *Akebia quinata*, Dene. Chinkiang, 1876. W. G. Stronach.

4. *Xylosma (Hisingera) japonicum*, A. Gray. In fruticetis circa Cantonem, d. 10 Oct., 1869, legit Sampson. Not previously found south of Amoy.

5. *Polycarpon pusillum*, Roxb. (= *Arversia Laeflingiæ*, Walp.) Secus fluvios West et North Rivers, prov. Cantonensis, legg. Sampson et Hance.

6. *Adinandra Millettii*, Benth. & Hook. fl. Versus cacumina montium Pakwan, supra Cantonem, d. 5 Junii, 1869, coll. Dr. Henr. Wawra. This is the first indication of the locality of this handsome and very rare plant, Millett's specimens having, I believe, been destitute of any ticket.

7. *Melochia corchorifolia*, L. In ditione Cantonensi, neenon in graminosis circa Whampoa, rara.

7. *Turraa pubescens*, Hell. In interioribus ins. Hainan, Martio, 1868, coll. R. Swinhoe. Found throughout the Indian archipelago, and in Eastern tropical Australia.

9. *SAGERETIA RUGOSA*, *sp. nov.* Ramulis haud spinescentibus tomentellis, foliis 2-3 poll. longis petiolo 3-4 lineali ovato-oblongis acutis minute glanduloso serrulatis supra glaberrimis subtus rufotomentosis (innovationum nunc utrinque glaberrimis) valde rugosis costulis utrinque 5-8 cum venulis transversis supra impressis subtus elevatis, floribus in racemos axillares plerumque simplices terminalesque paniculatos dispositis, rachi calycibusque extus cano-tomentosis. In omnibus North River et Lien-chau River, prov. Cantonensis, m. Octobri, 1876, legg. Revv. J. Lamont et J. C. Nevin. (Herb. propr. n. 19695.)

A very handsome plant, nearest *S. oppositifolia*, Brongn., but I suppose well distinguished by the marked rugosity of its leaves, rufous on the under surface.

10. *Vitis (Cissus) semicordata*, Wall., β . *himalayana*, Kurz. Ad Whampoa, ipse primum inveni Julio, 1860; exinde pluries vidi in varios Chinæ australioris locos, arbores scandentem truncosque aulæo foliorum viridissimo abscondentem. The leaves on young shoots are not unfrequently simple.

11. *SABIA BULLOCKII*, *sp. nov.* Novellis crispulo pilosis, ramis striatulis glaberrimis olivaceo-fuscis, foliis tenuiter membranaceis oblongis ovato-oblongis v. rotundatis basi acutis apice obtusis pallide marginatis petiolo marginato lamina 3-4 plo brevior, pedunculis unifloris glaberrimis sursum dilatatis 3-6 lin. longis, sepalis parvis rotundatis ciliatis, petalis oblongis obtusiusculis tenuiter nervulosis elineolatis flaventibus, staminum petalis quadrante breviorum filamentis ligulatis sensim attenuatis antheris extrorsis, stylis gracilibus petala fere æquantibus. Secus fl. North River, prov. Cantonensis, m. Martio, 1877, coll. T. L. Bullock. (Herb. propr. n. 19964.)

I have not seen mature foliage or fruit of this plant, which is evidently allied to the Japanese and North Chinese *S. japonica*, Maxim., and the Himalayan *S. leptandra*, Hook. f. & Th.

12. *Desmodium (Catenaria) laburnifolium*, DC. In silvis ad Tsing yüne, faucibus fl. North River, prov. Cantonensis, Sept. 1866, legg. Sampson et Hance.

13. *Clitoria macrophylla*, Wall. In incultis secus amnem North River, circ 200 mill. pass. a Cantone, d. 23, Julii, 1864, fl. et fr.

in collibus extra Cantonem, æst. 1866. T. Sampson. Only recorded heretofore from Tenasserim, Burma and Java.

14. *FLEMINGIA* (*Flemingiastrum*) LAMONTII, *sp. nov.* Caule flexuoso trigono tomentoso, ramis dense hirsutis, stipulis lineari-oblongis subfalcatis acuminatis striatis, petiolis 5-7 lin. longis canaliculatis dense tomentosis, foliolis brevissime petiolulatis oblongis acutiusculis 10-17 lin. longis 5-8 lin. latis lateralibus inæquilateris supra rugosis tomentosis subtus tomentellis glandulisque minimis nigris conspersis nervis omnibus dense hispidis conspicue elevatis reticulatis, racemis axillaribus breviter pedunculatis petiolum æquantibus v. duplo superantibus dense multifloris, bracteis lanceolatis acutis striatis hispidis $1\frac{3}{4}$ lin. longis pedicellis bilinealibus, calycis trilinealis dense fulvo-hispidi glandulisque nigris obsiti profunde fissi laciniis lineari-setaceis, corollæ in sicco rubentis glaberrimæ calycem vix superantis vexillo striato, ovario biovulato, legumine breviter oblique oblongo obtuso 4-lin. longo eglanduloso breviter et dense griseo-tomentoso. Secus fl. West River, prov. Cantonensis, m. Maio, 1875, coll. Rev. J. Lamont. (Herb. propr. n. 19479).

This is very closely allied to *F. congesta*, Roxb. ! but differs by its much smaller-sized leaflets, densely tomentose and rugose above, like those of *Atylosia scarabæoides*, Benth., from the impression of the nerves, which are strigosely hispid beneath and far more conspicuously prominent, and by the almost entire absence of petiolule. *F. semialata*, Roxb. ! which occurs in the neighbourhood of Canton, is also distinct by its much larger, smoother, less-nerved leaflets, winged petiole, and elongated usually compound inflorescence.

15. *Casalpinia Sappan*, L. In valle cava promontorii Kaulung, adversus Hongkong, m. Febr. 1874, primus detexit Rev. J. Lamont. A most interesting addition to the flora of China.

16. *Spiræa* (*Chamadryon*) *prunifolia*, S. & Z. Prope Ningpo legit Tarrant; in prov. Fokien, a 1861, coll. De Grijs; circa Chinkiang, 1876, W. G. Stronach. Doubtless introduced from China into Japan, where it does not seem to occur with single flowers.

17. *Exochorda grandiflora*, Lindl. In vicinibus Chinkiang, a. 1876, coll. Stronach.

18. *Rhodotypos kerrioides*, S. & Z. Circa Chinkiang, a. 1876, coll. W. G. Stronach. This remarkable plant had not previously, I think, been found out of Japan.

19. *Rubus corchorifolius*, L. fil. In ditione Fuchauensi coll. Gregory; secus fl. North River, prov. Cantonensis, Martio, 1877, Bullock. These are the only Chinese localities from which I have seen this plant, for the Fokien one cited by Maximowicz refers to my *R. althæoides*.

20. *Rubus rosifolius*, Sm., a. *tropicus*, Maxim. In prov. Fokien, a. 1861, leg. De Grijs. The only truly wild Chinese specimens I have seen.

21. *Rubus Thunbergii*, S. & Z. In insula Si dung ding san, lacus Tai hu, prov. Kiangsu, d. 28, Apr. 1874. F. B. Forbes. The Fokien

locality quoted from me by Maximowicz refers to the preceding species.

22. *Fragaria collina*, Ehrh.? In m. Siao wu tai shan, Jul. 1876, coll. W. Hancock. The specimen is in blossom only, and has a 1-flowered scape; it is therefore not possible to determine it with certainty, but it probably belongs to this species, and is, I believe, the only true Strawberry hitherto recorded from China proper.

23. *Potentilla discolor*, Bge. Secus fl. North River, prov. Cantonensis, Martio, 1877. T. L. Bullock. Not previously found in Southern China. Smaller than the northern and Formosan specimens.

24. *Cratægus cuneata*, S. & Z. Juxta Chinkiang, 1876, legit Stronach. Previously gathered by Mr. F. B. Forbes at Kiu-kiang. The specimens are more typical than a Yokuhama one I have from Maximowicz.

25. *Saxifraga (Nephrophyllum) cernua*, Linn. In monte Siao wu tai shan,* 100 mill. pass. a Peking, occasum versus, Julio, 1876, leg. W. Hancock. Not uncommon in Siberia, but not heretofore recorded from China proper.

26. *Hydrangea chinensis*, Maxim. Chinkiang, 1876. W. G. Stronach. These are the only specimens I have seen of what is apparently a rare species.

27. *Deutzia scabra*, Thunb. Circa Chinkiang, 1876, coll. Stronach. Not to my knowledge previously recorded from the Chinese continent. The specimens, however, appear certainly referable to this species, including *D. crenata*, S. & Z.

28. *SANICULA LAMELLIGERA*, *sp. nov.* Herbacea, 4-pollicaris, radice fibrosa, foliis radicalibus longe petiolatis trifoliolatis foliolis brevissime sed distincte petiolulatis basi cuneatis lateralibus bipartitis intermedio trilobo segmentis omnium inciso-serratis, serraturis mucronatis, caulibus folia vix superantibus scapiformibus, umbella biradiata basi folio unico tripartito mucronato-serrato involucrata, umbellulis pluribus 3-5 floris, floribus exterioribus masculis pedicello ipsis paulo longiori gestis centrali femineo sessili, calycis tubo lamellis pluribus angustis verticalibus alulato laciniis linearibus, petalis obovatis retusis, staminum longe exsertorum antheris albis. Secus fluvium North River, prov. Cantonensis, coll. am. T. L. Bullock, Martio, 1877. (Herb. propr. n. 19,942).

A remarkable species, most nearly allied to the Korean *S. tuberculata*, Maxim., but very distinct from any hitherto described.

* This celebrated mountain, situated about eighty miles west of Peking, and the loftiest in the neighbourhood, will be found laid down in the capital map attached to Dr. Bretschneider's memoir, 'Die Pekinger Ebene und das benachbarte Gebirgslande' (Petermann's Mittheilung. Ergänzungsheft, 46). Dr. Bretschneider assigns it an elevation of more than 12,000 feet, and says that it is covered with snow at the end of May. The plants of Mr. Hancock, who I believe is the first foreigner to ascend the mountain, were gathered between 5300 and 10,150 feet.

29. *Phellopterus litoralis*, Benth. Ad litora marina, juxta Chi fu, coll. W. Hancock. Not previously found in China.

30. *HERACLEUM MÖLLENDORFFII*, *sp. nov.* Caule plurisulcato aspero, foliis sparsim brevissimeque hispidis trisectis (summum tantum trilobatis) segmentis longe petiolulatis basi cordatis ad medium palmatifidis grosse inciso-serratis, umbellis radiantibus, fructibus ellipticis utrinque obtusis spinulis minutis sparsis hispidulis 3 lin. longis vittis dorsalibus lateralibusque lineari-subclavatis una alterave sæpissime deficiente commissuralibus 2 clavatis parallelis omnibus medium mericarpium adtingentibus v. paulo ultra pratensis. In m. Po hua shan, Chinæ bor. d. 6, Octobris, 1874, legit Dr. O. von Möellendorff. (Herb. propr. v. 19, 197).

This is probably the plant referred doubtfully in Maximowicz's 'Index Floræ Pekinensis' to *H. dissectum*, Ledeb., from which it is apparently quite distinct.

31. *Oldenlandia alata*, Koen. In rupibus humidis inter silvas ad Tingü shan, prov. Cantonensis, ineunte Junio, 1867, detexit Sampson. The specimens belong strictly to *Hedyotis pterita*, Bl., distinguished by the capsule with four equally broad wings, which Decaisne ('Herb. Timor. Descript.' 89) says is the same as Koenig's species, an opinion the accuracy of which is questioned by Miquel. A character not noticed before, so far as I know, is that the capsule, while quite fresh and succulent, dehisces at the top, and exposes the perfectly white and immature seeds, which are subsequently blackish brown and deeply pitted. I cannot, after examining the living plant, think with Mr. Bentham ('Fl. Hongkong.' 152) that this is reducible to *O. racemosa*, Lam.

32. *Cyathocline lyrata*, Cass. In prov. Cantonensi, vere 1866. T. Sampson.

33. *Antennaria leontopodina*, DC. ? I have received this from a number of localities in North China, where it seems very common. M. Maximowicz assures me that it is the *Leontopodium sibiricum* γ . *depauperatum* of Turczaninow, and a reference to vol. ii. Add. p. 38, of that author's 'Flora Baicalensi-Dahurica' will show that he proposed, doubtfully, naming it *A. Steetziana*. The limits between many Helichryseous genera seem to me altogether fanciful; but I do not believe the present plant can by any careful observer be united with *Leontopodium sibiricum*, Cass.

34. *Anaphalis triplinervis*, Benth. In m. Siao wa tai shan, legit Hancock. New to China. The leaves of the Chinese plant are very much smoother than in Blinkworth's Kumaon specimens, but I do not think it can be separated specifically.

35. *Microrhynchus (Launæa) sarmentosus*, DC. Longissime repens et radicans in arena litorea profunda ac mobili ad Pak sha, extremitate australiori prov. Cantonensis, ex adverso ins. Hai nan: ipse legi d. 20 Novembris, 1866.

36. *Pieris (Eupieris) lanceolata*, Don. Inter saxa in summo cacumine montium Pakwan, supra Cantonem, d. 26 Martii, 1870, leg. Sampson. Only previously recorded from the mountains of India.

37. *Stimpsonia chamædryoides*, A. Gray. Prope Fuchau, Maio,

1857, legit Gregory. Japan is alone mentioned as the native country in the 'Genera;' but I sent one of Gregory's specimens to Kew, when first detected.

38. *Mitrasacme indica*, Wight. Ad Swatow, in scaturiginosis, duo tantum exemplaria pusilla invenit Sampson, Junio, 1866. Circa Amoy ipse legi, Oct. 1857. Found hitherto only in the Indian peninsula, Ceylon and Australia.

39. *Calotropis gigantea*, R. Br. In parva insula Nau chau, juxta Hainan, m. Julio, 1870, leg. Sampson.

40. *Lithospermum Zollingeri*, A. DC. In monte Feng wang shau, circ. 35 mill. pass. ab urbe Shanghae, æstate 1876, coll. J. P. Martin. Only previously gathered in Japan. Maximowicz, who no doubt rightly reduces to this *L. japonicum*, A. Gray, refers it to the section *Margarospermum* ('Mél. Biolog. Acad. Pétersb.' viii. 542), next *L. purpureo-caruleum*, L. *Lithodora* is not coextensive with this, as stated by Willkomm ('Prodr. Fl. Hispan.' ii. 499) and Bentham and Hooker ('Gen. Plant.' ii. 860); for Reichenbach includes in his section *L. purpureo-caruleum*, which Grisebach ('Spicil. Fl. Rumel.' ii. 85) expressly excludes, and I think he and Boissier ('Fl. Orient.' iv. 218) right in associating this species with *L. officinale*. As remarked by Bentham, *L. apulum*, Vahl., and its ally *L. microspermum*, Boiss. (= *L. Webbii*, Coss. & DR.) form a good section of themselves, for which Columna's name *Apula* might well be restored.

41. *Ipomœa (Eupipomœa) Turpethum*, R. Br. Prope Whampoa, ipse legi, d. 16 Februarii, 1871; secus amnem Lien chan, Oct. 1876; coll. Rev. J. C. Nevin.

42. *Ipomœa (Pharbitis) congesta*, R. Br. In insula Prata, maris chinensis, m. April, 1858, leg. C. Wilford. The peduncles are 1-flowered, and the corolla rather more than three inches in length in my specimens.

43. *Pedicularis longiflora*, Rudolphi. In m. Siao-uri-tai-shan, Julio 1876, coll. W. Hancock. This curious and very distinct species had only hitherto been found in Baikal, Siberia.

44. *Thunbergia fragrans*, Roxb. Serpens inter gramina secus viam a portu Hoihan ad metropolin Kieng-chan-fú ins. Hainan ducentem, d. 18, Novembris, 1866, coll. Sampson et Hance.

45. *Dadalacanthus nervosus*, T. And. In umbrosis riparum scopulosarum præcipitum ad fauces Shiuhing, secus fl. West River, Febr. 1857, legit Sampson. Not previously recorded from China.

46. *Avicennia officinalis*, L. In ins. Kulangsu, Amoy, Julio, 1865, coll. Sampson.

47. *Polygonum multiflorum*, Thunb. Circa Chinkiang, 1876, coll. Stronach. A rare Chinese plant, as far as I can judge from different envois.

48. *WIKSTREMLIA MONNULA*, *sp. nov.* Ramis angulatis glaberrimis atropurpureis, ramulis pubescentibus, foliis oppositis v. alternis herbaceis ellipticis acutis supra glaberrimis opacis subtus pallidis tenuiter venosis sparsim pilosulis 9 lin. longis 4 lin. latis petiolo $\frac{3}{4}$ lineali, racemis ramulos terminantibus capituliformibus

8-12-floris, perigonio gracili sericeo-pubescente in sicco luteo-purpurascenti semipollicari lobis brevibus obtusiusculis tubo triplo brevioribus, antheris superioribus subexsertis inferioribus medio tubo sitis, ovario oblongo apice sericeo-pubescente, stylo brevi glaberrimo stigmatē magno capitato, squamulis hypogynis binis lineari-oblongis viridibus ovario triplo brevioribus. In prov. Cantonensi, secus fl. North River, m. Martio, 1877, coll. T. L. Bullock. (Herb. propr. n. 19,989.)

A pretty and delicate species, apparently quite distinct from any yet described.

49. *ARGYROTHAMNIA* (*Speranskia*) *CANTONENSIS*, *sp. nov.* Caule tomentoso, foliis alternis flaccidis ovato-oblongis utrinque obtusis grosse et inæqualiter crenato-serratis serraturis sinibusque minute glandulosis supra sparsim pilosis subtus tomentosis penninerviis costa nervisque subtus prominulis copiose et minute pellucido-punctatis $1\frac{1}{2}$ -2 poll. longis 7-9 lin. latis petiolo 3-9 lineali, stipulis nullis, racemis terminalibus hirsutis, floribus binis v. sæpius ternis pedicellatis nunc in ramulos breves dispositis unisexualibus $1\frac{1}{2}$ lin. diametro bracteis parvis lanceolatis fultis, sepalis extus hirsutis lanceolatis, petalis tenerrimis albidis deltoideo-obovatis unguiculo brevi sepalis paulo brevioribus, staminibus 10-15 triverticillatis parum exsertis filamentis glaberrimis, ovario tridymo hirsuto tuberculis grossis oblongis obsito, stylis hirsutis bifidis stigmatibus laceris. Secus fl. North River, prov. Cantonensis, Martio, 1877, coll. T. L. Bullock. (Herb. propr. n. 19,955.)

An interesting plant, resembling in general appearance its near relative *A. tuberculata*, Müll. Arg.! from North China, but differing by its long-stalked proportionally wider leaves, with crenate teeth, the entire absence of stipules, and the smaller flowers and bracts.

50. *Euphorbia Esula*, L.; *E. cyparissioides*, Boiss. Secus fl. North River, Mart. 1877, leg. Bullock. Common apparently in the extreme north of China, but not previously recorded from the south of the Empire.

51. *Chloranthus japonicus*, Siebold. Secus fl. North River, Martio, 1877, leg. Bullock. A singularly meridional station for a plant heretofore detected only in Japan, the Korean archipelago and Manchuria.

52. *Trewia nudiflora*, Willd. In fruticetis juxta Cantonem, Aprili, 1870, detexit T. Sampson. New to China.

53. *Eriocaulon echinulatum*, Mart. In uliginosis extra Cantonem, secus viam ad montes Pakwan ducentem, d. 16 Octobris, 1866, detexit T. Sampson. This pretty little species had hitherto only been recorded from Burma.

54. *Cyperus Wightii*, N. ab E. Whampoa, Maio, 1875. The Chinese plant is quite identical with an Assam specimen gathered by Jenkins, for which I am indebted to Dr. George King, who gives *C. Zollingeri*, Steud. as a synonym. *C. compressus*, var. *spiculis angustis*, Thw. (C. P. 807) is also undistinguishable, and Dr. Harland gathered the same plant in Singapore. His specimen in my herbarium was doubtfully identified by Mr. Bentham with *C.*

lucidulus, Klein. Although referred to *C. compressus* by Thwaites, Nees and Steudel both place it in a separate paragraph of the genus. This species is new to the Chinese flora.

55. *Polypodium hirtellum*, Bl. In summo monte Tai-mo-shan, i.e., 'mons ingens molarum' e regione ins. Hongkong, alt. 3000 ped., d. 23 Februarii, 1877, coll. T. Sampson. Found hitherto only in Java and Ceylon. The Ceylon fern (C. P. 3902) given me by Dr. Thwaites as named by Sir William Hooker himself *P. lasiosorum*, is certainly not distinct, nor has it the long stalk figured by Blume ('Fl. Jav. Fil.' t. 46, f. 6) on which its distinction was mainly based. Thwaites' C. P. 3921, *P. parasiticum*, var. *latiusculum* (not *pilosiusculum*, as misnamed by Mr. Wall, 'Cat. of Ceylon Ferns,' p. 7) appears to me distinct from the species to which it is referred, and nearer the present one.

56. *Polypodium lineare*, Thunb. In m. Siao-wu-tai-shan, Jul., 1876, coll. W. Hancock. Although occurring in Japan, and at various points along the Chinese coast, this is, I believe, the most northerly point on the Asiatic mainland where it has been hitherto gathered. The Russian writers and Milde do not mention it as occurring in the Peking district, Manchuria, or Siberia.

57. *Cystopteris montana*, Link. In m. Siao-wu-tai-shan. W. Hancock. This is the first record of this fern from Eastern Asia, so far as I am aware. The specimens agree perfectly with Norwegian ones.

58. *Cystopteris fragilis*, Bernh. Cum priore.

59. *Woodsia glabella*, R. Br. Cum duabus præcedentibus. Now first recorded from China, but it had been previously found in Dahuria, Siberia, and Sachalin.

60. *Hymenophyllum* (§ *Glabra**) *emersum*, Baker. In rupibus summi montis Tai-mo-shan (mons ingens molarum) adversus Hongkong, alt. 3000 ped., d. 23 Februarii, 1877, coll. T. Sampson. Only known previously from Ceylon and Mauritius.

NOTES ON SOME SOUTH-EAST DEVON PLANTS.

BY THE REV. W. MOYLE ROGERS.

I.—INLAND.

ALL the plants recorded here have been observed by me in the course of the last twelve months in the parish of Trusham, or its immediate neighbourhood. Trusham is a small parish of between 700 and 800 acres, lying about midway between Exeter and Dartmoor, on the south-west slope of the Haldon Hills, the crests of which rise between it and the nearest sea-coast, nine miles distant, at Dawlish. It has for its contiguous parishes Hennock and Christowe on the west, with the river Teign as boundary between, Chudleigh on the south and east, and Ashton on the north. The

* Confr. Prantl, Untersuchung. z. Morphologie d. Gefasskryptogamen. I. Hymenophyllaceen, p. 54.

soil (the Ordnance Geological Chart is my authority) is carboniferous, with greenstone cropping up here and there, limestone occasionally to the south-east of Chudleigh, and granite above Hennock; while to the west of Bovey Tracey (a town beyond Hennock, and five miles by road from Trusham) lie the "Bovey Beds" (Lignites and Clays). This last-named district, known in the neighbourhood as the Bovey Heathfield, is said to be rich in interesting plants; but I have as yet visited it only once, and that so early as May. The semi-maritime character of the flora of Trusham parish appears to me to be its most marked special feature, especially when it is remembered that the Haldons intervene between the district and the sea.

Ranunculus parviflorus, Linn. Exceedingly abundant on open down and in stony field throughout the district, and quite a feature in the flora—especially as the foliage keeps freshly green through the greater part of the year. Also very common on the coast of South-east Devon, near Sidmouth, at Budleigh Salterton, and on Dawlish Warren.

Cardamine impatiens, Linn. In "Teign Lane," Trusham, where it was discovered by Mr. T. R. Archer Briggs in May last, while the plants were still only an inch or two high. Long known by the Rev. H. Roberts at Ashton, in a lane parallel to Teign Lane, but from two to three miles to the north of it; and on his authority recorded for South Devon in 'Topogr. Bot.' In Teign Lane this year it flowered freely, from the middle of June to the end of September, along the dry bushy bank for a quarter of a mile or more.

Barbarea intermedia, Boreau. In Trusham, Ashton, and Christowe parishes; rather frequent in waste spots and in rocky ground, especially by the river Teign; but never many plants together. *B. praeox*, Brown, is often to be seen near it, but is most abundant in the borders of stony fields.

Teesdalia nudicaulis, Brown. Very common throughout the district in bare rocky ground, and not infrequent in thin copses.

Viola odorata, Linn. (with purple flowers). Very abundant at the Chudleigh Rocks, but occurs nowhere else in the district, so far as I have yet seen. The more common variety (*b. alba* of Lond. Cat., ed. 7) is fairly general in woods and lanes. The lilac form, which on chalk in Dorset and South Wilts I have always found (without difficulty, though usually in small quantity) growing with the purple and the white, seems quite absent here. The Chudleigh Rocks are also remarkable for the great abundance of *V. Reichenbachiana* to be found there—almost to the exclusion of the more general *V. Riviniana*; the exact reverse of this being true at Trusham, Ashton, and apparently elsewhere in the district.

Viola lactea, Sm. Common on the Bovey Heathfield, on Knighton Heath (which is a continuation of Bovey Heath), and on similar ground near. With it, but (so far as I observed) only on the drier and more strictly heathy spots, occurs a form which I suppose to be the var. *b. intermedia* of 'Lond. Cat.,' ed. 7.

Dianthus Armeria, Linn. The only species, I believe, for which Trusham is named in 'Flora Devoniensis.' Rather frequent in stony bushy ground in Teign Lane and elsewhere in the parish. It lacks personal authority for South Devon in 'Topogr. Bot.'

Stellaria aquatica, Scop. Trusham. Only two or three plants along one of the little streams flowing into the Teign.

Sagina subulata, Wimm. On Haldon Hill and on Bovey Heathfield. On the south-east Devon coast only at Dawlish Warren, and (in but one spot, though in good quantity there) on Peak Hill, near Sidmouth.

Hypericum linariifolium, Vahl. On rocks in Trusham and Christowe. The Trusham Station is not more than a quarter of a mile from the Teign. It is of very limited extent, but had probably as many as thirty plants of this rare St. John's wort in flower from the middle of June until the beginning of October. At the Christowe Station—a rocky "Cleave" on the opposite side of the river, and more than a mile from its bank—there were hundreds of most luxuriant plants in July. There is no previous record, so far as I can learn, of either of these stations. The one given on the Teign in Mr. Ravenshaw's 'List' ("near Dunsford Bridge") is several miles further up the river. It appears to me particularly well figured in Bentham's 'Illustrated Hand-book of the British Flora;' and the opening words of his description—"Intermediate in some measure between the *trailing H.* and the *common H.*"—give a good idea of its appearance when flowering. But "seldom above eight or ten inches high" does not apply to the Christowe plants, which run up freely to eighteen inches or more; though it is true of those which grow on the more exposed rock at Trusham. In both stations, the leaves at first are only very slightly (if at all) revolute; they have the midrib very prominent beneath, are somewhat glaucous in hue, and remarkably blunt, narrowing only slightly from base to point. The stems appear to be uniformly ascending—never erect as in *H. perforatum*, Linn., nor prostrate as in *H. humifusum*, Linn., and (I should be disposed to add) obscurely two-edged, though authorities seem agreed in calling them terete. There is a rigid look about the whole plant, and a regularity of outline in the leaves and in the especially bright yellow petals, which mark the species off at first sight from all other British ones. The peculiar resinous smell so characteristic of the Tutsan is very strong in this species.

Hypericum hirsutum, Linn. Nowhere in the district, except near Chudleigh; there it is frequent.

Geranium pusillum, Linn. One of the commonest species at Trusham, in all the barer fields and stony waste places; also in the parishes of Ashton and Doddiscombe Leigh (next beyond to the north-west), and on the Chudleigh Rocks.

Geranium lucidum, Linn. The extreme abundance of this is quite another feature in the flora of the district, and one that can hardly fail to catch the eye of even non-botanical observers.

Covering wall and hedgebank, and occupying every favourable spot in the woods.

Geranium Robertianum, Linn., var. *b. modestum*. Well-marked specimens of this variety from the immediate neighbourhood of the Christowe *Hypericum linariifolium*. There were plants of typical *G. Robertianum* growing close by, and I could see nothing in the respective situations of the two forms to account for the variation. Is there any other distinctly inland station on record for it? Here it cannot be less than ten miles from the sea coast.

Oxalis corniculata, Linn. I cannot but regard this as truly indigenous at Trusham. Elsewhere in South Devon, as also in West Cornwall and Dorset, it has always seemed to me a mere garden "escape." But in Trusham it not only occurs in considerable quantity in three of the lanes, but I also find it on a bare furzy down, where it certainly looks quite as much a "native" as the *Rumex Acetosella*, *Sedum anglicum*, and *Geranium pusillum*, which grow beside it. This plant finds no place in 'Topogr. Bot.'

Trifolium subterraneum, Linn. Remarkably abundant in South-east Devon generally, and in Trusham and its neighbourhood especially. In Trusham the turf, wherever undisturbed, is as a rule full of it, almost to the exclusion of the commoner species—*T. pratense*, Linn., and *T. repens*, Linn. In some of the more stony fallows, however, and on the open downs, *T. filiforme*, Linn., and *T. glomeratum*, Linn., dispute the ground with it. *T. striatum*, Linn., *T. arvense*, Linn., and *T. procumbens*, Linn., are also frequent; *T. minus*, Relhan, is to be met with everywhere in lane, and wood, and field border; while in one or two bare rocky spots at Trusham, and at the Chudleigh Rocks, *T. suffocatum*, Linn., is in as great quantity as almost any other species. *T. scabrum*, Linn., I have found nowhere in the district but at the last-named station; there, too, it is abundant with most of those named above. *T. hybridum*, Linn., is rapidly spreading through the district. *T. medium*, Linn., I have as yet observed only in Ashton parish, near the Teign.

Lotus tenuis, Kit. Inland in South Devon, only near Oaklands, in Chudleigh parish, where it seems thoroughly established, but I suspect only as an escape from cultivation. At Exmouth, and near Woodbury Road Station (between Exmouth and Exeter) it grows freely along the border of salt marshes. Does this betray a special liking on its part for the seaside? or has the proximity of a railway station in each instance anything to do with it? The extremest form of this plant that I remember to have seen was in a somewhat similar situation, viz., between the railroad and the backwater at Weymouth, from the very rails to the water's edge.

Lotus angustissimus, Linn. Very common in Trusham, Ashton, and Hennock parishes, in company with some of the rarer trefoils named above; especially on open downs and in rocky bushy places and borders of stony fields. In some of these stations it

can hardly be less than a distance of eleven or twelve miles from the sea. I should be glad to learn how far inland this little *Lotus* and *Trifolium suffocatum*, Linn., have been found by other botanists. Mr. Briggs (in Journ. Bot. for Nov. 1874, p. 328) says that about Plymouth he has never seen either *L. angustissimus*, Linn., or *L. hispidus*, Desf., "at more than three-quarters of a mile from salt water." The latter species I have met with at only one South-east Devon station,—on high ground near the left bank of the Otter, at about a mile from the river's mouth, on just such a spot as he speaks of for it, "old unbroken land patched with furze."

Ornithopus perpusillus, Linn. This species and *Sedum anglicum*, Huds., and two or three of the trefoils (especially *T. glomeratum* and *T. striatum*, or *T. arvense*), are the almost unfailing companions of *Teesdalia nudicaulis*, Brown. A little careful search, especially if there is a furze bush near for shelter, will generally add a plant or two of *Corydalis claviculata*, DC.,—a very local species in my experience in the south-west of England.

Lathyrus Nissolia, Linn. In Trusham parish, on bushy rocky ground above the Teign; but apparently in no great quantity.

Potentilla procumbens, Sibth. In Trusham, Chudleigh, and Ashton parishes; on roadside banks, not uncommon. This plant lacks personal authority for South Devon in 'Topogr. Bot.,' and Mr. Briggs tells me that he has not met with it in the neighbourhood of Plymouth. In some stations I have found *P. reptans*, Linn., close by, and occasionally a form somewhat intermediate between these two; but where I have seen *P. Tormentilla*, Schenk., I have always looked for *procumbens* in vain.

Potentilla argentea, Linn. There is, I believe, no record of this having been found in Devonshire previous to my discovery of it at Trusham just a year ago. Singularly enough it is quite frequent in this parish, where I now know at least six distinct stations for it at some distance from each other; and yet beyond the parish I have so far searched for it in vain. It likes situations similar to those in which I find *Dianthus Armeria*, Linn., *i. e.* rocky bushy banks and the corners of stony fields.

Pyrus torminalis, Ehrh. At the Chudleigh Rocks, and by roadside and in wood in Hennock and Chudleigh parishes. Probably not uncommon elsewhere in the district, as I may easily have overlooked it in mistake for *Acer campestre*, Linn., (which is very common in this part of the county), especially as I have not found it in flower, perhaps from its being usually cut back too soon.

Epilobium lanceolatum, S. & M. Mr. Briggs pointed out to me some young plants of this species in May last on the Chudleigh side of the little "Bramble Brook," which separates that parish from Trusham. At about a mile from that station we afterwards came upon it in Hennock parish, and a day or two after we saw it in considerable quantity in and about Bovey Tracey. I have since found very handsome specimens of it in Christowe parish, in the same "Cleave" which produces *Hypericum linarifolium* in

such abundance, and by the Teign; and again, six or seven miles north-east of that, on a high bank by the roadside between Ide and Exeter, less than a mile from the city.

Epilobium tetragonum, Linn. In Ashton and Chudleigh parishes; frequent near the town.

Callitriche obtusangula, Le Gal. Found by Mr. Briggs and myself in a deep pool by the Teign in Ashton parish, and in another pool by the same river below Chudleigh Bridge. Not recorded for South Devon in 'Topogr. Bot.'

Petroselinum segetum, Koch., and *Sison Amomum*, Linn. Both frequent in the district; as also about Exmouth and Lympstone.

Enanthe pimpinelloides, Linn. Frequent through the district in meadows, and occasionally in dry bushy places. It is also certainly not very rare along the south-east Devon coast, as I have found it on the cliffs at Salcombe Hill, near Sidmouth; at Budleigh Salterton, at Exmouth, and between Lympstone and Topsham. At Exmouth I was surprised to find an unmistakable specimen of it in a salt marsh.

Torilis infesta, Spreng. In the parishes of Trusham and Ashton; but so far as I have seen only in cultivated fields. Lacks personal authority for South Devon in 'Topogr. Bot.'

Charophyllum Anthriscus, Lam. This species, certainly uncommon or very local in the south-west of England, is to be found in considerable quantity in a waste spot or two in Trusham parish. The only other station in the county where I have seen it is between Mount Pleasant and Dawlish Warren.

Smyrniium Olusatrum, Linn. Well established in and about Trusham Churchyard, and at Ashton. A garden "escape?" By the sea I have seen it near Dawlish, Lympstone, Exmouth, and Budleigh Salterton.

Viburnum Lantana, Linn. At the Chudleigh Rocks, and near Kingsteignton (between Chudleigh and Newton Abbot); but it appears to be rare in the district, though frequent farther east in the county. *V. Opulus*, Linn., is much more general.

Rubia peregrina, Linn. I have not yet been able to find this in Trusham; but it is frequent in the contiguous parishes on all sides, Chudleigh, Ashton, and Christowe.

Galium tricorne, With. In cultivated fields at Trusham and Ashton. Introduced with seed? Not recorded for South Devon in 'Topogr. Bot.'

Valerianella carinata, Lois. Found by Mr. Briggs, and by him pointed out to me, in great quantity on a roadside wall by Bovey Tracey; but I have not been able to discover it elsewhere in the district. Finds no place in 'Topogr. Bot.,' and in 'Lond. Cat.' is printed in italics only, as not an admitted "native" of the British Isles.

Valerianella Auricula, DC. Not uncommon in the parishes of Trusham and Ashton; indeed I have seldom looked for it in vain wherever in this district I have found the commoner species, *V. dentata*, Koch., in any abundance.

Carduus tenuiflorus, Curt. At Ashton and Trusham, abundant.

Picris hieracioides, Linn. Ashton and Hennock.

Mentha gentilis, Linn. At Hennock, in rocky bushy ground near Bott Tor. Finds no place as a species in 'Topogr. Bot.'

Melittis Melissophyllum, Linn. Frequent in the district.

Myosotis palustris, With. I have looked in various parts of the district for this species, but so far in vain. *M. caspitosa*, Schultz., is the usual wet land form; but I have found *M. repens*, Don., in one meadow on the Hennock side of the Teign, and at Christowe.

Primula officinalis, Linn., and *Plantago media*, Linn., are apparently also absent from the district; far the commonest *Plantago* in all the unenclosed and wilder parts being *P. Coronopus*, Linn.

Rumex pulcher, Linn. Frequent at Trusham and at the Chudleigh Rocks.

Carpinus Betulus, Linn. Occurs rather frequently in the parishes of Trusham and Chudleigh, on Haldon Hill, and by the River Teign. How far it may claim to be indigenous in most or in any of these stations I do not feel competent to say. In 'Topogr. Bot.' South Devon is one of the many vice-counties bracketed at the end of the records for this tree with the note—"Recorded, but usually as an alien."

Spiranthes autumnalis, Rich. On an open down at Trusham and at Ashton. Lacks personal authority for South Devon in 'Topogr. Bot.'

Luzula Forsteri, DC. Very abundant; indeed quite the commonest *Luzula* throughout the district. *L. pilosa*, Willd., occurs on Chudleigh Rocks, and (somewhat sparingly) in other parts of Chudleigh parish. But elsewhere in the district, except on Haldon Hill, I have not hitherto met with it, *L. Forsteri* taking its place in wood and lane.

Scirpus sylvaticus, Linn. By the River Teign, in Trusham and Ashton parishes.

Carex larigata, Sm. One of the commonest Carices throughout the district, as apparently in other parts of South Devon.

Gastroidium lendigerum, Gaud. In Trusham parish, on a dry bank by the roadside; a good many plants, but in a very confined station. On a heath, however, between Trusham and Ashton, and also all over a stony field near it, it grows in the greatest profusion. On the south-east Devon coast I know only one station for it—at Exmouth, near the cricket-ground.

Agrostis setacea, Curtis. A frequent grass throughout the district, and where found usually most abundant.

Avena pubescens, Linn., is apparently absent, as well as the rarer *A. pratensis*, Linn.

Poa nemoralis, Linn. Frequent at Trusham, Christowe, and the Chudleigh Rocks. Lacks personal authority for South Devon in 'Topogr. Bot.'

Poa compressa, Linn. On dry banks in Teign Lane, Trusham.

Triticum caninum, Huds. In a wood by the Chudleigh Rocks

in some quantity. Lacks personal authority for South Devon in 'Topogr. Bot.'

Asplenium septentrionale, Hull. On high rocks between Chudleigh and Dartmoor—a station discovered by the Rev. H. Roberts several years ago, and kindly shown by him to me in July last. Not recorded for South Devon in 'Topogr. Bot.'

Asplenium lanceolatum, Huds. On granite rocks in Hennock parish.

Aspidium aculeatum, Sw. On shady banks in Hennock and Dunchideock parishes, but very scarce; the common species of this genus in this district, as apparently in South-east Devon generally, being *A. angulare*, Willd.

II.—MARITIME.

The following records are the result, not of a twelve months' stay in one place, but of occasional visits to different points on the coast from Axmouth to Dawlish, made at uncertain intervals from 1872 to 1877; but chiefly (from Sidmouth as a centre) in the spring of 1876, and (from Exmouth as a centre) in the early part of August, 1877. Some of the less common plants observed during these visits are mentioned with maritime as well as inland stations in the preceding notes; and to these no further reference is made in what follows here.

Nuphar lutea, Sm. In the River Clyst, by the village of Clyst St. Mary, near Topsham; frequent. The same river is given for it in 'Flora Devonensis.' Lacks personal authority for South Devon in 'Topogr. Bot.'

Crambe maritima, Linn. Cliffs between Sidmouth and Salcombe Beach; fairly abundant, but mostly out of reach, in May, 1876. Station given in 'Flora Devonensis.'

Diplotaxis tenuifolia, DC. Exmouth Harbour; a few plants.

Cochlearia anglica, Linn. In great abundance on the left bank of the River Axe, between the village of Axmouth and the mouth of the river. Also near Ottermouth, and by the stream at Woodbury Road station.

Cerastium semidecandrum, L. This chickweed, so rare about Plymouth (see Journ. Bot., No. 143, p. 32), and which in 'Topogr. Bot.' is queried for South Devon, is exceedingly abundant on Dawlish Warren and at Budleigh Salterton. It is also to be found in some quantity, and of very large size, near the top of Salcombe Hill, Sidmouth; but both in that neighbourhood and in most parts of the South-east Devon coast it appears much less general than the very common *C. tetrandrum*, Curt., which also prevails inland, on Haldon Hill and at the Chudleigh Rocks, where *C. semidecandrum* seems wholly absent. *C. pumilum*, Curt., which Mr. Townsend has found near Torquay, I have looked for in vain further east. On Dawlish Warren the unfailing companion of *C. semidecandrum* is the *Stellaria media*, b. *Boræana*.

Hypericum montanum, L. Frequent between Seaton and Beer.

Malva rotundifolia, L. This mallow, which Mr. Briggs

speaks of (in Journ. Bot., Dec. 1873, p. 374) as "an uncommon plant in South-west Devon," I have as yet found only on Exmouth Sands in South-east Devon.

Radiola millegrana, Sm. On Dawlish Warren with *Centunculus minimus*.

Erodium moschatum, Herit. At Dawlish, near the Coast-guard Station, and (with *E. cicutarium*) on the sands near Exmouth Harbour.

Medicago maculata, Sibth. Abundant at Exmouth, Sidmouth, and Dawlish Warren. Apparently general on South-east Devon coast. Also in great quantity at the Chudleigh Rocks.

Trigonella ornithopodioides, DC. At Seaton and on Dawlish Warren.

Trifolium fragiferum, L. Borders of salt marshes at Exmouth and Budleigh Salterton. Lacks personal authority for South Devon in 'Topogr. Bot.' *T. scabrum* is abundant at Seaton and Exmouth: *T. striatum* on Salcombe Hill (Sidmouth); and *T. subterraneum* on most parts of the South-east Devon coast.

Vicia bithynica, L., with *b. angustifolia* intermixed, is fairly abundant at Salcombe Beach (east of Sidmouth); between Exmouth and Strait Point; and on the other side of Exmouth, between it and Lympstone. *Lathyrus Aphaca*, L., which lacks personal authority for South Devon in 'Topogr. Bot.,' and *L. sylvestris*, L. (abundant also on "the Landslip" to the east of Exmouth) grow with this vetch on Salcombe Beach, and in the ravine there opening to the sea. I also found one plant of *L. Aphaca* on the cliffs on Peak Hill to the west of Sidmouth. In 'Flora Devoniensis' "Cliffs near Sidmouth" is one of two Devon stations given for it.

Enanthe Lachenalii, Gmel. Among *Juncus maritimus* between Lympstone and Topsham, and on Dawlish Warren.

Centaurea Calcitrapa, L. In a sandy field by the sea to the east of Exmouth, as recorded in 'Flora Devoniensis.' There were several tall much-branched plants there in August, 1877. Lacks personal authority for South Devon in 'Topogr. Bot.'

Hypochaeris glabra, L. In considerable quantity on Dawlish Warren and at Exmouth (near the Harbour). Lacks personal authority for South Devon in 'Topogr. Bot.'

Erythraea pulchella, Fries. At Exmouth and on Dawlish Warren; also inland on a heath between Trusham and Ashton.

Chlora perfoliata, L. On Salcombe Beach, to the east of Sidmouth. Apparently a rare plant in South-east Devon. Lacks personal authority for South Devon in 'Topogr. Bot.'

Veronica Anagallis, L. Appears to be quite local in South-east Devon, where I have found it only by the River Clyst (near Topsham) and near Exmouth; both which stations are named for it in 'Flora Devoniensis.'

Lithospermum purpureo-caruleum, L. Overrunning dense thickets in the ravine (referred to above) which opens to the sea at Salcombe Beach. Lacks personal authority for South Devon in 'Topogr. Bot.'

Cynoglossum officinale, L. On the "Landslip" to the east of Axmouth, and at Seaton. Lacks personal authority for South Devon in 'Topogr. Bot.'

Statice Limonium, L. Near Exmouth, between Lympstone and Topsham; and on Dawlish Warren. In the last-named station, on sand washed by high tides, grows in plenty a singularly stunted form, from one and a half to three inches high, with leaves mostly less than an inch long, and very compact inflorescence. Quite near, but amongst masses of *Juncus maritimus*, the species runs up to a height of seven or eight inches or more, having the lower branches mostly flowerless, and (in some of the specimens) remarkably lax spikelets, reminding one of *S. bahusiensis*. Lacks personal authority for South Devon in 'Topogr. Bot.'

Salicornia radicans, Sm. Spreads for some distance on the north side of Dawlish Warren, over sand washed by high tides. It is not recorded for South Devon in 'Topogr. Bot.;' nor has it, I believe, been reported from either Devon or Cornwall. Between it and the drier part of the Warren occur in great quantity both typical *S. herbacea*, L., and its variety *b. procumbens*.

Chenopodium olidum, Curt. Very common at Exmouth, where *C. murale*, L., also occurs in some quantity about the Harbour.

Euphorbia Paralias, L. Exmouth sands, near the Harbour; a few plants only. Lacks personal authority for South Devon in 'Topogr. Bot.'

Zostera marina, L., *b. angustifolia*. Abundant between Exmouth and Lympstone, as reported in Mr. Ravenshaw's 'List.' The species lacks personal authority for South Devon in 'Topogr. Bot.'

Sagittaria sagittifolia, L. In the River Clyst; near Clyst St. Mary; as reported in 'Flora Devoniensis.' Queried for South Devon in 'Topogr. Bot.'

Trichonema Columnæ, Reich. Very abundant in its well-known station, Dawlish Warren, in 1876 and 1877.

Allium vineale, *b. bulbiferum*. On the sands between Exmouth and Strait Point, frequent.

Schanus nigricans, L. Clayey banks at Salcombe Beach, east of Sidmouth. Lacks personal authority for South Devon in 'Topogr. Bot.'

Carex distans, L., and *C. extensa*, Good. In salt marshes at Budleigh Salterton and Exmouth; the latter very abundant at Exmouth (the station given for it in 'Flora Devoniensis'), as also between Lympstone and Topsham.

Echinochloa Crus-galli, Beauv., and *Setaria viridis*, Beauv. Together on waste ground near some new buildings at Exmouth.

Phleum arenarium, L. Abundant on Dawlish Warren and Exmouth sands. Lacks personal authority for South Devon in 'Topogr. Bot.'

Festuca uniglumis. Soland. On Exmouth sands, as reported in 'Flora Devoniensis;' near the flagstaff. *F. rubra*, *b. arenaria*, is also abundant at Exmouth and along the neighbouring coast. Both lack personal authority for South Devon in 'Topogr. Bot.'

Triticum junceum, L. This, which as a segregate has no record for South Devon in 'Topogr. Bot.,' is abundant on the sands at Exmouth and in the neighbourhood, and also on Dawlish Warren. With it near Exmouth are, at least, two other distinct maritime forms of *Triticum* which I believe to be *T. pungens*, Pers., and the littoral form of *T. repens* (*T. littoreum*, Schum.). What appears to me yet another form occurs in some quantity on the sands between Exmouth and Strait Point, and this I think may be *T. acutum*, DC. But, I should add, the only maritime form of this genus which I feel able clearly to identify is *T. junceum* proper.

Lepturus filiformis, Trin. Frequent at Exmouth, Dawlish Warren, and Budleigh Salterton.

Elymus arenarius, L. Apparently absent now from South Devon. My search for this rare grass and for *Euphorbia Peplis*, L., (both reported in 'Flora Devoniensis' for Exmouth,) was very close there and on Dawlish Warren in August last; but it proved wholly unsuccessful.

SHORT NOTES.

ROSA MOLLIS, Sm., &c., IN NORTHAMPTONSHIRE.—By the borders of Plain Woods, five miles west of Northampton, *Rosa mollis* occurs plentifully, not only in the hedgerows, but also about the wood itself. This Rose appears to be more widely distributed than was formerly considered. Mr. Baker has named some Roses that I have gathered during the year in this county. They include *Rosa coriifolia*, Fries., from hedgerows between Gayton and Rothers-thorpe; *R. arvatica*, Bak., stone-pit near Northampton; *R. verticillanthes*, Merat, (not the type) from the Nene Banks; *R. implexa*, Gren., east slopes of Boro Hill at about 400 feet. *R. tomentella*, L., about Gayton. *R. pimpinellifolia*, L., is frequent near the top of Boro Hill, about 750 feet; and also grows sparingly in Harleston Firs. *R. micrantha*, Sm., is not infrequent in Whittlewood and the other Forests.—G. C. DRUCE.

PARINARIUM DILLENIFOLIUM, R. Br.—Steudel has quoted from Wallich (Cat. 7520) the name of this species, which he gives as a synonym of *Petrocarya dillenifolia*, Steud. The type-specimen consists merely of three leaves gathered by Wallich himself "in montibus Penang." I think there can be no doubt that these leaves belong to a plant of very different affinity, namely, *Dipterocarpus cornutus*, Dyer, Fl. Brit. Ind. i. 296, the diagnosis of which is founded on fruiting specimens collected by Maingay at Malacca.—W. T. THISELTON DYER.

Notices of Books and Memoirs.

Guide du Botaniste, en Belgique (plantes vivantes et fossiles). Par FRANÇOIS CRÉPIN. Bruxelles: Mayolez. Paris: Baillière. (Sm. 8vo, pp. 494).

THIS book is planned somewhat on the lines of the first volume of M. Germain de Saint-Pierre's 'Guide du Botaniste,' published at Paris in 1852, and is intended to form a handbook of instruction and general botanical information, especially for those commencing the study. The book is divided into two parts, the first relating to Botany generally, the second to Belgium exclusively. In the former we find successively treated of—excursions, the collection of plants, the formation of herbaria, exchanges, writing for publication and the correction of printers' proofs; then follow directions for the study of the anatomy and physiology of plants, their geography, and a classified catalogue of the books, periodicals, &c., most useful in a botanist's library. The study of fossil plants follows, and is treated in the same order at considerable length: this is a novel feature in works of this description.

The second part is of more interest, and though devoted to Belgium must prove useful to botanists of other countries. We have first a succinct history of the progress of Botany in Belgium from the beginning of the sixteenth century to the present time, and this is followed by an account of the existing museums, gardens, libraries, and other botanical establishments of the country. The botanical geography of Belgium is exhibited in a very interesting essay, which occupies a considerable space, and is followed by lists of species to be found during excursions into the various districts. In connexion with this portion of the book is a complete catalogue of all the fossil plants of Belgium at present known, and indications of the principal localities where they may be obtained. The volume concludes with a general classified bibliography of the books and papers of Belgian botanists, which occupies 67 pages.

Most young botanists have felt the want of some such guide as this when entering alone, as so many do, on a study which appears to bristle with difficulties. M. Crépin's book well supplies what is wanted; there is room for one of a similar character intended for English readers. H. T.

Introduction to Botanic Teachings at the Schools of Victoria. By BARON FERD. VON MUELLER, Government Botanist. Melbourne, 1877. (8vo, pp. 152).

THIS little book is deserving of note and commendation. It is intended as an introduction to the study of plants in elementary schools, the author's experience having convinced him that the

only method of rendering such study "agreeable and lastingly fruitful" consists in arousing the pupils' interest in the discrimination of the native plants of their locality. A 'Victorian School-Flora,' commenced by the author with this object, is postponed for the publication of this more elementary treatise. In this each large Order of the flora of Victoria is taken up and described in a plain but attractive manner. The Gum-trees (*Eucalyptus*), as forming the chief timber-trees of the Australian Continent, are taken first, and other Victorian genera of *Myrtaceæ* follow. The second chapter is devoted to the Wattles (*Acacia*) and other *Leguminosæ*; the third to the She-oaks (*Casuarina*), and so on through twenty-two chapters. The subjects are well illustrated by clear large woodcuts, mostly copied from the plates of the author's 'Plants of Victoria': most of these are of course quite unfamiliar, even by name, to the majority of English botanists; and indeed it cannot fail to strike all as remarkable to see species unknown to Science within the lifetime of the present generation now used as illustrations of elementary facts in a book for school-children. In Europe we have become accustomed to the well-known stock illustrations; but it is natural and right that our colonies should make their own text-books, and use the plants which grow on their own soil. As one of the first productions of its class in a British colony, therefore, the present treatise has a particular interest.

H. T.

Beiträge zur Entwicklungsgeschichte der Flechten, von E. STAHL, Heft II. (A. Felix, Leipzig, 1877).

THE first part of this work, which dealt with the *Collema*, and more especially with the question of their reproduction, was noticed in the Journal for 1877, p. 284. It will be remembered that the results obtained were clearly in favour of the sexuality of their reproduction, and as clearly confirmative of Schwendener's discovery as they could well be. In this second part the nature of the Hymenial-gonidia is the subject, and in his cultivation "from spore to spore" of the plants treated of, Dr. Stahl has succeeded in gaining for us a very complete knowledge of these until now little known organisms. That it was Nylander who first called attention to the constant occurrence of these Hymenial-gonidia in the empty spaces of the perithecia of many pyrenocarpous lichens, appears strange when it is made known how ill their life-history agrees with his "anti-Swendeneristic" views. However, he did little beyond proclaiming their existence; and Fruiting and Winter were the first to show that the Hymenial-gonidia were the offspring of the Thallus-gonidia. The part played by them in the vital economy of the lichen still remained unknown, and afforded to one party a subject for speculation and to the other a matter to be rather avoided than otherwise. Dr. Stahl, not contented with speculation, has now investigated them with the following results.

In the hymenium of *Dermatocarpon Schæreri*, and growing free between the asci, are to be found globular Hymenial-

gonidia, which differ from the Thallus-gonidia chiefly in being smaller, and which are cast out of the perithecia along with the ripe spores. They naturally fall in each other's company; and if this happens on a suitable substratum, the spores germinate and the germ-tubes embrace the Hymenial-gonidia, which soon attain the dimensions of Thallus-gonidia. This is admirably shown on Taf. v. figs. 6, 8, 9, 10. With careful cultivation, a short time suffices for the production of the true *Dermatocarpon Schæveri* with its characteristic thallus. The baton-shaped Hymenial-gonidia of *Polyblastia rugulosa*, which agree in their characters with the free algæ of the genus *Stichococcus*, have been observed to act in an exactly similar manner. A small species of *Thelidium*, until now undescribed, very often accompanies *Dermatocarpon Schæveri*, and the gonidia of the former are specifically identical with those of the *Dermatocarpon*. If the spores alone of the *Thelidium* be brought together with nothing but the Hymenial-gonidia of the *Dermatocarpon*, and be cultivated in the most isolated manner, the result is the thallus of the *Thelidium* complete with its characteristic spore-fructification. The same alga (a species of *Pleurococcus*) forms, then, the gonidia of these two lichens, i. e., two species of *Ascomyctes* can consort with the same alga. It will not be denied that the above is a very crucial experiment, and, so far as can be seen, there is no reason to doubt its accuracy. Its result is one of the most decided proofs that have been given of the accuracy of Schwendener's views, and goes far to strengthen this already well-grounded doctrine. The carrying up of the Hymenial-gonidia (the offspring of the Thallus-gonidia), their emission along with the spores, and finally their employment as the Thallus-gonidia of the new lichen, form a life-history at once simple and beautiful.

G. M.

Annales du Jardin Botanique de Buitenzorg. Publiées par M. LE Dr.
R. H. C. C. SCHEFFER, Directeur de ce Jardin. Vol. I. Batavia :
H. M. Van Dorp et Cie. 1876. (Pp. 182, tl. 30).

THOUGH dated October, 1876, this has only lately come to hand. Botanists will welcome it as good evidence that the beautiful gardens at Buitenzorg are being further utilized for scientific purposes. We have in this handsome volume the second part of Dr. Scheffer's valuable Notes on Palms of the group *Arcinæ* (which seems to have been written as far back as 1875), in which he describes, in their places, new genera under the names *Mischophlæus*, *Gronophyllum*, *Rhopaloblaste*, *Ptychandra*, and *Heterospathe*, each with a single species. Much of this material appears to have been embodied in Beccari's account of New Guinea and Malayan Palms in his 'Malesia,' noticed in this Journal last year; and some questions of priority in nomenclature are not unlikely to arise. The paper is illustrated with 30 plates, some of details, but chiefly heliographic portraits of the trees themselves taken in the garden, and very successfully managed. The other contents are:—An enumeration of the plants of New Guinea (superseded by Baron

von Mueller's more recent one), and on two new species of the curious genus *Gonocaryum*, both by Dr. Scheffer; an account by M. Teijsmann of his travels in New Guinea; and notes by M. Binnendijk on ornamental trees cultivated in the Buitenzorg Gardens. It may be mentioned that all the papers are in Latin or French. Though the delay in the publication of the volume has been unfortunate, its production is very creditable to the colonial press.

H. T.

Recherches sur les Organes de la Végétation du Selaginella Martensii, Spring. Par M. TREUB. Leide: Brill. 1877.

THIS paper goes over ground already examined by Pfeffer and others, but with greater fulness of detail. Two forms of terminal cell are recognised in the stem, viz., the conical and the pyramidal. The author holds that in their very early state the young branches have not a terminal cell, and also that there is no dichotomous ramification here, as Pfeffer supposes to be the case, but that the branches are monopodes ramifying periodically and forming two rows of lateral members. He finds that the root-bearing axes first appear when the branch near which they are inserted is about half-way between its formation and the commencement of its ramification, and that in the earliest state seen by him they consist of two large cells; soon, though, they possess a terminal cell shaped like a quadrangular pyramid, afterwards replaced by one having the form of a quadrangular prism. Details are given of the growth and development of the stems, root-bearing axes, roots and leaves.

S. M.

Histoire des Drogues d'Origine Végétale. Par F. A. FLÜCKIGER et D. HANBURY. Traduction de l'ouvrage Anglais 'Pharmacographia' augmentée de très nombreuses notes par le Dr. J. L. DE LANESSAN, avec une préface par H. BAILLON, et 320 figures. Paris: Octave Doin. 1878. 2 vols., 8vo. (Pp. 662, 671).

A very good French translation of Flückiger and Hanbury's classical work, which has had the advantage of revision by the former author. In addition, printed in smaller type, are botanical descriptions of the genera and species mentioned in the text, and detailed accounts of the histology of the drugs, both illustrated with woodcuts, those of minute anatomy being highly satisfactory. A number of additional substances are also described, with the object of rendering the book more complete, or at least better adapted for a text-book in schools of pharmacy and medicine in France.

H. T.

Contribuciones a la Flora del Paraguay. By SIGN. D. PARODI.

THE first fasciculus (1877) consists of notes on the *Convolvulacea*; a sketch of classification in Spanish, and descriptions of species (many new) in Latin. This tract of 32 pages is printed at Buenos Ayres.

Flora of Tropical Africa, By D. OLIVER, assisted by other Botanists.
Vol. III. London: L. Reeve. (Pp. 544.)

THIS volume was published last October. It contains the orders *Umbelliferae* and *Araliaceae* by Mr. Hiern, which were printed so long back as 1871 (with the second volume), though only now published; the *Rubiaceae*, *Valerianaceae* and *Dipsaceae*, all also by Mr. Hiern; the *Compositae* by Prof. Oliver and Mr. Hiern; the *Goodenorieae* by Mr. Hiern; the *Campanulaceae* by Mr. Hemsley; the *Ericaceae*, *Plumbaginaceae*, and *Primulaceae* by Prof. Oliver; the *Myrsinaceae* and *Sapotaceae* by Mr. Baker; and the *Ebenaceae* by Mr. Hiern. The bulk of the volume is, of course, occupied by the great Orders *Rubiaceae* and *Compositae*: statistics relating to the former have recently been published by Mr. Hiern in the 'Journal of the Linnean Society.' H. T.

PROF. PERCEVAL WRIGHT, in the 'Transactions of the Royal Irish Academy,' vol. xxvi., has described and figured a chlorophyllous unicellular Alga, which is parasitic within the mucous tubes of *Schizonema Dillwynii* and *Colletonema vulgare*, and the cells of *Calothrix confervicola* and *Polysiphonia urcolata*. Cohn described in 1872, under the name of *Chlorochytrium Lemnae*, a green entophyte in Lemna-fronds; and Prof. Wright provisionally places his plant under the same genus (as a second species, *C. Cohnii*, sp. nov.) in preference to making a new one, though he states that the process of the formation of the zoospores is quite different, and that two kinds of zoospores, large and small, occur.

In another memoir, Prof. Wright, in describing a new species of Chytridiaceae, *Rhizophyidium Dicksonii*, parasitic in the cells of *Ectocarpus granulatus*, shows that it is probable that some of the "utricular" fruits of Harvey and spores of Kützing are, in the true *Ectocarpus*, in reality parasitic Chytridia.

Prof. FARLOW, of Harvard University, continues, in the 'Bulletin of the Bussey Institution,' his notes on diseases caused by Fungi. A plate is given of *Uncinula spiralis*, a common mould on Vines, especially in the Western States, where it has caused some damage: its conidial form is stated to be practically indistinguishable from *Oidium Tuckeri*, the grape-mould of Europe. Dr. Farlow also, in the 'Proceedings of the American Academy,' supplements his list of United States Marine Algæ, published in 1875. Many are from the west coast, and there are several novelties from California.

Mr. HILLHOUSE publishes a list of Bedfordshire plants in the 'Transactions of the Nat. Hist. Society' of that county, embodying the additions during 1876. The total of Phanerogams is nearly 700.

In the 'Annales of the Lyceum of Nat. Hist. of New York' (vol. xi., no. 12) is a catalogue of the Myxomycetes of the United States, arranged according to Rostafinski's system by Mr. M. C. Cooke.

The 2nd Part of vol. xiii. of 'Hooker's Icones Plantarum,' dated Dec. 1st, contains plates 1226-1250. Several interesting

species are described. *Ancrumia*, HARV. MSS., and *Trichlora*, Baker, are new genera of *Gilliesiaceae*, from Chili and Peru respectively; *Heterachne*, Benth., a new genus of Grasses founded on *Poa abortiva*, R. Br. (*H. Brownii*, Benth.) and *H. Gulliveri*, Benth., the latter of which is figured. There are also three species of Brown's genus *Neurachne*; and Mr. Bentham's recent labours among the Australian Grasses are further illustrated by another new genus, *Plagiosetum*, founded on *Pennisetum refractum*, F. M., and by the reference of the curious dioecious *Neurachne paradoxa* of Brown to *Spinifer*. The figures are unfortunately very far from satisfactory, either botanically or artistically.

OTHER NEW BOOKS.—J. DECAISNE, 'Sur les Caractères et les Affinités des Oliniées.' Paris: Martinet. 1877. (Pp. 15, tab. 1.)—'Flora Brasiliensis. Fasc. LXXIII. *Lythraceæ*,' by Koenhe. Dated 1 Oct. 1877. (Tab. 39—67.)—H. J. ELWES, 'Monograph of the Genus *Lilium*.' Parts 3 & 4.—R. DE VISIANI, 'Floræ Dalmaticæ Supplementum II. Pars prima.' Berlin: Friedlander. 1877. (12 mk.)

ARTICLES IN JOURNALS.—NOVEMBER, 1877.

Botanische Zeitung.—K. Goebel, "Development of the Prothallium in *Gymnogramme leptophylla*" (concluded).—A. de Bary and E. Strasburger, "*Acetabularia mediterranea*" (tab. 13).—F. Kamienski, "Comparative researches on the development of *Utricularia*" (tab. 14).

Flora.—F. Mueller, "On the structure of some species of *Elatine*" (tab. 7).—R. Caspary, "Memoir of A. Braun" (concluded).—V. A. Poulsen, "On the morphological nature of the haustorium in *Cassyltha* and *Cuscuta*."—F. Arnold, "Mosses of the French Jura" (continued).

Hedwigia.—G. Winter, "Morphological Notes."—Wollny, "On the excrescences in *Vaucheria*."—Id., "*Spirogyra margaritacea*, n. sp." (with figure).

Oesterr. Bot. Zeitschr.—G. C. Koerber, "*Coniocybe Owanii*, n. sp."—J. E. Hibsich, "Notes on Flora of Lower Austria."—J. Freyn, "*Colchicum Janka*."—J. A. Knapp, "Distribution of *Veronica grandis*, Fisch."—Meurer, "*Knautia neglecta*."—L. Celakovsky, "On *Melilotus macrorrhizus*, W. & K."—A. Straehler, "*Salix repens*, var. *Rieseana*."—A. Kerner, "Distribution of Hungarian plants" (continued).—V. de Borbas, "Hybrid Pinks."—S. Schunck, "Botany of the Kanalthal in Corinthia" (continued).—F. Antoine, "Botany of the Vienna Exhibition" (continued).

Magyar Novegytani Lapok.—J. Sachs, "On arrangement of cells in recent parts of plants."—M. Staub, "*Populus euphratica*."

Botanisk Tidskrift (ser. 3, vol. ii. pt. 1).—V. A. Poulsen, "On swarm-spores of a species of *Edogonium*."—Zahrtman, "Botanical Excursion to Taastrup So."—F. Thuemen, "*Æcidium Rostrupii*, n. sp."—P. Nielsen, "Genetic relationship between *Æcidium Tussilaginis* and *Puccinia Poarum*, n. sp."—O. G. Petersen, "Excursion to Hesselsen."—E. Warming, "Biological and Morphological Notes" (continued).

Ann. des Sc. Nat. (ser. 6, vol. iv. pt. 4).—A. Fischer de Waldheim, "The *Ustilagineæ* and their host-plants" (continued).

Bull. Soc. Bot. France (vol. xxiii. Session at Lyons).—A. Méhu, "Flora of the Prairie de Bourdelans."—X. Gillot, "On a hybrid of *Mespilus germanica* with *Crataegus Oxyacantha* (= *Mespilus Smithii*, Ser., *M. grandiflora*, Sm.).—Germain de St. Pierre, "Evolution of the plant-species, &c."—Id., "On *Dasyllirion longifolium* and *Yucca filifera*."—Id., "Collection of temperate Orchids in Gardens of the Chateau d'Eu."—Id., "Double flowers in *Aceras*."—L. Cusin, "Exotic plants of the Tête d'Or" (site of Exhibition at Lyons in 1872).—A. Boullu, "Examination of Roses in Lyons flora, with descriptions of new species."—M. Billiet, "On a *Festuca* found at Neuville."—M. Grand d'Eury, "On the carboniferous flora of the environs of St. Etienne."—J. B. Verlot, "On the existence of *Genista delphinensis* in the Pyrenees."—Lacroix, "On the presence of *Phelipæa ramosa* in roots of *Coleus*."—Reports of excursions and visits to public collections and gardens, including that of A. Jordan.

Bull. Soc. Bot. Belgique (vol. xvi. pt. 1).—V. Trevisan, "Conspetus Ordinum *Prothallophytarum*."—Id., "On the tribe *Platystomæ* and the family *Hypoxylaceæ*."—Obituary notices of A. Bellynck and Mdlle. H. Cerf.

Botaniska Notiser.—V. A. Poulsen, "On the development of the holdfasts of tendrils" (*Glaziouvia*, n. gen. *Cucurbitac.*)

American Journ. Microscopy.—H. L. Smith, "Notes on Cleve and Möller's Diatoms."

Journ. Linn. Soc. Lond.—J. Ball, "Spicilegium Floræ Maroccanæ" (tab. 9-14).

Botanical News.

PROF. W. C. WILLIAMSON, of Owen's College, Manchester, communicated to the Royal Society, on the 16th November, his eleventh memoir on the structure of the fossil plants of the coal measures, as the Bakerian lecture.

WE see from a local paper that there is danger of the inclosure of the Lizard Common, Cornwall. All interested in our western rarities will be sorry to read this. We think that a strong expression of the feeling of botanists on the subject should be made, and would perhaps have a good effect.

HENRY LAWSON, M.D., died at Cork on October 4th. He was for many years editor of the 'Popular Science Review,' and also conducted the 'Monthly Microscopical Journal' from its commencement till his death, which has caused the discontinuance of that periodical.

THE death is recorded of L. PFEIFFER, at Cassel, aged 72. His laborious compilations, especially the 'Nomenclator botanicus' (1874), are most useful to all working botanists. The genus *Pfeiffera* was dedicated to him by Salm-Dyck in 1845.



Original Articles.

SIDE-LIGHTS ON THE STRUCTURE OF COMPOSITES.

BY MAXWELL T. MASTERS, M.D., F.R.S.

(TAB. 194, I.)

THE specimen of *Helenium autumnale* figured at Plate 194 I. has a double interest, structural and historical; structural in that it is calculated to throw some light on the conformation and even the lineage of *Compositæ*; historical in that it illustrates a condition of things quite analogous to those upon which Linnæus, in his now little-read essay 'Prolepsis Plantarum' (1760), founded some of his deductions.

I purpose in the following communication saying a few words on both these subjects; and first as to points of structure. The normal flower-heads of *Helenium autumnale* have the ordinary character of the capitula of corymbiferous Composites, but in the present instance, in place of each flower, existed a slender stalk, with one or more pairs of opposite, linear, remote bracts, and terminated by a small flower-head with its involucrel and contained florets, the latter being variously modified. So far, then, the case may be described as one of proliferation of the inflorescence, a condition not very unfrequent among Composites.*

Coming now to the individual florets, it may be remarked that they presented all stages of modification between mere tufts of linear green leaves and the ordinary tubular and ligulate florets proper to the species. It is not requisite to go into details as to all these modifications, as it will serve my present purpose to select for comment a very frequent condition in which the following appearances presented themselves:—Ovary wanting; pappus none; corolla yellow or virescent; in mode of development, form, venation, and relative position with regard to the stamens, exactly as in normal flowers. The five stamens were perfectly free alike from the corolla and from one another, springing from a prolonged cylindrical thalamus (hypogynous). No trace of cohesion of the anthers existed. Above the stamens the thalamus was prolonged into a short cylindrical stipes, bearing a pair of opposite green leaves, perhaps the equivalents of the carpels, but without any trace of ovule, style or stigma. Above these the thalamus was again prolonged, and generally terminated in a rudimentary flower-head, the florets of which from their size and distinctness offered an excellent opportunity for tracing the development of the flowers. The florets may therefore, in general terms, be said to have been

* See 'Vegetable Teratology,' section "Proliferation."

subject to suppression of the inferior ovary and pappus, dissociation of the stamens, and median proliferation.

In the accompanying figure, tab. 194, I, the proflied inflorescence, drawn by Mr. Worthington Smith, is shown at 1; one of the normal tubular florets is shown at 2, with the inferior ovary surmounted by lanceolate scales representing the pappus; the venation of the corolla is not sufficiently marked in the drawing, but it is of the ordinary character peculiar to Composite corollas. An ovule is shown at 3. One of the monstrous flowers is shown at 4, with no calyx or pappus, but only a distended corolla. At 5 the stamens and the little shoot surmounting them are shown. Figs. 6 to 11 illustrate various stages in the development of these flowers; the earliest stage of all, that of a hemispherical tubercle, is not shown. At 6 are indicated the first rudiments of the corolla; at 7, the beginning of the stamens (alternating with the pistils) is indicated; 8 shows a side view of the corolla at a slightly more advanced stage; 9 shows a flower of about the same age as 8, laid open to display the stamens. At 10 are displayed the two leaves which stand in place of the carpels. At 11 a flower still further advanced is shown with its subtending bract, and beneath it is the andrœcium with the stalked gynœcium shown separately. The general course of development here is quite consonant with that which occurs in Composite flowers in general, except in the case of the gynœcium. Ordinarily, after the formation of the stamens, the thalamus becomes depressed or cup-shaped in the centre, and from its walls are protruded, one on each side, two carpellary tubercles, at first of a semilunar shape, and which form the two styles; these speedily become coherent, and are pushed up from below and thus grow in length. The calyx of Composites, or what corresponds to it, only appears after the corolla, and then as a sort of thickened ring, from which the pappus-hairs or scales subsequently proceed. The development of the stamens and corolla is precisely the same as in the monstrous flowers above described.*

The facts just cited raise the question whether or no there is a true calyx in Composites, and what is the nature of the pappus? It would occupy far too much space to go into these questions fully here. I can only indicate a few of the more important points, and leave the reader to consult the rather voluminous literature of the subject for himself. For my own part I am disposed, from the facts above mentioned and from my examination of a large number of teratological specimens, to agree with those who, like Buchenau † and

* See Payer, 'Organogénie Végétale,' p. 637, whose observations on the development of the flowers of Composites I have frequently verified. See also Duchartre, "Sur les Fleurs des *Dipsacus* et *Helianthus*," in 'Ann. Sc. Nat.' ser. 2, vol. xvi. (1841), p. 221; and Köhne, 'Ueber Blüthenentwicklung bei den Compositen'; the last only known to me from the summary in the 'Bull. Soc. Bot. France,' vol. xvi. p. 109, Rev. Bibl.

† Buchenau, 'Ueber Blüthenentwicklung bei den Compositen,' 'Bot. Zeitung,' 1872, nn. 18—20. Warming om Forskjedem mellem trichomer og Epiblastemer af højere Rang. (1873), analysis in 'Bull. Soc. Bot. France,' t. xx. p. 217, Rev. Bibl.

Warming, are of opinion that at present Composites have no real calyx or only traces of it, and that the pappus consists of mere appendages or outgrowths not referable to distinct sepals. Buchenau suggests that prehistoric Composites had a five-leaved calyx, which has become effaced, as time has rolled on, from the pressure exerted by the densely packed flowers. Did, then, these ancestral Composites possess looser inflorescences in those days? Who shall tell? Treub* considers the pappus to consist of five sepals modified, because he has seen, as I have also done, Composites with five green sepals in place of a pappus; but the occasional development of an organ which is usually suppressed does not prove that the parts that are generally present, like the pappus, are necessarily modified representatives of abortive organs. They may or they may not be. Lund, following Hofmeister, thinks each pappus-hair represents a sepal, the sepals being therefore multiplied as the carpels of *Ranunculacææ* are†; but Warming, in the paper previously cited, disposes of that view by showing, with truth, that the hairs or scales of the pappus do not correspond in position with the sepals, but occur in an indefinite manner, and very late in order of development; the true calyx of Composites is the slight rim which forms beneath the base of the corolla. In all of these points I am disposed to concur with the Danish naturalist, who further refers these organs to "trichomes" rather than to phyllomes, on anatomical grounds upon the validity of which I am in no position to offer an opinion.

Those who are disposed to speculate on the ancestral condition and possible lineage of Composites, as indicated by the course of development, may fairly deduce from the specimen above described, as well as from the history of development in general, that Composites are descended from some plants having a tubular calyx and corolla, five hypogynous free stamens, and a dimerous superior pistil, — that in fact at one time they formed part of a great group which Linnæus would have included under his Pentandria Digynia.

But little space is left for allusion to the historical interest attaching to this specimen. It may briefly be mentioned that Linnæus, in his 'Prolepsis Plantarum,' a very remarkable but somewhat fantastic essay, considers the flower as in some sense an "anticipation" of a shoot of several years' growth. Those parts which, in a shoot, would be developed in succession year after year, are, he says, in the case of the flower, developed in one year. Following out this idea, Linnæus conceived the idea that the pistil represented the sixth year's growth thus produced in advance. For brevity sake I quote the passage relating to monstrosities of *Carduus heterophyllus* and *C. tataricus*, which clearly were very similar to those above described in *Helenium*, with the addition of leafy sepals. Unfortunately I have not been able to trace any specimens of these plants in the herbarium of Linnæus.

* 'Treub, Notice sur l'Aigrette des Composées Archives Néerlandaises,' t. viii.

† Lund Begeret hos Kurvblomsterne, analysis in 'Bull. Soc. Bot. Fr.' t. xx. p. 33, Rev. Bibl., and vol. xxi. 1874, Rev. Bibl. p. 27; Trimen's 'Journal of Botany,' 1873, p. 184; Hofmeister, 'Handb. Physiol. Bot.' 1868, t. i. 468. For Phylloidy in the Calyx and Ovary of Composites see references in 'Vegetable Teratology,' pp. 247 and 260.

“ Ut vero pistillum credamus esse rudimentum sexti anni foliorum, eo inducimur, quod non sine singulare voluptate vidimus quomodo flores *pleni Cardui heterophylli et tatarici*, in quibus flores majores evasere, seminum *Pappo* dilatato in foliola angusta lacinata, *Corollis* majoribus, crassioribus, instar foliorum, viridibus et serratis, *staminum* filamentis castratis, sed *stylo*, quod singulare, enato in duo foliola viridia serrato ciliata, ad similitudinem bractearum.” (Linn. ‘*Prolepsis Plantarum*,’ 1760, ‘*Amœnitates Academicæ*,’ vi. p. 338.)

NOTE ON THE DIMORPHISM OF RESTIACEÆ.

BY MAXWELL T. MASTERS, M.D., F.R.S.

(TAB. 194, II.)

ALTHOUGH the genera of *Restiaceæ* are in general easily recognisable when the female plants are at hand, yet it is no easy matter to discriminate the species of the larger genera one from the other. Often, too, there is a greater difference in outward appearance between the male and female plants of the same species than there is between plants of widely different generic structure. The male plants of different species, and, in some cases, of different genera are so singularly alike that it becomes a matter of difficulty, sometimes even of impossibility, with the material at command, to determine with anything like confidence even the genus to which a particular male plant belongs. This being the case, the botanist who occupies himself with these plants is glad to avail himself of any character, however intrinsically unimportant it may seem, which may enable him to discriminate between the species or groups of species. The characters afforded by the persistence or caducity of the sheaths which encircle the stem at more or less distant intervals afford useful generic distinctions, while, in the genus *Restio* itself, two generally well-defined groups may be constituted, according as the leaf-sheaths or vaginæ are loosely or tightly wrapped around the stems. In ascertaining this point only those sheaths should be considered which have no branch or shoot in their axils, because, of course, the presence of such a shoot would involve a more or less loose fit on the part of the investing sheaths. Of less importance for specific distinction is the presence of stems of two forms—the one relatively unbranched, erect, leafless except as to the sheaths, and usually bearing the inflorescence; the other comparatively shorter, much and intricately branched, the ultimate branchlets being fine, needle-like, often more or less curved, and bearing a large number of small leaves, provided not only with the vaginal portion but also with linear needle-like curved laminae. Some species appear never, or rarely, to produce sterile branches of this character; others constantly produce dimorphic branches. In this latter case, the character of the sheaths is, except in one instance now to be noted, invariable. The exceptional case is afforded by *Restio*

crispatus, R. Br.* The type-specimens of this plant are in the Banksian herbarium at the British Museum, where I have had the opportunity of examining Brown's types of *Restiaceæ*. Brown's specimens include plants of two different aspects, some with relatively elongate (one to two feet) unbranched stems usually sterile, and with sheaths of two forms, those at the base near the rhizome being relatively short and tightly wrapped around the stem, those at the upper portion being longer and spreading away from the stem near the apex. The other form of stem is much branched above the middle, where it divides into a wealth of intricate, curved, rigid, needle-like branchlets, the terminal ones of which, contrary to what generally (but not universally) happens in these much-branched stems, bear spikelets. The sheaths on the unbranched portion of the stem are, relatively speaking, lightly wrapped around the stem. So different in aspect are the two forms of stem just described, that Mr. Benth. in looking over these very specimens, affixed a note to the form with unbranched stem and lax sheaths to this effect,—“These do not belong here.” On subsequently examining these specimens myself I lighted on one in which both forms of stem, with both forms of sheath, sprang from one and the same rhizome. A fragment of this specimen, sufficient to indicate the different appearance of the stems and sheaths, is given at tab. 194, ii., where fig. 1 represents a portion of the plant with its dimorphic stems, the unbranched one being shorn, in the drawing, of a considerable proportion of its proper height. The tight sheaths at the base of the stem, as contrasted with the longer, looser ones in the upper part, are plainly shown. On the fertile branched stem, the sheaths are seen to be all of them shorter and closer than on the unbranched barren stem. Figs. 2 and 3 show sheaths of the two forms detached. For the full description of the plant I must refer to the forthcoming supplement to the ‘Prodromus;’ but I may add that the differences above noted are independent of sex, occurring on both male and female plants, and that the flutings and other markings which often afford good specific characters in this genus are identical in the two forms. I have spoken of the character afforded by the sheaths as being in some senses intrinsically unimportant, but in others it appears to me that they are far from being so; and the particular instance which has suggested this note tempts one to speculate on the origin of varieties, the differentiation of sexual and of specific forms, and other matters, a temptation which the limits of space and the patience of the reader induce me forthwith to resist.

* *RESTIO CRISPATUS*, R. Br. Prodr. 246; Kunth Enum. iii. 418; Benth. Flor. Austral. vii. 235. Mast. in DeCand., Suites au Prodr. i., 271, ined; *Calorophus crispatus*, Nees in Pl. Preiss. ii. 67.

ON RANUNCULUS TRIPARTITUS, *DeCand.*

BY PROF. C. C. BABINGTON, F.R.S.

I have recently received from Messrs. H. and J. Groves a fine set of specimens of the true *Ranunculus tripartitus*, DC., and wish to corroborate the record of its existence in England already given in this Journal (Journ. Bot. 1877, p. 209). There was formerly a plant so named included in our Floras, but it has been shown by Mr. Hiern to be the *R. intermedius*, Knaf, which was first described in the Journal denominated 'Flora' (v. 24, pt. 2, 558); and of this there is a beautiful figure, under the name of *R. tripartitus*, in the 'Suppl. to Eng. Bot.' (pl. 2946). It was through a mistake of mine that the wrong name was given to it. Mr. Hiern corrected this error in the 'Journal of Botany' (v. 9, p. 67). Messrs. Groves found the present plant near Setley, Brockenhurst, Hampshire, in April, 1877. But Mr. R. V. Tellam had previously found it on Innes Moor, in the parish of Roche, Cornwall, in 1876, as I learn from a specimen, for which I am indebted to Mr. T. B. Blow. I see that it is stated in the 'Botan. Loc. Record Club Report' for 1876 that both *R. tripartitus* and *R. intermedius* grow on Innes Moor. Mr. Tellam's specimen has submersed leaves with remarkably divaricate segments, rendered rigid on the older leaves by a deposit upon them; but the younger leaves have taken the tassel-shaped form on their removal from the water. Difficulties of this kind often occur in deciding upon the character of the submersed leaves when the plants grow in water full of lime or adhesive mud. The few submersed leaves upon Messrs. Groves' plant show the same character imperfectly, but Mr. Tellam's plant is very satisfactory in this respect.

R. tripartitus was first noticed in Brittany, and figured and described by the elder DeCandolle in 1808. It has since been observed in many parts of France, especially in the north-western provinces. Other stations are mentioned by authors, but are doubtful, as *R. intermedius*, Knaf, and *R. ololeucos*, Lloyd, have been often mistaken for it. The latter has very much larger flowers, which have wholly white petals and somewhat differently shaped fruit: the former is our *R. intermedius*.

My foreign specimens of *R. tripartitus* are from La Mothe-Saint-Héray (Deux Sèvres), contained in Billot's 'Exsiccatæ'; Nantes, from M. Lloyd; Angers, from M. Lenormand; the department of the Maine and Loire, from Dr. Leo; and from Portugal, from Dr. Welwitsch (No. 663).

We may characterise the plant as follows:—

RANUNCULUS TRIPARTITUS, *D.C.* Submersed leaves loosely trifurcate; *tassel-shaped segments* flaccid; *floating leaves* long-stalked, subpeltate, tripartite, with *wedge-shaped* 3-4-lobed segments; peduncles slender, about equalling the leaves; flowers very small; petals narrowly obovate, subacute,

slightly exceeding the calyx, 3-veined, not contiguous, deciduous; style long, subulate; stigma tongue-shaped; receptacle globular; *carpels obovate, inflated, rounded at the end.* — *R. tripartitus*, DeCand. Icon. Pl. Gall. Rar., p. 15, tab. 49 (1808); Koch in Sturm. Deutschl. Fl. 67, 12; Reichenb. Icon. Fl. Germ. iii. t. 2, f. 4574; Billot, Fl. Gall. et Germ. Exsic. 2403 (sp.); Lloyd, Fl. de l'Ouest de la France, ed. 3, p. 5; Boreau Fl. Centre Fr. ed. 3, p. 9.

The floating leaves are nearly, but not quite, tripartite; the base of the outer segments is straight. The divisions of the submerged leaves spread in a divaricate manner in the water, and when a deposit takes place upon them they continue spreading when taken out of the water; otherwise they collapse into the tassel-shape under those circumstances. Stipules large, rounded, but slightly attached to the petiole. Buds subglobular. Flowers star-like. Stamens few, short. Style slender, usually bent at about the middle, terminal on the full-grown, obovoid, much-inflated carpels; its base persistent.

This is undoubtedly the plant of DeCandolle, and is an interesting, but not unexpected, addition to our flora.

ON THE REDISCOVERY OF THE GENUS *EUSTEPHIA* OF CAVANILLES.

BY J. G. BAKER, F.L.S.

IN the third volume of his well-known 'Icones et Descriptiones Plantarum,' published at Madrid in 1794, Cavanilles describes and figures, from a specimen of unknown origin, which flowered in May, 1794, in the Royal garden at Madrid, a new genus of *Amaryllidaceæ* which he calls *Eustephia*. The plant resembles closely in leafage and general habit *Cyrtanthus* of the Cape and *Phædranassa* of the Andes, but is marked principally by its very peculiar stamens, which present a type then entirely unknown in the order, the six filaments being equally tricuspidate, like three out of the six are in *Ornithogalum nutans* and *Allium Porrum* and *Ampeloprasum*, flattened in the lower two-thirds, with a sharp tooth projecting at the top of the flattened part on each side of the subulate central fork which bears the anther. When Dean Herbert monographed the Order he expressed, with characteristic energy and positiveness, an entire disbelief in the existence of this plant. At page 58 of his 'Amaryllidaceæ' he writes:—

"*Eustephia*, Cavanilles, must be expunged: no such plant will be found. It seems to be a species of *Phycella*, of which the description is unintelligible and the accompanying figure repugnant to all probability;" and again at page 71:—" *Eustephia* delenda, utpote falso delineatur, diagnosi pessima. Nunquam talis invenietur. Procul dubio *Phycellæ* species mendosissime depicta et descripta."

And again, at page 156, he returns to the charge at greater length. The foundation of his positiveness is probably the fact that the plant bears a considerable resemblance, in flower and general habit, to the Chilian *Phycella ignea*, in which there are minute teeth at the base of each filament. However that may be, it turns out that the "*mendosissime*" existed in his imagination only, for during the last few years it has reappeared in English gardens, and the substantial accuracy of the plate and generic and specific description of Cavanilles is fully vindicated; and I now, therefore, claim again for it an admitted rank as a distinct monotypic genus.

What I know about its reappearance is as follows:—I received in May, 1875, a specimen from Mr. Green, of Reigate, who was formerly gardener with Mr. Borrer, and afterwards with Mr. Wilson Saunders. All that he was able to tell me of its history was, that he had bought in London in a miscellaneous lot of Andine bulbs. Not thinking of looking in the dim limbo-land to which *Eustephia* had been consigned, I failed to identify the plant, and published it in the 'Gardeners' Chronicle' as a new section of *Phædranassa*, under the subgeneric name of *Odontopus*. Since that time we have received a living plant at Kew from Colonel Trevor Clarke; and on looking lately accidentally at the figure of Cavanilles, whilst referring to something else, I found that my *Phædranassa rubro-viridis* was identical with the long lost *Eustephia*. And on looking amongst the unnamed *Amaryllidaceæ* in the Kew herbarium, I find that we have two specimens gathered by Maclean in Peru; and another specimen, sent by Herbert from his garden at Spoforth, shows that this is the same plant which he mentioned, by name only, under tab. 3865 of the 'Botanical Magazine' as *Eustephia Macleanica*. So that now we have its whole history satisfactorily cleared up.

There is another genus of *Amaryllidaceæ*—*Calliphurria*, of which the type, *C. Hartwegiana*, has lately been introduced into cultivation by Mr. Bull and figured in the 'Botanical Magazine' (tab. 6259)—that has petaloid tricuspidate filaments. *Eurycles* also often, and even *Eucharis* sometimes, has the corona slit down to the base into six distinct divisions. The five genera already mentioned, *Phycella*, *Eustephia*, *Calliphurria*, *Eurycles* and *Eucharis*, furnish, in the order in which I have just mentioned them, a gradual transition in structure between the typical *Amaryllidaceæ*, like *Amaryllis* and *Crinum*, with free filiform filaments, and the monadelphous *Pantratiæ*, like *Pantratum*, *Ismene*, and *Hymenocallis*, in which the filaments are united into a complete corona in their lower part.

The following description is drawn up entirely from the specimens I have myself examined, and may be compared with the diagnosis and plate of Cavanilles as a test of the accuracy of my identification. The only points in his description to which I should be at all disposed to take exception are, that he speaks of the bracts as a calyx, of the perianth as a corolla, describes the part of the said corolla (in the generic, but not in the specific description) as five instead of six, and figures six distinct hollows

in the perianth-tube below and between the points from which the filaments spring.

✓ Genus *EUSTEPHIA*, *Cav. Icon.*, vol. iii. p. 20, tab. 238. Perianth regular, tubular, erect in bud, drooping when expanded, with a short campanulate tube above the ovary and six oblanceolate obtuse segments, with a close-ribbed central keel, which are slightly cucullate and pilose at the tip, and spread only a little in the upper third when fully expanded. Stamens six, inserted equally at the throat of the tube; filaments about as long as the perianth-segments, straight, parallel, narrowly flattened in the lower two-thirds, and there furnished with two conspicuous linear erecto-patent teeth—one on each side of the central filiform process, which bears the rather small oblong versatile anther. Ovary three-celled; ovules many in a cell; style protruded a little beyond the perianth-segments, straight, very slender; stigma capitate, puberulent, subentire. Fruit not known.

E. COCCINEA, *Cav. loc. cit.*; *Kunth Enum.*, vol. v. p. 514. *Phædranassa (Odontopus) rubroviridis*, Baker in *Gard. Chron.* 1875, part 2, p. 7. Bulb ovoid, about an inch in diameter, the brown membranous tunics produced 3-4 inches up its neck. Leaves not developed till after the flowers fade (in May in English gardens), 3-4 to a bulb, sessile, linear, bright green, a foot or more long, $\frac{1}{4}$ - $\frac{1}{2}$ inch broad. Flowers produced from February to May. Scape a foot long, slightly ancipitous. Umbel 6-8-flowered. Bracts numerous, membranous, reflexed, linear, $1\frac{1}{2}$ -2 inches long. Pedicels 1- $1\frac{1}{2}$ inch long. Perianth 18-21 lines long; ovary oblong-trigonous, $\frac{1}{2}$ inch; tube as long as the ovary; segments above an inch long, green at the tip, the rest bright red, $\frac{1}{2}$ inch broad, narrowed very little to the base from three-quarters of the way up, obtuse. Anthers $\frac{1}{8}$ inch long; pollen yellow. Style finally protruded $\frac{1}{4}$ inch beyond the tip of the perianth-segments.

ON SALIX TREVIRANI, *Spreng.*

BY THE REV. J. E. LEEFE, F.L.S.

IN a packet of specimens of Willows sent to me for examination in November last, by Dr. Fraser, of Chapel Ash, Wolverhampton, was one named *S. Trevirani*, of which it seems desirable to give some account. Dr. Fraser considers *S. Trevirani* to be wild. He met with it by the side of a brook at Bilbrook, in Staffordshire, and has observed it there for several years. It forms a large shrub, or small tree about fifteen feet high, and only one plant has been noticed, and a young one near it. From the beautiful pink catkins, in the early spring, it was referred at first to *S. rubra*, Huds.; but on being shown, as I understand, to Dr. Boswell, it was named by him *S. Trevirani*. Though it has only been seen as yet in one spot, it is to be hoped that by drawing attention to it the Willow will

be found in other places, and thus be established as an interesting addition to the British flora.

The description which I have added is taken from a single specimen of leaves and one of the catkins, but as Dr. Fraser has kindly sent me cuttings, I hope in time to make a further examination of the plant in a growing state, and to correct any mistakes where necessary. Bark of catkin- and leaf-bearing shoots light brown; catkin-bearing shoot rather angular. Buds pointed, nearly quite smooth, unless it be at the tip. Male catkins shortly pedunculate, cylindrical, in an allied form broader about the middle, rather dense, blunt, from half to three-quarters of an inch long, furnished at the base with two or three linear or lanceolate narrow leaves reaching half the length of the catkin, pointed and finely serrated though not always, more or less downy or silky. Young leaves on the ament-bearing shoot similar in form to the bracts, serrated and more or less downy, having the margin slightly recurved. Catkins diandrous, scales yellowish brown, tipped with whitish hairs, which do not reach beyond the anthers. Adult leaves about three inches long, narrow lanceolate, on a petiole much longer than the bud, acuminate, smooth with rather depressed veins, paler below, with a rather stout midrib and many branching more prominent veins; the leaves are rather wavy at the margin, obscurely serrated, much less so than the young leaves, which have rather glandular serratures.

Dr. Fraser's Willow is the same, I think, as one which I received some years ago from Woburn Abbey under the name (no doubt owing to some misplacement of tallies) of *S. fusca*. I mention this name because the Willow may be found in other gardens under the same. I have always considered it to be the male of *S. hippophaefolia*, Thuil., but had no idea of its being a native. I find by my notes that the Woburn Willow is diandrous, but sometimes triandrous, that the filaments are pubescent at the base, and the nectary bifid. In *S. hippophaefolia* the young leaves are somewhat reflexed at the margin, indicating perhaps some affinity with the *viminales*; and the same remark applies to the male of *S. rubra*, Huds. A Willow received from the Rev. L. Darwall is near to *S. Trevirani*. My friend called it *S. androgyna*, as the aments contain both male and female flowers. The lower part of the catkins of *S. androgyna* is generally staminiferous. The stamens are two, scales pale yellowish downy, not equal to the ovarium which is either downy or smooth. Stigmas cloven and reflexed, germen on a short stalk, style equal to or longer than the stigmas. Nectary, I think, in the male single, in the female about equal to the pedicel of the ovarium. Sometimes the filaments are tipped with a club-shaped ovariform body instead of anthers. The upper part of the narrow cylindrical ament generally consists of female flowers. Floral leaves serrated, downy below. Mr. Darwall thought his Willow related to *S. hippophaefolia*. Through the kindness of Mr. Charles Bailey, of Manchester, I have had an opportunity of examining Wimmer's published specimens, and among my notes upon them I find the following:—

No. 251. *S. viminalis-triandra*, ♀ *Trevirani*, *S. Trevirani*, Spr. Style very short, stigmas emarginate or cloven, as in *hippophæfolia*. Leaves very like *hippophæfolia*.

No. 249. *S. viminalis-triandra* ♀ *julis gracilibus germinibus sterilibus*, *S. Trevirani*, Spr. Catkins more slender than in *lanceolata*, Smith, and scales less pubescent. The leaves more decidedly serrate than in *S. hippophæfolia*.

No. 250. *S. viminalis-triandra* ♂ (of Wimmer's 'Salices Europææ,' p. 140, where this so-called hybrid is named *Salix triandra viminalis*).

This appears the same as my *fusca* from Woburn, *i.e.*, the male of *S. hippophæfolia*. Whatever may be thought by others of *S. Trevirani* and the forms mentioned above, I will only say for myself that I see much resemblance to the *triandra* group, but scarcely any to the *viminalis*.

Dr. Anderson, in his able and remarkable monograph of the genus in DeCandolle's 'Prodromus,' p. 271, refers *S. Trevirani* and *S. hippophæfolia* to a species called *S. multiformis*, Döll, without any mark of hybridity, and says that it is "inter *S. triandram* et *S. viminalem* media." *S. Trevirani* is stated to be hardly distinguishable from *S. undulata*, Ehrh. 'A. *S. undulata* ad *hippophæfoliam* formæ variæ itaque seriem plane contiguam efficiunt.' But *S. undulata*, Ehrh. is placed in the monograph nearly seventy pages farther back, and has the mark of hybridity †† prefixed to it. It would seem, therefore, as if—according to this theory of hybridity—one name (say *S. multiformis*, Döll.) should include all these forms. I should prefer, however, at present to call Dr. Fraser's interesting willow the male of *S. hippophæfolia*.

THE CRYPTOGAMIC FLORA OF KENT.

By E. M. HOLMES, F.L.S.

(Continued from vol. xv. p. 237).

HEPATICÆ.

THE following list of Hepaticæ found in Kent, although more extensive than might have been expected from the geological character of the county, must nevertheless be looked upon as far from complete. Many of the species are so minute, and grow so mixed up with others and with various mosses, that their presence is only revealed by their fructification, or by accident when examining mosses under the microscope.

A few species found in Sussex upon Ardingly, Harrison's and Eridge Rocks, &c., such as *Blyttia Lyellii*, *Jungermannia lanceolata*, *J. minuta*, *Bazzania trilobata*, and *Scapania umbrosa*, can scarcely be expected to occur in Kent, since there are no rocks in that county of equal extent or possessing similar advantages of shade and moisture.

Several species which are mentioned without localities in

Jenner's 'Flora of Tunbridge Wells,' such as *Cephalozia connivens*, *J. hyalina*, *J. barbata*, *Blepharozia ciliaris*, and *Odontoschisma Sphagni*, may yet be added to the list by those who have the opportunity of exploring the south-western and western portions of the county. The marshes between Deal and Sandwich and the neighbourhood of Romney Marsh may possibly yield some of the rarer frondose species, such as *Pallavicinia hibernica* and *Petalophyllum Ralfsii*, while the damp woods in the neighbourhood of Canterbury should furnish more than one species of *Cephalozia* and *Lejeunia* if carefully searched. The amount of success with which occasional visits to Kentish woods have been rewarded, convince me that they are far richer in cryptogamic plants than the dry nature of the soil would lead one to expect.

In the present paper only two works beside the local floras already mentioned* have been quoted, viz. :—

W. J. Hooker, 'British Jungermanniæ,' 1816.

M. C. Cooke, 'British Hepaticæ,' 1866.

Dr. Carrington's new work not being at present completed, it seemed advisable not to quote from it; names adopted in this paper are, however, identical with those used up to the present time by that author. The arrangement followed has been that of Dumortier in his 'Hepaticæ Europææ.'

It may be here mentioned that the following method of examining the leaf-structure will be found useful in determining nearly allied species having leaves somewhat similar in outline, when found only in the barren state:—Take a leaf (if from a dried specimen it should previously be steeped in water), place it between two slips of glass, with a few drops of a mixture of equal parts of liquor potassæ and water, warm over a spirit lamp until ebullition takes place; then wash the leaf in water, place it on a fresh slip and add a drop of iodide of zinc solution and put on the cover. Under the action of the liquor potassæ the inner wall contracts upon its contents, and the whole structure is rendered more transparent; the epidermal layer of the leaf is dissolved as well as the connecting tissue binding the cells together; the outer wall of the cells appears as a white line separating them, thickened at the angles by a hyaline deposit (the trigonum instertiale of authors), which is uncoloured by the iodide of zinc.

MARCHANTIACEÆ.

MARCHANTIA POLYMORPHA, L.

On damp banks in sandy places; frequent in flower-pots in greenhouses. July. E. B. t. 100; Cooke Brit. Hepat. f. 186, 187.

Blackheath; *Fl. Metr.* Quarry near Penshurst Station, with both male and female fructification; *George!*

Easily distinguished when in the barren state from *Lunularia* by its circular cups containing gemmæ.

* Journ. Bot., 1877, p. 12.

ASTERELLA HEMISPHERICA, Beauv. *Marchantia hemisphærica*, L. (E. B., Bot. Guide); *Reboulia hemisphærica*, Raddi; *Fagatella hemisphærica*, Mack. (Jenner, Fl. Tunbr.)

Damp rocky places and moist sandy hedgebanks in hilly districts. Not common, April to June. E. B. t. 503. Cooke Brit. Hepat. f. 191.

In a small watercourse near the Wells at Sydenham, towards Norwood, Martyn; *Bot. Guide*. On the bank in the lane leading from Rusthall Common to the High Rocks; Lamberhurst Quarter, &c., not common; *Jenner Fl. Tunbr.* Boro' Green; Ightham; Halstead.

In the barren state may be known from *Lunularia* by the purplish under surface of the frond and the absence of cups of gemmæ.

CONOCEPHALUS CONICUS, Dumort. *Marchantia conica* (Forster Fl. T.; Jenner Fl. T.) *Fagatella conica*, Corda.

On damp sides of rivulets and on dripping places; common. March, April. E. B. t. 504. Cooke Br. Hepat. fig. 190.

In the little lane from Rusthall Common to the High Rocks, on the right-hand side near the gate and elsewhere; *Forster Fl. Tunbr.* Southborough; *Fawcett.* Maidstone; Bigberry Wood, near Canterbury; Goudhurst; Beech borough; Speldhurst.

Known in the barren state by the absence of cups containing gemmæ, by its reticulated surface and aromatic odour.

PREISSIA COMMUTATA, Nees. *Lichen pileatus parvus foliis crenatis*, Ray Syn.

Fissures of damp rocks, especially of limestone; sometimes on sandy ground near the sea; very rare. April, May. Cooke Brit. Hepat. fig. 188.

"Mr. Dandridge observed it in a small watercourse near Dulwich Wells, towards Northwood;" *Ray Syn.* iii. p. 114.

(In Forster Fl. Tunbr. *Marchantia androgyna*, E. B. t. 2545, is said to occur on wet rocks in the little lane from Rusthall Common to the High Rocks. The upper figures in this plate are usually referred to *Preissia commutator*, Nees, a species which I have not been able to find in the locality stated. In the lane mentioned, both *Asterella hemisphærica* and *Lunularia cruciata* occur; and the former is given in Jenner Fl. Tunbr. as occurring there, so that it is possible that Forster's plant is referable to *Asterella hemisphærica*.)

[*Dumortiera irrigua*, Nees, should be looked for by the side of streams in the Kentish Weald and in greensand districts. It has the habit of *Pellia epiphylla*, but is of a dark green colour. It has recently been found at Hastings, in Sussex, by Mr. E. George, and may therefore occur in the south of Kent.]

LUNULARIA CRUCIATA, Dumort. *Lunularia vulgaris*, Mich. (Jenner Fl. Tunbr.)

On moist limestone walls and damp hedgebanks; frequent

about Tunbridge Wells; not observed in fruit. July, August. Cooke Brit. Hepat. f. 185.

Cold Bath, Lower Green; *Jenner Fl. Tunbr.* Rose-bank, Tunbridge Wells, abundantly; *Walker!* Near Rusthall Common, in the lane leading to the High Rocks, abundantly; Langton Green; Speldhurst; Ightham; Biddenden.

When in fruit, distinguished by its hairy fruit-stalk and by the fruit being usually divided into four narrow rays, although sometimes five or six and sometimes only three are developed.

In the barren state it is easily recognised by the semicircular or crescent-shaped cups containing gemmæ.

[*Targionia hypophylla*, L., should be looked for in Kent, as it occurs in the south of England on warm dry rocky banks. The fronds are purplish underneath like those of *Asterella hemisphærica*, but the fruit is a sessile capsule situated just beneath the apex of the frond.]

RICCIACEÆ.

RICCIA GLAUCA, L.

In clover fields and on damp fallow ground. December. E. B. t. 2546. Cooke Brit. Hepat. 197.

Woolwich Heath; *Dill.*; *Huds. Fl. Ang.* Ashford; Ide Hill, near Sevenoaks.

Var. γ. minima. *Lichen omnium minimus foliolis scissis super terram expansis*, Dill.

Blackheath; *Dillenius*; *R. Syn.* iii. p. 115.

R. CRISTALLINA, L. *Uva palustris furcata angustioribus et firmioribus segmentis*, Ray Syn.

In a ditch near Deptford Dock, Mr. Petiver; *Ray Syn.* iii. p. 63.

RICCIELLA FLUITANS, A. Br.

Stagnant pools and still places by river sides, floating among *Lemna*, &c. E. B. t. 251. Cooke Brit. Hepat. fig. 199.

In a pond in the lane which leads from Langton Green to the Dropping Spring towards Pound's Bridge; *Forster Fl. Tunbr.* (The pond has since been filled up and made a burying ground.)

JUNGERMANNIACEÆ.

Tribe—*Frullaniæ*.

FRULLANIA DILATATA, Dumort. *Jungermannia dilatata*, L. (*Jenner Fl. Tunbr.*)

On trunks of trees and on rocks; very common. Winter. Hook. Brit. Jung. t. 5.

Knockholt; *George!* Southborough; *Fawcett!* Trees near Chelsfield; Fant Wood, Maidstone; Dover; in fruit near Westerham.

F. TAMARISCI, Dumort. *Jungermannia Tamarisci*, L.

In loose tufts on trees, rocks and bushes in hilly districts. July. Brit. Jung. t. 6.

Knockholt; *George!* Sevenoaks; *Howse!* On prostrate bushes, Lydd Beach, abundantly.

Affects heathy and hilly districts and more exposed situations than the last; its purplish tinge, more pinnate branches, calyx without tubercles, and loose habit distinguish it from *F. dilatata*, which is usually firmly attached to its place of growth.

LEJEUNIA MINUTISSIMA, *Dumort.* *Jungermannia minutissima*, Smith.

On trunks of trees, especially oak and fir, in damp woods; not observed in fructification. April, May. E. B. t. 1633. Brit. Jung. t. 52.

On an old elder tree. Morant's Court Hill.

L. SERPYLLIFOLIA, *Libert.* *Jungermannia serpyllifolia*, Dicks.

On trunks of trees in subalpine districts. April, May. Brit. Jung. t. 42. Cooke Brit. Hepat. fig. 152.

Darent Wood; *George.*

Known from *Lepidozia reptans*, which it resembles in size and habit, by its globular green capsule white when empty, short fruit-stalk, and entire leaves.

RADULA COMPLANATA, *Dumort.* *Jungermannia complanata*, L.

On trees, rocks, and bushes; common. Bearing fructification all the year round. Brit. Jung. t. 81. E. B. 2499.

Greenhithe; *George!* Near Chelsfield, on roots of trees; Penshurst; Hungershall Wood. In fruit near Westerham, Abbey Wood, Postling, and Charing.

Distinguished from all the species of *Frullania* by its pale yellow-green colour and by the absence of stipules.

PORELLA PLATYPHYLLA, *Lindb.* *Jungermannia platyphylla*, L.

On stones and stumps in hedgebanks; common, especially in chalky districts; not observed in fructification. March to August. Brit. Jung. t. 40, fig. 1. Cooke Brit. Hepat. fig. 143, 145.

Bromley; Knockholt; *George!* Southborough; *Fawcett!* Swanscombe Wood; Otford; Shoreham; Chelsfield; Kemsing; Ightham; Wrotham; Willesboro' Lees, near Ashford; Wye, on chalky banks; Canterbury; Herne Bay.

Tribe—*Lepidozieæ.*

LEPIDOZIA REPTANS, *Dumort.* *Jungermannia reptans*, L.

Among rocks and on damp banks in woods and thickets; frequent. March, April. Brit. Jung. t. 75. Cooke Brit. Hepat. fig. 121.

Banks of Woolwich Heath, in moist places, *Dill.*; *Bot. Guide.* Abbey Wood; *George!* Darent Wood, near Dartford, and Ightham, in fruit; Abbey Wood; Hungershall Rocks.

In the barren state the toothed-leaves and attenuated branches distinguish this from *Lejeunia serpyllifolia*.

[*Odontochisma Sphagni*, Dum, should be looked for in Kent. The stems grow either singly or in a scattered manner among *Sphagnum*, to which they are attached by their radicles.]

CEPHALOZIA BICUSPIDATA, *Dumort.* *Jungermannia bicuspida*, L.

On damp banks in woods and on heaths, &c.; very common.

February to April. E. B. 2239. Brit. Jung. t. 11.

Toad Rocks, Rusthall Common; Hungershall Rocks; Joyden's Wood, near Bexley.

Easily recognised by the large pale calyx, which is singularly out of proportion to the minute size of the plant, and known from *C. byssacea* by the central, not terminal, fructification.

C. BYSSACEA, *Dumort.*

On damp chalky banks in woods, &c.; frequent. February to April. Brit. Jung. 12.

Railway bank, Forest Hill; *George!* Between Otford and Shoreham; Maidstone.

The tufts are usually looser than those of *C. bicuspida*, and the fructification is terminal.

LOPHOCOLEA BIDENTATA, *Dumort.* *Jungermannia bidentata*, Sm. (Jenner, Fl. Tunbr.)

Among mosses in woods and thickets and on damp hedgebanks; very common. March, April. E. B. t. 606. Cooke Brit. Hepat. fig. 109.

Crystal Palace Grounds; very common; *George!* In the wood by the Hungershall Rocks; *Jenner Fl. Tunbr.* Southborough; *Fawcett.* Ightham, in fruit. King's Wood.

Easily recognised by its pale green colour and deeply divided leaves.

L. HETEROPHYLLA, *Dumort.* *Jungermannia heterophylla*, L.

On stumps of trees in woods and thickets; frequent. March, April. Brit. Jung. t. 31. Cooke Brit. Hepat. fig. 110.

Perry Vale, Sydenham; *George!* Ightham; Abbey Wood; Crofton Wood, near Orpington.

Distinguished from the last—to which it bears considerable resemblance in colour and habit—by the irregularity with which the leaves are divided and by never having long teeth to the leaves.

CHILOSCYPHUS POLYANTHOS, *Corda.* *Jungermannia polyanthos*, L.

On stones and banks by clear streams and rivulets in woods, &c.; not observed in fructification. April to June. Brit. Jung. t. 62.

North Frith Wood; *Howse.*

Known in the barren state from *Lophocolea heterophylla* by its more flattened leaves, entire stipules, and different place of growth.

HARPANTHUS SCUTATUS, *Spruce.* *Jungermannia stipulacea*, Hook. *J. scutata*, Web. et Mohr. (Jenner Fl. T.)

On moist banks and rocks among the larger mosses; rare. June. E. B. 2538. Brit. Jung. t. 41.

On rocks in Hungershall Wood; *Jenner Fl. Tunbr.*

Bearing some resemblance to *Jungermannia attenuata*, but distinguished by its smaller size and prominent stipules of different shape, as well as by the yellowish green colour of the leaves.

KANTIA TRICHOMANIS, *Gray*. *Mnium trichomanis facie foliolis integris* and *Mnium trichomanis facie foliolis bifidis*, *Ray Syn.* *Jungermannia trichomanis*, *Dicks.* *Calypogeia trichomanes*, *Corda.*

On damp clayey banks and on paths in woods; frequent. February to April. *Brit. Jung.* t. 79.

On Shooter's Hill, Eltham; and Woolwich; *Ray Syn.* iii. p. 79. North Frith Wood; *Howse!* Longbeach Wood, near Charing, in fine fructification in April; also at Ightham Common; Swanscombe Wood, near Greenhithe; and Ashford, in fruit; Crofton Wood, near Orpington; Penshurst; Thornden Wood, near Canterbury; Joyden's Wood, in fruit; Hungershall Rocks.

Easily recognised when in fruit by its long black cylindrical capsule and somewhat stout spirally marked seta, as well as by the subterranean pouch at the base of the fruitstalk.

BLEPHAROSTOMA TRICHOPHYLLA, *Jungermannia trichophylla*, *L.* (*Jenner Fl. T.*)

On turfy heaths; rare. June. *Brit. Jung.* 7. *E. B.* 2482. Hungershall Rocks, 1839; *Jenner Fl. Tunbr.*

Known from *B. setacea* by its straight filiform leaves usually arranged in threes or fives, and by its terminal fructification.

B. SETACEA, *Mitt.* *Lepidozia setacea*, *Mitt.*

In damp heathy places, and in bogs among *Sphagnum* and under tufts of heath. October, November. *Brit. Jung.* 8.

In the bog at Fisher's Castle, and elsewhere; not uncommon. *Jenner Fl. Tunbr.* Keston Common; *Howse!* Joyden's Wood, near Bexley; Ightham Common, in fruit; Thornden Wood, near Canterbury; wood near Waldershare; Biddenden.

Known from *J. bicuspidata* by its subulate incurved jointed leaves, usually arranged in pairs; and from *B. trichophylla* by its lateral fructification and the long teeth of the calyx.

SCAPANIA COMPACTA, *Dumort.* *Jungermannia resupinata*, *L.*

On damp exposed rocks, among heath and in hedgebanks; rare. May, June. *Brit. Jung.* 23.

Rocks by the roadside, near Chiddingstone; abundant near the Toad-rock on Rusthall Common.

Known from *S. undulata* by its prostrate habit, smaller size, shorter stems, and convex appearance of the upper leaves.

S. UNDULATA, *Dumort.* *Jungermannia undulata*, *L.*

In wet places, and by the side of streams in hilly and rocky districts; not common. May, June. *Brit. Jung.* t. 22.

Ide Hill, near Sevenoaks, growing in company with *Hypnum pratense* by the roadside; very fine in a small well near Hurst Wood, Tunbridge Wells; Wye.

Has an erect and looser habit of growth, and less rigid leaves than the last species, and often grows immersed in water.

S. NEMOROSA, *Dumort.* *Jungermannia nemorosa*, *L.*

Damp shady banks and woods. May, June. *Brit. Jung.* t. 21. *Cooke Brit. Hepat.* fig. 48.

North Frith Wood; *Howse*. Joyden's Wood, Bexley; Swanscombe Wood; King's Wood, near Maidstone.

Known from the above species by its strongly dentato-ciliate leaves, the upper lobe of which is scarcely half the size of the lower.

[*S. curta*, Dumort., which often grows intermixed with *S. nemorosa*, and is distinguished from it by its smaller size and more distant leaves, of which only the upper ones are toothed; and *S. umbrosa*, Dumort., which is also a small species, with truly serrate, narrower and more ovate leaves, should be looked for on sand-rocks in Kent.]

DIPLOPHYLLUM ALBICANS, *Dumort.* *Jungermannia albicans*, L.

On damp hedgebanks and woods; very common. March, April.

E. B. 2240. Cooke Brit. Hepat. fig. 53.

North Frith Wood; *Howse*. Southborough; *Fawcett*. Boughton Quarries, near Maidstone; Ightham Common; Joyden's Wood.

Known by the pellucid nerve-like line in the centre of the leaves.

PLAGIOCHILA ASPLENIODES, *Dumort.*

On damp shady banks, mixed with various mosses; frequent.

April, May. Not observed in fructification. Brit. Jung. t. xiii. Cooke Brit. Hepat. fig. 36.

Knockholt; *George!* North Frith Wood; *Howse!* King's Wood, near Maidstone; Long Beech Wood, near Charing; Dover; Joyden's Wood; Hungershall Rocks.

JUNGERMANNIA CRENULATA, *Smith.*

On moist claybanks in woods, and in boggy places on heaths.

December to April. Brit. Jung. t. 37.

On the wet rocks in the lane leading from Rusthall Common to the High Rocks; *Forster Fl. Tunbr.* Hungershall Rocks; Quarry near the Toad Rocks, in fruit in December; Keston Common, in fruit in April; Goudhurst.

Easily recognised in the barren state by the enlarged quadrate cells of the margin of the leaves. Known from *Nardia scalaris* by the absence of stipules, and by the contracted mouth of the four-angled calyx.

[*J. gracillima*, not yet found in Kent, appears to differ only in its more slender habit, and in the marginal cells of the leaves never being enlarged.]

J. PUMILA, *Dumort.*

On rocks and stones by streams and rivers, or in damp shady places. June. E. B. 2230. Brit. Jung. 17.

Hungershall Rocks, abundant; *Jenner Fl. Tunbr.*

Known in the barren state from *J. crenulata* by its smaller size and more ovate leaves: its concave leaves distinguish it from *J. lanceolata*, and its calyx tapering much at both ends from other species.

J. SPHÆROCARPA, Dumort.

On wet rocks and stones by rivulets and in boggy places; rare. March, April. E. B. t. 608. Brit. Jung. t. 75.

North Frith Wood; *Howse!* Joyden's Wood, near Bexley.

When in fruit easily known by its spherical brown capsule, and by the exerted calyx having four large triangular teeth at the apex, which is not contracted as in *J. pumila*, nor angular as in *J. crenulata*. In the barren state the orbicular leaves distinguish it from the above-mentioned species, and the absence of stipules from *Nardia scalaris*.

J. ATTENUATA, Lindb. J. barbata β . *minor*, Hook.

In old woods, on sandy banks amongst mosses. April. Brit. Jung. t. 70, fig. 18.

Abbey Wood; Ightham, in fructification.

Bears considerable resemblance in the shape of the leaves to *J. capitata*, but in that species stipules are absent, and the terminal leaves form a kind of tuft. In *J. attenuata* the leaves of the young shoots are closely imbricated, so as to give them a rigid wiry appearance. From *J. barbata* it is distinguished by having the leaves only 2-3-toothed, and the stipules very minute, ovate and nearly entire.

Hooker had not seen the fruit of this species when the 'British Jungermanniæ' was written. I was fortunate enough to find two capsules among the rocks in the wood on Ightham Hill. The fructification, as in *J. barbata*, appears lateral, owing to the stem forming innovations beneath it. The peduncle is remarkably short, and exceeds the calyx by not more than a line, the capsule is dark brown and oval, and the spores and elaters exactly resemble those of *J. barbata*.

J. EXSECTA, Schmidel.

On banks, in old woods, &c.; rare. Not observed in fructification. Brit. Jung. t. 19. E. B. Suppl. 2745.

Joyden's Wood, near Bexley.

Bears a strong resemblance to *J. ventricosa*, but the stems are usually arranged in a stellate manner, and the leaves are furnished with reddish, not yellow, gemmæ, which are abundant in October and November, and at once separate it from every other species. The leaves are toothed somewhat irregularly, but one tooth in the middle of the upper margin of the leaf is always very prominent, and easily distinguishes it from *J. ventricosa*.

J. VENTRICOSA, Dicks.

Shady banks, among rocks, and in heathy places; frequent.

November to April. Brit. Jung. t. 28. Cooke Brit. Hepat. fig. 77.

Southborough; *Fawcett!* Roadside near Seal, Sevenoaks; *Howse!* Ightham.

Jenner, in 'Fl. Tunbr.,' remarks, "A plant grows on Hungershall Rocks, &c., which does not agree exactly with Hooker's description, but probably is not distinct." The species varies much in appearance: the form which occurs on Hungershall

Rocks was producing capsules freely in December, 1877, these being stated in 'Brit. Jung.' to be "extremely rare." The conspicuous yellow gemmæ and the involute margins of the leaves distinguish this species from *J. excisa*, Dicks, which is not a good species. Dr. Gottsche states that the *J. ventricosa* may be distinguished from its allies by the violet colour of the cortical layer of the stem.

J. CAPITATA, Hook. *J. intermedia* var. *capitata*, Nees.

In small pale green patches on turfy soil and among rocks ; rare. Spring. Brit. Jung. t. 80.

Hungershall Rocks ; *Jenner Fl. Tumb.*

Has the pale green colour of *J. incisa*, but differs in the segments of the leaves not being jagged, and in the leaves having cellules as large as those of *C. bicuspidata*.

J. INCISA, Schrader.

In dense pale green patches, having a crisped appearance, at the foot of sand-rocks and in bogs. November to April. Brit. Jung. t. 10. Cooke Brit. Hepat. fig. 82.

Hungershall Rocks, abundantly in one spot.

Has some resemblance to *Fossombronia pusilla*, which however differs in having purplish radicles, a capsule dehiscing irregularly, and echinulate spores.

J. INFLATA, Huds.

In wet places on heaths and in heathy woods. January to April. E. B. 2512. Brit. Jung. 38.

Keston Common.

The erect leaves, the blackish colour of the tufts, and the small cells of the leaves, distinguish this from *J. Wilsoniana*, Nees ; and the presence of but few bifid bracts from the genus *Cephalozia*.

NARDIA EMARGINATA, Gray. *Jungermannia emarginata*, Ehrh. *Sarcoscyphus Erhardti*, Corda.

On damp rocks and banks in subalpine districts ; rare. April to June. E. B. 1022. Brit. Jung. 27.

Rusthall Common, on exposed rocks ; *Jenner Fl. Tumb.*

N. SCALARIS, Gray. *Alicularia scalaris*, Corda.

On damp clayey banks in woods, &c. March, April. Brit. Jung. 61.

Keston ; Chiselhurst.

Known from all those species of *Jungermannia* which resemble it, by the presence of stipules and the immersed calyx, and by the nucleate bodies, generally consisting of two to four granules arranged in a line, contained in the leaf-cells.

FOSSOMBRONIA PUSILLA, Nees. *Jungermannia pusilla*, L.

On moist places in woods and sides of ditches ; not common. November to March. Br. Jung. 69. Cooke Brit. Hepat. fig. 164.

Banks of Woolwich Heath, in moist places, *Dillenius ; Bot. Guide*. In the lanes on the left-hand of the road from Langton to Speldhurst, near the Dropping Spring ; *Forster*

Fl. Tunbr. Swanscombe Wood, near Greenhithe, in fruit.
Joyden's Wood, in fruit in November.

BLASIA PUSILLA, L. *Jungermannia Blasia*, Hook.

On wet sandy ground occasionally inundated, and on the sides of pools on heaths. March, April. *Brit. Jung. t.* 82-84.

In plenty in the lane on the left-hand side of the road leading from Langton Green to Speldhurst Church, near the Dropping Spring; scarce. *Forster Fl. Tunbr.* "I gathered it in 1841, in the wet part of the lane near the burying-ground, between Langton Green and Ashurst;" *Jenner Fl. Tunbr.*

With regard to this plant, Forster makes the following curious remark in a foot-note in 'Fl. Tunbr.' p. 141. "The duration of this plant being so short, not lasting a month from the time of its first appearance to its fading away, may be the cause of its fancied scarcity." The duration of the fructification must be here intended, as the plant is a perennial. In the barren state this may be recognized by its fleshy narrow fronds and the striated appearance of their upper surface, also by the toothed scales on the under surface of the nerve and within the incurved tips of the fronds. The capsule differs from that of *Pellia epiphylla* in being brown.

PELLIA EPIPHYLLA, Raddi. *Jungermannia epiphylla*, Mohr.

In shady wet places and banks of rivulets. February, April. *Brit. Jung.* 47. *Cooke Brit. Hepat. f.* 171.

About Woolwich; *Fl. Metr.* Near Speldhurst; *Forster Fl. Tunbr.* Southborough; *Fawcett!* Canterbury; Sandwich; Dover.

P. CALYCINA, Taylor. *Lichenastrum capitulis rotundis e foliorum medio evascentibus*, Ray *Syn.* iii. *Jungermannia epiphylla*, var. γ . *furcigera*, Hook.

In dripping places and on sides of ditches; not observed in fruit. February, March. *Brit. Jung. t.* 47, fig. 18. *Cooke Brit. Hepat. fig.* 172.

About Woolwich; *Ray Syn.* iii. p. 110, n. 3. Hungershall Rocks; *Jenner Fl. Tunbr.* Southborough; *Fawcett!* Damp spot in a lane between Dunk's Green and Rats Castle, near Hadlow; Bexley.

A narrow form is abundant in the springs by the roadside between Aylesford and Maidstone, and at Tovil, near Maidstone.

METZGERIA FURCATA, Dumort. *Jungermannia furcata*, L.

On trunks of trees, bushes, and on shady rocks; very common. October to March. Not observed in fructification. *Brit. Jung. t.* 55, 56. *Cooke Brit. Hepat. fig.* 180, 181.

Knockholt; *George!* Southborough; *Fawcett.* Penshurst; Ightham; Dover. In Great Stockham Wood, on Dunton Green, with gemmæ, abundantly.

Usually fruits on the shady side of trees in damp localities.

RICCARDIA MULTIFIDA, Gray. *Jungermannia multifida*, L. *Aneura multifida*, Dum.

On damp clayey banks and on the sides of ditches; frequent. January to March. Brit. Jung. t. 45. E. B. 186.

Charlton Wood; *Fl. Metr.* Near the Dropping Spring in the lane on the left-hand side of the road from Langton Green to Speldhurst Church; *Forster Fl. Tunbr.* Charlton, near the quarry; Crofton Wood, near Orpington; Sandwich; Dover; Tunbridge Wells; between Tunbridge Wells and Speldhurst, in fruit.

R. PINGUIS, Gray. *Jungermannia pinguis*, L. *Aneura pinguis*, Dum. Wet marshy spots and places inundated in winter. February, March. Brit. Jung. t. 46. Cooke Brit. Hepat. fig. 174.

Charlton Wood; *Fl. Metr.* In a wet part of the large quarry near Charlton Station, abundantly in fruit; in company with *Pellia epiphylla*.

Easily distinguished from *Pellia epiphylla*, which has a spherically green capsule, by its black oblong capsule and long tubular calyptra; from *P. calycina* by the absence of a nerve.

ANTHOCEROS PUNCTATUS, L.

In damp fallow fields and on ditch-banks, &c. July, August. E. B. t. 1537. Cooke Brit. Hepat. fig. 194.

Banks of Woolwich Heath, in moist shady places (Dillenius); *Bot. Guide.* In the little lane from Rusthall Common to the High Rocks; *Forster Fl. Tunbr.*

A. LÆVIS, L.

On damp clay-banks, often growing with *A. punctatus*. July, August. Cooke Brit. Hepat. fig. 193.

On the rocks in the lane leading from Rusthall Common to Speldhurst Church; *Forster Fl. Tunbr.*

A. punctatus may be distinguished by the papillose surface of the frond and by the darker spores from *A. lævis*, which has fronds smooth on the upper surface and yellowish spores. The lobes of the thallus in the latter species are also rather thicker and more rounded in outline.

(To be continued.)

SHORT NOTES.

POLYGALA CALCAREA IN BUCKS.—In the collection of British plants presented by Miss Chandler to the British Museum Herbarium there is a well-marked specimen of this plant on the same sheet with *P. vulgaris*, collected at Hughenden in June, 1865. The species has not previously been recorded for the county.—JAMES BRITTEN.

RICCIA SPURIA, Dickson.—The correct determination of this plant has long been a desideratum, as no specimens were known to be in any collection; and the figure in Dickson's work (fasc. iv. tab. xi. fig. 16) represents a form of fructification so curious and distinct from that of *Riccia* that it became a matter of great interest to identify the plant. Guided by this figure, and by his knowledge of foreign species, Prof. Lindberg, in his paper "Hepaticæ in Hibernia m. Julii, 1873, lectæ" (pp. 479, 480), published his opinion that it was probably referable to the same genus as *Synhymenium aureonitens*, Griff. The acquisition of Dickson's herbarium by the British Museum having afforded an opportunity of examining the original specimen, he is enabled fully to confirm the accuracy of his previous conjecture. Griffith's plant is congeneric with *Cyathodium cavernarum*, Kunze, only known hitherto from the West Indies and Cape Verd Islands; *Riccia spuria*, Dicks., is this species, and although Dickson merely says, "in paludibus turfosis montium Scoticarum," Prof. Lindberg considers it quite possible that it is a native, as the western coasts of Great Britain and Ireland have several Cryptogams in common with the West Indies. He states that the plant is smaller and more scattered and the spores less perfectly developed than in the Cape Verd specimens.

The synonymy of the two species which constitute the genus will stand as follows:—

1. *CYATHODIUM SPURIUM*, Lindb.

Riccia spuria, Dicks. Plant. Crypt. Brit. fasc. iv. p. 20, and tab. xi. fig. 16 (1801).

Cyathodium cavernarum, Kunze in Lehm. Pugill. Plant. vi. p. 17 (1834).

Figured also in Montagne, Ic. Plant. in Flor. Cub. Descript. t. xix. fig. 4 (1863).

Hab. Scotland, Cape Verd Islands, Cuba, Mexico.

2. *CYATHODIUM AUREONITENS*, Lindb.

Synhymenium aureonitens, Griffith, Notulæ ad Plant. Asiat. i. p. 344 (1847), and t. lxix. D, fig. 2.

Hab. India.

Attention is called to this very interesting plant in the hope that botanists will search for it in Scotland, and that it will be again detected there.—R. BRAITHWAITE.

Notices of Books and Memoirs.

Die Parthenogenesis der Cælebogyme ilicifolia. Von JOHANNES HANSTEIN. (Hanstein's Botanische Abhandlungen, dritter Band, drittes Heft). Bonn, 1877.

THE whole tendency of this memoir is to support the supposition of parthenogenesis. Every possible precaution was taken to isolate the

plants under examination, and to ascertain whether there was any pollen produced by any of the flowers. In no instance was a trace either of anther or of pollen-grain found. Copious details are given of the thirty flower-buds examined, and from which seventeen fruits were obtained. Considerable difference was observed in the period of swelling of the ovary, which commenced sometimes four days after maturation of the stigma, but sometimes not until after twenty-five, thirty-eight, or thirty-nine days; the time elapsing between commencement of swelling and perfect maturity also oscillated between fourteen and thirty-eight days. Nineteen embryos were found in the seventeen fruits: of these five were solitary in one cell of five fruits, a sixth and a twin-pair occurred in two cells of a sixth fruit, a triplet in one cell of a seventh, and quadruplets in one cell of an eighth and ninth fruit. All these embryos are figured: they vary considerably in their size and shape, and in the degree to which their perfection is carried. The author enters somewhat minutely into the philosophy of parthenogenesis, and gives a full list of plants in which this method of reproduction has hitherto been found, omitting *Cannabis* and *Mercurialis* however. The investigation was conducted conjointly with Alexander Braun, who thus returned, quite at the close of his career, to a subject in which he had formerly taken such deep interest.

S. M.

Acetabularia mediterranea. Von A. DE BARY und E. STRASBURGER.
(‘Botanische Zeitung,’ Nov. 1877.)

It was only the other day that we drew attention to the discovery of another case of conjugation of zoospores, viz., in *Botrydium granulatum*. We have now to mention a similar discovery in the case of the curious alga mentioned at the head of this notice. The authors set themselves the task of finding out what becomes of the spore, the subsequent history of which has hitherto remained unknown. The ripe spore is about ninety-five micro-millimetres long by about seventy broad, and it is provided with a lid. On the inner side of the wall is a thick layer of protoplasm, containing a great number of starch-grains coloured green by chlorophyll. The central space is filled with water-like fluid, in which lies an accumulation of small red pigment-grains collected always close to the inner side of the layer of protoplasm. The starch afterwards dissolves, and the now homogeneous plasma divides simultaneously into numerous nearly equal polyhedral portions arranged in a single row except perhaps near the lid, which latter after a while bulges outwards, and in this movement is closely accompanied by the contents. Suddenly the lid is uplifted, and the contents immediately project, surrounded by a swollen enveloping membrane. The lid usually remains, as it were, hinged to the spore, and seldom is quite cast off. The portion of the contents which has escaped from the spore usually

encloses a part of the central space (bladder), which thus becomes ultimately divided into two: to it great importance is attached as an agent in effecting upraisal of the lid. The enveloping membrane then bursts, and the swarm-spores immediately escape, scarcely a minute being occupied in complete emptying of the spore: in this latter there only remains the now spherical "bladder," to which are attached a number of small colourless starch-grains, and a few solitary granules of chlorophyll. The swarm-spores are 2-ciliated, and, as mentioned above, they usually copulate, those that do not do so coming to grief. In copulation usually two (but sometimes several) spores come together, but the cilia remain free, and the motion of the united mass is swifter than that of the individual members. The mass assumes rounded form after a time, and the cilia are absorbed into it, and subsequently it is surrounded by a thin membrane of cellulose. Copulation never occurs between swarm-spores of the same spore. Sometimes a crowd of united zoospores escapes from a spore, and swims about like a copulated mass, which it much resembles, but it finally comes to nothing. About five months after copulation the mass begins to germinate; but we must refer those anxious to know more about the vegetative life of the plant to the paper itself.

The reproductive structure spoken of as a "spore" is regarded as a true spore, since it forms the asexual close of a sexually produced generation. For the swarm-spores the term "*gametes*" is proposed, the spore being called "*gametangium*." The mass of copulated *gametes* is called a "*zygote*"—a term which is also proposed as a substitute for *zygospore* and *isospore*, these not being spores in Sachs' sense. An ingenious comparison is drawn between the *hypnospores* of *Botrydium* and the spores of *Acetabularia*.

S. M.

Bedfordshire Plant List for 1876 (being the First Report of the Botanical Survey of Bedfordshire.) By W. HILLHOUSE, F.L.S. 1877.

THE newly issued catalogue of Bedfordshire plants will speak favourably for the industry of the Society which is its sponsor. About 270 species have been added to the 430 included in the list drawn up under the same auspices some twelve months previously. But the roll has been unduly swollen by the admission, without any sign of distinction, of several non-British plants, some of which, such as *Pinus Pinaster*, seem to be especially out of place in a preliminary enumeration. The arrangement adopted comprises apparently only those species which have fallen under the observation of members of the Society, and no notice is taken even of contemporary records. It is not very clear how far the statements and specimens of correspondents have been submitted to the judgment of any central authority. Few botanists would be inclined to admit, without some better evidence than is here afforded, the occurrence as natives in the county of *Viola lutea*, *Vicia lutea*, *Callitriche autumnalis*, and *Carex limosa*; and their

insertion without any mark of uncertainty throws some doubt on the correct naming of the more critical plants in the catalogue. It may be questioned also whether the use of initials presents any advantage that can compensate for the inconvenience of effectually disguising the relative value of assertions thus authenticated.

R. P.

In the 23rd part of the 'Symbolæ ad fl. Brasil. central. cognoscendam,' published in the Copenhagen Natural History Society's Journal for last year, Mr. Hiern enumerates the *Solanaceæ*, *Acanthaceæ*, *Gesneraceæ*, and *Verbenaceæ*. He has been unable to avoid adding seven new species to the already gigantic genus *Solanum*, and there are about a dozen previously undescribed species in the other genera contained in the orders enumerated above.

Prof. Maximowicz, in a second portion of his *Diagnoses Plant. Nov. Asiatic.* ('Mél. Biologiques de St. Petersburg,' x. 1877), describes several new Chinese and Mongolian species of *Corydalis*, and gives monographic revisions of the East Asiatic species of *Lonicera* (thirty) and *Pedicularis* (fifty). *Dipelta*, gen. nov., from China, is also here described; it occupies a position between *Symphoricarpus* and *Abelia*.

Pringsheim's 'Jahrbuch für Wissenschaftl. Botanik' for 1877 contains memoirs on morphology, chiefly of dichotomous inflorescences, by H. Wydler; on the primitive meristem of Dicotyledonous roots, by J. Eriksson (with ten plates); and on the force of pressure in the stem in the phenomena of 'bleeding' and 'weeping.'

In Cohn's 'Beiträge,' for 1877 (Bd. ii. heft 3) are papers by L. Just, on the influence of high temperatures on the capacity for germination of seeds; by Schroeter, on the *Ustilagineæ* (t. 13); and by Koch, on Bacteria (tab. 14-16). We defer a full notice.

In the 'Linnæa' (vol. vii. pts. 5 & 6, dated October, 1877), E. Goeze concludes his interesting account of the vegetation of Portugal, and H. Polakovsky enumerates the Phanerogams of his Costa Rica collections, of which the Cryptogams were catalogued in this Journal last year.

OTHER NEW BOOKS. — W. TURNER, 'Libellus de re herbaria novus,' 1538; reprinted in *facsimile*, with notes, modern names, and a life of the author, by B. D. JACKSON (privately printed), London, 1877. — A. ERNST, 'Estudios sobre la Flora y Fauna de Venezuela.' Caracas, 1877. — T. DE HELDREICH, 'Catalogus systematicus herbarii Theod. G. Orphanidis,' Fasc. I. *Leguminosæ*. Florence, 1877. — COUTANCE, 'L'Olivier, histoire, botanique, &c.' Paris, Rothschild. — BLANCHERE, 'Les ravages des Vergers et des Vignes avec une étude sur le Phylloxera.' Paris, Rothschild. — JUST, 'Botanischer Jahresbericht, 1876,' Part i., Berlin, 1878. — W. BLAND, 'Elementary Botany,' Part 2. London, Bemrose & Co. (6d.)

ARTICLES IN JOURNALS.—DECEMBER, 1877.

Bot. Zeitung.—F. Ludwig, ‘On the cleistogamy of *Collomia grandiflora*, Dougl.’—V. A. Poulsen, ‘The extra-floral nectary in *Batatas edulis*.’—E. Askenasy, ‘On the annual periods of buds.’

Flora.—C. Kraus, ‘On the molecular constitution of protoplasm in dividing and growing cells.’—F. Arnold, ‘The Mosses of the French Jura’ (continued).—Nylander, ‘Addenda nova ad Lichenographia Europæam’ (fifteen new species, eleven from Ireland.)

Oesterr. Bot. Zeitschr.—E. Hackel, ‘On a Grass with variable lower pales.’—J. Freyn, ‘*Verbascum tomentosum* (*V. Chairii* × *sinuatum*)’—M. Winkler, ‘Two hybrid plants from Spain.’—A. Kerner, ‘Distribution of Hungarian plants’ (continued).—W. Voss, *Puccinia Thümeniana*, n. sp.’—L. Celakovsky, ‘Further notes on *Melilotus macrorhizus*, W. & K.’—H. Kempf, ‘Flora of Vienna.’—R. v. Uechtritz, ‘Botanical notes.’—F. Antoine, ‘Botany of Vienna Exhibition’ (continued).

Bot. Notiser.—E. Ahrling, ‘Examination into the MSS. of Linnæus existing in Sweden.’—A. S. Winslow, ‘*Salix*- and *Rosa*-flora of Göteborg’—‘Swedish Botanical Literature for 1876.’

Proceedings of Societies.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE,
PLYMOUTH, 1877.

(Concluded from vol. xv., p. 318.)

August 20.—J. Gwyn Jeffreys, Esq., F.R.S., President, in the chair.—“On the structure of the pitcher of *Cephalotus*,” by Prof. Alexander Dickson. [A full abstract of this paper is printed at pp. 1–5.]—Prof. Dickson exhibited a specimen of *Pogonatum alpinum* with two capsules beneath a single calyptra. There was some doubt, however, whether the calyptra were really single.—“On structural characters in relation to habitat in plants,” by A. S. Wilson. This was an attempt to show that the external characters of plants were caused by their environment, especially as related to drought or humidity. The paper caused much discussion.

August 21.—The Rev. W. S. Symonds read an extract from a letter from Prof. O. Heer, Zurich, to Sir Joseph Hooker, dated 14th Aug. 1877, on the plants collected by Capt. Feilden in the Arctic Expedition. These are of the greatest interest, and give us, in many directions, important conclusions. Of *Taxodium distichum miocenicum* not only do the twigs occur, but also the male catkins, as at Cape Staratchin. There are two species of *Pinus* (seeds and leaves), a leaf and fruit of *Ulmus*, leaf and bark of *Betula prisca* and *Torellia rigida*. *Torellia* is a highly remarkable genus, of which Prof. Heer got from Spitzbergen only fragments of

leaves. It is no doubt a *Taxinea*, very near *Phanicoopsis* of the Jura. The fact of the existence of *Nymphæa*, of large Grasses, of ten species of Conifers, of *Populus*, *Betula*, *Corylus*, *Ulmus* and *Viburnum* near 82° N. lat. is very interesting.—“On the classification of the Vegetable Kingdom,” by Prof. W. R. McNab. [Printed in full in *J. Bot.*, 1877, pp. 340–344.]—“The classification of the flowering plants considered phytogenetically,” by Prof. McNab. Haeckel’s monophyletic pedigree of the Vegetable Kingdom, as given in his ‘History of Creation,’ vol. ii. (English edition), was discussed and objections to its conclusions urged. Thus in two cases the groups are known to occur earlier than Haeckel’s theory requires, in another case (monchlamydeous *Dicotyledons*) the plants do not appear until much later (in the Cretaceous instead of the Triassic). The geological distribution of *Dicotyledons*, founded on Schimper’s ‘Paléontologie Végétale,’ was then fully discussed. The general conclusions drawn were the following:—1. That the *Gamopetalæ* are more recent than the *Choripetalæ*. 2. That the apetalous orders must be looked upon not as forming a separate group, but as being the lowest members of the subordinate groups of the *Choripetalæ*. 3. That the older representatives in the chalk of the larger group generally belong to families having variable characters, more especially in regard to the number of the parts of the flower. Thus the oldest representative of Order 69, *Umbellifloræ*, is *Araliophyllum* in the chalk. The *Araliaceæ* have variable characters, as shown by the formula— $Ca_{(5-10)}Co_{5-10}An_{5-10}Gn_{(2-10)}$, a formula which will include that of the *Umbellifera*, viz., $Ca_5Co_5An_5Gn_{(2)}$. 4. That while the *Monocotyledons* are undoubtedly monophyletic, the *Dicotyledons* are certainly polyphyletic, and hence the great difference seen in the formulæ of their flowers.

LINNEAN SOCIETY OF LONDON.

November 15, 1877.—Dr. Gwyn Jeffreys, F.R.S., Vice-President, in the chair.—Dr. Trimen exhibited specimens of *Boswellia Carterii*, Birdw. (foliage and branches), and *B. Frereana*, Birdw. (in flower). They were gathered in October last by Mr. J. Collins from the trees planted at Aden, near the tanks. Dr. Trimen made some observations on the variability of the foliage of *Boswellia*, and expressed an opinion that *B. Bhau-Dajiana*, Birdw., was not specifically separable from *B. Carterii*. *B. Frereana* in its wild state is confined to Somali-land, where it was recently collected by Hildebrandt. It affords the fragrant true resin called “Luban Meyti,” which Hanbury considered to be the African “Elemi;” this is much chewed by Orientals, but rarely imported into England. *B. Carterii* yields the well-known “Olibanum,” or “Frankincense,” and grows wild both in Somali-land and on the south-west coast of Arabia.

December 6.—Prof. Allman, F.R.S., President, in the chair.—Mr. Thiselton Dyer exhibited leaves and wood of the Nan-mu tree. This tree grows in Yunnan, between 25° and 26° N. lat., and its wood is highly valued by the Chinese court for building purposes, and by the wealthy for coffins. It forms enormous columns

in tombs of the Ming dynasty, three hundred years old, and has usually been supposed to be teak. The tree is still botanically indeterminate, but it probably belongs to *Lauraceæ*, and the leaves closely agree with those of *Phœbe pallida*.—Mr. Thiselton Dyer also exhibited and made some remarks on a seed of *Entada scandens*, and one possibly belonging to *Cyathocalyx Mainyayi*, an Anonaceous plant, which were found in the cæcum of the *Rhinoceros sumatrensis* from Chittagong which died in the Zoological Gardens, Regent's Park. Fruits of *Oncocarpus vitiensis* were likewise shown, these having been obtained from the crop of a fruit-pigeon (*Carpophaga latrans*) from Fiji.—Mr. Thiselton Dyer also exhibited part of a fruit-head of a species of *Pandanus* from India, forming a brush, of which the fibrous tissue of the drupes constituted the bristles, said to be used to scrape cloth, like the Teazle.—Mr. J. Eliot Howard brought before the meeting living examples of the flowers and foliage of *Cinchona Calisaya* var. *Josephiana*, and *C. Calisaya* var. *anglica* (hybrid), grown in his garden at Tottenham.—Mr. M. Moggridge read a note containing the record of his having met with *Dabeocia polifolia* growing wild on Wallis Down, near Bournemouth, Hants, during last summer, Doubtless this has been here accidentally introduced, but it is interesting as apparently being well established.*—The Secretary read a paper by Dr. I. Bailey Balfour, entitled "Observations on the Genus *Pandanus*, with an enumeration of all species described or named in books, herbaria, and nurserymen's catalogues; together with their synonymy and native countries, as far as these have been ascertained." Few families of plants present more difficulties of study and elucidation than the *Pandanaceæ*. These difficulties exist by reason of the variability of the species, the barriers in the way of procuring the male flowers, and the feeble characters borne by the leaves, while the fruit, after drying, in a great measure loses its distinctive features, and therefore its value as a means of comparison, &c. The Screw-pines had attracted the notice of the early voyagers, but their descriptions are by no means good, or enable identification to be made with certainty. To Rumphius we owe the name of *Pandanus*, though his account and figures are poor compared with those of Rheede of a century previous. Linnæus, though indicating a plant under the designation *Bromelia sylvestris* omitted nevertheless the genus *Pandanus*, an omission afterwards rectified by his son. Afterwards, as knowledge of species increased, many new genera were unnecessarily introduced, which Dr. Balfour, from his studies and observation, is inclined to reject; even Brongniart's New Caledonia genera do not claim acceptance. *Pandanus* runs over a wide expanse of longitude, stretching as it does from the East African coast through the Mascarene Islands, India, the Indian Archipelago, Australia, as far eastward as the Sandwich Islands. The Eastern Archipelago and the Mascarenes, Dr. Balfour regards as centres whose species of *Pandanus* do not commingle. The species of the Mascarene area have frequently red spines on

* This Heath has been already recorded from Bournemouth, and also from Southampton. (See Journ. Bot. 1872, p. 277).

the margins of their leaves, although this is by no means universal, while with those of the eastern area this is an exception; with the former the spines on the leaf-edges or midribs, are seldom recurved, whilst this peculiarity is common with those of the latter. The nomenclature Dr. Balfour finds a source of great trouble, the multiplication of names by horticulturists giving rise to complexity and confusion. A note on the means of preserving *Pandani* fruit, &c., and a copious list of species and synonymy follow.—The Secretary also read a communication from Dr. J. Stirton, "Notes on the Rev. Mr. Crombie's paper on the Lichens of the 'Challenger' Expedition."

December 20.—Prof. Allman, F.R.S., President, in the chair.—Dr. Masters showed a specimen of *Colletia cruciata* he had that day received in a living state from Sig. Fenzi, of Florence, which was of special interest in connection with those exhibited by Dr. Prior at a previous meeting (see J. Bot. 1877, p. 377), and seemed to throw some light on the history of the plant in question. The remarkable form known as *C. cruciata* was originally described by the late Sir W. Hooker from native Chilian specimens. Some years after Dr. Lindley received specimens of the plant from the gardens of Lady Rolle at Bicton, said to have been raised from the seeds of *C. spinosa* by the gardener, Mr. Barnes, a man of much natural keenness of observation. Dr. Lindley, overlooking the previous publication of the plant, and accepting the statement as to its origin, described and figured it as *C. bictonensis*, and referred to it as a remarkable case of transformation. When, however, the previous publication of Sir W. Hooker's *C. cruciata* was remembered, and the specimens examined, it was naturally thought that Mr. Barnes was mistaken in his assertion, and that he had unwittingly sown the seeds of the two species (known to be natives of the same localities). The specimen exhibited by Dr. Masters, however, showed that Mr. Barnes' statement was not necessarily entirely erroneous, for from the same branch proceeded shoots with the broad flattened-deltoid spines characteristic of *C. cruciata* and others, with slender cylindrical spines, very similar to, but more slender than, those of *C. spinosa*.—Mr. Worthington G. Smith exhibited, under the microscope, a specimen of the fossil fungus (*Peronosporites antiquarius*) which he has recently described and figured in the 'Gardeners' Chronicle,' and made some remarks thereon. He also showed a number of enlarged drawings of sections of Fungi, among others that of *Boletus subtomentosus* stating that in this typical specimen, five inches in diameter, there are 17,000 pores or tubes. Each pore when cut across showing 2000 cells on the surface. The number of surface-cells on the under side of a specimen is 36,000,000. The cells in an entire plant are calculated to be 61,500,000,000, and the number of spores produced by the same specimen 5,000,000,000.—Mr. Stephen W. Silver exhibited a series of vegetable products, arrows and other instruments, from the Fiji Islands and New Caledonia, collected and forwarded by Mr. Edgar Layard, H.B.M.'s Consul, Noumea. Among the specimens was a quantity of the substance (from the island of Mallicollo) which is said to be used by the natives

for poisoning their arrows. The exact composition of this has not yet been ascertained, though it is supposed to be a composition similar to that described by the Rev. Thos. Powell in the 'Journ. Linn. Soc.,' vol. xvi. p. 58 (see J. Bot. 1877, p. 127.)—"On the *Algæ* found during the Arctic Expedition," by Prof. Dickie. This report deals with material collected between 78° and 83° N. lat. by Capt. Feilden, Dr. Moss and Mr. Hart, who accompanied Capt. Sir George Nares. It is noted that of freshwater species there are representatives of fourteen genera, many common to Europe. Of *Diatomaceæ* thirty-one genera and seventy species have been identified, most being marine. Seven species of olive-coloured *Algæ* are given, but it seems no marine species belonging to the red series were obtained, or at least placed in Prof. Dickie's hands. A comparison of the *Algæ* of the Spitzbergen seas follows, and full references are made to the papers of Prof. J. G. Agardh and P. T. Cleve in the 'Transactions' of the Swedish Academy.

Botanical News.

A NEW scientific periodical has been commenced in Paris under the title 'Revue internationale des Sciences,' Dr. de Lanessan being the editor. It appears weekly, and consists of signed articles on all departments of science, and analyses of books and memoirs of importance, reports of scientific societies, and scientific bibliography of all countries; the list of "collaborateurs" is extensive. The price of each number is 50 c., and the publisher Octave Doin, 8, Place de l'Odeon, Paris.

We are glad to learn that the second edition of Sir J. D. Hooker's 'Student's Flora' is well advanced. We also hear that Mr. Bentham has in the press a new edition of his "Handbook of the British Flora." The publication of the seventh and concluding volume of the 'Flora Australiensis' is immediately expected.

PROF. EICHLER, of Kiel, has been appointed to the Professorship of Systematic Botany at Berlin, in the place of Alex. Braun.

The Royal Horticultural Society has appointed as Assistant-Secretary, Mr. Samuel Jennings, F.R.S., formerly of the Agricultural Society of Bengal.

The death is recorded, at Worthing, of the Rev. THOMAS SALWEY, Rector of Oswestry. He was well known for his work in the Lichens of this country, and published several papers on those of Shropshire and the Channel Islands in the 'Annals and Mag. of Nat. Hist.' and the Edinburgh Botanical Society's Transactions. He also issued a valuable series of exsiccata, 'Lichenes Britannici.' He visited Madeira, and in 1847 discovered in Guernsey *Allium triquetrum*.

ANDREW MURRAY died on 10th January, at the age of 66. He was born in Edinburgh, and was a Writer to the Signet there,

and in practice for some years. In 1858 he was president of the Edinburgh Botanical Society, and contributed several papers to the Transactions of that Society. It was not till 1860 that he came to London to occupy the post of assistant-secretary to the Horticultural Society, and has been intimately connected with its scientific committee since its foundation. Though best known as a zoologist (especially as a very accomplished entomologist), Mr. Murray had a good knowledge of plants, and published in 1863 a volume on the 'Pines and Firs of Japan'; he was also engaged on the text of Lawson's 'Pinetum Britannicum,' which is still uncompleted. Mr. Murray was a very careful and accurate observer and an acute reasoner, and his loss is deplored by a large circle of friends.

We have to record the death of Mr. SAMUEL ANDERSON, of Whitby, in Yorkshire, an energetic collector and investigator of the mosses and Hepaticæ of that district. He was the first to discover *Sphagnum molle* in this country, and contributed largely to the 'Sphagnaceæ Britannicæ Exsiccate,' recently issued, the specimens prepared by him bearing witness to the care and neatness which marked all the work that passed through his hands. Several species of Hepaticæ recently detected by him are also new to the Yorkshire Flora.

We are sorry to have to announce the death of our correspondent, Miss ELIZABETH HODGSON, of Ulverstone, which took place there on 26th December last, at the age of 64. Her principal contribution to botany was her 'Flora of Lake Lancashire,' which appeared in this Journal in 1874 (New Series, vol. iii. p. 268-296). Lake Lancashire, though politically a part of that county, is physically an appendage of the Lake district, running up from the coast to Coniston water and the west shore of Windermere; and as its hills rise to a height of 2500 feet, and its geology presents great variety, its botany, which had been little studied systematically since the days of Ray's correspondent, Thomas Lawson, is of much interest. Miss Hodgson recorded nothing but what she had herself seen; and as she sent her specimens up to London before printing to be verified, and afterwards presented her collection to the British Museum, her paper possesses the highest claim to authenticity. Many of the species are represented by a large and well-selected series of forms, some of which are of critical interest. For many years she was a member of the Botanical Exchange Club, but lately for some time her health had been very feeble; she was also an able geologist, and contributed from 1863 downwards many papers to the 'Journal of the Geological Society,' the 'Geologist,' and the 'Geological Magazine.' Her latest scientific task was, after she was too ill to collect for herself, to make by deputy a collection of the Furness Mosses.

CORRECTION in the December number.—In the paper on 'Bermudian Ferns,' (p. 367), everywhere for 1863 read 1843; for 1864 read 1844, and for 1865 read 1845.

Original Articles.

ON THE FLORAL STRUCTURE AND AFFINITIES OF *SAPOTACEÆ*.

BY MARCUS M. HARTOG, M.A., B.Sc., F.L.S.

IN the spring months of 1877 I had the opportunity of following the development of the flower in the following species of *Sapotaceæ*, cultivated in the Royal Botanic Gardens, Pérádeniya, Ceylon:—*Chrysophyllum oliviforme* and *C. Caimito*, *Achras Sapota*, *Bassia longifolia*, *Dasyaulus nerifolius*, *Mimusops Elengi*, and another species near *M. parvifolia*, Br. Since my return to Europe I have dissected dried specimens of most of the other genera in the herbaria of the Jardin des Plantes, the British Museum, and Kew, and have found that the results elucidated most of the types of this very peculiar family, and form a strong basis for a preliminary sketch of its morphology. Eichler, in 1876, attempted this in his 'Blüthendiagramme' (pp. 331–4), but from dried specimens only, so that he left many problems untouched. Several of his interpretations, however, are very sagacious. I may add that the greater part of the substance of this paper was worked out in Ceylon, while I have only seen Eichler's book since my return home.

INFLORESCENCE.—This is always axillary. In *Achras Sapota* the flowers are solitary axillary, forming by their approximation a sort of leafy umbel. By carefully digging out the mass of resin enveloping the terminal leaf-bud, I found that the axillary bud which later forms a flower, at the time when it is a mere hemispherical tubercle emits a pair of lateral outgrowths, the first traces of the bractlets. These, which I had before been altogether unable to find, persist even in the nearly adult flower as minute, elongated, subulate scales at the base of the pedicel, and are caducous with the tomentum in which they are almost buried.

In *Bassia* the (stipulate) leaves are succeeded towards the end of the season by 3-fid bud-scales, closely imbricated. In the axil of most of these is formed a flower-bud, bearing, as in *Achras*, two lateral bractlets (delicately membranous and very caducous). Either bractlet has another axillary flower-bud, which is, I believe, ebracteolate.

Mimusops, sp., has also solitary axillary flowers, but sometimes its bractlets are fertile as in *Bassia*.

The other plants (*f*)* have all paired dichasia, each cyme

* To save repetition, I add (*f*) when the development was worked out on the fresh specimen, (*d*) where only dry flowers were available.

being axillary to one of the opposite scales which are the first production of the shoot axillary to the foliage leaf. The bractlets are here always present, coriaceous, often caducous; and, as they are always at the very base of the pedicel, the adult inflorescence is described as fascicled. The primary axillary shoot on which these paired fascicles are formed may remain dormant altogether, or grow out sooner or later into an innovation.

CALYX.—This is quincuncial in number, order of appearance of individual parts, and imbrication in the adult flower in both species of *Chrysophyllum*. Sepal 1 is between the parent axis and the right bractlet, 2 between the axis and the left bractlet, and 4 is posterior.

In the remaining species (*f*) the calyx consists of two equal alternating, successive whorls—2-merous in *Bassia* and *Dasyaulus*, 3-merous in *Achras*, 4-merous in both species of *Mimusops*. The outer sepals, when two in number, alternate with the bractlets; when three, two are antero-lateral, and the third posterior; when four, two are antero-, two postero-lateral.

In all the other species the calyx falls under one or other of the above categories.

COROLLA.—With this organ begins the multiplication of parts so much affected by this Order. In *Chrysophyllum*, however, as in several *Ternstroemiaceæ*, the petals are quincuncial in origin,* like the sepals with which they alternate, but in the contrary direction. Petal 1 is between sepals 1 and 3, or 1 and 4.

In all the others (*f*) the corolla begins by a simultaneous whorl, isomerous and alternating with the calyx as a whole. This is all that we have in *Achras* and *Mimusops*.

In *Bassia*, a second isomerous whorl is formed, alternating with the former, and at first internal to it, though soon appearing as if intercalated.

In *Dasyaulus*, after the formation of the four alternisepalous petals, the receptacle broadens, and another petal forms in front of either inner sepal, raising the number to six.

In *Lucuma marginata*, *L. curvifolia*, &c., (*d*), six petals succeed four sepals; but here two are *external* and in front of the outer sepals, and then come the four alternisepalous ones.

The so-called outer petals of *Mimusops* (*f*), as of *Imbricaria*, *Labramia*, *Eichleria*, gen. nov.,† *Bumelia* and *Dipholis* (*d*), were for the first time correctly interpreted as stipules (“*Nebenblättchen*”) by Eichler. My own observations are as follows:—After the appearance of both andrœcium and pistil, when the true petals are already closely imbricated, a horizontal thickening appears outside and just above the base of each petal. Owing to lateral bulgings, this thickened bar soon appears depressed in the centre. Each bulging then enlarges, and outstrips for the time the parent

* As I judge from their relative size at the first moment when I was able to see the petaline tubercles at all; but I never found less than five present, or else no petals at all.

† See APPENDIX.

petal. In the adult flower these appendages are so arranged that each appears to pair with its neighbour of the next petal, so that they form *paria sepalis superposita*. But in all the species of these genera that I have dissected, fresh or dry, the true petals were invariably and exactly alternisepalous, a relation seen by Eichler, but contradicted or passed over by most other writers.

ANDRŒCIUM.—In all the species examined fresh, and probably in a vast majority of the species of the Order, the andrœcium is truly diplostemonous. Next the petals comes an equal simultaneous alternating whorl of stamens, and then is formed an alternipetalous set internal to the former.* In *Mimusops* and *Achras* the alternipetalous set become sterile staminodes; in *Chrysophyllum* they appear as tubercles, but soon abort altogether, leaving no trace. I have seen a third whorl in one or two adult flowers of *Bassia longifolia*.

In *Labourdonnaisia* (*d*), where the corolla is biseriate, the two sets of stamens continue the alternation of the petaline whorls. In *Payena* (*d*) (including *Cacosmanthus* and *Ceratophorus*), the same is the case; but then a third doubled inner whorl of stamens is formed, alternating with the individual members of both sets † (see formula below.)

The andrœcium requires further study in certain species of *Bassia* ‡ and *Pycnanandra*, *Cryptogyne* and *Omphalocarpum*. Throughout the Order the petals soon become connate with one another and the stamens by the upgrowth of a podium or "corolla-tube."

GYNŒCIUM.—The carpels form a single verticil, and are usually isomerous and alternate with the innermost whorl of stamens. In *Achras*, however, (contrary to Eichler's conjecture) the carpels alternate with the stamens and staminodes together; and in *Chrysophyllum Caimito* (*f*), some of the intervals between the stamens are occupied by two carpels, or rather some of the carpels develop in the intervals between the still visible abortive staminal tubercles and the fertile ones. A similar explanation probably fits the pleiomerous pistil of *Lucuma grandiflora*, *Labramia*, &c. *Omphalocarpum* needs working out. The oligomerous pistil of certain species of *Lucuma*, &c., is most probably due to true abortion.

The special development of the pistil deserves further notice. The carpels, at first hemispherical, soon become crescentic. The cusps, which run inwards, soon unite with their neighbours, but do not reach the centre of the receptacle. The united carpels then grow vertically upwards to form a tube, entire externally, and divided inside by the incomplete radial septa formed by the carpelary commissures into as many elongated chamberlets opening into

* In the other species it was easy to observe the successive appearance of these whorls; but in *Mimusops* I had to infer it from the inner set being the smaller in the very youngest buds, though soon equalling or outgrowing the others.

+ I had conjectured this from an inspection of Wight's figure of *Payena lucida* (*Isonandra polyandra*, Wt., *Icones* t. 1589); and a dissection of every species in the Kew Herbarium has confirmed this amply.

‡ Eichler conjectures that the pleiometry is here due to "dedoublement."

a central tube. These chamberlets enlarge at the base to form the lateral and outer walls of the ovarian cavity; but above their cavity is usually more or less effaced. The adult style is, then, traversed by a tube which enlarges into a vault above the free apex of the receptacle, and into this vault the cells of the ovary open at the top. The stigma is usually lobed with as many festoons as there are carpels. In *Achras* this is masked at anthesis by the copious secretion of viscid fluid.

The ovules arise singly from the receptacle in front of and free from each carpel at the time when its edges coalesce with its neighbours. Only a single coat is formed, and the nucleus appears to be a lateral outgrowth from the very short funicle or placenta. The micropyle always points downwards and outwards; and the degree of anatropy is determined by the approach which the inner or receptacular wall of the ovary makes to the vertical. The impression left on my mind was that these organs were the axillary buds of the carpels,—a view that I should not have ventured to promulgate had it not been put forward for several other Orders by continental botanists.

Disk.—In most of the flowers of this order the base of the ovary is more or less thickened and glandular (and hairy.) It secretes nectar in all the species examined fresh, except *Bassia* and *Dasyaulus*, where, as is well known, the corolla-tube is thick, fleshy, and gorged with saccharine juice. In several of the Australian species of *Sideroxylon* (formerly *Achras*), the thickening of the ovary forms a well-marked ring above the base, and this is regularly festooned in *S. obovatum*; hence the autonomy of *Hormogyne*, founded only on the presence of a disk, supposed to be absent in the rest of the Order, must fall to the ground.

One or two other points are these:—The pedicels often undergo movements of nutation. They are erect in the bud, pendulous at anthesis, erect again in fruiting. The flower is almost always, if not invariably, proterogynous; the style is protruded (and the stigma viscid) in the fresh species, before the corolla has opened anywhere but at the apex. The same relation was noticed by Griffith and Falconer in *Reptonia*,* a genus to which I shall revert directly.

It will now be seen that, in all the cases cited, the evolution of the flower is strictly centripetal,† with a tendency to augmentation in the number of parts of the whorl as we advance from the periphery inwards. This would seem to fall under Hofmeister's two great generalizations:—"Each new member arises in front of the widest intervals between the next oldest members." "If the intervals be wide, the new members are formed in front of the intervals between the members of the next oldest whorl

* In Trans. Linn. Soc., xix., 99, 101.

† Variations in the number of parts, reported by other observers, (e.g., ten petals instead of eight, thirteen instead of twelve, &c.), would seem to be due to collateral deduplication. I have been very unfortunate in my search for these abnormalities.

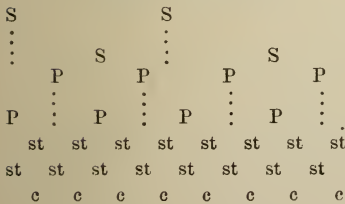
and those of the next but one."* In this last case, the two latter whorls may be viewed as forming a false whorl, and the new one may be termed an augmented whorl. The andrœcium of certain species of *Bassia*, of *Pycnanandra*, *Cryptogyne*, and *Omphalocarpum* still appear to me abnormal, or at least to need further explanation.

As regards the classification of the Order, we find three well-marked divisions, as follows—the names being on the whole those of Bentham and Hooker's 'Genera':—

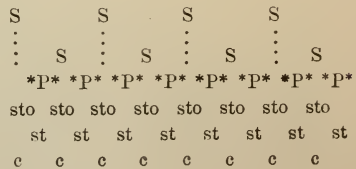
- I. ISONANDRÆ.—Petals exstipulate; stamens all fertile (including *Isonandra*, *Dichopsis*, *Pycnanandra*, *Bassia*, *Dasyaulus*, *Payena*, and *Labourdonnaisia* as limited by Bojer.
- II. CHRYSOPHYLLÆ.—Petals exstipulate; alternipetalous stamens sterile or abortive (including *Chrysophyllum*, *Ecclinusa*, *Lucuma*, *Sarcosperma*, *Sideroxylon*, *Argania*, *Labatia*, *Achras*, *Butyrospermum*, *Leptostylis*, *Cryptogyne* (?), *Hemnoonia* (?).
- III. MIMUSOPÆ.—Petals with lateral appendages; alternipetalous stamens fertile in *Eichleria* † only (including *Mimusops*, *Imbricaria*, *Eichleria*, *Labramia*, *Bumelia*, and *Dipholis*).

The structures and arrangements above described are exhibited in the following diagrams:—

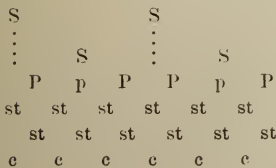
BASSIA LONGIFOLIA.



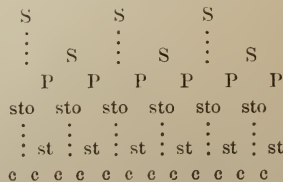
MIMUSOPS ELENGI.



DASYAULUS NERIIFOLIUS.



ACHRAS SAPOTA.



* Handb. I. (Allg. Morph.), 482, 489.

† See APPENDIX.

CHRYSOPHYLLUM OLIVIFORME.

S	S	S	S	S
P	P	P	P	P
+	+	+	+	+
st	st	st	st	st
e	e	e	e	e

PAYENA sp.

(Petals and andrœcium only).

P	P	P	P	P	P
st	st	st	st	st	st
⋮	⋮	⋮	⋮	⋮	⋮
st	st	st	st	st	st
st	st	st	st	st	st

LUCUMA CURVIFOLIA.

S		S			
P		S		P	S
⋮				⋮	
⋮	p	p	⋮	p	p
	sto	sto	sto	sto	sto
st	st	st	st	st	st
	c	c	c	c	c

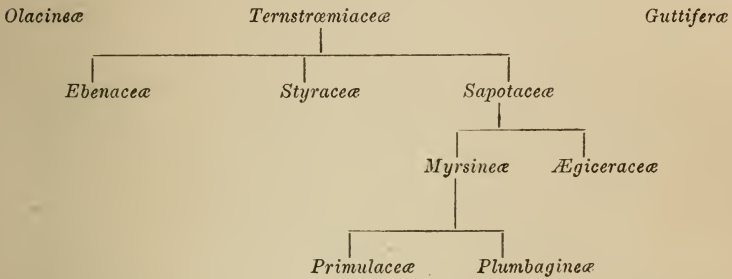
We may now consider the affinities of this Order to some others. I have traced the floral development in *Symplocos spicata* and *S. coronata* and in the male flowers of *Diospyros sylvatica* and *D. Embryopteris*. The separate inflorescences are racemose or dibotryal in *Symplocos*; axillary to each bract is a flower with two sterile bractlets, a quincuncial calyx, five alternate simultaneous petals, five alternipetalous staminal tubercles which become compound, and three carpels whose septa unite centrally. In *Diospyros* the inflorescence is cymose, or a raceme with a terminal flower (*D. Embryopteris*.) Each flower bears two bractlets, two outer and two inner decussating sepals, and four alternisepalous simultaneous petals. The andrœcium begins with four alternipetalous stamens, and then others are formed in centrifugal succession, much as in *Thea*.* Neither of these Orders, then, approaches *Sapotaceæ* as closely as *Styracææ* proper, judging from Payer's study of these.† We have additional reasons, also, for making *Symploceæ* distinct, as proposed by Miers and others.

But the Order which undoubtedly comes closest to *Sapotaceæ* is *Myrsinææ*. *Reptonia* has the flowers no less than the habit of *Sideroxylon*, and only five ovules; but these are not separated by the (incomplete) septa of *Sapotaceæ*, the seed is curved, and the albumen slightly ruminate. I was agreeably surprised on tracing the floral evolution of *Ardisia solanacea* and *A. paniculata* to find that, though no sign of alternipetalous stamens appears, the antipetalous tubercles (of the fertile stamens) are not formed till the petals have become crescentic, and touch by their edges. Now Pfeffer and others have regarded the petal of *Primulaceæ* as an appendage to the stamen because of its development from the back of the nascent staminal tubercle. That the opposition of Eichler

* Figured not over successfully by Payer 'Organogenie,' t. 154.

† Op. cit., 536, t. 152.

and others to this view was just will, I think, now be admitted by all, for *Myrsinæ* and *Primulaceæ* are only separable by the arborescent habit of the former; and surely no one will maintain that the petal of *Ardisia* has a different morphological value from that of, say, *Anagallis*. In animal development, cases are frequent where homological successions are masked by adaptive modifications. In many plants the petals, though first formed, are soon overtaken and outstripped by the stamens, a relation which is perhaps due to the longer time required for the formation of pollen than for petaline tissue. Carry the delay a stage further back, and you have the history of *Primulaceæ*. The accompanying diagram would express my ideas as regards the relations of *Sapotaceæ* to the allied orders:—



APPENDIX.

On *Labourdonnaisia* and *Fichleria*.

The genus *Labourdonnaisia* was founded by Bojer for certain plants of Mauritius with a biseriate corolla, each whorl being equal to the false whorl of the biseriate calyx. The calyx varies from six to eight pieces, the corolla from twelve to sixteen, or perhaps by deduplication to eighteen. Hence it was thought that the corolline symmetry was like that of *Mimusops*, and Sonder placed a plant with stipulate petals in *Labourdonnaisia*. To this was referred another plant of precisely similar floral symmetry by Mr. Bentham, in the 'Genera Plantarum,' with the just remark that they were allied to *Mimusops*. It will now be seen that the two last species are distinct from the Mascarene species, and fall into another genus which I have here named in honour of him who was the first to indicate the true structure of its section, *Mimusopeæ*. These are the definitions (not full descriptions) of the two genera:—

LABOURDONNAISIA, *Boj.* (char. emendat.) Sepala 6 v. 8, 2-plice serie imbricata. Petala 12 v. 16 (1, 2, interdum normali seriei additis), 2-plice serie imbricata. Stamina totidem, sub-1-seriata, omnia fertilia. Carpella *alternisepala*. Species omnes Mascarenses.

EICHLERIA, *nov. gen.*—Calyx *Mimusopis* v. *Imbricaria*. Petala totidem, appendicibus petaloideis geminatis integris *Mimusopis*. Stamina eodem numero petalis alternantia et totidem eis anteposita, omnia fertilia. Carpella sectionis (*Mimusopearum*) *sepalis antepositis*.—Genus a *Mimuso*pe staminibus alternipetalis fertilia tantum differt.

Species 2 :—

1. *E. discolor*, mihi (*Labourdonnaisia*, Sond. in Linnæa, xxiii, 73). Natal.
2. *E. albescens*, mihi (*Labourdonnaisia*, Benth.; *Bassia*, Griseb. in Cat. Pl. Cub., 164). Cuba.

ON A QUESTION OF BOTANICAL NOMENCLATURE.

BY W. P. HIERN, M.A.

THE law which should regulate the choice or creation of the botanical names of plants has been the subject of an interesting discussion in the June, August, September, and December numbers of the 'Journal of Botany' for last year, and the contributors to it have been the Editor, Professors A. DeCandolle and Caruel, and Mr. Ball. I had hoped that some of our greatest systematic botanists in this country, besides those included above, would have taken part in the controversy so far as to leave no doubt in the public mind, or in the minds of foreign botanists, about their views. They at least do not agree with the last-named botanist in regarding the priority of the specific portion of a plant's name as all-important, and in requiring it, unless already adopted for another species of the genus, to be respected without regard to any other names in the genus to which the plant is found to belong, that may have previously existed for the plant in question. It is doubtless true that the majority of our leading botanists have long shown in their systematic publications, and still prove by their practice, that such is not their rule; still a plain statement supported by argument, and made by such a veteran as Mr. Bentham, would have been useful: it would have turned the scale of testimony, and gone a long way towards the settlement of the question.

It is admitted on both sides that the multiplication of synonymy, which at present has acquired enormous dimensions, and which is daily increasing, is a real evil and serious inconvenience; and therefore it is a fair presumption to lay down that laws of nomenclature ought not to require unnecessarily a further increase of synonymy. It then follows that an already existing name is (unless regard be had to other considerations) preferable to one to be created; and this deduction applies as well to generic words as to specific combinations. In the case of specific combinations, it is of course essential to final precision, on the Linnæan plan of binominous nomenclature, that the left-hand component, being a generic word, should be the recognised name of the genus to which the species belongs; and this limitation is universally

allowed. But, without good and sufficient cause, to limit by law the word which may form the right-hand component of the specific combination must in many cases involve the obligation to compound new names, and therefore would on the whole imply an enlargement of synonymy. Why, then, is it desirable to pass or permit a law which directs that the right-hand component must be the oldest of such words which have ever been published under any genus whatever with reference to the species under consideration?

There is no reason, derivable from the general nature of the case, to suppose that a name is intrinsically better because it is older,—that a name which may have been published in an early stage of scientific investigation should be more suitable than one given after the acquisition of more extended knowledge,—or that a name hurried into publication should excel one subsequently, regularly, and deliberately selected by a competent monographer. I venture to say that the right and chief use of the law of priority resides in the effect that it furnishes a general, impartial, and unalterable rule whereby a name in a good and proper genus is fixed beyond the reach of future disturbance; but the law must not be permitted to be, aggressive, or to carry its general influence beyond the bounds of its general usefulness. When it has been employed to determine the generic word, and to select one of the various specific combinations of which the generic word forms the left-hand member, and which may have already existed for the species, it has done its proper duty, and it ought not further to compel the formation of a new specific combination by any regard to the antiquity of the right-hand member alone.

For example, why should it be a legal obligation to construct a new name for the South American tree, *Diospyros Paralea*, Steud. (1840), a species the earliest name of which was *Paralea guianensis* Aubl. (1775), only because *guianensis* is the oldest specific portion, and *Diospyros* the necessary generic word? Or, if some recent author had constructed and published the name which I should regard as an unnecessary and superfluous combination, should all succeeding generations be required to use it, in preference to a name which is appropriate, which has been adopted in DeCandolle's 'Prodromus,' in the 'Flora Brasiliensis,' and in other books, and which is strictly in accordance with all necessary laws of nomenclature?

Again, while in some instances the specific portions of botanical names are given so as to express some absolute character of the species, such as *annua*, *glabra*, *indica*, on the other hand others, such as *aberrans*, *affinis*, *dubia*, *intermedia*, *maxima*, *minor*, have been given with reference to, or in comparison with, its supposed congeners, or as specially adapted to the particular genus in which the plant was placed; such latter words are clearly liable to become inappropriate when appended to a different genus, and even the former may be rendered unsuitable when attached to a genus which includes in its generic character the attribute expressed therein.

It is further obvious that, if the principle here opposed were permitted to prevail with all its logical consequences, the synonymy

of a genus would be perpetually liable to disturbance, whenever it became necessary to import additional species from other genera, the specific portions of the names of which might then take precedence by their greater antiquity over those already established in the genus.

The considerations stated above expose some difficulties and objections not of isolated occurrence but of a general nature, so that they are capable of establishing fair and reasonable arguments against making this disputed law of nomenclature, and are not merely incidental cases of hardship exceptionally detected in the course of operation of a necessary and well-established law; they, therefore, can and ought to be permitted to have their full weight in this matter.

Professor Caruel aptly appeals to the practice of Linnæus and of succeeding botanists, and contends that when the first word of a botanical name is taken away the whole name falls to the ground. As Linnæus himself expressed it, "Nomen specificum sine generico est quasi campana sine pistillo;" and when a new generic name is prefixed to the same affix, agreement is, *à priori*, doubtful.

We in this country can point with pride to the great and brilliant additions recently made to systematic botany by our own botanists, and can show that they almost all, without exception, have seen no necessity for the law now sought to be imposed on us; for while they are ever ready to maintain the specific member of a name when possible and convenient, yet they practically assert their liberty to alter it whenever, on removing it to another genus, it seems to them right or preferable to do so. This liberty, so distinctly handed down to us, is more necessary than a law to repeal it; it is no undue license, it is often extremely useful, and we must not be deprived of it.

ON TWO NEW GENERA OF AMARYLLIDACEÆ FROM CAPE COLONY.

By J. G. BAKER, F.L.S.

Apodolirion, Baker. Flowers solitary, sessile in a membranous spathe from the top of the bulb. Perianth erect, symmetrical, with a long cylindrical tube, and an erect funnel-shaped limb with six equal ascending lanceolate or oblong segments, finely nerved all over the back, not specially keeled. Stamens distinctly biseriate, three inserted at the throat of the tube, and three a short space above the base of the segments; filaments short, filiform; anthers linear, basifixed, erect, sagittate at the base. Ovary clavate, three-celled; ovules several in a cell, horizontal, superposed. Style filiform, a little longer than the perianth-tube; stigma simple, capitate. Fruit unknown. Root-stock a tunicated bulb; leaves synanthous or hysteranthous; flowers delicate in texture, moderately large, whitish or pale red.

Allied to *Gethyllis*, from which it mainly differs in the stamens. Of European genera, similar in habit to *Crocus* and *Colchicum*.

Key to the Species.

Leaves hysteranthous; segments of perianth-limb oblanceolate, acute.

Perianth-tube 3-4 inches long 1. *A. Mackenii*.

Perianth-tube 1½ inch long 2. *A. Buchanani*.

Leaves synanthous; segments of perianth-limb oblong, cuspidate 3. *A. Bolusii*.

1. *A. MACKENII*, *Baker*. Bulb and leaves not seen. Perianth-tube filiform, three to four inches long; limb pale red, an inch and a half to two inches long; segments oblanceolate-unguiculate, acute, a quarter of an inch broad two-thirds of the way up. Anthers a quarter of an inch long; three upper inserted about a quarter of an inch above the base of the segments, on filaments shorter than themselves; three lower from the throat, rising up to or a little above the insertion of the filaments of the three upper ones. Style reaching up to the top of the three lower stamens. Noodsberg, Natal, April, 1869, *McKen!*

2. *A. BUCHANANI*, *Baker*; *Cyphonema Buchanani*, *Baker*, in *Trimen Journ.*, 1876, p. 66. Root-stock a globose bulb an inch in diameter, with membranous pale tunics produced one to two inches above its top, in which the spathe is hidden. Leaves hysteranthous. Spathe an inch long. Perianth-tube filiform, an inch and a quarter to an inch and a half long; limb whitish, faintly tinged with red, an inch and a half long; segments oblanceolate, acute, a quarter of an inch broad three-quarters of the way up. Anthers a quarter of an inch long; three higher inserted a quarter to one third of an inch above the base of the segments on filaments an eighth of an inch long; three lower reaching up from the throat to the point where the filaments of the three upper are inserted. Style reaching up to the top of the three lower anthers. Natal, *Rev. J. Buchanan!*

3. *A. BOLUSII*, *Baker*. Bulb not seen, its outer tunics produced an inch and a half to two inches above its neck. Leaves three, cotemporary with the flower and overtopping it, like those of *Cyrtanthus helictus* in shape and character, linear, glabrous, spirally twisted, one sixth of an inch broad. Perianth-tube two inches long, cylindrical, stouter than in that of the two other species; limb whitish, an inch and a half long; segments oblanceolate-oblong, ascending, half an inch broad above the middle, obtuse, with a cusp. Anthers above a quarter of an inch long, the upper row inserted half an inch above the base of the segments on filaments shorter than themselves: anthers of the lower row reaching up to the base of those of the upper row. Style not distinctly seen in our only specimen. In damp places on the highest mountains near Graaf-Reinet, at an elevation of 4300 feet, December, 1868, *Bolus*, 717!

ANOIGANTHUS, *Baker*. Flowers in an umbel, or reduced to one, bracteated by a spathe of one or two large lanceolate valves. Perianth erect, symmetrical, with a short funnel-shaped tube above the ovary, and an erect funnel-shaped limb with six equal ascending, lanceolate, acute segments, about three times as long as the tube, laxly nerved all over the back. Stamens six, distinctly biseriate; filaments filiform, straight, ascending, longer than the anthers, those of the three upper inserted at the throat of the tube, those of the three lower a little below. Anthers small, oblong, versatile. Ovary oblong, three-celled; ovules horizontal, very numerous. Style filiform, reaching finally nearly to the top of the perianth-segments. Stigma trifid, with short falcate spreading branches. Fruit a capsule, with loculicidal dehiscence. Seeds compressed, tightly packed in the cells. Acaulescent herbs, with a bulbous root-stock and moderately large, whitish, or pale-yellow flowers.

From *Cyrtanthus*, with which this has been associated, this recedes widely in the character of the perianth, which resembles that of *Hæmanthus* or *Buphane*. In habit and stature, the common species recalls our European *Leucojum æstivum*.

Tall, umbellate, with lorate leaves 1. *A. breviflorus*.
Dwarf, 1-flowered, with filiform leaves 2. *A. luteus*.

1. *A. BREVIFLORUS*, *Baker*; *Cyrtanthus breviflorus*, *Harvey* Thes. t. 139 (a poor figure). Bulb ovoid, an inch in diameter, with a short neck, and very dense tuft of slender root-fibres. Produced leaves generally three, cotemporary with the flowers, lorate, obtuse, half to three-quarters of an inch broad, above a foot long when fully developed. Scape slender, terete, varying in length according to situation from a couple of inches to a foot or a foot and a half. Umbel two to ten-flowered. Bracts one or two, lanceolate, one and a half to two inches long. Pedicels finally one to two inches long, erect in all stages. Ovary green, oblong, an eighth of an inch long; tube a quarter to three-eighths of an inch long, funnel-shaped; limb half to three-quarters of an inch long, whitish; segments equal, lanceolate, acute. Three upper stamens reaching half-way up the limb, the three lower just out of the throat. Anthers pale yellow, oblong, half an inch long; filaments a quarter to one-third of an inch. Style overtopping the stamens, with three falcate stigmatose lobes, thickened at the tip. Perianth persistent till the fruit is half formed. Capsule membranous, oblong, or turbinate, half to three-quarters of an inch long, each cell filled full of compressed seeds. *Natal*, *Krauss*, 255! 394! *Sanderson*, 692! *Plant*, 106! At 5000 feet, on Mount Kondewelde, of the Sneeuwbergen range, December, 1872, in leaf and flower, *Bolus*, 2577! Damp places on the Baziya hills, Transkeian Kaffraria, (type and a depauperated one to two-flowered form, one to two inches high, without leaves present with the flowers), *Rev. R. Baur*, 248! In marshy plains, *Beaufort*, *Cooper*, 255! Damp table-land of Mount Boschberg, *MacOwan*, 2133! Also *Drege*, 3521!

2. A. LUTEUS, *Baker*; *Cyrtanthus luteus*, *Baker*, in *Trimen's Journ.*, 1876, p. 66. Bulb ovoid, half an inch in diameter, with brown tunics produced beyond its neck. Leaves filiform, not fully developed at the flowering-time. Scape slender, one to two inches long, with never more than a single flower. Spathe of two linear valves about an inch long. Pedicel much shorter than the spathe. Flower bright pale yellow, permanently erect, an inch to an inch and a quarter long. Ovary oblong, an eighth of an inch; tube narrowly funnel-shaped, a quarter to one-third of an inch; segments lanceolate, acute, half to three-quarters of an inch. Stamens and style as in the last. *Natal, Rev. J. Buchanan!*

NEW COMPOSITÆ FROM MONTE VIDEO.

By J. G. BAKER, F. L. S.

THE following new species are contained in a parcel which I have recently received from Signor Arechavelata, Professor of Botany in the University of Monte Video. Many other species belonging to tribes not yet monographed in the 'Flora Brasiliensis' are probably new; but whilst it is yet undecided whether the work shall be proceeded with I leave these for the present.

VERNONIA PTEROCAULON, *Baker, n. sp.* An erect, suffruticose, unbranched perennial, about three feet in height; the stem, under side of the leaves, and especially the involucre and rachis of the inflorescence, densely coated with persistent white cottony tomentum. Stem bearing heads of flowers in its upper two-thirds, winged throughout the leafy portion and lower part of the inflorescence. Leaves sessile, erecto-patent, alternate, oblanceolate-oblong, entire, cuneate at the base, subcoriaceous, bright green and glabrous on the upper surface, those of the lower third of the stem reaching a length of three to four inches, above this passing gradually into the bracts which subtend the lowest heads of flowers, which are about an inch long. Inflorescence occupying two-thirds of the length of the stem; the lower heads solitary and distant, subtended by reduced leaves; the rest, except the uppermost, which are solitary, placed two or three together on a very cottony, stout, flexuose rachis; all sessile. Involucre campanulate, one-sixth of an inch long and broad; the lanceolate, multi-serial, closely imbricated scales densely matted with white cottony tomentum. Flowers about twenty in a head. Achene not seen fully developed; pappus one-sixth of an inch long, composed of numerous whitish ciliated bristles. Corolla red, with short lobes, and a tube funnel-shaped in the upper and cylindrical in the lower half.

Corro Largo, in dry stony soil, *Arechavelata*, 4103!

Totally different, by its long unbranched rachis of inflorescence, leafy at the very base only, from any species already known. In leafage and general habit it recalls to mind *Pterocaulon spicatum*, DC.

EUPATORIUM (CAMPULOCLINIUM) ARECHAVALETÆ, *Baker, n. sp.*
 A robust erect perennial, three feet high. Stem unbranched below the inflorescence, stout, sulcate, slightly pubescent. Leaves few, alternate, sessile, four to eight inches long, half to an inch broad at the middle, entire or obscurely serrulate, moderately firm in texture, slightly pubescent and scabrous on both surfaces. Heads six to twenty in a terminal corymb; the upper foot of the stem nearly naked; the bracts linear and minute; the branches rough with short bristly hairs; some of the heads sessile in the centre of the forks, the side ones on curved ascending peduncles three-fourths to an inch long. Heads containing fifty flowers or more; the campanulate involucre half an inch in diameter and one-third of an inch long; the large, pauciserial, obtuse, oblong-lanceolate, closely adpressed scales, with a green many-nerved keel and a broad membranous border (white with a red tinge) all round it. Receptacle glabrous, alveolate. Achene seen immature only; pappus one-fourth of an inch long, of very numerous white bristles. Corolla bright purple, its tube as long as the pappus, and the linear segments one-third as long as the tube. Style-arms protruded, subulate.

Monte Video, in damp soil, *Arechavaleta*, 4172! 4173!

There are only two species of *Campuloclinium* with alternate leaves already known, from both of which this recedes widely.

STENACHÆNIUM RIEDELII, *Baker, n. sp.* An erect perennial herb, three to four feet high, with stem, leaves and involucre densely clothed with soft, spreading, white, silky hairs. Leaves mainly in a radical rosette, sessile, oblanceolate-oblong, six to ten inches long, crenato-repand principally in the upper half, narrowed gradually from the middle to the base, moderately firm in texture, strongly nerved on the under side. Stem winged through the lower half, its leaves few and very much reduced in size as compared with those of the radical rosette. Heads six to eight, at the end of long, densely silky, ascending peduncles, containing many hundred flowers each. Involucre campanulate, more than an inch in diameter, three-fourths of an inch long; the multiserial, closely imbricated, linear scales densely plumose. Many outer rows of flowers imperfect, composed of a glabrous achene one-eighth of an inch long, a pappus half an inch long, of very numerous brownish flexuose setæ, and a filiform corolla as long as the pappus, minutely lobed at the very top. Many inner rows of flowers perfect, with a similar achene and pappus, but a much stouter cylindrical corolla, more deeply lobed, and purple at the top, containing both a style and anthers.

Monte Video, in damp soil, *Arechavaleta*, 4029!

This is the unnamed species of *Stenachænium* mentioned by Mr. Bentham in 'Genera Plantarum' as having been gathered by Riedel. With its large radical rosette of leaves and densely silky stems, and very numerous flowers, packed in dense silky heads as large as, say, those of *Carduus nutans*, it is a very striking plant.

STENACHENIUM CAMPESTRE, *Baker, n. sp.* A perennial herb, with a slender, creeping, woody rootstock, and erect 1-2-headed stems about a foot high. Leaves mostly crowded near the base of the stem, sessile, oblanceolate, entire, obscurely pubescent, two to three inches long. Stem winged in the lower half or two-thirds, the leaves above the base small and few, the upper part especially clothed with fine, short, spreading, whitish pubescence. Flowers in a head, very numerous. Involucre nearly an inch in diameter, half to five-eighths of an inch long; the pale greenish-drab, closely adpressed scales in many rows, the outer ones pubescent, the long inner ones nearly glabrous. Achene, pappus, and corolla as in the other species, both in character and size.

Monte Video, in open plains, *Arechavaleta*, 4032!

AN ENUMERATION AND CLASSIFICATION OF THE SPECIES OF *HIPPEASTRUM*.

By J. G. BAKER.

IN the present paper I propose to attempt to classify the species of *Hippeastrum* as now known, understanding the genus in an enlarged sense; that is to say, so as to include, in addition to *Hippeastrum* as circumscribed in Kunth, *Habranthus*, *Phycella* and *Rhodophiala* as defined in the same work, and *Rhodolirion* as recently defined by Philippi ('*Linnæa*,' vol. xxix., p. 65). Between these there is no material difference in structure, and any groups that can be devised are, in my view, of merely sectional value. The genus is one of great horticultural interest, and our information about it has been materially increased during the last generation. A great many new species have been discovered, especially in Chili; and these have been described by Philippi in the '*Linnæa*' and other places. It will be seen that I have reduced in number very materially the species known to Herbert and Kunth. The series begins with dwarf, slender plants that touch so closely upon *Zephyranthes* that it is a point open to discussion where the exact line of demarcation should be drawn; and as a rule, the stature of the plant gets more robust, the leaves broader, and the flowers larger as we proceed towards the end of the chain. Using the term in this enlarged sense, *Hippeastrum* is a genus entirely confined to tropical and warm temperate America, which differs from the monotypic Cape genus *Amaryllis* solely by the seeds, which in *Amaryllis* are few, large, and bulbiform like those of *Crinum*, *Hymenocallis*, and *Clivia*, whilst in *Hippeastrum* they are numerous and flattened, with a dark-coloured testa, as in *Zephyranthes*, *Pyrolirion*, and *Pancreatum*; so that the two genera, although they resemble one another precisely in flower, are placed far apart in the classifications of Herbert, Kunth, and Salisbury.

Genus *HIPPEASTRUM* (*Herbert App. to Bot. Rey.*, 1821, p. 31.)—Perianth openly, or rarely narrowly funnel-shaped; tube above the

ovary generally short; throat naked, or variously appendiculate or fimbriate; segments permanently ascending and imbricated, oblong or oblanceolate, or obovate-oblong, sub-equal, or the lowest inner one narrower than the rest. Stamens inserted at the throat of the tube; filaments filiform, more or less decidedly declinate, usually shorter than the perianth-segments; anthers linear-oblong, versatile. Ovary oblong, three-celled; ovules many in a cell, horizontal, superposed; style filiform, declinate along with the stamens; stigma capitate, or shortly trifid. Fruit a loculicidal capsule, with numerous black discoid seeds.—Acaulescent herbs. Bulbs with many brown membranous tunics. Leaves few (generally two to four), of short duration, fleshy, linear, or lorate. Flowers one to six in an umbel, the spathe of which is tubular in the lower half in the first section, slit down to the base in all the others.

KEY TO THE SECTIONS AND SPECIES.

Section I. ZEPHYRITES (*Herb.*) Flowers solitary, suberect; spathe entire and tubular in the lower half; perianth an open funnel, with a short tube; stigma trifid; leaves narrow linear (one-eighth to a quarter of an inch broad).

* *Grandiflori* (*Perianth-limb two to three inches long.*)

1. *H. sylvaticum.* 2. *H. versicolor.* 3. *H. tubispathum.*
4. *H. andicolum.* 5. *H. concolor.*

** *Parviflori* (*Perianth-limb one and a half to two inches long.*)

6. *H. gracilifolium.* 7. *H. cearense.* 8. *H. franciscanum.*
9. *H. texanum.* 10. *H. Andersoni.*

Section II. HABRANTHUS (*Herb.*) Flowers generally two to six in an umbel, rarely reduced to one; spathe slit down to the base; perianth (except in *H. phycelloides*) an open funnel, with a short tube; stigma trifid; leaves linear (one-sixth to a quarter of an inch broad).

* *Flowers never more than one or two.*

11. *H. chilense.* 12. *H. roseum.* 13. *H. lineatum.*

** *Umbel two to six-flowered. Perianth an open funnel.*

14. *H. advenum.* 15. *H. bifidum.* 16. *H. Bagnoldi.*
17. *H. montanum.* 18. *H. Berteroanum.* 19. *H. Jamesoni.*

*** *Umbel two to six-flowered. Perianth a narrow funnel.*

20. *H. phycelloides.*

Section III. PHYCELLA (*Lindl.*) Flowers several in an umbel; spathe slit down to the base; perianth a narrow funnel, usually more or less distinctly toothed at the throat; segments oblanceolate; stigma exserted, capitate; leaves linear (a quarter to half an inch broad).

21. *H. bicolor.* 22. *H. Herbertianum.*

Section IV. RHODOPHIALA (*Presl.*) Flowers one or several in an umbel; spathe slit down to the base; perianth an open funnel, with a short tube; leaves linear (a quarter to one-third of an inch broad).

* *Flower solitary.*

23. *H. uniflorum.* 24. *H. modestum.*

* *Flowers two or more.*

25. *H. andinum.* 26. *H. pratense.*

Section V. RHODOLIRION (*Philippi.*) Like the last, but perianth-tube longer, and flowers always solitary.

27. *H. montanum.* 28. *H. Rhodolirion.*

Section VI. MACROPODASTRUM (*Baker.*) Habit robust; flowers one to five, large, an open funnel, with a long tube not closed in with a neck at the throat; spathe slit down to the base; stigma capitate or trifid; leaves one to two inches broad.

Stigma capitate . . . 29. *H. solandriiflorum.*

Stigma trifid . . . 30. *H. ambiguum.*

Section VII. OMPHALISSA (*Salisb.*) Habit robust; flowers two to four, large, openly funnel-shaped, the throat closed in by a distinct produced neck; spathe slit down to the base; stigma trifid; leaves one to two inches broad.

31. *H. aulicum.* 32. *H. organense.* 33. *H. calyptratrum.*

34. *H. psittacinum.*

Section VIII. ASCHAMIA (*Salisb.*) Habit robust; flowers two to four, large, openly funnel-shaped, the throat not closed in by a neck; stigma entire; spathe slit down to the base; leaves one to two inches broad.

* *Tube very short.*

35. *H. pardinum.* 36. *H. Leopoldi.* 37. *H. miniatum.*

38. *H. Reginae.*

* *Tube three-quarters to one inch long.*

39. *H. procerum.* 40. *H. barbatum.* 41. *H. reticulatum.*

42. *H. equestre.* 43. *H. Roezli.* 44. *H. stylosum.*

Section IX. LAIS (*Salisb.*) Habit robust; flowers two to four, large, openly funnel-shaped, the throat not closed in by a neck, stigma trifid; spathe slit down to the base; leaves one to two inches broad.

45. *H. breviflorum.* 46. *H. vittatum.* 47. *H. rutilum.*

LIST OF THE SPECIES, WITH SYNONYMS AND GEOGRAPHICAL DISTRIBUTION.

1. *H. sylvaticum.*—*Habranthus sylvaticus*, Herb.; Kunth Enum. v. p. 498. Bahia, *Martius*; Ceara, in dry open woods near Crato, *Gardner*, 1857!

2. *H. versicolor*.—*Habranthus versicolor*, Herb. ; Kunth Enum. v., p. 498. Buenos Ayres, *Tweedie* !

3. *H. tubispathum*.—*Amaryllis tubispatha*, L'Herit. Sert. Angl. p. 9. *Habranthus robustus*, Herb. ; Kunth Enum. v., p. 498. Buenos Ayres, *Tweedie* !

4. *H. andicolum*.—*Habranthus andicola*, Herb. ; Kunth Enum. v., p. 500. Chili, *Poppig* !

5. *H. concolor*.—*Habranthus concolor*, Lindl. ; Kunth Enum. v., p. 500. Mexico, near Leon, *Hartweg*, 219 !

6. *H. gracilifolium*.—*Habranthus gracilifolius*, Herb. ; Kunth Enum. v., p. 497. Uruguay, *Isabelle* !

7. *H. cearense*.—*Habranthus cearensis*, Herb. ; Kunth Enum. v., p. 500. Ceara, in dry, open woods, with *H. sylvaticum*, *Gardner*, 1858 ! Goyaz, *Burchell*, 8123 !

8. *H. franciscanum*.—*Zephyranthes franciscana*, Herb. MSS. Bulb subglobose, an inch and a quarter in diameter, with pale brown, membranous tunics produced beyond its neck ; leaves narrow, linear, hysteranthous, one-twelfth of an inch broad ; scapes two from a bulb, one-flowered, slender, four to six inches long ; spathe an inch and a quarter long, membranous, cleft into two valves less than half way down ; pedicel shorter than the spathe ; ovary oblong, oblique, a quarter of an inch long ; tube a narrow greenish funnel one-third to a quarter of an inch long ; limb pale red, sub-erect, three-quarters to an inch long ; segments oblanceolate-oblong, a quarter of an inch broad, much imbricated ; stamens unequal, not nearly as long as the segments ; anthers linear-oblong, one-sixth of an inch long. Alagoas, in open, sandy ground on the banks of Rio San Francisco, *Gardner*, 1422 !

9. *H. texanum*.—*Zephyranthes texana*, Herb. ; Kunth Enum. v., p. 487. *Habranthus Andersoni* var. *texanus*, Kunth Enum. v., p. 499. Texas, *Drummond*, iii., 410 ! *Lindheimer*, 314 ! New Mexico, *C. Wright*, 1904 !

10. *H. Andersoni*.—*Habranthus Andersoni*, Herb. ; Kunth Enum. v., p. 499 (excl. var. 6.) Uruguay, *Tweedie* ! *Captain King* ! *Gibert*, 179 ! 182 ! 184 ! 185 ! 506 ! 831 !

11. *H. chilense*.—*Amaryllis chilensis*, R. & P. Fl. Peruv. iii., p. 56, erroneously referred by Kunth to *H. miniatum*. *Habranthus chilensis*, Herb. ; Kunth Enum. v., p. 497. Chili, *Herb. Reed* ! Peru, *Pavon* !

12. *H. roseum*.—*Habranthus roseus*, Herb. ; Kunth Enum. v., p. 495. *H. pumilus*, Herb. ; Kunth Enum. v., p. 499. *Zephyranthes purpurea*, Philippi, in 'Linnæa,' xxix., p. 65. Chili, *Herb. Reed* !

13. *H. lineatum*.—*Habranthus lineatus*, Philippi, Desc. Nuev. Plant. (1873), p. 66. Chili, *Philippi*.

14. *H. advenum*. Herb., App. 31. *Amaryllis advena*, Ker in Bot. Mag. t. 1125. *Habranthus hesperius*, Herb. ; Kunth Enum. v., p. 495, with the numerous synonyms cited. *H. mendocinus*, Philippi, in 'Linnæa,' xxxiii., p. 258. *Chlidanthus Cumingii*, Presl. ; Kunth Enum. v., p. 654. *Eustephia macleanica*, Baker, in Ref. Bot. t. 332. Common in Chili, with three well-marked varieties, *Philippi* ! *C. Gay* ! *Cuming*, 355 ! 395 ! &c.

15. *H. bifidum*.—Uruguay and South Brazil, *Tweedie! Fox! Gibert, 174! 505!* So far as I can make out there is one eastern species of this group, to which belong *Habranthus kermesinus, nobilis, nemoralis, intermedius, spathaceus, bifidus, pulcher,* and *pedunculatus*, as defined in Kunth. A plant from the Andes of Ecuador, gathered by *Dr. Jameson* and *Colonel Hall*, is not distinguishable by dried specimens.

16. *H. Bagnoldi*.—*Habranthus Bagnoldi*, Herb.; Kunth Enum. v., p. 496, with its three varieties. *H. punctatus*, Herb.; Kunth Enum. v., p. 495. Chili, *Cuming, 865! Reynolds! Melocoton, Gillies!* North Patagonia, *Captain Middleton!*

17. *H. montanum*.—*Habranthus montanum*, Philippi, Desc. Nuev. Plant. (1873), p. 66. Chili, *Philippi.*

18. *H. Berteroanum*.—*Habranthus Berteroanum*, Philippi, in 'Linnæa,' xxix., p. 66. Chili, *Bertero.*

19. *H. Jamesoni*, Baker.—Leaves and bulb not seen; scape slender, two to four-flowered, about half a foot long; spathe of two membranous pale linear valves, one and a half to two and a half inches long; pedicels half an inch to an inch and a quarter, the lower flowers drooping, the upper ascending; ovary oblong, a quarter to one-third of an inch long; perianth an open funnel, two to two and a half inches long, apparently pale red; tube one-sixth of an inch long; segments unequal, the four upper ones oblong, one-half to five-eighths of an inch broad at the middle, the two lower ones lanceolate, one-quarter to one-third of an inch broad; stamens unequal, about half as long as the segments; anthers linear-oblong, one-sixth to a quarter of an inch long; style a little longer than the stamens, trifid at the tip. Argentine territory; side of ravines, near Jachal—flowering in February, *Dr. Jameson!*

20. *H. phycelloides*.—*Habranthus phycelloides*, Herb.; Kunth Enum. v., p. 492. Chili, *Macrae! Herb. Reed!* Connects *Habranthus* with *Phycella*, as it possesses the narrowly funnel-shaped perianth with oblanceolate segments of the latter and the trifid stigma of the former.

21. *H. bicolor*.—*Amaryllis bicolor*, Ruiz & Pav., Fl. Peruv. iii., p. 57. Under this I would unite *Phycella ignea, cyrtanthoides, magnifica, graciliflora, attenuata, brevituba,* and *bicolor*, as they stand in Kunth, with apparently *P. angustifolia*, Philippi, Desc. Nuev. Plant, 1873, p. 67, as an alpine variety. The plant is common in Chili, and is so showy that it has been gathered by most collectors of numbered sets. I may cite *Cuming 494, Lechler 3213, Bridges 32,* and *Mattheus 321.* The forms differ in the size of the flower, the breadth of the leaf, and distinctness of the teeth between the bases of the filaments.

22. *H. Herbertianum*.—*Phycella Herbertiana*, Lindl.; Kunth Enum. v., p. 513. Chili, *Macrae.*

23. *H. uniflorum*.—*Rhodophiala uniflora*, Philippi, Viag. Desert. Atacam., No. 365. Atacama, *Philippi.* This I have not seen, but suspect that it will prove a form of *H. pratense.*

24. *H. modestum*.—*Rhodophiala modesta*, Philippi, Desc. Nuev. Plant (1873), p. 66. Chili, *Philippi!* A well-marked species.

25. *H. andinum*.—*Rhodophiala? andina*, Philippi, Desc. Nuev. Plant (1873), p. 67. Chili, *Herb. Reed!*

26. *H. pratense*.—*Habranthus pratensis*, Herb.; Kunth Enum. v., p. 492. *H. speciosus*, Herb.; Kunth Enum. v., p. 492. *Amaryllis chilensis*, Hook & Arn., Bot. Beech, p. 47, non R. & P. *Rhodophiala amarylloides*, Presl.; Kunth Enum. v., p. 853? *R. Volckmanni*, Philippi, in 'Linnæa,' xxxiii., p. 259. *R. lata*, Philippi, Viag. Atacam., No. 369. Chili, *Beechy! Macrae! Herb. Reed! &c.*

27. *H. montanum*.—*Rhodolirion montanum*, Philippi, in 'Linnæa,' xxix., p. 65. Chili, *Herb. Reed!*

28. *H. Rhodolirion*.—*Rhodolirion andinum*, Philippi, in 'Linnæa,' xxix., p. 66. Chili, *Bustillos.*

29. *H. solandriiflorum*, Herb.; Kunth Enum. v., p. 519. Venezuela, *Fendler*, 1505! British Guiana, *Pollard*, 114! *Schomburgk*, 700! *Appun*, 2328! North Brazil, *Gardner*, 3477! *Burchell*, 8083! 8120-4! Here the tube of the perianth is four or five inches long.

30. *H. ambiguum*, Herb.; Kunth Enum. v., p. 520. Buenos Ayres, *Tweedie!* Most likely will prove to be a garden hybrid between *solandriiflorum* and *vittatum*.

31. *H. aulicum*, Herb.; Kunth Enum. v., p. 515 (excl. var. γ ., which is *H. organense*.) *H. Heuserianum*, Karsten Fl. Columb. t. 102. Brazil.

32. *H. organense*, Herb.; Kunth Enum. v., p. 516. *Amaryllis Gardneri*, Seubert in Fl. Bras. iii., p. 149. South Brazil, *Bowie* and *Cunningham!* *Gardner*, 686! 688! *Glaziou*, 8992!

33. *H. calypttratum*, Herb.; Kunth Enum. v., p. 516. Brazil, *Gardner*, 687!

34. *H. psittacinum*, Herb.; Kunth Enum. v., p. 517. Brazil.

35. *H. pardinum*.—*Amaryllis pardina*, Hook, fil., in Bot. Mag. t. 5645. Andes of Peru, *Pearce.*

36. *H. Leopoldi*.—*Amaryllis Leopoldi*, Moore in Gard. Chron., 1870, p. 733, fig. 140. Andes of Peru, *Pearce.*

37. *H. miniatum*, Herb.; Kunth Enum. v., p. 524, excluding the synonym *Amaryllis chilensis* of Ruiz & Paron. Peru, *Pavon! Mattheus!*

38. *H. Reginae*, Herb.; Kunth Enum. v., p. 525. Widely spread in Tropical America.

39. *H. procerum*, Lemaire Ill. Hist. xi., p. 408. *Amaryllis procera*, Duchartre; 'Flore des Serres,' t. 2077-8. *A. Rayneri*, Hook fil., in Bot. Mag. t. 5883. South Brazil, *Binot.*

40. *H. barbatum*, Herb.; Kunth Enum. v., p. 522. Guiana. This I have only seen in the Linnæan herbarium.

41. *H. reticulatum*, Herb.; Kunth Enum. v., p. 521. Brazil.

42. *H. equestre*, Herb.; Kunth. Enum. v., p. 523. *H. occidentale*, Roem.; Kunth Enum. v., p. 518. Martinique, *Hahn!* Yucatan and Tabasco, *G. P. Johnson!* Columbia, *Moritz!* Holton! *Birschel!* French Guiana, *Sagot*, 827! *Rothery!* British Guiana, *Parker!* Ecuador, *Jameson*, 715! Chili, *Bridges!*

43. *H. Roezli*.—*Amaryllis Roezli*, Regel, 'Gartenflora,' 1874, p. 290, t. 809. Andes of Bolivia, *Roezl*.

44. *H. stylosum*, Herb.; Kunth Enum. v., p. 523. *Amaryllis staminea*, Seubert in Marl. Fl. Bras., iii., p. 150. French Guiana, *Hort. Brooks*. North Brazil, *Burchell*, 9819-2. *Gardner*, 1167!

45. *H. breviflorum*, Herb.; Kunth Enum. v., p. 520. Buenos Ayres, *Tweedie*!

46. *H. vittatum*, Herb.; Kunth Enum. v., p. 520. Tropical America.

47. *H. rutilum*, Herb. App. p. 31. *H. bulbulosum*, Herb.; Kunth Enum. v., p. 527, with the eleven varieties there noted. South Brazil, *Gardner*, 5210! *Weir*, 48! 314! *Glaziou*, 8991! &c. I cannot clearly distinguish from this *H. Martianum*, Roem.; Kunth Enum., v., p. 525; and *H. glaucescens*, Herb.; Kunth Enum. v., p. 526.

NOTES ON RUBI.

(No I.)

BY CHARLES C. BABINGTON, F.R.S., &c.

1. *RUBUS LEESII*, *Bab.*—I have often expressed doubt concerning the right of this curious plant to specific rank, chiefly on account of its being invariably nearly, if not totally, barren. I have never known a drupe, although apparently perfect, to germinate; but Dr. Focke tells me that he has once done so, and obtained the true plant. Until recently, I should have said that all the specimens which I have seen were very constant in the character of their foliage; but a plant sent to me by Mr. H. Bromwich (gathered "in a bog at Woodloes, near Warwick," in July and September, 1876), and issued also by the Botan. Exchange Club as *R. Leesii*, is considerably different. It has the leaves of the barren stem (the "cane" of gardeners), simple and three-lobed, but nevertheless bearing a wonderful resemblance to those of the typical *R. Leesii*. On the specimen distributed by that "Club" the leaves all have this structure; but those received direct from Mr. Bromwich have a few leaves of the usual character of those of *R. Leesii*, viz., ternate, with all the leaflets sub-sessile but quite distinct. Unfortunately, in the otherwise beautiful plate in the 'Suppl. to Eng. Bot.,' t. 2981, the terminal leaflet is represented as possessing a rather long stalk. The introduction of that stalk is a mistake of the artist, who probably had the ternate form of *R. Idæus* in his mind. The true *R. Leesii* has never a stalk more than one-sixth of an inch in length. Unfortunately, this error escaped the notice of the author of the text which accompanies that plate (Mr. Lees), and also the editor of the new 'English Botany.'

Continental authors who have noticed *R. Leesii* are agreed in considering it as a form of *R. Idæus*, similar to the form of *Fragaria vesca* called *F. monophylla*. The plate in 'Fl. Dan.' (Suppl. t. 138) of the *R. Idæus c. anomalus* of Arrhenius,

undoubtedly represents my *R. Leesii*. Mr. Bromwich's plant is even more curious than the *var. anomalus*; for it has most of the leaves on the barren stem 3-lobed, although a few of them are ternate. Arrhenius thought that Host ('Fl. Aust,' ii. 28) had seen a similar plant; but on reading Host's remarks, I cannot find any cause for thinking that he knew any plant really different from the ternate-leaved forms of *R. Idæus*. As Focke ('Journ. of Bot.,' x., 27) justly remarks, the lengthening of the leaves in a forward direction is arrested in *R. Leesii*, but very marked in true *R. Idæus*. He supposes that this may be a form developing into a new species, but that can hardly be the case, as it usually, if not always, has barren drupes.

I think, therefore, that we cannot sustain *R. Leesii* as a species distinct from *R. Idæus*, although the two plants can never be confounded either in the field or the herbarium. Some very valuable and interesting remarks upon *R. Idæus*, by F. W. C. Areschong, will be found in the 'Journ. of Bot.,' xi., 108.

2. *R. SUBERECTUS*, *Anders.*, and *R. FISSUS*, *Lindl.*, seem to be well understood by the northern continental botanists, but they were hardly clear to such a master in this genus as the Rev. A. Bloxam. In his recently-issued "Set of British Rubi," he gives a very good example of *R. fissus* from Moira Reservoir, in Leicestershire, as *R. suberectus*. I had not previously seen any specimens named *R. fissus* or *R. suberectus* by him, and this specimen rather troubles me, as it renders doubtful the counties which I have quoted for these plants on his authority (Worcester, Hereford, and Leicester) in my "Rubi," (pages 53 and 57.) Those counties now require confirmation. Mr. Bloxam issued two specimens, one as *R. suberectus* and the other as *R. fissus*; but I cannot see in what they differ. One of the specimens named *R. fissus* by Lindley for Leighton is exactly the *R. suberectus* of this published "Set." *R. microacanthos* (Kalt.!), in 'Wirtg. Herb. Rub.,' ed. ii. 51, and Boulay's! 'Ronces Vosg.,' 12I, is a synonym of *R. suberectus* (Anders.)

3. *R. IMBRICATUS*, *Hort.* I now possess a good series of *R. ramosus* (Blox.), from near Plymouth (T. R. Archer Briggs), and near Birmingham (J. Bagnall.) Also authentic specimens from Mr. Bloxam, from the neighbourhood of Rugby. It only seems to differ from *R. imbricatus* by the leaflets not being imbricate and sometimes having felt beneath. In no other respect can I detect any important difference. The names are not very good, but unfortunately the worse of them is by many years the elder. Mr. Briggs has given a detailed description of *R. ramosus* in the 'Journ. of Bot.' (ix., 330.) I do not think that it was described under that or any other name previously, unless it is the same as *R. imbricatus*. It is probable that the imbricate character of the leaflets of Mr. Hort's plant is not constant, although he considered it so marked a distinction as to use it to furnish a specific name. I could not find any plant with such leaves at Redbrook, and I have not seen one with them, except those from Mr. Hort himself, unless they are so on a specimen gathered at Redbrook by the Rev. A. Ley in 1871.

Mr. Harbord Lewis sent a plant several years since from Allerton Road, near Liverpool, which I doubtfully named *R. imbricatus*; I now believe that it is really one of the *Corylifolii*.

(To be continued.)

NOTE ON THE GENUS *PYGEUM*, Gaertn.

BY H. F. HANCE, Ph.D., &c.

WHEN describing, seven years ago, a supposed new species of *Pygeum*,* I failed to perceive its identity,—of which there can be no doubt,—with *Prunus macrophylla*, S. & Z., although I possessed a good flowering specimen of the Japanese plant. This and *P. spinulosa*, S. & Z., seem to me just as much allied to *Pygeum* as to *Prunus*, particularly by their thin cartilaginous putamen, though they have not the “drupa transversim latior, in medio utrinque leniter compressa”† of the typical species, which suggested to Gaertner his somewhat unpoetical name. They technically belong to the section *Laurocerasus*, which, although combined with *Padus* by DeCandolle, Koch, and many other writers, is, when properly limited, a truly natural group, as long ago well insisted on by Torrey and Gray.‡ I do not hesitate to express a decided conviction that *Pygeum* must be merged in this, which differs from all other sections of *Prunus* by its coriaceous evergreen foliage, frequently almost a quite juiceless fruit,§ and thin putamen.|| The remodelled group can either be retained in *Prunus*, or, I think preferably, and more naturally,—taking into consideration that “est propria quaedam *Lauroceraso* facies,”¶—be distinguished generically, under Tournefort’s original name. A comparison of two such plants as *Pygeum acuminatum*, Colebr. and *Prunus acuminata*, Wall., will, I think, show the justice of my opinion. Mr. Kurz has recently established, under the name of *Pygeopsis*, a section of *Prunus*, distinguished only by the character “Evergreen trees; flowers racemose;” and he remarks:—“The genus *Pygeum* is so closely allied to the section *Pygeopsis* of *Prunus* as to make it difficult to keep it distinct. Indeed, *Pygeopsis* and *Prunus* combined stand pretty much in the same relation to *Prunus* as *Eriobotrya* does to *Pirus*.”** This section appears altogether

* Sem. ‘Journ. Bot.’ viii., 243; where see my remarks on its extreme affinity to *Prunus*.

† Gaertner, ‘De fruct. et sem. Plant.’ i., 218.

‡ ‘Fl. N. America,’ i., 411.

§ In some species rather an *achenium* in its character than a *drupe*.

|| Certainly in *P. macrophylla*, S. & Z.; *P. javanica*, Miq.; *P. spinulosa*, S. & Z.; and *P. Junghuhniana*, Miq.

¶ Tournefort, ‘Inst. rei herb.’ ed. 3, curante Jussieo, i., 628.

** ‘Journ. As. Soc. Bengal,’ xiv., 303. *Eriobotrya*=*Photinia*, Bth. & Hook., f.

identical with Miquel's previously founded *Nothocerasus*;* nor can I see that it is in any way distinguishable from *Laurocerasus*.

SHORT NOTES.

FLORA OF LAKE LANCASHIRE (Journ. Bot. 1870, pp. 268–296).—In Miss Hodgson's herbarium, now incorporated with the general British collection in the British Museum, are some plants which are not included in her published list. *Cochlearia danica* (named by Mr. Baker), from Walney Island, was placed on the sheet with *Arenaria serpyllifolia*, and was thus overlooked. *Parnassia palustris* and *Crepis virens* were no doubt accidentally omitted. Miss Hodgson's specimens of the former are from Gillbanks, Ulverston; Plumpton Moss; and top of Hawkshead Hill. The *Melilotus vulgaris* of the list seems to me rather *M. parviflora*, Desf.; and the *Daucus maritimus* is not the true plant. The only specimen in Miss Hodgson's herbarium representing the *Galium Mollugo* of her list is *G. Aparine*. We have a type-specimen from Ulverston of *Rosa bractescens*, Woods, which is not in the list. The *Erythraea littoralis* of the list, so far as the Humphrey Head plant is concerned, is *E. pulchella*; the plants from "Plumpton salt marshes" are of both species. The names *Atriplex angustifolia* and *A. hastata* have been transposed; and *Polyyonum Hydropiper*, as regards the specimens from "plantations," is represented by a *Rumex*, apparently a young state of *R. nemorosus*, a species not included in the list.—JAMES BRITTEN.

SCOTCH LOCATITIES.—*Rosa involuta*, Sm. (*R. Smithii* of Baker), River Almond, near Ratho, Linlithgowshire, June 23rd, 1868, several plants.—*Malaxis paludosa*, Sw., on the west side of Ben Lomond, near Rowardennan, Stirlingshire, August 22nd, 1877.—On looking over some of my old gatherings, I find *Carduus arvensis*, Curt., β . *setosus* near Currie, Edinburghshire, September, 1865.—A. CRAIG CHRISTIE.

* 'Fl. Ind. Batav.,' i. 1, 364. The only distinctions on which Miquel relies are the shape of the fruit, and the leaves, generally quite entire in *Nothocerasus*, and serrate in *Laurocerasus*. The first character is obviously inadequate to sectional distinction; and, as to the latter, *P. (Nothocerasus) macrophylla*, S. & Z., *P. (Nothocerasus) spinulosa*, S. & Z., and *P. (Nothocerasus) undulata*, Ham., have serrate leaves; whilst they are usually quite entire in *P. (Laurocerasus) caroliniana*, Ait., and invariably so in the Caribbean *P. (Laurocerasus) occidentalis*, Sw., and its allies.

Notices of Books and Memoirs.

Libellus de re Herbaria Novus. By WILLIAM TURNER. Originally published in 1588; reprinted in *facsimile* with notes, modern names, and a Life of the Author, by BENJAMIN DAYDON JACKSON, F.L.S. Privately printed. London. 1877.

MR. B. D. JACKSON has followed up his admirable reprint of Gerard's Catalogue, which has been duly noticed in these pages, with "a *facsimile* reprint of a still earlier work—the first publication in this country of a true botanical cast;" and he has this time availed himself of the heliotype process, the result being an absolutely perfect reproduction, in every detail, of the British Museum copy of Turner's 'Libellus.' By this means, a very rare, if not unique, book is rendered available to an enlarged circle of readers, although, as the reprint is limited to a hundred copies, it cannot be said to have become common. It is impossible to speak too highly of the mechanical portion of the work; and Mr. Jackson has enhanced its value by the sketch of Turner's life which he has prefixed to it. We do not, indeed, find many striking facts regarding this interesting man which had not previously been brought forward in the Appendix to the 'Flora of Middlesex;' but a copy of Turner's Will is added, and the list of his works is by far the most complete ever published.

Following the reprint is a list of the modern scientific names of the plants enumerated, some of which are, we think, open to question. This criticism is based on the fact that the *English* names, of which a large number are given by Turner, sometimes point to identifications other than those given by Mr. Jackson; Turner's English names are almost certainly in every case genuine, while his Latin equivalents for them, upon which Mr. Jackson has too exclusively relied, were necessarily often merely tentative. An index of these English names would be a valuable addition to the work; and we are glad to learn that it is Mr. Jackson's intention to draw up such a list for distribution to subscribers. Some of the identifications will probably at the same time come under revision; so that it is unnecessary to offer any suggestions or criticisms upon those at present given.

J. B.

Vergrünungsgeschichte der Fichen von Trifolium repens. Von Dr. LAD. CELAKOVSKY. ('Bot. Zeit.,' March, 1877.)

THE author maintains his position with regard to the foliar nature of the ovule. He looks upon the nucleus as an emergence from the ovulary 'leaf,' and combats the recently-published conclusion of Peyritsch on the 'shoot' nature of ovules. We venture to think that it would be far better were an evolutionary teratologist

like Dr. Celakovsky to endeavour to find some basis for the estimation of the phylogenetic value of teratology. While engaged on this task, he would see that none of the facts with which he deals can throw any light on ovular homology, which is a problem restricted to the comparative morphology of the sexual organs.

S. M.

Der Einfluss der Luftfeuchtigkeit (Influence of Moisture on Vegetation). Von PAUL SORAUER. ('Botanische Zeitung,' January, 1878).

CAREFULLY conducted experiments with spring-barley yielded the following results:—In dry air branching was greater than in moist, the mean figures standing at 2·77 and 2·37 respectively; length of leaves was greater in moist air in the ratio of 21·37 to 21·07, but the breadth was less (6·74 to 7·33); a moist atmosphere is more favourable to length of leaf-sheath in the proportion of 9·26 to 8·18, to growth of the principal stem (13·5 to 11·5), and to root-development (26·8 to 23·9). It was found that the epidermal cells of the leaves were more numerous and broader, the cells between the stomates shorter, and the stomates themselves shorter in dry air. Also, that leaves developing in a moist atmosphere have comparatively fewer stomates per millimetre of length. The question is worth further working out *à propos* of the relation between the minute structure of organs and their environment.

S. M.

A Catalogue of the Collections in the Museum of the Pharmaceutical Society of Great Britain. Compiled by E. M. HOLMES, F.L.S., Curator of the Museum. London. 1878.

THE execution of this catalogue reflects credit on the energetic compiler, who has succeeded in producing a volume which, apart from its primary object as a guide to the rich Museum of the Pharmaceutical Society, contains a large amount of useful information, in a very short form, on the drugs themselves. More than half the volume is occupied by the vegetable *Materia Medica*, the substances being arranged under the plants producing them alphabetically under the Natural Orders in the usual sequence. A few botanical slips should be corrected in a new edition. *Irvingia* is a member of the *Simarubaceæ*, not of the *Anacardiaceæ* as here placed. There are two, not three, seeds in the fruit of *Rhamnus Frangula*. The alteration of *Eucalyptus Globulus* to *E. globula* is founded on a misconception; the author of the species intentionally used the substantive word *Globulus* in allusion to the button-shaped form of the fruit. *Latakia tobacco* has been proved to be produced by *N. Tabacum*, not *N. rustica*; the ovules in the common Juniper are alternate with the three fleshy scales, not "at the base of each;" and the leaves of the Savin are surely much less, not "more," spreading than those of the former plant. But, on the whole, the

catalogue is very free from errors, and is enriched with numerous references to other works, and with a comprehensive index. It does not include the valuable collections bequeathed to the Society by the lamented Hanbury; these it is intended to catalogue along with his herbarium—which is very rich in some particulars *e.g.*, *Zingiberaceæ*,—in a supplementary Catalogue.

H. T.

Fascicle 74 of the 'Flora Brasiliensis' contains the *Humiriaceæ* and *Lineæ* by Urban, and the *Oxalideæ*, *Geraniaceæ*, and *Vivianiaceæ* by Progel.

Dr. Ernst, of Caracas, has published an account of a little-known botanist, Senor J. M. Vargas, which was read before the Society of Sciences, at Caracas, on the occasion of the deposition last year, in the National Pantheon there, of the remains of the botanist. J. M. Vargas was born at La Guayra, the sea-port of Caracas, on the 2nd of March, 1786. After having concluded his medical studies in Caracas, he took his degree as M.D. in 1808, and went some years afterwards (in 1814) to Edinburgh, where he remained till 1817. He then resided in Porto Rico till 1827, when he returned to his native country, taking up his residence at Caracas, where he was named Professor of Anatomy and Surgery. He died in New York in 1854, and his remains were brought, in 1877, to Caracas. The memoir contains, as an appendix, several letters between Vargas and other botanists, especially A. P. DeCandolle, to whom he sent many plants. A list of those mentioned in the 'Prodromus' is here given, of which over thirty were new to science, and there first described. Dr. Ernst concludes his memoir by proposing *Vargasia* as a new genus of *Marcgravia*, founded on two species growing in Venezuela, and differing from *Ruyschia* in the number and arrangement of the stamens, the bilocular ovary, and the bi-convex bracts on the flower pedicels.

The lately-published 'History of Harting,' by the Rev. H. D. Gordon, contains a notice of the flora of that West Sussex parish, by J. Weaver.

We are glad to call attention to a new monthly journal devoted to Natural History, the 'Midland Naturalist' (Birmingham), which, to judge from the first three numbers, will be a very useful medium of inter-communication for the members of the numerous societies in the midland counties. All branches of science are included. In botany, there are papers on Abnormal Ferns, by E. J. Lowe; the Relations of Chlorophyll and Starch, by Dr. Hinds; the Distribution of the Genus *Rosa* through Warwickshire, by J. E. Bagnall, &c. The editors are Messrs. Badger and Harrison, and the London agents Messrs. Hardwicke and Bogue. The Magazine is very well and neatly printed, and the price sixpence.

The (American) 'Botanical Gazette' for January contains the first part of an enumeration, by A. W. Chapman, of a large number of plants, chiefly from the semi-tropical regions of Florida, which are either new or have not hitherto been recorded as belonging to the Flora of the Southern States.

OTHER NEW BOOKS.—D. C. EATON, 'Ferns of North America,' Part 1, Cassino, Salem, Mass.—C. LUERSEN, 'Medicinisch-Pharmaceutische Botanik,' Part 1, Haessel, Leipzig.—M. C. COOKE, 'Mycographia seu Icones Fungorum,' Part 5, *Morchella*, *Gyromitra*, *Helvella*, *Spathularia*. Williams and Norgate. 12s. 6d.—P. ÅHNFELT, 'Carl von Linné's Lefnadsminnen Tacknade af honom Sjelf.' Lamm, Stockholm, 2kr. 50ore.

ARTICLES IN JOURNALS.—JANUARY, 1878.

Scottish Naturalist.—J. Stirton, 'On certain Lichens of the Genus *Parmelia*' (extra European).—J. W. H. Trail, 'Scottish Galls.'

Trans. Bot. Soc. Edinb. (vol. xiii., pt. 1, 1877.)—W. Lauder Lindsay, 'Recent Contributions to the Flora of Iceland.'—A. Stephen Wilson, 'Experiments with Turnip-seed' (tab. 2).—J. B. Balfour, 'Remarks on Prof. E. Morren's Views of Vegetable Digestion.'—M. C. Cooke, 'Pezizæ at Inverleith House' (tab. 3).—C. W. Peach, 'On Fossil Plants from the Calciferous Sandstone round Edinburgh.'—J. Sadler, 'On the Alpine Flora of Ben Nevis, Inverness-shire.' J. McNab.—'Open-Air Vegetation at the Royal Botanical Gardens.'—G. Maw, 'Botanical Tour in the Levant.'—F. M. Webb, 'Notes on some Plants in the British Herbarium at the Royal Botanical Gardens.'

Journ. Linn. Soc. Lond. (No. 94, January 16th.)—J. Ball, 'Spicilegium Floræ Moroccanæ' (continued).

Quart. Journ. Microsc. Science.—S. H. Vines, 'On the Homologies of the Suspensor' (tab. 5).—F. Darwin, 'The Contractile Filaments of *Agaricus muscarius* and *Dipsacus sylvestris*.'

Silliman's American Journ.—S. Watson, 'Poplars of North America (*P. Fremonti*, n. sp.)'

Ann. Sc. Nat. (Ser. 6., iv., Nos. 5 and 6).—Fischer de Waldheim. —'The *Ustilagineæ* and their Host Plants' (continued).—B. Renault. 'New Researches on the Structure of *Sphenophyllum* and its Affinities' (tab. 7-9).—P. van Tieghem, 'Third Memoir on the Mucorini' (tab. 10-13).

Revue Internationale de Sciences.—H. Baillon, 'On the Significance of the different parts of the Ovule, and the Origin of those of the Seed.'

Bot. Zeitung.—P. Sorauer, 'The Influence of Aërial Moisture'

[see p. 90].—R. Hollstein, 'The destiny of Anthoxanthin Corpuscles in withering Flower-leaves.'—F. Kienitz-Gerloff, 'On the Development of the Moss-Capsule, and the Embryo-Development of some *Polypodiaceæ*' (tab. 1, 2).

Flora.—P. G. Strobl, 'Flora of the Nebrodes in comparison with that of the whole of Sicily.'—S. Schulzer, 'Mycological Notes.'—K. Prantl, 'On the occurrence of *Cuscuta Gronovii*, W., in the Valley of the Main.'—L. Dippel, 'Remarks on the Composition of Chlorophyll.'—O. Böckeler, 'Diagnoses of new or little-known *Cyperaceæ*.'

Oesterr. Bot. Zeitschrift.—'Memoir of A. E. Vogl' (with portrait).—W. Winkler, 'Anatomy of Galls on Pine caused by Pine-Lice.'—A. Kerner, 'Distribution of Hungarian Plants' (continued).—F. von Höhnel, 'Explanation of the occurrence of coagulated Latex in the interior of Vessels.'—B. Stein, 'Three *Cerastia*.'—F. von Heldreich, 'On *Silene Ungerii*, Fenzl.'—F. Antoine, 'Botany of the Vienna Exhibition' (continued).

Magyar Novenytani Lapok.—K. Mika, 'On Sphæraphides in the Epidermis of *Capsella Bursa*.'—M. Staub, 'On the *Crocus* of Fiume.'

Bot. Notiser. (Jan. 10th).—E. Ahrling, 'Examination of the Linnean MSS. to be found in Sweden' (continued).

Nuov. Giorn. Bot. Ital. (Jan. 22nd).—F. Caruel, 'On the Pollination of the *Asteraceæ*.'—G. Archangeli, 'On *Trifolium obscurum*, Savi.'—M. C. Cooke, 'Præcursor ad Monographiam *Hendersonia*.'—H. Terraciano, 'Transformation of Stamens into Carpels in *Capsicum grossum*, and Fructiferous Proliferation in *C. annum* (tab. 1).—J. Zanardini, 'Phyceæ Papuanæ a Beccari in Nov. Guin. collect. (*Endosiphonia*, *Ceratodictyon*, *Spongodendron*, genn. nov.)—A. Mori, 'On structure of the Stem of *Erythrina Crista-Galli*' (tab. 2).—A. Borzi, 'Researches in the Sexuality of the Ascomycetes' (tab. 3, 4).

Proceedings of Societies.

LINNEAN SOCIETY OF LONDON.

January 17, 1878.—Prof. Allman, F.R.S., President, in the chair.—Mr. Thiselton Dyer exhibited the *Dipterocarpeæ* collected by Beccari in his visit to New Guinea in 1872. These were only three in number, an extremely poor result compared with the extraordinary abundance and variety in the forms belonging to this family previously collected by the same botanist in the adjacent island of Borneo. The specimens, which were somewhat fragmentary, consisted of fruits of a species of *Hopsea* and of an *Anisoptera*,—differing, apparently, from *A. polyandra*, which was the only *Dipterocarpea* previously known from New Guinea,—and

of a specimen in flower of a *Vatica*, probably also a new species. The *Dipterocarpeæ* being, perhaps, the most characteristic family of the Indo-Malayan Flora, the poverty of its representation in New Guinea was a conclusive proof that its vegetation was not a markedly Malayan type.—Mr. J. R. Jackson, of Kew Museum, exhibited several examples of the fasciated stems of *Dipsacus Fullonum* (the Teazle), which curious malformations Messrs. Marshall and Snelgrove have converted into the fashionable product of handles for ladies' sun-shades. He also made some remarks on a bird's nest made of cotton goods and wool, forwarded by Sir Bartle Frere, from South Africa, to Sir J. Hooker.—The following paper was read: "On the Nutrition of *Drosera rotundifolia*," by F. Darwin. With the object of obtaining direct evidence as to whether insectivorous plants thrive as well if deprived of animal food, a series of experiments were set on foot with about two hundred plants of *D. rotundifolia*. These were cultivated in soup-plates under gauze, and each plate was divided into halves by a low wooden partition. The plants on one side of the partition were supplied every few days, from the beginning of July to the first days of September, with minute fragments of roast meat, each weighing about one-fiftieth part of a grain, a fragment being placed on each leaf, none being supplied to those on the other side of the partition. The fed leaves soon became of a more intense green, and the whole plants larger and stouter, with more numerous flowering stems. At the beginning of September, the seeds being ripe, all the flower-stems were gathered, and the plants of three plates were picked out of the moss, and carefully washed. The following gives the result of counting, measuring, and weighing the various parts of the two sets of plants:—

Ratio between number of starved and fed plants	100 : 101·2
Ratio between weights of the plants, exclusive of flower-stems	100 : 121·5
Total number of flower-stems	100 : 164·9
Sum of the heights of the stems	100 : 159·9
Total weight of flower-stems	100 : 231·9
Total number of capsules	100 : 194·4
Average number of seeds from capsules	100 : 122·7
Average weight per seed	100 : 157·3
Total calculated number of seeds produced	100 : 241·5
Total calculated weight of seeds produced	100 : 379·7

These results are conclusive, as showing the advantage gained by the plants fed with meat, and it can scarcely be doubted that the capture of insects is of similar benefit.

February 7, 1878.—Professor Allman, F.R.S., President, in the chair.—Mr. Thiselton Dyer made a brief communication on the so-called "Rain Tree" of Moyobamba, North Peru, which promised to excite as much interest amongst residents in hot, dry countries as the supposed anti-malarious properties of the "Fever Tree" (*Eucalyptus Globulus*) had done

amongst the inhabitants of hot, wet ones. From information through Mr. Spruce, it seemed probable that the Rain Tree was *Pithecolobium Saman*, and the so-called "Rain" the fluid excreta of Cicadas which fed on the juices of the foliage. Other trees, however, might become "Rain Trees," and the whole phenomena was comparable to the production of honeydew from the Lime by the agency of Aphides.

Botanical News.

THE editor of the reprints of Gerard's 'Catalogus' and Turner's 'Libellus,' Mr. B. D. Jackson, has issued a circular proposing a "Turner Printing Club," having for its object the re-issue, in *fac simile*, with notes, of early and very rare publications in Natural History. A small subscription, half-a-guinea, is suggested, in the hope of securing a wide support for the scheme. It has our complete approval, and we know of no more competent and useful editor than Mr. Jackson for books of this special kind. His address is 30, Stockwell Road, S.W.

THE Society of Apothecaries, which has for more than two centuries done its best to encourage botanical pursuits, has now instituted prizes in Botany for girls. The examination, consisting of oral and written questions on the structure and physiology of plants, and their classification and description, so far as such subjects are treated of in Hooker's 'Primer' and Oliver's 'Elementary Lessons,' will be held on the third Wednesday and Friday in June; and candidates, who must give evidence of being under twenty years of age, must send in their names, fourteen days before, to the Beadle, Apothecaries' Hall, Blackfriars.

ONE of the greatest botanists of the time has passed away in ELIAS MAGNUS FRIES, the honoured and venerable Professor in the University of Upsala, who peacefully ended his long life on Feb. 8th, having exceeded but a few days the hundredth anniversary of the death of his great predecessor Linnæus. As we hope to be able to give our readers a memoir of the life and work of Fries, it is not necessary to now do more than remind them that he was born in 1794 (15th August), and that his labours in botanical science, which in their character are worthy of comparison with those of Brown, extended over a period of more than sixty years, his first communication bearing the date of 1814, and his mental vigour and capacity remaining to the close of his life.

WE have also to record the death of SENOR JOAQUIM CORREA DE MELLO, of Campinas, Brazil, which occurred on December 20th, 1877. He was a very observant botanist, and has contributed several papers to the Journal of the Linnean Society on the tropical plants growing in his neighbourhood.

The death, at the age of 76, of the Rev. ANDREW BLOXAM, one of the best known of British botanists, occurred on Feb. 2nd, at Harborough Magna, Warwick, of which he was Rector. Mr. Bloxam's study of the British Flora extended over more than fifty years, and embraced all its branches, but the more critical genera attracted his special attention. He was one of the earliest and most successful students of *Rubi*, and his keen observation in the field led to the detection of many forms which, as distinguished by him, have since held their ground. He published several papers on this genus in the old series of the 'Phytologist,' and there are also descriptions of two new forms in this Journal for 1869 and 1870. For many years Rector of Twycross in Leicestershire, he made the flora of that county a special study, and published an account of the Botany of his parish in the 'Phytologist,' and (in conjunction with the Rev. Ch. Babington) of Charnwood Forest in Potter's 'History.' He studied the Fungi with great assiduity and success, and his large collection of them was acquired a few years ago by the British Museum, along with MSS. unpublished Catalogues of the Cryptogams of Leicestershire.

ON January 6th, there died at Arcueil, near Paris, at the great age of 87, FRANCOIS VINCENT RASPAIL. Between thirty and forty years ago, he was a prolific writer on all departments of Natural History and Medicine. In Botany, Raspail's chief work was among the Grasses; and he published, in 1825, his 'Memoire sur la Famille des Graminées,' which contains a classification on new principles. His 'Nouveau Systeme de Physiologie Végétale et de Botanique' appeared in 1837. Brongniart's genus of *Bruniaceæ*, *Raspailia*, was defined in 1826, and superseded Presl's genus of the same name given four years later.

ROBERT SWINHOE, who died in London on October 28th, 1877, at the early age of 41, was for some years Her Majesty's Consul at Formosa, and afterwards at Ningpo. He was a good naturalist, and a Fellow of the Royal and Linnean Societies. His specialty was ornithology, but he took a general interest in all branches of science, and his position gave him the opportunity of contributing to the elucidation of many botanical difficulties.

THE herbarium of the late Alexander Braun has been purchased by the Prussian Government for the sum of 21,000 marks.

The Cryptogamic herbarium of De Notaris has been acquired by the Italian ministers of public instruction for the Botanic Garden at Rome.

THE beautiful garden, at Antibes, of the late M. Thuret has, we are informed by the 'Gardeners' Chronicle,' become the property of the French Government, and will be formed into a sort of Mediterranean appanage to the Paris Jardin des Plantes. It is intended to give the direction to M. Naudin, of Collioure, and the object will be to make a botanic and experimental garden where new introductions may be tried, experimented upon, and distributed to other establishments.

Original Articles.

ON A NEW SPECIES OF *GARDENIA* FROM WEST TROPICAL AFRICA.

By W. P. HIERN, M.A.

(TAB. 195.)

GARDENIA KALBREYERI, *Hiern*. — *G. fruticosa*, inermis ramis patentibus glabrescentibus, foliis oppositis obovatis apice acute cuspidato-acuminatis basi vel prope basim cuneatis firmiter chartaceis breviter petiolatis supra costa excepta glabrescentibus subtus pallidioribus secus costam nervosque plus minusve hirsutis, stipulis intra-petiolariibus ovatis acuminatis integris vel apice bifidis, floribus solitariis terminalibus semi-pedalibus, calycis limbo infundibulari quinque-fido tubo infundibulari truncato integro sed exteris additis lobis ovatis ovalibusve obtusis imbricatis ex tubo prope apicem at sub apicem tubi exorientibus annulum brevem intra medium limbum integentibus, corolla hypocrateriformi bis calycem excedente extra scabrigo-sericea tubo elongato intus glabro limbo patente diam. semipedali profunde quinque-lobo, antheris linearibus exsertis, ovario oblongo sulcato, stylo elongato-clavato apice lobato breviter vel vix exserto, placenta unica.

HABITAT in Guinea superiore ad oppidum Old Calabar dictum, in locis apertis; legit mensi Maio anni 1877 *Kalbreyer!*, No. 212.

A shrub of twelve to fifteen feet. Branches straight, terete, somewhat furrowed towards the apex, reddish, appressedly puberulous above, glabrate below. Leaves $3\frac{2}{3}$ – $5\frac{1}{8}$ in. long by $1\frac{3}{5}$ – $2\frac{1}{2}$ in. broad (on the specimen in the British Museum), dark and glabrescent above, except that they are sometimes scattered with appressed hairs especially along the flat top of the midrib; margin very narrowly revolute, sparingly ciliate; lateral veins about ten to twelve on each side of the midrib, feeble, rather darker than the rest of the lower surface of the leaf; petiole $\frac{1}{4}$ – $\frac{3}{8}$ in. long, sparingly hairy; stipules erect, connate at the base, appressedly hairy outside, $\frac{1}{3}$ – $\frac{1}{2}$ in. long, deciduous. Flowers "very fragrant, large, lily-shaped, yellowish, with brown spots" (*Kalbr. sched.*) Peduncle stem-like, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, with a pair of stipular bracts near the apex. Calyx-limb $2\frac{1}{4}$ in. long, sparingly and appressedly hairy outside, glabrous inside; free portion of the tube $1\frac{1}{8}$ in. long, coriaceous; lobes unequal, $\frac{3}{4}$ – $1\frac{1}{2}$ in. long. Corolla about 6 in. long when expanded, pale outside, fleshy-coriaceous; tube slender; lobes oval, $2\frac{3}{8}$ in. long by $1\frac{1}{2}$ in. broad, rather pointed at the apex and rather convolute dextrorsely (as seen from above) at the base. Anthers

sessile or sub-sessile, 1 in. long, not locellate. Disk annular, fleshy. Ovary 1-celled, $\frac{1}{2}$ inch long. Style more or less hirsute above. Placenta marginal, longitudinal; ovules numerous. Fruit unknown.

This, in common with one or two other species of the genus in Tropical Africa, is remarkable on account of the calyx-lobes arising from the outer side of the calyx-tube just below its free truncate entire apex, thus leaving inside the calyx a short ring about the middle of its limb. It differs from *G. Jovis-tonantis*, Hn., in Oliv. Fl. Trop. Afr., iii, p. 101, n. 2, by its pentamerous flowers and opposite not ternate leaves, as well as by other characters; it should immediately follow this species in the 'Flora.' The general appearance of the flowering branches is much like that of *Randia malleifera*, B. et H. f., from which, however, it is quite different with regard to the calyx-limb as well as generically by the structure of the ovary. It is a handsome addition to the previously known species of *Gardenia*, and would be well worthy of introduction for hot-house cultivation. I have much pleasure in dedicating it to its discoverer, Mr. Kalbreyer, collector for the firm of Messrs. Veitch and Sons, of Chelsea, who was successful in detecting several novelties, the Orchids having been described recently by Professor H. G. Reichenbach in the Regensburg 'Flora.'

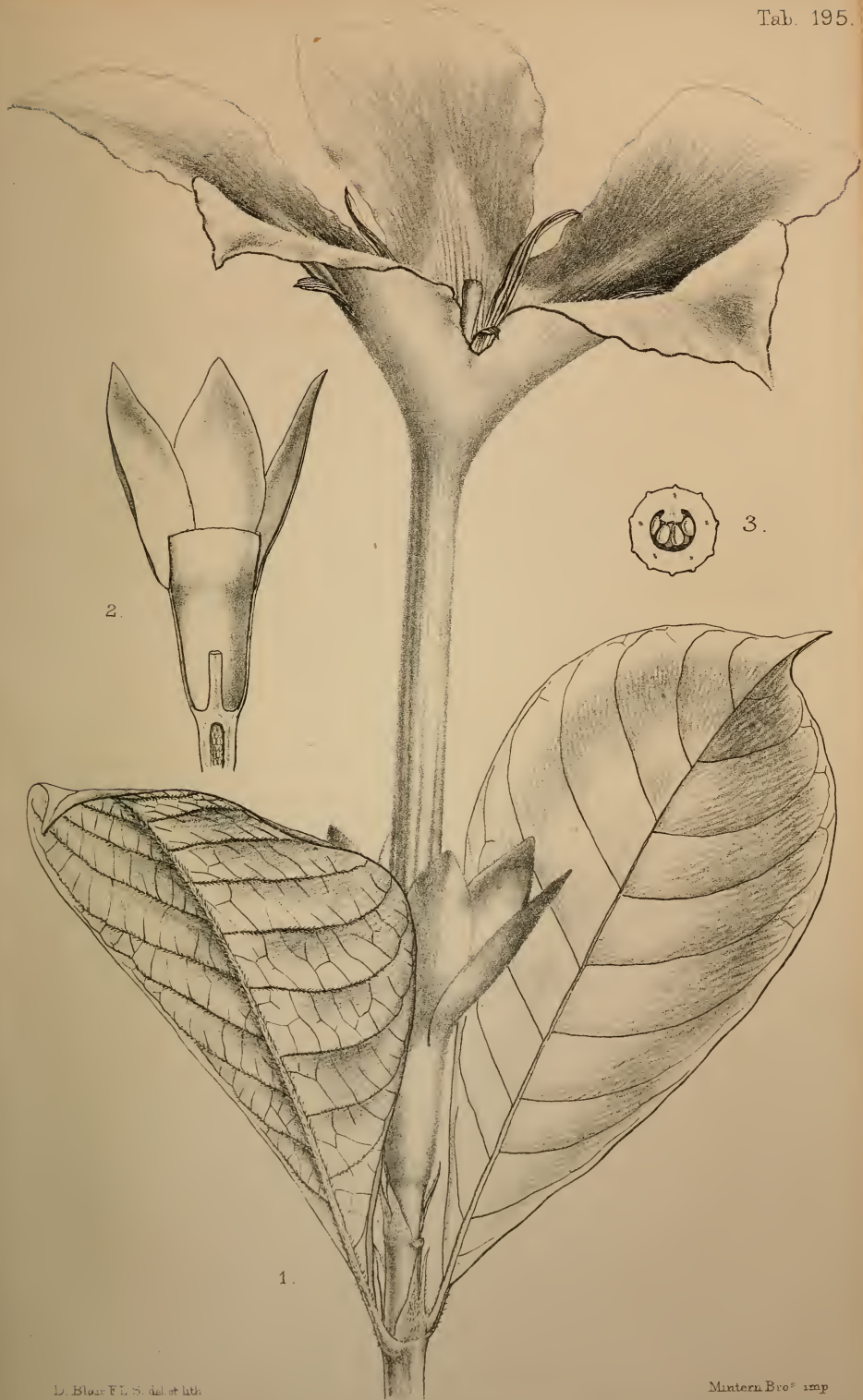
DESCRIPTION OF TAB. 195.—1. *Gardenia Kalbreyeri*, Hiern, drawn from a specimen in the British Museum, collected by Kalbreyer at Old Calabar. 2. Section of the calyx, showing the free, entire edge of the tube. 3. Transverse section of the ovary.

ON THE DIPTEROCARPEÆ OF NEW GUINEA, WITH REMARKS ON SOME OTHER SPECIES.

BY W. T. THISELTON DYER, M.A., F.L.S.

GRISEBACH, in his "Vegetation der Erde," has expressed the conclusion that the flora of New Guinea is "thoroughly similar to that of Borneo," and that in fact its vegetation is an eastern extension of the general Indo-Malayan flora which is so splendidly developed in its most characteristic features in that island. This is, as Mr. Bentham has pointed out,* a result quite at variance with the distribution of animals as expounded by Wallace. Such a conclusion, Mr. Bentham justly also observed (p. 14), was "premature in the present state of our knowledge;" and he added, on the authority of Sir Joseph Hooker, as an example of the want of identity of the respective floras, that no *Dipterocarpeæ* had been found to the east of Borneo. This remark was, of course, only intended to apply to the Malayan Archipelago, since the family is

* 'Anniversary Address to the Linnean Society, 1872,' p. 13.



known to be well represented in the Philippines. But even with regard to New Guinea, it was not absolutely true, since a single species, *Anisoptera polyandra*, had been described by Blume from that island.

The explorations of Beccari have, however, conclusively shown that though *Dipterocarpeæ* are not absent from the New Guinea flora, they are very poorly represented in it. His collections, in fact, in marked contrast to the unrivalled suites of specimens which he was able to obtain from Borneo, only comprise very imperfect and fragmentary specimens of three species, the representatives of as many genera. Two of these are from Mount Arfak, on the northern coast, a locality which is particularly interesting, as on the same mountain Beccari detected, at a height of 6000 feet, the first species of *Epacrideæ* known from New Guinea—*Styphelia trochocarpoides*, F. Muell.* The occurrence of representatives of two such characteristic types of such distinct floras as the Indo-Malayan and Australian on the same mountain, is a striking fact in geographical botany. It can hardly be doubted, in fact, that the sudden falling off in the numerical abundance of *Dipterocarpeæ*, perhaps the most preponderant feature in the fully-developed Indo-Malayan flora, and the simultaneous appearance of a conspicuous member of the Australian flora proper, shows that Mr. Bentham's doubts as to the validity of Grisebach's generalization on the nature of the New Guinea flora were really well founded.

The specimens which Professor Beccari has so kindly placed in my hands are, as I have said, excessively fragmentary. Any description of them would hardly be justifiable were it not for their exceptional importance. To only one have I felt justified in giving a specific name.

ANISOPTERA sp. nov.—Calyce fructifero læte ochraceo-flavido, pube aurea obtecto; tubo sphæroidali verruculis minimis pallidis consperso; lobis accretis majoribus lineari-spathulatis, obtusis, in tubum gradatim desinentibus, fortiter tri-costatis, costis utraque pagina prominentibus una media aliis marginalibus; lobis minoribus linearibus, acutis, uninerviis.

Mount Arfak, New Guinea, 1872, *O. Beccari*.

Omnia nisi fructus ignota. Calycis fructiferi tubus $\frac{1}{2}$ poll. longus; lobi majores 3–4 poll. longi, fere latitudine semipollicares; lobi minores ad $\frac{3}{4}$ poll. longi, $\frac{1}{10}$ poll. lati.

I think the discovery of the foliage and inflorescence of this plant will vindicate its specific distinctness. It differs from *A. costata*, Korth., in having the enlarged lobes of the fruiting calyx tapering more gradually to the tube and with their lateral nerves closer to the margin. From *A. polyandra*, Bl., which, as I have remarked, had already been detected in New Guinea, it differs in the greater length of the smaller fruiting calyx-lobes.

* 'Descriptive Notes on Papuan Plants,' p. 107.

VATICA PAPUANA, *Dyer*.—Arbor, ramulis teretibus, pallidis, glabris; foliis oblongo-lanceolatis vel oblongo-ellipticis, breviter acuminato-caudatis, basi obtusis, chartaceis; pagina superiore glaberrima, opaca; inferiore pube stellulata parcissime tecta, costa media fortiter, nervisque lateralibus utrinque 17 modice prominentibus; stipulis linearibus, acutis, uninerviis; petiolo brevi, crasso; florum partibus (præsertim calyce staminibusque) omnino *Vaticæ*; fructibus . . .

Ramoi, New Guinea, 1872, *O. Beccari*.

Folia 9–13 poll. longa, $2\frac{1}{2}$ –4 poll. lata; petiolo semi-pollicari. Alabastra semi-pollicaria.

In the absence of fruit, the exact affinities of this species must remain doubtful. But the foliage characters approach those of *V. Rassak*, Bl., from which, however, it is distinguished by the form of the leaves, which are narrowly oblong and less abruptly acuminate in *V. Rassak*, with more numerous lateral veins (about 21), and a longer petiole.

HOPEA, *sp. nov.*—Calyce fructifero obscure puberulo, lobis majoribus basi elliptico, limbo oblongo-spathulato, apice obtuso, infra plus minusve abrupte coarctato, nervis crebris (ad 10) percurso.

Mount Arfak, New Guinea, 1872, *O. Beccari*.

Omnia nisi fructus ignota. Calycis fructiferi lobi aucti $1\frac{1}{2}$ –2 poll. longi, $\frac{1}{2}$ – $\frac{3}{4}$ poll. lati. Capsula $\frac{1}{4}$ poll. longa.

Although I have only seen fragmentary fruits of this species, I have considerable confidence in its being otherwise unknown. The fruits agree in general facies more closely than perhaps with those of any other with an undescribed species from the Philippines. Of this I add a description:—

HOPEA PHILIPPINENSIS, *Dyer*.—Arbor, ramulis ad angulum 45° fere divergentibus, teretibus, siccitate rugosis, pallide fuscis, novellis fusco-canescensibus; foliis anguste oblongis, brevissime caudato-acuminatis, basi paullo obliquis, obtusis, utrinque glaberrimis, costa media utrinque nervis lateralibus subtus prominentibus; petiolo brevissimo; paniculis brevibus terminalibus vel lateralibus; floribus . . . ; fructu majusculo calyce accreto cincto; calycis lobis majoribus basi ovato tumido, limbo late spathulato, apice rotundato, basim versus valde attenuato, nervis 8 percurso.

Philippine Islands, *H. Cuming*, 879.

Folia 4–6 poll. longa, $1\frac{1}{4}$ –2 poll. lata; petiolo $\frac{1}{4}$ poll. longo. Calycis fructiferi lobi aucti $2\frac{1}{2}$ –3 poll. longi, latitudine fere pollicares. Capsula semi-pollicaris.

The dried fruits assume the same rich chocolate-brown colour which is observable in the New Guinea species.

Dr. Hance has described,* from Sumatra, a Dipterocarp in fruit, to which he has given the name of *Dryobalanops Schefferi*. He remarks that "I really do not know where it is to be placed unless here. Possibly it may be the type of a distinct genus." This greatly stimulated my curiosity, and I was much gratified when Dr. Hance, with his accustomed kindness, sent me a specimen of the plant. At the same time I received others from Dr. Scheffer, as well as what I believe to be the same species in a flowering stage. It was at once apparent that the species, though very remarkable, would not go into *Dryobalanops* as I understand that genus, being excluded, apart from the absence of the characteristic close linear venation of the leaves, by the evanescence of the calyx-tube which is always well-developed in the fruit of *Dryobalanops*. There is, however, no real difficulty in placing the species in *Vatica*, the peculiarity of the fruit simply consisting in the excessive horizontal and downward dilatation of the accrescent calyx-lobes, the margins of which stand out and meet in a sub-valvate manner. This is, in fact, only an extreme exaggeration of the sub-valvate æstivation of the calyx which is characteristic of the genus. Similar fruits, though not so strongly developed, are afforded by *Vatica Schouteniana*, Scheff., and *Vatica bancana*, Scheff., of both of which I have had the opportunity, through Dr. Scheffer's kindness, of studying the type-specimens.

I am inclined to believe, as I have said above, that amongst the unnamed *Dipterocarpeæ* sent me by Dr. Scheffer are the flowering state of this plant, and it seems to me to differ in no material respect from *Vatica pallida*, Dyer, described by me † from Maingay's specimens collected at Penang. Of this I had seen no fruiting specimens, but I see indications in the deflexed calyx, which I have pointed out in my description, of the assumption of the striking development presented by the mature fruit.

Vatica lanceafolia, Bl. In describing this species for the 'Flora of British India' (vol. i., p. 302), I had not had the opportunity of seeing mature fruit. Specimens in this state, collected by Sir Joseph Hooker, have lately turned up in the Kew Herbarium, where they had long been indeterminate. They have so little the aspect of a Dipterocarp that Sir Joseph Hooker labelled them at first sight as belonging to a species of *Diospyros*, and under this name they may lurk undetected in other herbaria. The absence, however, of albumen in the seeds shows that they are not Ebenaceous.

The geographical distribution of the species may also be somewhat amended. Mr. C. B. Clarke informs me that Silhet, in Wallich's Catalogue, always means Khasia. The species is a high-level one, and does not occur on the plains of E. Bengal at all. It is distributed over a well-defined district formed of Bhotan, Assam, Khasia, Cachar, and Upper Birma.

* 'Journal of Botany,' 1876, pp. 307, 308.

† 'Flora of British India,' i. p. 303.

Shorea sublacunosa, Scheff. I have identified with this species, which is therefore additional to the Flora of British India, a plant collected by Wallich at Singapore, in 1822, and labelled *Dilleniacear. ordinis? nervosa*, Wall. Cat., 6635. To it must also be referred some hitherto indeterminate specimens from Griffith's collections found by him at Ayer Punnus. They are 5018 and 5019 in the Kew distribution. This species is remarkable for the conversion of its leaf-buds into most singular cone-like galls.

I have already pointed out* the identity of *Parinarium dilleni-folium*, R. Br., with *Dipterocarpus cornutus*, Dyer. There is, however, under the same number (7520), in the Wallichian Herbarium, two sheets of another plant with the manuscript name *Parinarium Wallichianum*, collected by Wallich himself at Singapore, in 1822, Sir Joseph Hooker, in the forthcoming part of the 'Flora of British India,' has referred this to *Dipterocarpus*, but its distinct stipules removes it from that genus. I cannot suggest any other position for it unless it be a new *Shorea*. But the presence of some bodies like glands on the petiole makes its Dipterocarpeous affinity very doubtful, and I am disposed to think that it belongs to *Chrysobalanæa*. I add a brief description, in the hopes that some botanist may attempt to re-discover the plant, and get more information about it.

Arbor incertæ sedis, novellis compressis petiolisque indumento contexto pallido dense vestitis demum glabrescentibus; foliis oblongo-ellipticis, obtuse apiculatis, basi rotundatis, chartaceis; pagina superiore fere lævi, glaberrima, nitida; inferiore indumento membranaceo candidissimo dense vestita, costa media, nervisque lateralibus ad 30 patentibus, fortiter prominentibus; stipulis linearibus, acutis, membranaceis, caducis, externe canescentibus; petiolo brevi glandulis quibusdam facie superiore munito; floribus

Singapore, Wall. Cat., sub 7520.

Folia 7-14 poll. longa, 3-6 poll. lata; petiolo $\frac{1}{3}$ poll. longo.

Sir Joseph Hooker has enumerated in the 'Linnean Transactions'* some indeterminate *Dipterocarpeæ* collected in Borneo by Low and Motley. I have been able to clear up some of these, and it may be useful to record the results with the corresponding numbers:—

1. "A small-leaved *Dipterocarpus?* Motley, 143," is *Dipterocarpus fagineus*, Vesque.
2. *Vatica*, sp. ?? is an undescribed *Hopea*.
3. *Vatica?* is *Shorea macroptera*, Dyer, 'Flor. Brit. Ind.' i., 308.
4. *Vatica?* is *Shorea Pinanga*, Scheff.
5. *Vatica?* is indeterminate.
6. *Hopea?* is an undescribed *Shorea*.
7. *Hopea?* is indeterminate.

* 'Journal of Botany,' 1878, p. 25.

* 'Illustrations of the Flora of the Malayan Archipelago and of Tropical Africa.'—Linn. Trans., vol. xxiii., p. 161.

In Baker's 'Flora of Mauritius and the Seychelles,' a Dipterocarpeous tree which occurs in the Seychelles is mentioned (p. 17) as coming very near in habit and leaf to *Vateria ceylanica*. At that point in the printing of the book nothing but foliage was available for description, and no identification or diagnosis of the species was possible. Subsequently, through the exertions of Mr. Horne, Director of the Mauritius Botanic Garden, flowers and fruit were procured and sent to this country preserved in spirit. From these I drew up a diagnosis, which is printed in the additions and corrections (p. 526); as, however, in this position it will probably be overlooked, I take the opportunity of appending it to these notes.

VATERIA SEYCHELLARUM, Dyer, in Baker Flor. Maur. and Seych., p. 526. Arbor elata, ramulis lepidotis; foliis longe-petiolatis, ellipticis vel obovato-oblongis breviter apiculatis, basi rotundatis, coriaceis, utraque pagina glaberrimis, nervis lateralibus utrinque ad 20 erecto-patentibus subtus prominentibus; petiolo tereti; stipulis; racemis axillaribus, brevibus, paucifloris; floribus glabris; sepalis ovatis, obtusis, fructu minime acretis, nequaquam recurvis; petalis obovatis, erosis; staminibus per pluribus, antheræ valvis exterioribus majoribus; fructu globoso, pericarpio carnoso; cotyledonibus carnosissimis, plano-convexis, radiato-sulcatis. Baker, l. c., p. 17.

Seychelles, near Port Glean, Horne.

Folia 6-8 poll. longa, 4-6 poll. lata; petiolo 2-3 poll. longo. Flores diametro $\frac{3}{4}$ pollicares. Fructus diametro sesquipollicaris.

The occurrence of this single endemic species in the Seychelles is, like that of *Nepenthes Pervillei*, an interesting connecting-link between the Indo-Malayan Flora and its westward outlying extensions in Madagascar and Central Africa. In themselves, the characters of *Vateria Seychellarum* make its systematic position somewhat difficult of determination. In the absence of the reflexed fruiting calyx, it is without one of the most distinctive points in the genus. On the other hand, it is separated from *Vatica* by its indefinite stamens, of which *Vateria* affords a few other examples. In general habit, as already stated, it agrees with *V. ceylanica*, but differs in the two points already referred to, and in the longer petioles.

SPICILEGIA FLORÆ SINENSIS: DIAGNOSES OF NEW, AND HABITATS OF RARE OR HITHERTO UNRECORDED CHINESE PLANTS.

By H. F. HANCE, Ph.D., Memb. Acad. Nat. Cur., &c., &c.

(Continued from p. 15.)

II.

1. *CLEMATIS (Viticella) STRONACHII*, sp. nov. Fruticosa, scandens, tomentosa, caule sulcato, foliis bijugo-pinnatim biternatis petiolulis

primariis divaricatissimis sæpe apice volubilibus foliolis brevissime petiolulatis membranaceis anguste lanceolatis acuminatis sæpius latere exteriore basin versus lobulo auctis tenuiter penninerviis $1-1\frac{1}{2}$ poll. longis $1\frac{1}{2}-3$ lin. latis, pedunculis axillaribus 1-floris folia paulo excedentibus infra medium bracteas binas sessiles ovatas acutas 2-pollicares (ex alterius axilla pedicellum bracteatum floriferum rarius edentes) gerentibus, flore erecto, sepalis 5 oblongis acutis medio trinerviis extus sericeis 15-18 lin. longis 5-7 lin. latis genitalia duplo superantibus marginibus ptyxi involutis; filamentis ligulatis antherisque iis triplo brevioribus glaberrimis, carpellis plurimis dense hirsutis staminibus 2-3-plo brevioribus breviter rostratis. Circa Chinkiang, prov. Kiang-su, a. 1876, coll. W. G. Stronach. (Herb. propr. n. 20136).

A handsome species, quite distinct from the few other East-Asiatic members of the section. I cannot determine the colour of the flowers from the dried specimens.

2. *Ranunculus hirtellus*, Royle? In parva insula Si-dong-ding-san, lacus Tai-hu, prov. Che-kiang, d. 30 Apr. 1874, leg. F. B. Forbes. The specimens differ from Himalayan ones by the pubescence, appressed on the upper portion of the stem, being on the lower part composed of dense pale buff spreading hairs: I do not see any other differences.

3. *Trollius asiaticus*, Linn., β . *typicus*, Rgl. In m. Siao Wu-tai-shan, 100 mill. pass. ab urbe Peking, occasum versus, m. Julio 1876, coll. Hancock. I refer the plant to this variety—of which I have beautiful specimens gathered by Stubendorff at the river Birjussa, in Eastern Siberia—because it has 16 sepals and 24 petals; but it agrees with the var. *affinis* (= *T. chinensis*, Bge.), which Père David sent me from the Peking mountains, in the narrowness of the latter organs, and their almost equalling the sepals.

4. *Lychnis* (*Melandrium*, *Wahlbergella*) *apetala*, Linn. In monte Siao Wu-tai-shan, Jul. 1876, coll. Hancock. New to the flora of China Proper.

5. *Hypericum* (*Eremanthe*) *uralum*, Ham. Circa Chinkiang, 1875, coll. Stronach. Agrees better with the Indian plant than with a Japanese specimen of *H. patulum*, Thunb., which has the leaves proportionately much wider, the stem almost terete, except at the upper portion; and does not seem quite identical.

6. *Hypericum* (*Eu-hypericum* *Holosepalum*) *attenuatum*, Choisy. Juxta Chinkiang, a. 1876, leg. Stronach.

7. *Vitis pentaphylla*, Thbg. Circa Chinkiang, 1876, coll. Stronach. The late Prof. Miquel attempted an arrangement of this difficult genus ('Ann. Mus. Bot. Lugd.-Bat.,' i., 72.); but, while his divisions are for the most part natural, they are assigned too high a value, and the sequence in which he has placed them is unnatural; for instance, *Kalocissus* is far nearer *Vitis* than it is to *Monostigma* or *Ampelopsis*. If, however, we adopt as primary divisions *Cissus* and *Eu-ritis*, as defined by Kurz. ('Journ. As. Soc., Bengal,' xlv., 170), and group Miquel's divisions under these, combining *Ampelopsis* with *Monostigma*,—for neither the length of style nor

the quaternary or quinary flowers are constant characters,—and recognising *Ampelos* (as I would call *V. vinifera* and its allies) as a sub-group of equal value with *Kalocissus*, we can, I believe, effect a very natural arrangement of the species. Lawson's revision of *Vitaceæ* in the 'Flora of British India' is very unsatisfactory.

8. *Crotalaria chinensis*, Linn. In montibus Pak-wan, supra Cantonem, d. 7 Aug. 1866, leg. Sampson.

9. *Medicago lappacea*, Lam. Mr. W. G. Smith has suggested ('Journ. Bot.,' xiv., 53) that this plant may have been introduced into Bedfordshire from China, "because one of the habitats of the plant is the rice-fields of Hongkong." This is a very fanciful hypothesis. The locality where Mr. Lamont found the plant is in the immediate neighbourhood of the race-course, where horses are exercised every day of the year, and where there are a grand stand and stables. There can be no kind of doubt that it sprang up casually from seeds conveyed in imported hay, and it has no higher claim to be regarded as a native of Southern China than *Medicago lupulina*, *Trifolii* spp. pll., *Cicer arietinum*, *Vicia hirsuta*, *V. tetrasperma*, or *Lathyrus Aphaca*, all of which I have myself met with at various times in similar localities, but which are in no way established as weeds.

10. *Indigofera trifoliata*, Linn. Copiosam in collibus herbosis circa Cantonem, Jul. 1867, detexit Sampson.

11. *Glycine (Leptocyamus) tomentosa*, Benth. In agro Amoyensi, Oct. 1857, ipse legi; ad sinum Ta-lien-wan, Manchuriæ, Julio 1860, coll. R. Swinhoe.

12. *Glycine (Leptocyamus) tabacina*, Benth. In graminosis insulæ Tai-tan, prope Amoy, m. Maio 1866, invenit Sampson. Not hitherto recorded from China, though found in some of the South Pacific isles.

13. *Rubus triphyllus*, Thbg., * β . *internuntius*, var. nov. Calycibus ramulisque densissime rubiginoso-glanduloso-setosis, carpellis quam in typo fortius reticulatis. Chinkiang, 1876. W. G. Stronach. (Herb. propr. n. 19,999.)

I have never yet seen Asiatic or Australian specimens of this widely-diffused species with the peculiar and dense glandular setæ of this plant, which are indeed more thickly set than in *R. phenicolasius*, Maxim. ! It offers a direct transition to that species, to which, when I first saw the Chinkiang examples, I felt sure, without comparison, they were referable. They agree better, however, with *R. triphyllus*, in their more lacinate leaflets, with veins impressed above, less attenuate sepals, and deep purple petals. The terminal leaflet is wide and truncate at the base, as in *phenicolasius*, but this is also the case in North Chinese and Manchurian specimens of *triphyllus*. They certainly lead to a suspicion that, if *R. strigosus*, Mx., be indeed reducible to *R. Idæus*, Linn., *R. phenicolasius* may not unlikely prove to be an extreme form of *R. triphyllus*.

* On the nomenclature of this species, see Focke, 'Botographische Abhandlungen,' in 'Abhandl. d. Naturwiss. Ver. zu Bremen,' 4 Bd., 2 Heft, 170.

14. *Rosa microcarpa*, Lindl. Juxta Fuchau, Maio 1873, coll. filius Alfredus; circa Chinkiang, a. 1876, Stronach. Prof. Crépin, who has shown that my *R. amoyensis* is identical with this, remarks ('Prim. Monogr. Rosac.,' 3e fasc. 246):—"M. Hance, en le décrivant n'a pas même songé à le rapprocher du *R. microcarpa*, Lindl.; il l'a rangé dans la section des *Nobiles*." In reference to this observation, I may take leave to state that I make no pretension to have mastered the views of recent rhodologists, amongst whom M. Crépin holds so high a rank; nor, indeed, are the most renowned experts as yet sufficiently in accord, to enable an ordinary student to see his way very confidently in this difficult study. When I placed my supposed new plant amongst the *Nobiles*, I understood the group as defined by Koch ('Synops. Fl. Germ.,' ed. 3, i., 199), who distinguishes it by its ovaries being sessile within the calyx-tube, and who does not recognise the *Systyla* as a distinct section, but distributes them between his *Canina* and *Nobiles*. With this explanation, it will be found that *R. microcarpa* really belongs where I had stationed it, though the profounder studies of specialists have greatly modified the older classification of Roses.

15. *Saxifraga (Hirculus) serpillifolia*, Pursh, var. *Pallasiana*, Engl. In m. Siao Wu-tai-shan, Chinae bor. Jul. 1876, leg. Hancock.

This distinct variety, which differs from the typical form "viscositate foliorum, caule glandulis rarioribus obsito, floribus majoribus" (Trautv. Florul. Taimyr., Phanerog. 42), had only previously been met with, as an Asiatic plant, in Arctic Siberia, and doubtfully near Lake Baikal. It is placed by Torrey and Gray ('Flor. N. Amer.,' i. 566) in the section *Aizoonia*, and by Engler ('Monogr. d. Gatt. Saxifraga,' 209) in *Trachyphyllum*. Drs. Hooker and Thomson ('Journ. Linn. Soc.,' ii., 71) station its near allies, *S. perpusilla* and *S. Stella-aurea*, in *Hirculus*, which may, I think, well absorb all or nearly all the *Trachyphylla*: indeed, in his 'Index Criticus Spec. Gen. Saxifragæ,' Engler placed *S. serpillifolia* under *Trachyphyllum*, but the Himalayan species just mentioned under *Hirculus*. It is a very interesting addition to the Chinese Flora. Trautvetter's plate ('Imag. Pl. Ross.,' t. 31) is a very faithful one.

16. *PARNASSIA OREOPHILA*, *sp. nov.* Robusta, 10-pollicaris, radice fibrosa, foliis membranaceis radicalibus petiolo laminam paulo excedente fultis ovatis v. subcordatis obtusis caulino conformi sessili amplexante 7-nerviis subtus pallidis utrinque glandulis minutis ferrugineis consitis, calycis tubo campanulato 3-lineali lobis ovatis obtusis erectis æquilongo, petalis lobos calycinos subduplo superantibus ovalibus integerrimis 5-nerviis breviter unguiculatis 4 lin. longis, staminum petalis duplo breviorum filamentis complanato-subulatis, staminodiis staminibus dimidio brevioribus quadrato-oblongis apice crasse et parallele trilobis lobis ipsis glandulosis sed glandulas distinctas non gerentibus, ovario semi-infero staminodia vix superante stylo brevi crasso stigmata bina latiuscula gerente coronata. In monte Siao

Wu-tai-shan, Chinæ bor., Julio, 1876, leg. W. Hancock. (Herb. propr. n. 20125.)

Closely allied to *P. Larmanni*, Pall. ('Regel, Plantæ Radd.,' t. 7, ff. 6-9), but differs by its stronger habit, almost sessile petals, wider filaments, shape of the staminodes, and two stigmas. *P. subcaulis*, Kar. & Kir., placed under this species by Regel, is referred by Dr. Hooker ('Journ. Linn. Soc.,' ii., 82) to *P. ovata*, Led.

17. *Osbeckia stellata*, D. Don. In saxosis colliculi Kun-yamngam, secus fl. North River, prov. Cantonensis, m. Julio, 1864, detexit Sampson. Found hitherto only in Nipal, Assam, and the adjacent territories.

18. *Sonerila tenera*, R. Br. In prov. Cantonensi, ad fauces fl. North River, Tsing-yune dictas, prope cœnobium buddhisticum Fi-loi-tsz, substrato micaceo-schistoso, d. 20 Sept. 1866, legg. Sampson et Hance. An addition to the flora of China; British Burma, the Himalaya, and the mountains of Eastern Bengal being the only localities hitherto recorded. Royle is erroneously given as the authority for this species in Triana's monograph. His plate, however, is so unsatisfactory, representing the leaves as broadly ovate and very obtuse at both extremities, that it is not without reason quoted with a mark of doubt by Mr. Bennett. ('Pl. Jav. Rar,' 216.)

19. *Sarcopyramis lanceolata*, Wall. E rupibus mucosis ad basin cataractæ, Ting-ü-shan, secus fl. West River, prov. Cantonensis, specimen unicum floridum carpsit paucaque tantum deflorata vidit indefessus Sampson. This and the preceding are the only members of the tribe *Sonerilææ* hitherto found in China.

20. *Lagerstromia microcarpa*, Wight. In silvis, Ting-ü-shan, prov. Cantonensis, d. 15 Jun. 1869, coll. Sampson. A tree with whitish flowers. I have seen no Indian specimens, but Wight's plate ('Ic. Plant. Ind. Or.,' i. 109) is an excellent representation of the Chinese plant.

21. *Enothera fruticosa*, Linn. In sabulosis maritimis pæninsulæ Macaiensis, Chinæ australis, copiosam ac penitus efferatam ipse inveni, Junio 1864, Dec. 1866. I do not know how this plant, which I have never seen cultivated in China, got to the above locality, but it appears quite established, growing freely in the deep loose sand of the long, narrow, desert neck of land, washed on either side by the sea, which separates the Portuguese from the Chinese territory, along with *Ipomæa Pes-capræ*, *Sebastiania chamælea*, *Spinifex squarrosus*, &c. The Chinese specimens belong to the variety, *E. hirsuta*, Torr. & Gray, and the blossoms, when fully expanded, are nearly three inches across, and very showy.

22. *Spermacoce? philippensis*, Spr. In herbidis sabulosis ad viam inter portum Hoi-hau et metropolin Kieng-chau ins. Hai-nan, d. 19, Nov. 1866, leg. Sampson. A scrambling plant, drying of a greenish yellow, with the stem rooting at intervals at the nodes, its two opposite sides between the angles, changing alternately at each node, clothed with a dense line of yellow, jointed hairs; the leaves are ovate-elliptic, acute, 4-6 lines long, scabrous above and

more or less hairy beneath, the primary veins three on each side of the costa deeply impressed on the upper and prominent on the under surface; there are no stipular fimbriae, though the sheaths are hairy like the sides of the stem, but a subulate tooth; the flowers are in axillary clusters of about ten, white, and with exserted stamens; the capsule is roughish and two-seeded, but I have not succeeded in making out the mode of dehiscence. It is probably impossible to discover if this be really Sprengel's species, but except in the erect habit, perhaps wrongly ascribed to it, it agrees exactly with the brief diagnosis ('Dietr. Synops.,' pl. i., 476). I do not think it can be Loureiro's *S. flexuosa*. *S. scaberrima*, Bl., according to a Banka specimen in my herbarium, gathered by Teijsmann, is a near ally, but much robuster in habit, with the angles not the plane surfaces of the stem hairy, long stipular bristles, flowers twice as large, in depauperate clusters, &c.

23. MYRRHIS? *CHÆROPHYLLOIDES*, *sp. nov.* Caule angulato sulcato glabro, foliis bipinnatisectis segmentis superioribus exceptis pinnatifidis acutis margine subtusque ad nervos strigosus vaginis petiolaribus margine apiceque lanoso ciliatis, involucri nullo, umbellis 6-9 radiis, involuelli phyllis 5-6 oblongo-lanceolatis acutis ciliatis reflexis, umbellulis 6-10-floris floribus pluribus sterilibus, petalis albis obovatis, fructibus glaberrimis oblongis $2\frac{1}{2}$ lin. longis lateraliter compressis jugis obtuse prominulis, vittis nullis, stylopodiis conicis basi in marginem undulatum expansis. In ins. Silver Island, juxta Chinkiang, Maio 1863, coll. Hay; circa oppidum Chinkiang, a. 1876, iterum invenit Stronach. (Herb. prop. n. 10127.)

I have repeatedly examined the fruit of this, without being able to detect any trace of vittæ; and hence, though in aspect and the slightly prominent juga it agrees better with *Charophyllum*, it seems technically to fall into the genus *Myrrhis*.

24. *Conyza aegyptiaca*, Ait. Ad muros urbis Amoy, ipse legi, m. Octobri, 1857. Quite like G. Thomson's Madras and Pinard's Egyptian specimens. It is curious that this plant is not recorded from any part of India (Clarke, 'Compos. Ind.'), or Western Asia (Boissier, 'Fl. Orient.')

25. *Gnaphalium anoyense*, Hance. Secus fl. Lien-chau, prov. Cantonensis, 100 mill. pass. ab ostio, Octobri 1876, coll. Rev. J. C. Nevin. Only known previously from Amoy.

26. CHRYSANTHEMUM (*Pyrethrum*) OREASTRUM, *sp. nov.* Herbaceum, perenne, tripollicare, laxè pilosum, foliis carnosulis 4-7 lin. longis $\frac{1}{2}$ - $\frac{3}{4}$ lin. latis radicalibus confertis linearibus apice trisectis segmentis linearibus iterum trisectis setaceo-mucronatis caulinis linearibus margine hinc inde denticulatis apice simpliciter trisectis summis linearibus indivisis margine apiceque fusco-membranaceis, floribus terminalibus solitariis, involucri squamis subscariosis lineari-oblongis obtusis pallidis extus cum caulis apice dense albo-tomentosis margine lato membranaceo glaberrimo ferrugineo sublacero cinctis, ligulis oblongis albidis (?) involucri duplo superantibus. In monte Siao Wu-tai-shan, Chinæ bor., m. Julio 1876, coll. Hancock. (Herb. prop. n. 20132.)

I have not been able, from the only two specimens in my

possession, which bear each a single flower, to ascertain the structure of the florets and achenes of this pretty plant, but I suspect it may be most nearly allied to the very rare and local *Pyrethrum Kirilowii*, Turcz., on which Schultz Bipontinus, following a suggestion of DeCandolle, founded his genus *Tridactylina*. DeCandolle describes that plant as having "habitus *C. Myconis*; folia multo majora quam *Saxifragæ tridactylitis*, sed forma affinia;" and F. v. Herder ('Plant. Radd.,' bd. 3, hft. 2, 40) remarks on its resemblance to *C. arcticum*, Linn. The leaves of Turczaninow's species are moreover described as obovate-cuneate, its ligulæ as yellow, and there is no mention of the very hairy involucre-scales, so it seems impossible to refer Mr. Hancock's plant to it. It is quite different from any Siberian species known to me.

27. *Artemisia (Abrotanum) vestita*, Wall. Supra pagum Tai-wan, secus fl. Lien-chau, prov. Cantonensis, Oct. 1876, leg. Rev. J. C. Nevin. Previously gathered in Shan-tung by the late Dr. Maingay, and at Kiu-kiang by Dr. Shearer; otherwise new to China.

28. *Saussurea alpina*, DC., var. *leucophylla*, Led.? In m. Siao Wu-tai-shan, Chinæ bor., Julio 1876, coll. Hancock. I think referable to this form, but I have seen no authentic specimens.

29. *SAUSSUREA (bracteata*) IODOSTEGIA, sp. nov.* Caule simpliciter inferne glabro apicem versus laxè villosulo, foliis inferioribus? mediis linearibus acutis margine denticulis parvis patentibus notatis sparsim pilosulis basi vaginantibus ac breviter decurrentibus 2½—5 poll. longis 3 lin. latis superioribus ovato-lanceolatis summisque ellipticis cucullatis submembranaceis bracteiformibus integris plus minus violaceo-tinctis venisque purpurascentibus reticulatis, capitulis 4 pedunculis brevibus villosis suffultis ovato-oblongis 7 lin. longis, squamis laxè glanduloso-pilosulis exterioribus ovatis interioribus ovato-lanceolatis obtusiusculis medio purpureo-pictis margine atro-purpureo cinctis. In m. Siao Wu-tai-shan, Chinæ septentrionalis, m. Julio 1876, legit W. Hancock. (Herb. propr. n. 20148.)

I have only a single imperfect specimen, but the plant is evidently a near ally of the Himalayan *S. obvallata*, Wall.

30. *Lobelia radicans*, Thbg. Ad ripas limosas fluviorum North et West Rivers, prov. Cantonensis, copiose. Quite identical with Japanese specimens. Though not before recorded from China, I have no doubt, judging from the characters assigned them, that several of A. DeCandolle's species are reducible to this.

31. *Rhododendron (Azalea) sinense*, Sweet. In insula Túng-dúng-ding-san, lacus Tai-hu, prov. Che-kiang, exeunte Aprili 1874, coll. T. B. Forbes. Excellent specimens of a plant very rare in a wild state.

32. *Pyrola (Thelaia) rotundifolia*, Lindl. In m. Siao Wu-tai-shan, Chinæ bor., Jul. 1876, coll. W. Hancock. Both the forms, *albiflora* and *incarnata*, which are surely not deserving of the rank of varieties.

* C. B. Clarke, 'Compositæ Indicæ,' 220.

33. *Moneses grandiflora*, Salisb. Cum præcedente. This is the first time the plant has been found in any part of the Chinese Empire. "Asiæ borealis" should be added to the geographical distribution in the 'Genera.'

34. *Ligustrum Ibot*, S. & Z. Circa Chi-fu, a. 1873, coll. C. C. Stuhlmann. Precisely like Japanese specimens from M. Maximowicz. New to the Chinese flora.

35. *Vincetoxicum mongolicum*, β . *Hancockianum*, Maxim.? In m. Siao Wu-tai-shan, coll. Hancock. My specimens, apparently referable to this, are only in fruit, and differ from Maximowicz's description by the stem being entirely smooth, except at the extreme apex; the leaves quite smooth beneath, but with a few scattered short hairs above along the midrib, and with two or three small raised papillose reddish glands on the upper surface of the blade at its junction with the petiole; the light-brown compressed seed I find nerveless, narrowly margined, 7 mill. long by $\frac{1}{4}$ wide, with a shining white coma only 11 mill. long.

36. *Vincetoxicum amplexicaule*, S. & Z. Chi-fu, a. 1873, coll. C. C. Stuhlmann.

M. Maximowicz remarks that *V. acuminatum*, Dene., though very like *V. japonicum*, Morr. & Dene., is readily distinguishable by its pure white corolla double as large, and by the form of its leaves. In a specimen of the former, gathered at Vlada Vostok by M. Sokoloff, a Russian naval officer, and given me by Dr. Bretschneider, the flowers are sometimes very slightly, sometimes not at all larger than in an authentic specimen of *V. japonicum*, γ . *purpurascens*, received from M. Maximowicz himself, and the leaves all wider above the middle than below, in fact, elliptic-oblong. As, too, the colour of the flowers varies a good deal in the latter plant, I do not think *V. acuminatum* has any claim to specific distinction.

37. *Cynanchum deltoideum*, Hance. Ad sinum Ta-lien-wan, Manchuriæ, coll. Swinhoe. M. Maximowicz has recently ('Mél. Biolog. Bull. Acad. St. Pétersb.,' ix., 803), arriving at the decision from my description only, without knowing the plant, referred this as a synonym to *C. pubescens*, Bge. I marvel at this, for, as he justly observes, Bunge's species has "folia nunquam alia quam cordata," whereas I had expressly stated those of mine to be "basi lata insigniter truncata." I possess, indeed, no authentic specimen of *C. pubescens*, but Dr. Wells Williams sent me, from Peking, what I cannot doubt for a moment to be Bunge's plant, and it differs from mine, not only in the very different shape of the leaves, but in inflorescence and the floral organs.

38. *Ehretia ovalifolia*, Wight. In ora septentrionali ins. Hainan, prope oppidum Hoi-hau, d. 19 Nov. 1866, leg. Sampson. I have seen no authentic specimens, but this agrees well with Dr. Wight's diagnosis and figure ('Icones,' t. 1383). The veins form a prominent reticulation beneath, the primary ones have barbellate axils, and the petioles are ciliate on each side of the upper margin with white hairs arising from brown glandular tubercles.

39. *Ehretia burcifolia*, Roxb. In collibus demissis, solo arenoso, circa pagum piscatorium Pak-shá, extremitate meridionali prov. Kwang-tung, ipse legi, d. 20 Nov., 1866.

40. *Lindenbergia urticifolia*, Lehm. Secus fl. Lien-chan, prov. Cantonensis, ultra Tai-wan, 65 m. p. ab ejus ostio, m. Octobri 1876, coll. Rev. J. C. Nevin. Not found before in China.

41. *Lindenbergia macrostachya*, Benth. In mœnibus urbis Cantonis, ipse primum legi, m. Octobri, 1860; in spelunca porphyritica ad Sai-chü-shan inter pulverem et frustula rupium dilapsarum invenit Sampson, Apr. 1866. Recorded only from various parts of India, Burma, and the Philippines.

42. *Veronica* (*Pseudolysimachia*) *sibirica*, Linn. In m. Siao Wu-tai-shan, Chinæ septentrionariæ, Jul. 1876, coll. Hancock. Not hitherto found in China Proper.

43. *Premna japonica*, Miq. In montibus juxta Ningpo, æstate 1872, coll. R. Swinhoe. Only found previously in Japan, specimens from which country are in every respect identical.

44. *Ajuga* (*Bugula*) *lupulina*, Maxim. In monte Siao Wu-tai-shan legit Hancock. My specimen of this fine and remarkable plant differs from Maximowicz's diagnosis in having the lower leaves only petiolate, the others sessile, and all oblong and quite obtuse; very different in texture and shape from the floral ones.

45. *Salicornia* (*Arthrocnemum*) *indica*, Willd. In sabulosis maritimis ad Hoi-tau, ora occidua ins. Hai-nan, maris chinensis, m. Januario 1866, coll. F. Fagg.

46. *Burmanniæ celestis*, Don. In humidis circa Cantonem, Oct.-Nov. florentum, a. 1865, primus detexit Sampson. Found hitherto only, if I do not err, in Nipal and Silhet, unless Blume's Malayan *B. javanica* be the same. The Canton specimens are exceedingly fine and well developed.

47. *Hypoxis aurea*, Lour. In summis montibus Pak-wan, supra Cantonem, copiose crescentem, primus decerpit Sampson, d. 6 Apr. 1870. Notwithstanding Miquel's doubts, the distribution, from the mountains of Kashmir through Cochinchina and Southern China to Japan, leaves no doubt of the identity of Don's *H. minor* with Loureiro's species.

48. *Aponogeton monostachyos*, Linn. fil. In stagno extra Cantonem, d. 22 Aprilis 1869, detexit cl. Sampson. I do not think this genus can be separated from *Naiadaceæ*, and, indeed, it is no doubt nearly allied to *Potamogeton*. Lindley placed both genera in *Juncaginaceæ*, but his ordinal character distinctly excludes *Aponogeton*. The ovules are frequently as many as ten to twelve in each ovary, inserted one above another along the ventral suture, and not basal, as figured by Agardh. ('Theor. Syst. Plant.,' t. 3, f. 10.) The *Spathium* of Loureiro, supposed by Endlicher to be identical with this species, has been shown by Decaisne to be a genuine *Saururus*.

49. *Juncus* HANCOCKII, sp. nov. Glaberrimus, radice fibrosa, culmo compresso striatulo 9-pollicari, foliis ad basin culmi tribus anguste linearibus arcte complicatis apice obtuso sphacelatis 2-2½ poll. longis vaginis latiuscule membranaceo-marginatis supremo

infra capitulum idque vix adæquante lamina brevissima subulata terminato, capitulo 4-6-floro bracteis 3-4 badiis late ovatis eo duplo brevioribus suffulto, floribus sessilibus, sepalis ovato-lanceolatis obtusiusculis tenuiter membranaceis nervo tenui viridulo interioribus paulo brevioribus, staminum 6 sepala paulo superantium filamentis quam antheras 3-4-plo longioribus, capsula ovoidea obtusa badia lucida sepalis staminibusque longiori styli trifidi basi persistente apiculata. In monte Saio Wu-tai-shan, Chinæ borealis, m. Julio 1876, coll. cl. Hancock. (Herb. propr. n. 20118.)

Allied to *J. leucomelas*, Royle, &c.

50. *Carex macrocephala*, Willd. In ins Pu-toi, ditionis Ning-poensis, a. 1873, legit C. Alabaster. Not previously, to my knowledge, collected in China.

51. *Fimbristylis polytrichoides*, Nees. Prope urbem Amoy leg. C. de Grijs.

52. *Fimbristylis dichotoma*, Vahl. Secus fl. West River, prov. Cantonensis, Junio 1865, leg. Sampson. This is the same as Nees' *F. pallescens*, admitted as a species by Thwaites, by Hooker and Thomson, and others, but on what grounds I confess myself unable to understand. I have made a careful microscopic examination of Indian, Ceylon, Chinese, Egyptian, Canarian, and Italian specimens, and I cannot detect the shade of a difference.

53. *Fimbristylis retusa*, Thw. In arenoso-graminosis ins. Danorum, Whampoæ, comite *F. gracilentata*, mihi, ipse decerpsi, initio Augusti 1866. Only previously known from Ceylon.

54. *Fimbristylis fulvescens*, Thw. In sub-paludosis agri Cantonensis, æst. 1866, coll. Sampson. Only found previously in Ceylon.

55. *Scirpus (Isolepis) trifidus*, Nees. Ad cacumina montium Pak-wan, supra Cantonem, Aug. 1866, coll. Sampson. Identical with Kashmir and Ceylon specimens; but, though admitted as a species by Drs. Hooker and Thwaites, apparently hardly separable from the North American *S. capillaris*, Linn.

56. *Scirpus timoriensis*, Kth. In scaturiginosis secus fl. Lien-chau, prov. Cantonensis, Oct. 1876, leg. Rev. J. C. Nevin. This, which is certainly quite distinct specifically from *S. mucronatus*, Linn., and its immediate allies, agrees in all respects with Kunth's diagnosis.

57. *Eleocharis chetaria*, R. & S. In vervactis udis prope Kam-chak, secus fl. West River, prov. Canton, m. Febr. 1867, leg. Sampson.

58. *Cyperus eleusinoides*, Kth. In rudertis, Cantone, vere 1876, coll. Rev. J. C. Nevin. New to the Chinese flora. I am indebted to Professor Oliver for the determination. Mr. Kurz named it for me *C. infraapicalis*, N. ab E., a name I cannot find in print; but I have not access to Kornicke's papers on the genus.

59. *Cyperus racemosus*, Retz.? In agris humidis juxta Puntong ditionis Cantonensis, Oct. 1869, coll. Sampson. The Chinese plant, which is very closely allied to *C. exaltatus*, Retz.! is identical with a Bengal one of Griffith's, and an Assam one of Jenkins's, the latter sent me by Dr. G. King, under the name of *C. alope-*

curoides, Rottb. A specimen which I possess labelled *C. alopecuroides*, and gathered by Despréaux in the Grand Canary, is, however, quite different, and very much like the Egyptian *C. dives*, Del.

60. *Cyperus procerus*, Roth. In fossis circa Cantonem, d. 21 Nov. 1869, coll. Sampson. Glumes of a brighter, less rubicund and more orange tint than in Ceylon specimens, but I can detect no other difference.

61. *Cyperus radiatus*, Vahl. ? Ipse legi, Whampoæ, Augusto, 1860, et cum præcedente invenit Sampson. Very close to the Canarian plant I have as *C. alopecuroides*.

62. *Panicum (Urochloa) semialatum*, R. Br. In montibus Pak-wan, alibique juxta Cantonem, non rarum.

63. *Garnotia adscendens*, Munro. Infra aquam desilentem, Ting-ü-shan, prov. Cantonensis, d. 31 Oct., 1867, coll. Sampson. The specimens seem quite identical with those from Khasia distributed by Drs. Hooker and Thomson.

64. *Manisuris granularis*, Sw. In collibus arenoso-psammiticis ins. Danorum, Whampoæ, detexit filius Alfredus, d. 6 Aug. 1870. Recorded by Kunth, on whose authority I do not know, as a native of China; but not to my knowledge collected there by any botanist during the present century.

65. *Cryptogramma gracilis*, Torr. (= *Pteris Stelleri*, Gmel.) In m. Siao Wu-tai-shan, Chinæ borealis, Jul. 1876, leg. W. Hancock. Precisely like Canadian specimens, and more robust and better developed than Turczaninow's, gathered at the River Oka, in Siberia, which resemble Trautvetter's figure ('Imag. Pl. Ross.,' t. 5.) Though, contrary to Milde's decision, I think this most likely specifically distinct from *C. crispa*, it certainly cannot, in any arrangement claiming to be natural, be placed in another genus, as is done by Sir W. Hooker, Mr. Baker, and Professor Eaton. The first-named writer, whilst remarking that the American fern is rather a *Pellæa* than a *Cryptogramma*, yet referred the Siberian specimens to *C. crispa*, R. Br. An addition to the Chinese flora.

66. *Asplenium heterocarpum*, Wall. Ad ripas torrentium, prope cœnobium buddhicum Fi-loi-taz, secus amnem North River prov. Cantonensis, d. 27 Julii 1864, primus in China detexit Sampson.

67. *Asplenium normale*, Don. In fissuris aridis rupium, ad cacumina montium Pak-wan, prope Cantonem; ad fauces Tsing-yün-hap, necnon in aliis locis provinciæ Cantonensis.

68. *Aspidium crenatum*, Willd. (= *Nephrodium odoratum*, Baker.) In rupe calcarea Kai-kun-shek, secus fl. West River, prov. Cantonensis, m. Junio 1864, primus detexit Sampson.

69. *Aspidium amabile*, Bl. Prope pagum Sung-tong, adversus ins. Hongkong, a. 1856, leg. b. Dr. Harland; necnon in aliis locis Chinæ australis, sed non vulgo, occurrit. I mention this fern because, though it is included in my 'Supplement to the Flora Hongkongensis,' Mr. Baker has, by some oversight ('Journ. Bot.,' xiii., 200), stated Dr. Shearer, who met with it near Kiu-kiang, to have been its first discoverer in China. Dr. Harland's specimens

were erroneously referred by the late Sir W. Hooker to *A. drepanum*, Sw., and described by me ('Ann. Sc. Nat.,' 4e sér., xviii., 235) as a new species, under the name of *A. controversum*. But I subsequently ('Ann. Sc. Nat.,' 5e sér., v., 259) corrected my mistake, and indicated the correct designation.

70. *Aspidium syrmaticum*, Willd. In silvis, Ting-ü-shan, prov. Cantonensis, coll. Sampson.

NOTES ON RUBI.

(No II.)

BY CHARLES C. BABINGTON, F.R.S., &c.

(Continued from p. 87).

4. *RUBUS SALTERI*, Bab.—There continues to be some difficulty about the two plants which I have combined under this name, and Mr. Bloxam has not lessened it by the specimens which he recently issued in his 'Set.' I find in that collection two specimens, named respectively *R. calvatus* and *R. sylvaticus*. In my opinion the latter specimen does not represent the plants formerly named *R. sylvaticus* by Bloxam in his 'Fasciculus,' and included by me under that name in my 'Synopsis,' and which is now called *R. mucronulatus*; nor that so named by him in Kirby's 'Flora of Leicester,' and by me as also a part of the *R. sylvaticus*, in the 'Synopsis,' which is *R. villicaulis*; nor with the *R. sylvaticus* of the 'Rubi Germanici.' Apparently the specimens now issued as *R. calvatus* and *R. sylvaticus* both belong to the former.

The synonyms of Boreau and Genevier, quoted in my 'Rubi,' must be erased. M. Genevier named a plant (gathered by Mr. Baker at Thirsk, in 1864) *R. piletostachys*; but it has an aciculate and aculeate calyx which Genevier markedly states not to be the case in his plant. The specimen from Thirsk seems to agree better with the *R. atrocaulis*, Müll., as described in 'Genev. Rubi Loire;' but then the similarly-named specimen in 'Wirtg. Herb. Rub.,' (ed. 1, fasc. i., no. 143) is not at all like our plant. The plant of Billot ('Fl. Gall. exsic.,' 2667) closely resembles our *R. calvatus*, but, as Genevier justly remarks, is totally devoid of setæ, although in other respects it accords fairly with our plant. Genevier says (l.c., p. 165), that it is *R. mentitus*, Müll., not the *R. piletostachys* of Gren. and Godr. Other continental specimens from M. Boulay, &c., do not accord with our plant, nor, as I think, with that of Genevier. Focke quotes the *R. piletostachys* of Müller and Genevier as certainly that of the 'Flore de France,' and places the plant next to *R. Schlechtendalii*.

5. *R. VILICAULIS*, W. & N. Mr. Bloxam has issued the flowering shoot of a plant with the name of *R. villicaulis* v. *derasus*, which, as far as I can judge from such imperfect materials, is the same as specimens I received from him in the year 1866 as *R. Bakeri* (Blox. MS.), and referred to the form of *R. villicaulis*,

called *derasus* in my 'Rubi' (p. 145). I still think so. It seems to be the *R. vulgaris* of Lindley's first edition of his 'Synopsis.'

I also possess another specimen bearing a MS. name conferred by Mr. Bloxam,—*R. Warrenii*,—which was gathered by Mr. F. M. Webb on Knutsford Heath, in Cheshire, and given to me by Mr. James Bagnall. Mr. Bloxam spoke doubtfully of it to the latter in 1870, and my correspondent adds: "My friend, Mr. Webb, tells me that Mr. Bloxam refers it to the *Bellardiani*. To me it does not appear to belong to that group, but to the *Sylvatici*." I fully concur with my excellent correspondent in this latter opinion. I gathered what is apparently *R. Warrenii* at Douglas, in the Isle of Man.

Both of these plants seem to belong to the original *R. vulgaris* of Lindley (not of 'Rubi Germ.'). *R. Warrenii* is the more prickly form, although it has very few setæ on the barren stem; but one of the specimens named by Lindley is not much less prickly. Also, the specimens called *R. Bakeri* by Bloxam, in 1866, with the appended remark, "It is a glandulose *Rubus*," have few prickles and scarcely a seta, but plenty of sessile glands on the barren stems. In the present state of our knowledge I think that we must include all these under the *R. villicaulis* β . *adscitus*, the β . *derasus* of my 'Rubi.'

I have said *R. villicaulis* β . *adscitus*, because it seems almost if not quite certain that I was mistaken in considering these or any of them as the *R. derasus*, Müll.; but unfortunately I have not now the authenticated specimens quoted in my 'Rubi' within my reach. Mr. Briggs, who has seen those same specimens, considers them to be different from any form of *R. villicaulis*, and Mr. Warren says (Journ. of Bot., ix., 367) that *R. derasus* is near *R. Bellardi*. My *R. villicaulis* β . *derasus* ought, therefore, to take the name of β . *adscitus* as being almost certainly the *R. adscitus*, Genev. Mr. Briggs has written fully about *R. adscitus* in this Journal (ix., 366).

6. *R. mucronulatus*, Bor. Both *R. leucanthemus* and *R. amphichloros* of Müller are referred to *R. mucronulatus* in my 'Rubi' on the authority of specimens named by Genevier. I now think that this is an error. Genevier places *R. leucanthemus* next to *R. vestitus* in his 'Ronces Loire,' and points out that the former differs from the latter by having white flowers and stamens and green styles. I find white stamens and green styles on some, at least, of my *R. vestitus*. Focke places *R. leucanthemus* as a synonym of *R. vestitus* ('Syn. Rub.', 291).

Genevier puts *R. amphichloros* very near to our aggregate species, *R. macrophyllus*, in its form called *R. umbrosus* by us. It is placed under *R. vulgaris* by Boreau, which shows that his opinion was very nearly if not exactly the same as that of Genevier. The specimens issued by Boulay (no. 10) are not precisely the same as ours. But I think that the plants may fairly be placed together. Such was the opinion of Genevier when Mr. Baker's specimens from Langley Lead Mine were submitted to him for determination.

Mr. Warren mentions in this Journal (vii., 359), but does not

describe, a plant which he states to be prevalent in some parts of Cheshire, and calls *R. festivus*, Wirtg. I have now had the loan for a short time of two specimens from Yorkshire which he authenticated as his *R. festivus*. Apparently there is no notice of this plant as a British native since that given by Mr. Warren in 1869, nor until now (October, 1877) have any specimens of it passed through my hands. These belong, and are returned to, Dr. F. A. Lees. They were gathered, I believe, near Sheffield. But I received what is probably the same plant from Mr. Edwin Lees many years since as a form of *R. Güntheri*. He found it in Harts-hill Wood, Warwickshire.

I think that Mr. Warren is correct in considering the specimens from Yorkshire to be *R. festivus*, Müll. & Wirtg. Foreign examples are in 'Wirtg. Herb. Rub.' (ed. 1, fasc. v., no. 138; fasc. vi., nos. 176, 177; and ed. 2, fasc. ii., no. 67). The following character of it as a species will be found on the tickets of nos. 138 and 67: "Caule arcuato subtereto piloso sparsim glanduloso [*i.e.*, setoso] et aciculato, aculeis brevibus subæqualibus reclinatis, foliis quinatis et ternatis obovatis simpliciter grosse dentatis supra glabris subtus pauce pilosis, panicula longa subflexosa foliosa ramosa, ramis 3-5-floris, calycibus reflexis, sepalis longe acuminatis, petalis rosaceis ovatis." It will be seen that this description says, "foliis . . . simpliciter grosse dentatis," but that character is not found on the accompanying specimens, which I should describe as having "foliis minute subduplicato dentatis." But perhaps the authors had in view the leaves of the flowering shoot to which their character is more applicable, although even there I find a double dentition. Focke ('Syn.,' 314) says of the leaves: "inæqualiter argute serrata." One of the Yorkshire specimens is rather coarsely dentate, but the other is minutely and doubly dentate, and very finely and elegantly so edged.

Mr. Warren seems to consider this plant as one of the *Glandulosi*. I have placed it with the *Spectabiles*; for Mr. E. Lees's plant chiefly differs from *R. mucronulatus* by having doubly dentate and thinner leaves, probably caused by growing in shade. Some of my specimens from Hartshill Wood, for which I am indebted to Mr. Bloxam, and which he called the *R. sylvaticus* of Leighton's 'Fasciculus,' are very nearly the typical *R. mucronulatus*; whilst Mr. Lees's specimens, to which the same name is quoted, are very nearly the same as those called *R. festivus* by Warren, and approach those published as *R. festivus* by Wirtgen.

On the whole, my impression is that we are fully justified in placing the British *R. festivus* under *R. mucronulatus*.

7. *R. RUBICOLOR*, Blor. This is placed as synonymous with *R. Sprengelii* in the 'Student's Flora.' Before doing so, I presume that Mr. Baker had seen better specimens of it than the flowering shoot which alone I find in my copy of Mr. Bloxam's recently-issued 'Set.' Genevier (l. c., 196) appears to have seen only very imperfect specimens. He places it close to our *R. Sprengelii*, which he combines with *R. nemocharis*, Müll. I have not seen the barren

stem of Mr. Bloxam's plant, but think that the *R. erubescens*, Wirtg. may be the same; for our plant seems to accord with no. 92 of his collection (ed. 1), although not with no. 32 of his Ed. 2. Yet these numbers are considered as belonging to the same species both by Wirtgen and Focke. I find it quite impossible to form a satisfactory opinion of the plant without seeing better specimens from Atherstone. A specimen gathered by Mr. Bagnall at Man-cetter, in Warwickshire, is not sufficient for determining the true place of the plant,—indeed is hardly the same as that of Bloxam, but rather one of the *Koehleriani*, although gathered at the "exact spot pointed out by Mr. Bloxam."

(To be continued.)

THE CRYPTOGAMIC FLORA OF KENT.

By E. M. HOLMES, F. L. S.

(Continued from p. 54*.)

LICHENS.

Fam. *Collemaeci*.

THE *Collemaeci* present few good distinctive characters, and many of them appear to have such numerous forms, that great difficulty has been experienced in identifying the specimens collected.

In compiling this portion of the Lichens it has been deemed advisable to follow the arrangement of the Rev. J. M. Crombie,† who has paid more attention to this group, perhaps, than any living British botanist.

Several species beside those here enumerated may be expected to occur in Kent, especially in damp chalk-pits or on sand-hills near the sea, or on the greensand rocks; among these may be mentioned *Leptogium palmatum*, which is usually found amongst grass, on shelly sand near the sea, and sometimes in hedgebanks or by roadsides in hilly districts; *L. tremelloides*, in damp lanes near the sea, easily recognised by its thin texture and leaden colour when dry; *Collema aggregatum*, on old trees; *C. melanum* and *C. chalazanum*, on mossy limestone walls; and *C. auriculatum*, in chalk-pits or on mud-capped walls, on a limestone soil. The *Nostochineæ* should perhaps be classed with these Lichens, since they are probably only phases in the life-history of various species of *Collema* and *Leptogium*. Until, however, they have all been identified with different species of these genera, as *N. vesicarium*‡ and

* On p. 44 I omitted to state that the directions given for examining *Hepaticæ* are quoted from Carrington's 'Irish Cryptogams,' as was also Dr. Gottsche's statement concerning *J. ventricosa* on p. 52.

† 'Journ. Bot.,' 1874, pp. 330—337.

‡ 'Botanische Zeitung,' 1855, p. 1.

*N. commune** have been with *Collema pulposum*, it will be necessary to treat them as Algæ.

Tribe—*Collemei*.

COLLEMOPSIS SCHERERII, Mass. *Pyrenopsis Schærerii*, Mass. (Leighton Lichen Flora.)

On detached pieces of chalk in shaded damp places; probably not unfrequent.

Boxley Hill, near Maidstone; on stones in a chalk-quarry near Kemsing.

C. DIFFUNDENS, Nyl. *Pyrenopsis diffundens*, Nyl. (Leighton Lich. Fl.)
On greensand rocks; rare.

Maidstone; *Admiral Jones*, 1865.

Unfortunately the specimen collected by Admiral Jones is not in this country, so that a more exact locality cannot be given. It is, however, likely to occur in Fant Woods near Maidstone, although I have hitherto been unable to detect it here.

[*Collemopsis Flotowiana*, Hepp., should be looked for in Kent. In Surrey it occurs together with *C. Schærerii*, from which it may be known by its redder and more distinct apothecia.]

COLLEMA FURVUM, Ach.

On limestone walls; rare.

On a bridge between Staplehurst and Boughton Monchelsea, sparingly, and without apothecia; on walls near Lympe.

C. PULPOSUM, Ach.

On damp clayey banks; common.

Tunbridge Wells, *Mr. Borrer*; *Leighton Lich. Fl.* Near Keston Common; Wrotham; Wye; Folkestone; Sandwich; Shoreham.

Var. *C. ceranoides*, Borrer. On chalky banks.

On a chalky bank near High Elms, Chelsfield. The plant gathered in this locality occurred in small isolated compact tufts, and corresponded exactly with a specimen given to me by Dr. Ralfs, to whom it was sent by Mr. Borrer.

It may be here remarked that I have more than once found near Shoreham a specimen of this species in which half the thallus had the firm consistency of the *Collema*, and the other half the gelatinous character and shape of *Nostoc commune*.

C. LIMOSUM, Ach.

On damp ground in quarries and amongst grass; not common.

On a grassy spot by the roadside near Chelsfield.

Appears to be only a state of *C. pulposum*, with the thallus scarcely developed.

C. CRISPUM, Ach.

On walls in damp shady lanes; frequent.

Abundant near Westerham; Chelsfield.

* 'Bulletin de la Société des Sciences Naturelles St. Petersburg,' vol. xii. p. 418.

C. CHEILEUM, *Ach.*

On walls and limestone banks, frequent.

Postling; Maidstone; Wrotham; Boughton Monchelsea; Seven-oaks; Brasted.

Appears to me to be only a variety of *C. crispum*, *Ach.*

C. NIGRESCENS, *Ach.*

On exposed trunks of trees in damp places.

On a willow tree near Penshurst; Beechborough, abundantly; with apothecia, near Halstead.

C. BIATORINUM, *Nyl.*

On mud-capped walls and on rubble-heaps in chalk-pits.

Maidstone; *Admiral Jones*, 1866. In a small chalk-pit near Selling.

Easily recognised by its granular minute thallus, usually of a brownish colour, and biatorine apothecia.

LEPTOGIUM CRETACEUM, *Sm.*

On chalk-stones in damp places, amongst bushes; rare.

On the Undercliff near Folkestone, abundantly, Dec. 1876.

The best guide to this species is the rosulate thallus and the cells containing generally simple granula gonima, furnished with one or rarely two nucleola. *L. subtile* has usually two or more granula gonima in each cell.

L. LACERUM, *Ach.* *Collema lacerum*. (Jenner Fl. Tunbr.)

Amongst moss on damp banks; not unfrequent.

Hungershall Rocks; *Jenner Fl. Tunbr.* Eynesford; Wrotham; Ightham; Folkestone.

L. SUBTILE, *Schrad.* *Collema subtile*. (Jenner Fl. Tunbr.)

On damp earth on grassy banks in shady lanes. Winter and early spring.

In the lane leading from Rusthall Common to the High Rocks; *Jenner Fl. Tunbr.* Near Halstead; between Hadlow and Dunk's Green; Hythe.

L. SINUATUM (*Huds.*)

On damp, chalky, or limestone soil amongst mosses; frequent.

Wye; between Deal and Sandwich, with abundant apothecia.

A form of this plant, approaching to *L. palmatum*, *Huds.*, occurs near Sandwich, on the sand-hills.

L. FRAGRANS (*Sm.*)

On the thick bark of old trees; rare.

Kent, *Mr. Borrer*; *Leighton Lich. Fl.*

A specimen received from Rev. A. Bloxam, gathered on trees near Folkestone, and labelled *Collema microphyllum*, appears referable to this species.

L. PLICATILE, *Cromb.* *Collema plicatile*, *Ach.* (*Leighton Lich. Fl.*)

On limestone walls, not unfrequent; the apothecia rather rare.

On a wall near Boxley Hill, Maidstone, with apothecia; Boughton Monchelsea; near Fant Woods and Barming, near Maidstone.

A very well-marked species. Easily known from *C. pulposum*, when moist, by the difficulty of removing a perfect tuft, as it breaks up into a number of pieces; when dry its angular lobes and reticulated surface serve to distinguish it.

L. TURGIDUM (*Ach.*)

On old mossy walls, and in chalk-quarries; frequent.

Walls near Maidstone; Wrotham; Westerham; Postling; Newington, near Sandgate, sparingly.

A form of this plant, like *Collema confertum*, with closely-packed apothecia, occurs on a flint wall between Chelsfield and Down.

L. SCHRADERI (*Bernh.*)

On mud-capped limestone walls, amongst mosses, and on rubble-heaps in chalk-quarries; frequent. The apothecia are rare.

Near Chelsfield; Wrotham; Shoreham; Folkestone; near Otford, with a few apothecia (January.)

In the sterile state this may be known from *L. turgidum* by the thalline lobes being dilated upwards so as to be somewhat wedge-shaped in outline, and when fertile by the apothecia being lateral instead of terminal, as in *L. turgidum*.

L. MICROSCOPICUM, *Nyl.*

On chalk stones or greensand rocks; rather rare.

Fant Woods, near Maidstone; sterile.

Differs from *L. cretaceum* in its more erect habit and denser mode of growth, and from *L. subtile* in the lobes of the thallus being more cylindrical and less broad.

PYRENIDIUM ACTINELLUM, *Nyl.*

On chalk; very rare.

Boxley Hill; *Admiral Jones*, 1865.

I have repeatedly searched this locality in vain for this Lichen. *Admiral Jones'* specimen in the British Museum has no apothecia upon it.

(*To be continued.*)

SHORT NOTES.

CHARA CONNIVENS, "*Salzm.*" A. Braun.—There is a plant in the Kew Herbarium, labelled "in fresh water ditches at Stokes Bay, Gosport, Rev. W. S. Bayton, 1828," which apparently belongs to this species; the specimen being small and imperfect, renders it difficult to determine satisfactorily. It closely resembles one of Kralik's Tunisian specimens (no. 344 *bis*), and, like it, differs from the typical form, in having rather shorter nucules and slightly longer bracts. This species should be looked for in the southern counties. It may be roughly distinguished from *C. fragifera*, its nearest ally, by its incurved branchlets and brittle character; from *C. aspera* and *C. galioides*, by the total absence of spines; and from *C. fragilis*, by being diœcious.—H. & J. GROVES.

ROSA SEPIUM, *Thuill.*—As the recorded occurrence of this species in Surrey rests on a single bush found by Mr. Baker at Hindhead, I think it may be worth while to state that I found it in large quantity on the Hog's Back, near Puttenham, last autumn.—
H. GROVES.

Notices of Books and Memoirs.

Die Schutzmittel der Pflanzen gegen Thiere und Wetterungunst und die Frage vom salzfreien Urmeer. (The means by which plants are protected against animals and unfavourable weather, and the question of the primitive freshwater sea.) Von OTTO KUNTZE. Leipzig, Arthur Felix. 1877.

THERE are two kinds of botanical traveller, differing from each other as much as it is possible to conceive: the one kind consists of those who content themselves with amassing specimens without paying attention to life-history; the other is of a very different complexion, and includes such men as Griffith, Robert Brown, and the author of that charming book 'The Naturalist in Nicaragua.' It is an example of the work of a member of the latter class that we now have before us; and though we cannot but think that some of the views here advocated are inadmissible, yet the one predominates greatly over the dross; and the author may be congratulated on having pushed on a pace or two the slowly but surely moving branch of our science which takes cognisance of the adaptation of means to ends.

In order to give a clear notion of the scope of the work it will be most convenient to briefly run over the principal cited methods of protection. From animals plants are protected by possession of runners; by close growth (thus effectually banishing animals too large to force a passage); by growing under sheltering bushes (this applies of course to herbs); by twining habit; by epiphytic habit; by presence of spines and thorns (protection against grazing birds); by all forms of trichomes (these, besides hindering browsers, prevent crawling up of insects, &c.); by production of organs and tissues suitable to ant-habitation; by growing in water, and by having leaves adapted to hold water at their bases; by rings of hairs on stem, &c. (against crawling insects); by slippery waxy surfaces; by milky sap (this, besides being poisonous to grazing animals, by its exudation impedes the movements of small climbing creatures); by presence of ethereal oils in all parts, including the seed (drives away insects); by corky tissues; by possession of leathery leaves which may be distasteful to grazing animals; by development of tubers, bulbs and allied structures; by revolution of leaf-margins and of corolla-tips (renders climbing difficult to ants); by the absence of chlorophyll; by poisonous or bitter principles developed chiefly in seeds, these also being protected by their hardness, leathery consistence and small size.

Protections against unfavourable weather are—runners (which support plants against overweight of snow in alpine and polar regions, and by admitting of a complete covering of snow are enabled to resist the otherwise fatal effects of frost); aerial roots—props against land-storms and dash of the waves; gregarious habit lessening the force of the wind, a result accomplished also by the horizontal position of the branches, by development of small scaly leaves, and by possession of leafy crowns, deep roots and strong or slim stems; hairy clothing, which protects against cold, rain and undue transpiration, and also intercepts and retains rain and dew; irritability to light or touch; possession of a waxy outer layer and of a strong cuticle; a thick sap which, owing to the hygroscopic property of its solid constituents, keeps the circulation active during the period of greatest sun-heat and the dry season; ethereal oils which, gradually evaporating, produce resin, a layer of which, accumulating on the evaporating surfaces, lessens the amount of transpiration; the thick sap of plants growing in deserts, where the difference between the temperature of day and night is very great, containing amorphous substances which are bad conductors of heat, protects them against injury from the daily great variations of temperature; phyllodes, and leaves occupying the position of phyllodes, being less transpirable, are adaptations to a dry climate; presence of corky tissues which protect against frost, &c.; absence of stomata, which in some cases prevents entry of thawing snow; thickened roots, &c., which are stores of nutriment and water, and preserve life during times of drought; besides the many arrangements by which the reproductive organs are protected from rain, dew and wind.

The author shows ready command of all recent information on vegetable function, such as the intoxicating properties of grasses, and the reciprocal relations between ants and their plant-homes. He is a strong advocate for fertilization by means of dew, in the case of spicate grasses and of lowly small-flowered herbs, such as *Sagina* and *Radiola*. He concludes that, as a general rule, scented fruits fall and attract gnawing insects, while unscented ones are brightly coloured and attractive to birds. His view of the origin of cleistogamy agrees in some respects with Mr. Darwin's, and he remarks with regard to it that wheat and barley are cleistogamous only in cold regions, and that *Oryza clandestina* is in the same condition only during cold summers: he also thinks that liability to have the nectar stolen without resulting pollination may be a state of things from which cleistogamy may result. Probably none who have thought much about the phylogeny of vegetation will disagree with the conclusion that the gramineous type is one of degradation, though they may be unwilling to subscribe to the view that differentiation of the forms has occurred for the most part in temperate regions, and that the lowly grasses found in the tropics are migrants of the glacial period. It is worthy of mention, too, that this author ranges himself on the side of those who think that Gymnosperms and Monocotyledons have originated near to but not from one another. The

requirements of space, however, will not allow us to enter further into the views of special evolution here enunciated. The chief objection we have to take relates to the uncontrolled way in which the author allows one or two special hobbies to take possession of his imagination. For instance, he tries to show that the principal agent in vegetable differentiation has been cooling of the earth! We are sorry to say, too, that we think he fails entirely to establish the truth of his chief hobby—the primitive fresh-water sea; primitive, that is to say, in the sense here adopted. According to this, the great-rooted plants of the coal-measures floated in a vast ocean of fresh water, the existence of the roots being cited as a main proof of this extraordinary position! In spite of these serious drawbacks, however, we have a hearty feeling of thankfulness towards the author for giving us this book.

S. M.

A few additions to the list of Cleistogamous plants have recently been made. Asa Gray ('Silliman's Journal,' 1878, p. 71) notes that Mr. Pringle has communicated to him that the condition occurs in *Dalibarda repens*, in '*Danthonia spicata* and its allies, and in *Vilfa* and other grasses.' Closed flowers of *Collomia coccinea* have been figured and described by F. Ludwig in '*Botanische Zeitung*' for December, 1877.

The following interesting facts will be found in the 2nd and 3rd parts of Mr. Fitzgerald's '*Australian Orchids*,' the first part of which we have already noticed. *Spiranthes australis*, Ldl., offers a great contrast with *S. autumnalis*, for in it the anther shrinks back, leaving the persistent pollinia exposed. In the many flowers examined, the pollinia were not deranged in the slightest degree, and some force even was required to break them up; no trace of pollen was found on the stigma, although abundance of seed was set. The only conclusion is that fertilization takes place by contact of the edge (and possibly part of the inner side) of the stigma with the pollinia. The same curious method of fertilization was found to occur in the case of *Orthoceras strictum*. It was observed that a flower of *Caladenia tessellata*, Fitzgerald, was fertilized by an insect endeavouring to escape from its cocoon; it is ingeniously suggested that perhaps this may often occur, as the dorsal sepal would conveniently shelter an insect about to undergo metamorphosis. Species of *Prasophyllum* show the benefit derived from a gregarious habit, the solitary plants frequently having not a flower fertilized, the gregarious one being all fertilized. We wish Mr. Fitzgerald would study the vegetative habit of his favourites.

Count Solms-Laubach has printed in the '*Linnæa*' (Bd. viii, heft 1, February, 1878) the monograph of *Pandanaceæ* upon which he has been for some years engaged. He recognises but two genera, *Pandanus*, Linn. f., and *Freycinetia*, Gaud., the former with 50, the latter with 28 species fairly well known, but each with

a considerably long list of indeterminable names mainly from Gaudichaud in 'Voyage de la Bonite.' Count Solms divides *Pandanus* into eight sections (types) by the structure of the ovary and male flowers; he gives, when possible, full descriptions and synonymy; and having had the opportunity of examining all the principal European herbaria, he clears up several pieces of confused synonymy. In *Pandanus* we find six new species, and in *Freyinetia* no less than nine. The paper was printed before the appearance of Dr. I. B. Balfour's account of the Mascarene species in Baker's 'Flora of Mauritius,' but the author adds a short supplementary note, giving the names of the additions made in Dr. Balfour's monograph.

The Bulletin of the Bussey Institution (January, 1878) contains the second part of Prof. Farlow's List of Fungi found near Boston, which is followed by numerous critical notes on the species and on others from various parts of the United States.

The 75th fascicle of the 'Flora Brasiliensis' was published on February 1st. It contains the *Hippocrateaceæ*, by J. Peyritsch; the *Meliaceæ*, by Cas. DeCandolle; and the *Hederaceæ*, by E. Marchal.

OTHER NEW BOOKS.—A. KERNER, 'Monographia Pulmonariarum,' 1878, 13 plates (Innsbruck, 12s.)—A. BRAS, 'Catalogue des Plantes Vasculaires du Département de l'Aveyron,' 1877 (Villefranche, 8s.)—A. GUILLAUD, 'Récherches sur l'Anatomie Comparée et le Développement des Tissus de la Tige des Monocotyledons' (Paris, Masson.)—C. GRAND-EURY, 'Flore Carbonifère du Département de la Loire,' 3 vols., 1877 (Paris, Baudry.)—A. G. NATHORST, 'Beitrag zur Fossilen Flora Schwedens,' 6 plates (Stuttgart, E. Koch.)—W. R. McNAB, 'Botany, Outlines of Morphology and Physiology' (London, Longmans, 1878, 1s. 6d.; 'London Science Class-Books.')

—G. A. LEBOUR, 'Illustrations of Fossil Plants, being an Autotype Reproduction of Selected Drawings' (Newcastle-on-Tyne, 1877.)—ID., 'Catalogue of Hutton Collection of Fossil Plants (Newcastle on-Tyne, 1878.)'

ARTICLES IN JOURNALS.—FEBRUARY, 1878.

Trans. Linn. Soc. Lond. (ser. 2, i., pt. 5.)—Cas. DeCandolle, 'On the Geographical Distribution of *Meliaceæ*' (tab. 30, 31.)—W. A. Leighton, 'New British Lichens' (tab. 32.)—*Id.*, 'New Irish Lichens' (tab. 33.)—J. G. Baker, 'Report on the *Liliaceæ*, *Iridaceæ*, *Hypoxidaceæ*, and *Hamodoraceæ* of Welwitsch's Angolan Herbarium' (tab. 34-36.)—C. Knight, 'Contributions to the Lichenography of New Zealand' (tab. 37, 38.)—M. T. Masters, 'On some points in the Morphology of *Primulaceæ*' (tab. 39-41).

Journ. Linn. Soc. Lond. (No. 95, February 27th.)—J. Ball, 'Spicilegium Floræ Moroccanæ' (continued, tab. 21-26).

Bull. Soc. Bot. France (1877, pt. 2).—C. Richon, 'On three interesting Fungi' (*Pilacre poricola*, n. sp.)—P. van Tieghem, 'On the

development of certain Ascomycetes' (*Penicillium* and *Gymnoascus*, *Aspergillus* and *Sterigmatocystis*).—Cauvet, 'On Duval-Jouve's notes on *Ruscus*.'—E. André, 'On two climbing *Bromeliaceæ* from New Grenada' (*Sodirola*, n. gen.)—Prillieux, 'On the green colouration of dead wood.'—Cauvet, 'On the histological characters of certain *Ipecacuanhas*.'—C. Fournier, 'On the *Arundinaceæ* of Mexico' (*Phragmites Berlandieri*, n. sp., *Calamochloa*, n. gen.)—P. Duchartre, 'On the growth of *Lilium Neilgherrense*.'—D. A. Godron, 'On a peculiar form of median proliferation in flowers.'—C. Flahault, 'On the spur of the tigellum in certain Dicotyledons.'—P. Sagot, 'On a male *Clusia* with monstrous female flowers.'—E. V. Lefebvre, 'Examination of Malbranche's *Rubi* of Normandy, with a list of species in Dep. of Seine Inferieure.'—Cornu, 'New *Saprolegnia*.'—E. Bonnet, 'Discovery of *Lycopodium Selago* in Dep. of Seine and Oise.'—Ramond, 'On a summer flowering of the Lilac.'—E. Malinvaud, 'New and rare Mints.'—E. Prillieux, 'Comparative anatomy of the tigellum and radicle of the beet-root during germination.'—G. Chastaingt, 'Vegetation of Aubin, Aveyron.'—J. Poisson, 'Case of sterility in *Fragaria elatior*.'—D. A. Godron, 'Bot. Collections at Museum, Nancy.'—D. Clos, 'Etymological Notes.'—E. Malinvaud, 'Mints with monstrous or anomalous inflorescence.'—Armand, 'On *Gladiolus Guepini*, Koch.'—E. Bonnet, 'On the genus *Deschampsia*.'—J. Poisson, 'On the colouring matters of the seed' (continued).

Linnæa (vii. heft 7).—H. Polakowsky, 'Plantæ Costaricensis ann. 1875, lectæ' (continued).—V. v. Borbas, 'Three species of *Arabis* from Hungary.'—I. Urban, 'Species of *Linum* from Western S. America'

(viii. heft 1).—H. Solms-Laubach, 'Monographia Pandanacearum.'—F. W. Klatt, 'American species of *Gnaphalium*.'

Bot. Zeitung.—Solms-Laubach, 'On Monocotyledonous embryos with apical growing-point' (tab. 4).—H. G. Reichenbach, fil., 'Ad Orchidographiam Japonicam Symbolæ.'—H. Wydler, 'Notes on *Anastatica hierocuntica*.'—Ahlburg, 'A new genus from Japan (*Aucubaphyllum*).—H. Wendland, 'Contribution to knowledge of Palms' (*Chrysalidocarpus*, n. gen., *Diodosperma*, n. gen.)

Flora.—L. Celakovsky, 'On the morphological significance of the so-called spore-shoot in *Characeæ*.'—Strobl, 'Flora of the Nebrodes' (continued).—H. G. Reichenbach, fil., 'Orchidææ Kalbreyerianæ.'—C. Müller, 'Decas Muscorum Indicorum Novorum.'—F. v. Thuemen, 'Diagnoses of Thuemen's *Myotheca Universalis*.'

Oesterr. Bot. Zeitschrift.—G. v. Niessl, 'Species of *Sporormia*, De Not.'—A. Kerner, 'Distribution of Hungarian Plants' (continued).—T. von Heldreich, 'Two new plants from Ionian Islands.'—F. Antoine, 'Botany of Vienna Exhibition' (*Allandtia Potoeckii*, n. gen. & sp., with a plate).—L. Menyharth, '*Melilotus macrorhizos*.'—V. Borbas, 'Excursion to the islands Arbe and Veglia.'

Magyar Novenytani Lapok.—O. Heer, 'On the specific difference between *Populus euphratica* and *P. mutabilis*, Heer.'—J. Kunszt, 'Flora of the upper part of the Neogradian Country.'

Hedwigia. — R. Vollny, 'New marine Algæ' (with plate). — E. Ule, 'Mycological Notes' (with plate).

Bot. Notiser. (Feb. 15th). — V. B. Wittrock, 'A comparative, biological, morphological, and anatomical study of *Linnaea borealis*.' — S. O. Lindberg, 'On *Grimmia trichophylla*, Grev.'

Proceedings of Societies.

LINNEAN SOCIETY OF LONDON.

February 21, 1878. — Mr. W. Carruthers, F.R.S., Vice-President, in the chair. — Mr. Thomas Christy illustrated by diagrams, and made some remarks on, Mr. Ossenkep's system of plant-propagation; he also exhibited specimens of the fresh berry of the Liberian Coffee, recently imported and of this year's crop. — Mr. E. M. Holmes exhibited a remarkable Oak-gall, the produce of *Aphilothrix Sieboldii*, Hart., obtained at Willesboro' Leas, Ashford: he likewise laid before the Society an example of *Duboisia myoporoides*, R. Br., gathered at Brisbane by Dr. J. Bancroft, and made remarks on its therapeutic effects. — Mr. Thiselton Dyer exhibited the remarkable inflorescence and a drawing of *Ptychosperma rupicola*, Thwaites, which had flowered for the first time in Europe at Kew. — The following papers were read: — 'Notes on the Mahwa Tree, *Bassia latifolia*,' by Mr. E. Lockwood. This tree yields food, wine and oil to the inhabitants. It is abundant in all parts of Central India, and at Monghyr a hundred thousand may be seen in the plains around. All manner of wild animals feed on its succulent deciduous corollas, and the natives use them as a wholesome food. An essential oil is likewise derived from the fruit. Each tree bears two or three hundredweights of corollas, the produce of the Monghyr district alone yielding a hundred thousand tons or more. By distillation a strong-smelling spirit is obtained. The crop is not only abundant, but never fails. Besides other uses, not the least valuable are in soap-making and as a fattening agent for cattle. The author called special attention to its merits in cheapness, unlimited supply, certain yield, nourishing qualities, and in being easily preserved,—all exceedingly important, as a possibly future economical product of our Indian Empire. — 'Synopsis of the *Hypoxidaceæ*,' by Mr. J. G. Baker. Rømer and Schultes' summary, published in their 'Systema' in 1830, is the latest account of this group of petaloid Monocotyledons, and at the present day not practically of use. Hence the present revision. Of late years a considerable number of additions has been made, principally from Natal and Tropical Africa. They form a group of plants containing four genera and between sixty and seventy species. They differ from the *Amaryllidaceæ* by their tuberous root-stocks, grass-like or coriaceous leaves, persistent perianth-segments, hairy scapes, and crustaceous testa of seeds. Their closest alliance is with the *Velloscia*, which nevertheless have a

shrubby habit, absence of tuberous root-stock, and embryo placed in a different position in the albumen. *Hypoxidaceæ* has its headquarters in the Cape Flora, which contains thirty-seven of the known sixty-four species. There are fifteen species in Tropical Africa, of which two are the same as occur at the Cape, four in Abyssinia, four in the Mascarene Isles, and seven in Angola. Sixty species belong to the Old World; the remaining few are American. In Europe they are absent, as is the case with Polynesia, North and Central Asia, and extra-tropical South America. The author then describes the general characters of the group, and proceeds to genera and species after the plan adopted in his previous papers on the *Liliaceæ*, &c.—‘On the *Schæppiæ* and *Cervantesiæ*, distinct tribes of the *Styracææ*,’ by John Miers, F.R.S. This memoir presents a searching examination of four genera of very doubtful affinity and of uncertain position. They have been considered by many botanists as belonging to the *Olacaceæ* or the *Santalaceæ*. But they cannot be referred to the former, because their seeds are invested by manifest integuments; and they cannot belong to the latter, because they possess a double calyx, and their calyx and corolla are not combined into a common perigonium. The genera in question are placed by the author in two distinct tribes of the *Styracææ*. The *Schæppiæ* consist of eight species of *Schæppia*, all of American origin, and of four species of *Schæppiopsis*, all natives of Asia. The *Cervantesiæ*, all from South America, consist of three species of *Cervantesia* and two of *Iodinia*. These are explained by analytical details, accompanied by drawings from nature.—The following gentlemen were elected Fellows of the Society:—Dr. H. F. Hance, of Whampoa, China; Edward Milner, Esq., New Cavendish Street; Dr. George Shearer, of Liverpool; and the Rev. Robert Boog Watson, of Edinburgh.

Botanical News.

WE regret the loss of SULPIZ KURZ, the Curator of the Calcutta herbarium. His death, at the age of only forty-four, took place at Pulo-Penang, Straits of Malacca, on January 15th, whither he had gone on a botanical expedition. Mr. Kurz was a native of Munich, and a pupil of Von Martius; but left Europe when a young man, and spent some years in Java, being employed in the botanic garden and herbarium at Buitenzorg. There the late Dr. T. Anderson found him. He came to the herbarium at Calcutta in 1864, and has held the post of Curator with great advantage to Indian botany. Mr. Kurz was a man of restless energy, and probably fell a victim to his disregard of the precautions necessary to explorations in tropical climates. He possessed a very extensive practical acquaintance with the Indian and Malayan floras; explored as a botanist parts of Burmah and Pegu, and published the results of his investigations in special reports to Government and in the ‘Journal of the Asiatic Society of Bengal.’ In 1869 he visited the Andaman

Islands, of which the vegetation was nearly unknown; but his visit, from severe illness, lasted but three months. With characteristic promptitude, a report on the results of the expedition was printed early in 1870. M. Kurz has been a frequent contributor to this Journal, his most important communications being a valuable monograph of the Indian *Pandanacea* in the volume for 1867, and an account of the Flora of the Nicobar Islands in 1875.

THE death, on January 6th, is recorded of JOACHIM J. MONTEIRO, who, during his residence of eighteen years in Angola as a mining geologist, contributed considerably to the knowledge of its flora by collecting and sending home specimens both living and dried; amongst others, some of the first specimens of *Welwitschia* received in England. He returned home a few years since, and in 1875 published a volume on 'Angola and the River Congo.' The following year he went out to the eastern side of the African continent, Delagoa Bay, and it was here, at Lourenzo Marques, that he died.

MICHEL CHARLES DURIEU DE MAISONNEUVE, died at Bordeaux, on February 20, aged 82. His work in the floras of Algeria and of Western France was very accurate and valuable.

THE Botanic Gardens at Kew have hitherto been closed to the public till 1 p.m. This is found so troublesome by those chiefly interested that an effort is now being made by horticulturists and other semi-scientific people with little leisure to obtain an earlier hour of admittance. Up to the present, however, this has been refused, the chief reason given being that it would seriously interfere with the strictly scientific work of the garden, which is carried on during the morning. Such is, at all events, the ground taken in a memorial sent round for the signature of botanists, emanating from two well-known lecturers, and advocating the continuance of the existing regulation. If such a result were likely to follow the public opening of the gardens in the morning, it would be in our opinion a sufficient reason for refusing to make the change; but we are convinced that the danger is wholly in apprehension. Besides the officials themselves, we believe we are not wrong in saying that the number of persons engaged in any definite scientific work in the gardens at Kew (we do not speak, of course, of the herbarium) is exceedingly small. Into the causes of this it is not necessary to enter, but it is obviously undesirable that everybody else should suffer in order that half-a-dozen artists and experimenters in fertilization may be undisturbed. What more easy than to rail off any spot (it is not asked to have the houses open) where special work is going on? Besides, there is the new Jodrell Laboratory in the gardens, built expressly for the use of the very persons in whose interests it is sought to continue to keep the whole of the gardens closed till the afternoon. Wishing, as every botanist must do, to see the utility of the magnificent gardens at Kew increased, we cannot but think that their early opening is much to be desired on behalf of a large class of deserving persons not likely to abuse the privilege; we also hope to hear of scientific work of an experimental kind done in the new Laboratory.

Original Articles.

ALABASTRA DIVERSA.

AUCTORE S. LE M. MOORE.

PARS SECUNDA.

(TAB. 196).

SPECIES sequentes rariores in Japonia anno præcedenti legit
cl. Bisset. Acceduntur loci necnon menses colligendi.

- Ranunculus Zuccarini*, Miq. Tokio (Yedo), Apr.
Isopyrum dicarpon, Miq. Oyama, Apr.
Barbarea vulgaris, Br. Nikko, Maj.
Cardamine sylvatica, Link., var. *Regeliana*. (Forma vera!).
Nikko, Maj.
Krascheninikowia heterophylla, Miq. Nikko, Maj.
K. heterantha, Maxim. (ex descr.) Nikko, Maj.
Prunus subhirtella, Miq. Nikko, Maj.
Pyrus Aria, Ehr., var. *Kumaonensis*, Nikko, Maj.?
Deutzia parviflora, Bge. Oyama, Apr.
Ribes alpinum, L., var. *japonicum*. Nikko, Maj.
Dierrilla Middendorffiana, Traut. & Mey., var. *Maximowiczii*, Nob.
Calyce manifeste spathacea, corollæ tubo elongato gracili, &c.
Nikko, Maj.
Viburnum phlebotrichum, S. & Z. Nikko, Maj.
Lonicera cerulea, L. Nikko, Maj. Oct., Det. cl. Maximowicz.
Rhododendron Albrechti, Maxim. Nikko, Maj.
R. quinquefolium, Biss. & S. Moore. Nikko, Maj.
R. Metternichii, S. & Z. Nikko, Maj.
Omphalodes Krameri, Fr. & Sav. Tokujiro, Maj. (Ex icon. in
'Sô Mokou.')
- Nepeta urticifolia* (*Dracocephalum*, Miq.) Nikko, Maj. (Ex
icon. in 'Sô Mokou.')
- Polygonum suffultum*, Maxim. Nikko, Maj.
Rumer japonicum, Meissn. Yokohama, Apr.
Asarum Blumei, Ducht. Oyama, Apr.
A. caulescens, Maxim. Oyama, Apr; Nikko, Maj.
Lindera membranacea, Maxim. Nikko, Maj.
Betula alba, L. Nikko, Maj.
Flatostemma involueratum, Fr. & Sav. Nikko, Maj. (Ex icon.
in 'Sô Mokou.')
- Cypripedium debile*, Rehb. f. (*C. cardiophyllum*, Fr. & Sav.)
Nikko, Maj.
Kruksea Tilingii, Regel. Nikko, Maj.
Bambusa tessellata, Munro. (*B. reticulata*, var. *macrophylla*,

Rupr. An *B. senanensis*, Fr. & Sav. ? *Arundinaria kurilensis*,
Rupr.) Nikko, Maj. Det. cl. Munro.

Carex curvicolis, Fr. & Sav. Oyama, Apr. Det. cl. Franchet.

C. ontakensis, Fr. & Sav. Nikko, Maj. Det. cl. Franchet.

Woodsia manchuriense, Hook. Nikko, Maj. Det. cl. Baker.

[*Erratum*.—In the former list of Mr. Bisset's collection (Journ. Bot. 1877, p. 297) I mentioned the occurrence of *Amaranthus Blitum*, L., remarking that this species had not hitherto been found in Japan. At M. Franchet's instance I have re-examined the specimen, which I now find belongs, in all probability, to the widely-dispersed *Eurvolus viridis*, Moq.]

THALICTRUM (*Euthalictrum microsepala*) FORTUNEI, *sp. nov.*—*T. foliis triternatis superioribus biternatis petiolo basi stipulis parvis more T. orientalis*, Boiss. vaginato, segmentis rotundatis basi truncatis vel cuneato-ovatis trifidis vel subtrilobis lobis obtusis subintegris, panicula racemiformi, sepalis ovatis acutiusculis filamentis dilatatis brevioribus, carpellis 3-6.

Hab.—E Ningpo Sinensium habuit C. W. Everard; Fortune, no. 28! absque loci indicatione.

Habitus et folia *T. orientalis*, Boiss. Sepala 0.3 cm. long. Stamina 0.4 cm. long.; filamenta obscure transversim corrugata. Species cum *T. orientali*, Boiss., et *T. isopyroidi*, C. A. Mey., melius comparanda. Ab illa discrepat sepalis filamentis dilatatis brevioribus, ab hac foliolorum forma magnitudine et ambitu.

CARDAMINE BRACTEATA, *sp. nov.*—Glabra, caulibus debilibus ascendentibus sparsim foliosis, foliis radicalibus longe petiolatis reniformi-cordatis emarginatis apiculatis undulatis vel fere obscure lobatis, foliis caulinis brevius petiolatis cordatis obtusis obscure 3-lobatis nunc incis, bracteis foliis caulinis similibus superioribus minoribus, floribus solitariis axillaribus, pedunculis tenuibus demum recurvis, siliqua pro genere brevi, apice angustata seminibus uniseriatis.—*C. sylvatica*, Link., var. *Regeliana*, 'Sô Mokou,' fol. 12, t. 11, sub nom. Yuri-Wasabi, non Miq.

Hab.—Ad Oyama in Japonia legit J. Bisset.

Folia radicalia ad 2.6 cm. lat. et 2.0 cm. long.; caulina ad 1.2 cm. long. Bracteae inferiores foliis caulinis æquimagnis. Pedunculi 0.4 cm. long. Species insignis ob flores bracteatos primo intuitu cognoscenda. A *C. sylvatica*, var. *Regeliana*, insigniter differt multis notis e.g. foliis, floribus bracteatis, siliqua brevi, habitu. Quoad fructum brevem confer *C. paradoxam*, Hance, e China.

CARDAMINE CHELIDONIOIDES, *sp. nov.*—Erecta, pedalis, pilosula, foliis 2-3 jugim pinnatis foliolis sparsis vix oppositis petiolulatis ovatis rotundatisve incis terminali majore, corymbis brevibus interdum quasiumbellatis paucifloris, floribus mediocris pedunculis brevioribus, sepalis oblongis acutiusculis dorso pilosulis quam petalis vix dimidio brevioribus, staminibus perfectis 4 æqualibus brevioribus ad staminodia minuta viridia reductis, capsula immatura linearis obtusa pilosula.

Hab.—Viget ad Nikko ditone japonica unde misit cl. Bisset.

Caulis primarius 2·5 cm. long., infra radices multas tenues emittens. Folia ad 10 cm. long., juniora vero multo breviora: foliola lateralia 0·7–1·5 cm. long., petiolulis laminam æquantibus vel ea brevioribus vel raro omnino deficientibus. Sepala 3 cm. long. Petala fragilia, alba. Capsula immatura 1·5 cm. long. Species ob multas notas valde singularis.

THERMOPSIS CHINENSIS, *Benth. MSS.*—*T.* caule erecto ramoso villosulo demum glabro, foliis sessilibus obovatis vel oblongo-obovatis apiculatis glabris, stipulis lanceolatis glabris, racemis terminalibus plurifloris, bracteis simplicibus pedicello brevioribus vel ei subæqualibus raro paullo brevioribus, calycis labio superiore bifido segmentis rotundatis lobis inferioribus lanceolatis, carina alis parum minore, ovario subsessili, legumine (haud maturo) lineari-acuto, recto, villosulo.

Hab.—Crescit in China, *Fortune*, A. 54! Shanghai, *Maingay*. Ningpo, *C. W. Everard*. In Ins. Loo Choo legit *C. Wright*, no. 57!

Prope 2-pedalis. Foliola usque ad 4·3 cm. long. et 1·8 cm. lat.: stipulæ ad 3·5 cm. long., petiolos interdum superantes. Bracteæ ovato-lanceolatae, villosulæ. Calyx circiter 0·8 cm. long., villosulus. Carina (ungue incluso) 2·3 cm. long. Legumen immaturum ad 3·5 cm. long.

A *T. fabacea*, DC., cui sat similis discrepat precipue floribus minoribus et stipulis angustioribus.

INDIGOFERA (*Euindigofera*, *Pinnata*) *WYNBERGENSIS*, *sp. nov.*—Fruticosa, stricta, caule tereti ramoso deinde obscure pruinoso, ramulis erectis tenuibus primo patenti-pubescentibus, foliis subsessilibus apicem versus caulis ramulorumque congestis 2-jugis, foliolis suberectis subsessilibus lineari-oblongis apiculatis subcoriaceis appresse strigoso-pubescentibus 0·5–1·7 cm. long., racemis ascendentibus longe pedunculatis multifloris, floribus parvis, calycis strigoso-pubescentis lobis subæqualibus subulatis tubo longioribus, vexillo ovato sessili, petalis sericeis calyceem vix superantibus, ovario sessili, pluries-ovulato, legumine tereti recto acuminato glabro.

Hab.—In solo arenoso in fruticetis prope Wynberg Afr. Aust. legit H. Bolus (no. 2774!).

Species ad *I. Dregeanam* proxime accedit, sed caule ramoso, foliis 2-jugis, foliolis minoribus haud canescentibus, floribus leguminibusque multo minoribus primo intuitu distinctissima. Caulis 45 cm. alt, infra nudo: ramulis indivisis 4·0–9·0 cm. long. Foliolorum rachis 0·2 cm. long. Pedunculi rigidi, fere glabri, 3·5–6·0 cm. long. Racemi breves. Pedicelli 0·2 cm. long., sub fructu duplo longiores. Flores circiter 0·3 cm. long. Calycis lobi tenues. Legumine 1·5 cm. long., 0·15 cm. lat.

RHYNCHOSIA (§ *Orthodanum*) *CLIVORUM*, *sp. nov.*—Erecta, suffruticosa, hirsutula, foliis manifeste petiolatis, foliolis ovato-lanceolatis subtus conspicue nervosis, stipulis pro sectione magnis oblongis acuminatis reflexis membranaceis, racemis foliis brevioribus paucifloris, calycis lobis oblongis acutis inæqualibus inferiore longiore et carinam leviter superante superioribus latioribus tubo longioribus vix basi connatis, vexillo ovato carinæ amplæ æqui-

longo, stylo leviter incrassato, legumine oblongo basi angustato villosa 2-spermo.

Hab.—In clivis montosis prope 'Pilgrim's Rest Gold Fields', Afr. Aust. subtrop. legit *J. H. McLea* (Herb. Bolus, no. 3033!).

Foliola 4.0–5.0 cm. long., 2.0–2.5 cm. lat., supra inconspicue bullata. Stipulae prope 1 cm. long., intus glabrae. Calycis tubus 0.5 cm. long., lobus inferior 1.1 cm. long. Vexillum vix 1.5 cm. long. Legumen 1.5 cm. long. Semina subreniformia, vix strophiolata. Species ab affinibus sectionis *Orthodani* obvestitum et foliolorum formam et flores magnos praeter alias notas facile distinguenda.

SWARTZIA (*Series Tounatea*) *AMAZONICA*, *sp. nov.*—*S.* foliis 2–3 (interdum 4?) jugis, foliolis oblongo-ovatis obtusis basi leviter cuneatis supra nitentibus subtus pallidioribus prominule nervosis furfuraceis demum glabris, racemis lateralibus infra folia ortis plurifloris, sepalis extus tomentosis intus sublævis, petalo nullo, antheris subuniformibus, ovario oblongo-falcato villosa, stylo uncinato-inflexo quam in *S. sericea* parum longiore.

Hab.—Crescit ad Tonantins in Brasilia ubi legit *J. W. H. Traill* (no. 163!).

'Arbor 40–50 ped. alt.' Ramuli teretes, cinerei. Petiolus communis 10–12 cm. long., primo fusco-tomentellus deinde glaber, basi ipsa interdum leviter incrassatus: foliola adulta 12–15 cm. long., 6–7 cm. lat.: petioluli circiter 0.5 cm. long., robusti. Stipulae et stipella desunt. Racemus circiter 8 cm. long., albide furfuraceo-tomentosus. Bractea ovata, ut videtur subcarinata, inflexa, intus glabra, 0.3 cm. long. Pedicelli bracteis bis terve longiores. Flores circiter 0.8 cm. diam., odorati. Sepala ovato-oblonga, obtusa, circiter 0.5 cm. long. Legumen haud visum. Affinis *S. sericea*, Vogel, sed differt inter alia foliolis, floribus minoribus, antheris subreniformibus.

RUBUS (*Oppositifolii*, sect. *NOV.*) *PARADOXUS*, *sp. nov.*—Fruticosa?, glabra, inermis, caule dichotomo subtereti tenui, foliis simplicibus breviter petiolatis per paria subaequalia vel quam maxime inaequalia oppositis coriaceis ovatis obtusis crenato-serratis, stipulis minimis setaceis, floribus axillaribus solitariis vel ad apicem ramulorum digestis, calycis lobis late ovatis apiculatis extus fere glabris intus tomentosis, petiolis sepala vix superantibus, ovariis ut apparet aequilater 2-ovulatis.

Hab.—In China nec collectore nec loco indicato. Exstat specimen unicum sat imperfectum in herb. Kew ex herb. Lindl. derivatum.

Folia ad 4.2 cm. long. et 2.7 cm. lat.: petioli 0.6 cm. long.; stipules 2-plo longiores. Pedunculi ad 1.5 cm. long., glabri. Flores vix 1 cm. diam. Calycis lobi 0.5 cm. long. Fructus maturus infeliciter deest. Species singularis omnibus ab congeneribus hucusque cognitis discrepat foliis oppositis; quamobrem in sectionem novam mihi videtur rite ponenda.

ASTER (*Diplopappus*) *TURBINATUS*, *sp. nov.*—Perennis? caule erecto simplici vel ramoso anguloso puberulo, foliis rigidis sparsis crebrisve ovato-oblongis acutis nunc lanceolatis amplexicaulibus

obscure apiculato-crenatis scabridissimis subtus pallidis, capitulis pseudosessilibus axillaribus, involucri turbinati bracteis multiseriatis seriis inferioribus pedunculum omnino tegentibus ovatis obtusis 1-nerviis ciliolatis, pappi setis subæqualibus lævibus albidis achenium immaturum prope 3-plo superantibus.

Hab.—Crescit in China, *Fortune* (104! et 19!); ad Ningpo, *Everard*.

Radix deest. Folia ad 6.0 cm. long. (plerumque 3.5–4.0 cm.) Capitula prope 2.0 cm. diam. Involucrum ad 2.0 cm. long. Achenia immatura angulata, puberula. Affinitatem proximam cum *A. baccharoidi*, Steetz, habet: ab hujus formis omnibus vero eximie discrepat foliis scabridioribus amplexicaulibus capitulisque pluriseriatis pseudosessilibus.

GARULEUM ALBUM, *sp. nov.*—*G.* caule erecto abundanter folioso robusto demum fere glabro, foliis sessilibus lyrato-pinnatifidis supra scabridissimis subtus tomentellis serratis serraturis crebris induratis, pedunculis elongatis capitula majuscula gerentibus, involucri bracteis ovatis acutis exterioribus tomentellis, fl. disci stylis ramis brevibus lanceolatis, acheniis compressis rugosulis.

Hab.—In Kafirland, Afric. Aust. legit *Revd. R. Baur.*, no. 226!

Caulis 0.5 cm. diam. Folia ad 7.5 cm. long. Pedunculi circiter 4.0 cm. long., albido-tomentelli. Achenia 0.5 cm. long. Adsunt flores inter eos radii et disci ambigentes. A nostra planta differt *G. latifolium*, Harv., caule minus robusto, foliis tenuibus haud tomentosis, pedunculis longioribus, involucri bracteis angustioribus.

CENTAUREA (§ *Acrocentron*) *EBENOIDES*, *Heldr. MSS.* Sesquipedalis, perennis, caule gracili araneoso-cano demum glabro inferne crebre folioso superne subnudo 1-cephalo, foliis (infimis longius) petiolatis pinnatim sectis plus minus lyratis segmentis lateralibus utrinque 3–9 oblanceolatis vel fere deltoideis et acutis integerrimis vel obscurissime 2–3-lobatis, segmento terminali ovato nunc ovato-lanceolato integro vel obscure utrinque lobato foliorum summorum lateralibus subsimili segmentis omnibus una cum petiolo araneosocanis nequaquam glabris, capitulis mediocribus terminalibus ovatis haud globosis, involucri sparsissime araneosi phyllis firmis inferioribus ac intermediis ovatis breviter pectinato-ciliatis in spinulam tenuem patulo-recurvem in inferioribus laminam subæquantem in superioribus ea multo brevioribus, phyllis intimis reliquis longioribus oblongis margine membranaceis haud pectinatis muticis, corollis siccitate pallide roseis.

Hab.—In sylvis partibus in septentrionalibus insulæ Eubœæ, ubi detexit ill. *J. S. Mill*.

Folia infima 8 cm., summa vix 4 cm. long.; segmenta lateralia ad 1.3 cm., seg. terminale ad 8 cm. long. Involucri phylla ima (spinis inclusis) vix 0.5 cm., intermedia circiter 1.0 cm., intima vix 1.5 cm. long. Achænia matura haud visa. Ex affinitate *C. scopulorum*, Boiss. & Hildr., abs qua abhorret habitu, foliolorum magnitudine et vestitu, capitulis minoribus, involucrio valde diverso.

I cannot understand how this beautiful species escaped M. Boissier's notice, it having been gathered by Mr. Mill as long ago as 1862. Perhaps the Kew specimen is unique.

PRIMULA (§ *Auriculastrum*) *MODESTA*, *Biss. & S. Moore.* — Vix pedalis, foliis spathulatis dentato-serratis subtus farinosis, scapo in exemplario unico viso 12 cm. alt. utrinque sulcato glabro 10-floro, bracteis brevibus setaceis, pedicellis elongatis, calycis campanulati segmentis oblongis obtusiusculis tubum subæquantibus, corollæ mediocri tubo calycem duplo superante fauce nudo limbi segmentis bilobis, staminibus juxta faucem inclusis, stigmatè brevi.

Hab. — In Japonia ad Nikko detexit cl. *Bisset* mense Maj. florens.

Folia in specimene nostro 16, ad 6·0 cm. long. et 1·1 cm. lat., supra glabra. Bracteæ 0·5 cm. long., pedunculis 5–6-plo breviores. Calyx 4 cm. long., glaber. Flores 1 cm. diam., cærulei. Capsula haud visa. Accedit ad *P. farinosam*, L., sed calyce minore ac latiore floribus longius pedunculatis foliis dentato-serratis ab omnibus ejus varietatibus bene distincta. A *P. algida* Ad. cui valde affinis distat ob folia farinosa minus dentata calycemque minorem.

JUSTICIA (§ *Betonica*) *FITTONIOIDES*, *sp. nov.* — Subcaulis, foliis 4 petiolatis pro genere maximis late cordato-ovatis obtusissimis supra scabriusculis subtus secus nervos sparsim strigoso-pubescentibus, spicis terminalibus longe pedunculatis pluri-parvifloris, bracteis parum conspicuis late ovatis obtusis, calycis segmentis 5 fere æqualibus lanceolatis, corollæ tubo erecto labio postico breviter bifido, filamentis dilatatis glabris, disco cyathiformi obscurissime lobato, ovario oblongo supra angustato minute puberulo, stylo integro, capsulis probabiliter 4-spermis, seminibus tuberculatis retinaculis truncatis suffultis.

Hab. — In 'Nyika Country,' Afr. Trop. Orient. coll. *Revd. T. Wakefield.*

Caule fere obsoleto, radicante. Folia ad 11 cm. long. et 10·5 cm. lat.: petioli vix ad 5·5 cm. long., sparsim strigoso-pubescentes. Spicæ 5 cm. long. Pedunculi ad 11 cm. alt., stricti. Bracteæ 6 cm. long., 4 cm. lat., obscure ciliatæ. Calycis segmenta prope 4 cm. long., corollæ tubo paullo minora.

A most remarkable species, with the habit of one or two American species. As there are ripe seeds, it is to be hoped that we shall be able to introduce a curious novelty into cultivation.

RUELLIA ARUENSIS, *sp. nov.* — Caule ascendente quadrangulari hirsuto ætate scabriusculo, foliis petiolatis oblongis vel oblongo-ovatis obtusis crenatis supra pubescentibus subtus crassinerviis hirsutis, floribus subsessilibus in foliorum superiorum axillis positis, bracteis bracteolisque oblongis acuminatis calyce multo brevioribus, calyce profunde 5-partito segmentis linearibus acutis hirsutis, corollæ tubo gracili calycem $2\frac{1}{2}$ -plo excedente limbo 5-lobo lobis obovatis obtusis, staminibus prope faucem corollæ insertis antheris 2-ocularibus loculis subæqualibus basi obtusis vel mucronulatis, capsulis tetragonis obtusis glabris calycem subæquantibus fere a basi circiter 20-spermus.

Herba perennis? semipedalis vel ultra. Folia 2–4 unc. longa, $\frac{3}{4}$ – $1\frac{1}{2}$ unc. lata; petioli $\frac{1}{4}$ – $\frac{3}{4}$ unc. longi, hirsuti, ætate scabriusculi.

Calyx 1 unc. longus. Corolla extus pubescens; limbus fere $\frac{3}{4}$ unc. diam. Antheræ oblongæ. Stylus pubescens. Semina suborbiculata.

Hab.—In insulis Aru coll. *H. N. Moseley*.

This plant forms part of by far the most interesting portion of the botanical collections made during the 'Challenger' Expedition—the portion obtained in the Indian Archipelago, North Australia, and the Admiralty Islands. The flora of the latter islands being entirely unknown, I greatly regret that I did not pursue my original intention of preparing a memoir *in extenso* upon it. I may state here that the Admiralty Islands have a well-marked Malayan-flora; so that Grisebach's *à priori* conclusion (see map in 'Vegetation der Erde') is amply sustained.

NEPETA (§ *Macronepeta*) EVERARDI, *sp. nov.*—Erecta, levissime puberula, foliis longe petiolatis ovatis acuminatis basi late truncatis nunc cordatis grosse serrato-crenatis, verticillastris laxis pedunculatis paucifloris, calycis dentibus triangularibus acutis postico paullo latiore et longiore, corollæ tubo gracili supra ampliato, labio postico 2-fido, labii antici lobo mediano crenulato, staminibus inclusis, disco antice tumente.

Hab.—Ad Ningpo Sinensium legit *C. W. Everard*.

Caulis gracilis paucifolius. Folia superiora tantum visa 6·5 cm. long., medio 3·0 cm. lat.; petioli foliis subæquilongi. Folia floralia lanceolata. Pedunculi 1–1·3 cm. long. Calyx 0·5 cm. long., corollæ tubo vix 4-plo brevior. Fructus haud visus.

N. macranthæ, Fisch. arcte affinis, sed distat ob foliorum formam, flores multo minores, calycem prope rectum &c. A *N. urticæfolia* (*Dracocephalo*, Miq.), cujus folia fere omnino habet, differt præter alias notas inflorescentia et floribus multoties minoribus.

POLYGONUM (§ *Bistorta*) TENUICAULE, *Biss. & S. Moore*.—Glabra, rhizomate nodoso, foliis radicalibus longe petiolatis oblongo-ovatis vel ovato-lanceolatis obtusis in petiolum sensim decurrentibus, caule folia radicalia subæquante gracillimo juxta medium folium unicum parvum ovatum obtusum et nonnunquam altius ochream efoliatam gerente, folii caulini ochrea modica ab apice foliigera, spicis terminalibus brevibus plurifloris, pedicellis floribus longitudine subæqualibus bractea (interdum duplo) longioribus, staminibus exsertis.

Hab.—Crescit ad Nikko ditone japonica, ubi eam detexit *cl. Bisset*.

Folia radicalia (una cum petiolo) ad 15 cm. long.; petiolus solus ad 8 cm. long.; lamina 2–3 cm. lat.; folia caulina ad 1·1 cm. long.; foliorum caulinarum ochrea laminam et petiolum æquans. Spica 2 cm. long. Achænia triquetra.

P. Bistortæ ac *P. viviparo* proxima, sed distinctissima ob foliorum formam, habitu pseudo-scapigero, spicas diversas aliasque notas.

GYMNADENIA PINGUICULA, *Rehb. f. & S. Moore*.—Habitus *S. tryphæformis*, *Rehb. f.*, sed uniflora, 3–4 pollicaris, folio ovato acutiusculo sessili nunc breviter pedunculato basi vaginis paucis parvis

membranaceis cincto, caule gracili juxta medium univaginato, bractea vaginæ consimili ovario multo brevior, flore maximo *Pinguiculam* (mirabile dictu) in mentem revocante, sepalis ovatis, labello flabellato trifido lobis lateralibus ovatis truncatis (ut apparet) patentibus lobo medio lateralibus minore integro vel emarginato.

Hab.—Ad Ningpo Sinensium coll. *C. W. Everard.*

Folia 2·5–3·5 cm. long. Sepala 0·5 cm. long. Labellum prope ad 1·5 cm. lat. Calcar 1·5 cm. long.

Ad 'a little Orchid picked up by a surgeon' in herb. Lindl. proxime accedit, sed distat folio solitario, floribus multoties majoribus, calcari comparate longiore.

HABENARIA PLECTOMANIACA, *Rehb. f. & S. Moore.*—Ultra bipedalis, foliis in caulis basi lineari-ligulatis acutis pluribus, superioribus vaginæformibus, racemo plurifloro, bracteis oblongis acuminatis ovaria pedicellata vix dimidio æquantibus, sepalo impari ligulato obtuse acuto, sepalis lateralibus multo majoribus irregularibus oblongis extus obtusis, apiculo sub apice sepali impari in limbo superiori medio, tepalis bipartitis partitione externa lineari-acuminata uninervi interna oblongo-acuminata plurinervi multo majori, labelli tripartiti partitione media lineari-lancea acuminata recta, partitionibus lateralibus subæqualibus subbrevioribus introrsum forcipatis calcari filiformi apicem versus sensim valide ampliato ovario pedicellato æquali imo longiore, anthera apiculata canalibus elongatis rostello apice acuto, cruribus stigmaticis longe productis ampliatis retusis.

Hab.—In 'Nyika Country,' Afr. Trop. Or., coll. *Revd. T. Wakefield.*

Species affines sunt *H. Huilla*, *cataphysena*, *anaphysena*, *ichneumonca*, quæ omnes calcarum indole, tepalis, floribusque minoribus longe recedunt. *H. G. Reichenbach fil.*

HABENARIA STYLITES, *Rehb. f. & S. Moore.*—Ultra pedalis, caule basi —, vaginis superioribus triangulis acuminatis, racemo densifloro multifloro, bracteis linearibus carinatis ovaria pedicellata dimidio æquantibus, sepalo impari oblongo-acuminato cassideo sepalis paribus oblongis acutis, tepalis bipartitis partitione externa lineari-acuta uninervi partitione interna falcata uninervi subæquali, labelli tripartiti partitionibus subæqualibus lineari-lanceis trinerviis calcari filiformi apicem versus paulo ampliato ovario pedicellato longiore, antheræ canalibus arrectis brevibus, cruribus stigmaticis elongatis apicem versus clavatis retusis.

Hab.—Nyika Country, Trop. Afr. Orient. coll., *Revd. T. Wakefield.*

Habenaria maerandra, Ldl., subaffinis est. In nostra folia infima adhuc ignota. *H. G. Reichenbach fil.*

LISSOCHILUS WAKEFIELDI, *Rehb. f. & S. Moore* Affinis *L. caoptero*, *Rehb. f.*, labelli lobo medio energetice gibbo convexo retinervi nec simplicinervi, flore plus duplo majore. Racemus pluriflorus nunc fractiflexus. Bracteæ triangulo-setacæ ovaria pedicellata longe non æquant. Sepala oblonga apiculata tepalis multo minora plus duplo breviora. Tepala elliptica acuta

energetice retinervia. Labellum trilobum; lobi laterales rotundati extrorsum flexi in lobum anticum ellipticum acutum medio gibbum disco quinque-carinatum excurrentes, carinis externis paulo oblitteratis. Calcar breve prope rectangulum retrorsum more *L. calopteri* quo a *L. aurantiaco*, *Oliveriano*, *Grantii*, bene recedit.

Hab.—In Nyika Country, Afr. Trop. Orient., coll. *Revd. T. Wakefield*.

L. specioso, Ldl., affinis, qui recedit labelli lobis lateralibus retusis abruptis non cum lobo medio confluentibus. *H. G. Reichenbach fil.*

Angraecum eburneum (*A. virens*, Ldl.), Pet. Th. in Nyika Country detexit *Revd. T. Wakefield*. Det. hæc benigne fecit amiciss. *H. G. Reichenbach fil.*

DENDROBIUM (§ *Dendrocoryne*) CHLOROPTERUM, *Rehb. f. & S. Moore* [Tab. 196].—*D.* flore carnosu brevi mento valde evoluto angulato, sepalo impari semilanceo sepalis paribus triangulis latis, tepalis semilanceis angustioribus microscopice serrulatis, labello trifido laciniis lateralibus parvis curvatis semifalcatis lacinia antica obcordata maxima callo in disco labelli papillari elevato ligulato medio utrinque unidentato antice in lamellas duas perpendiculares diviso, columnæ parte libera prona parva crassa.

Hab.—Patria ignota. Vidimus in hort. Kew. culta.

Caulis quasi pseudobulbosus, foliis subæquilongis basi angustatus, apice 2-folius. Folia coriacea, ovato-oblonga, obscure bidentata, ad 12 cm. long. et 4 cm. lat. Pedunculus e dorso folii exaxillaris, teres, erectus, caulem fere duplo superans, sparsim vaginiferus, superne pauciflorus. Bracteæ parvæ, triangulares, pedicellis elongatis multo minores. Flos prasinus 2.4 cm. diam.: labelli callus et columnæ pes albi. Pollinia aurantiaca optime evoluta.

Flos telæ carnosæ illi *D. aduncii*, Wall., sat similis; labelli fabrica *D. tridentiferi*, Ldl. contra multo similior.

Dr. Reichenbach conjectures that this may be one of the Orchids of the 'Challenger' Expedition. It certainly is not in the dried collection—consisting, unfortunately, for the most part of miserable mildewed scraps.

By the kindness of Rev. T. A. Preston, of Marlborough College, I lately had an opportunity of looking through two collections made at Ningpo, in China, by Mr. C. W. Everard. Below is a list of the more noteworthy species, some of which are of special interest from being the same as Fortune's hitherto unlocalised types. A few new species gathered by Mr. Everard are scattered through the text of the present paper.

Delphinium anthriscifolium, Hance.

Aconitum chinense, Herb. Kew (an Sieb.?). The form gathered by Fortune, Forbes and Shearer, referred to by Mr. Hemsley in Journ. Bot. 1876, p. 206.

Orychophragmus sonchifolius, Bge.

Akebia quinata, Dne.

Ilex cornuta, Ldl.

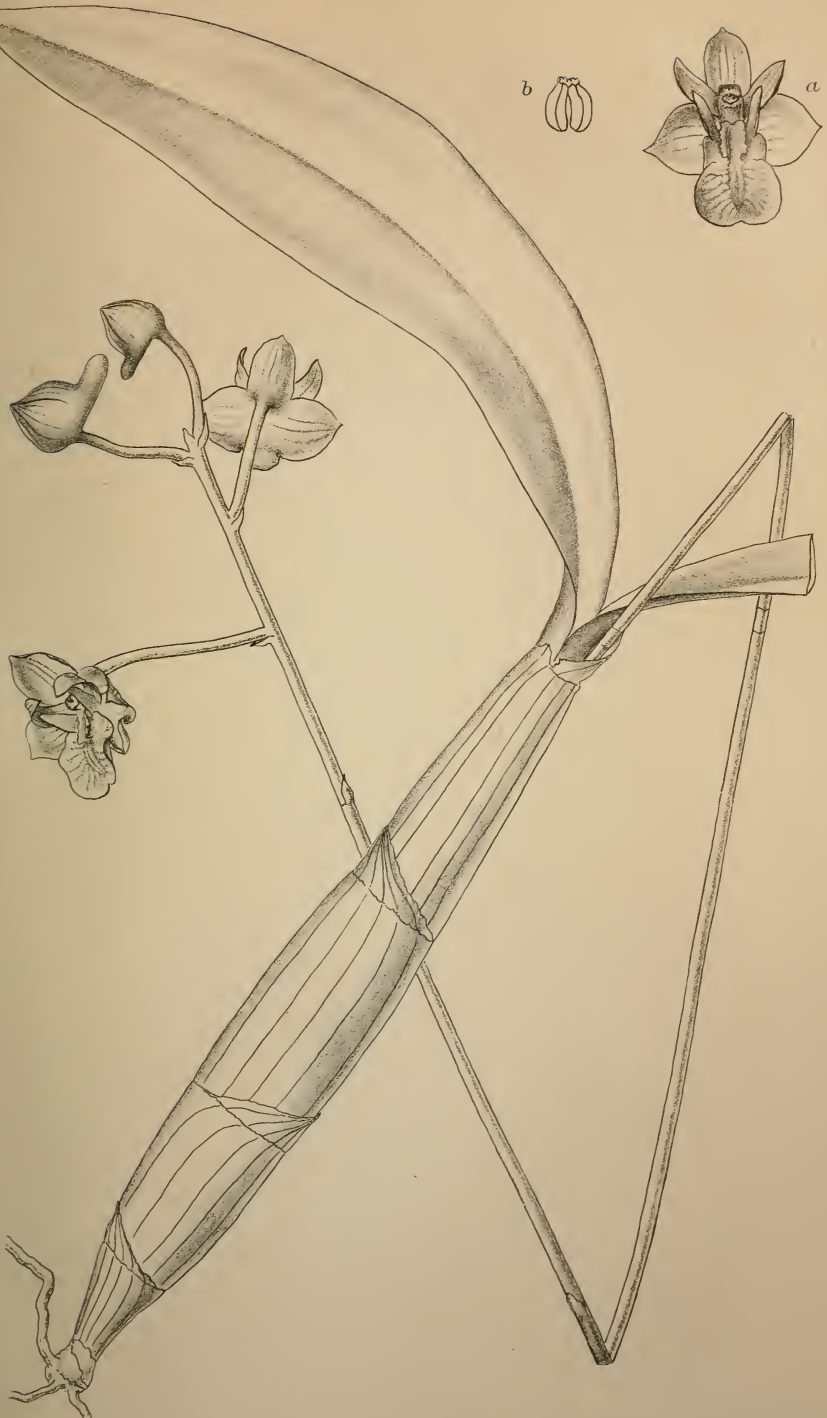
- Fragaria indica*, Andr.
Exochorda grandiflora, Ldl.
Photinia pustulata, Ldl.
Deutzia scabra, Thbg.
Ribes fasciculatum, S. & Z., var. *chinense*, Maxim.
Loropetalum chinense, R. Br., var. *floribus majoribus*.
Rhododendron oratum, Pl.
Ophiorrhiza japonica, Bl.
Senecio Oldhamianus, Maxim.
Lactuca debilis, Bth.
Symplocos decora, Hance., var. *angustifolia* (nob.)
Androsace saxifragifolia, Bge.
Lysimachia ferruginea, Edgew.
Lithospermum japonicum, A. Gray.
Buddleia Lindleyana, Fortune.
Bungea Sheareri, S. Moore.
Siphonostegia sp. *nondescript* (= Fortune, A. 76). M. Maximowicz has this interesting species in hand; his specimen was gathered by Dr. Savatier at Ningpo.
Rehmannia glutinosa, Libosch.
Teucrium nepetaefolium, Bth. M. Maximowicz refers this to *Verbenaceæ*. I greatly regret that there are no ripe fruits.
Scutellaria indica, L., var. *japonica*. (*S. japonica*, Morr. & Dne.)
Lamium chinense, Bth. A variety of this, with smaller, longer-stalked, ovate, obtuse, very coarsely crenate leaves, was found by Dr. Shearer at Kiu Kiang.
Filæagnus umbellata, Thbg.
Chloranthus Fortunei, Solms.
Litsæa polyantha, Bth. ined. (*Tetranthera*, Wall.)
Aleurites cordata, Müll. Arg.
Tulipa graninifolia, Baker.
Smilax ferox, Wall.
Paris polyphylla, Sm. This was also found by Dr. Shearer at Kiu Kiang.
Aletris japonica, Lamb.
Eccoelades falcata, Ldl.
Cephalanthera japonica, A. Gray.

DESCRIPTION OF TAB. 196.—Illustrating *Dendrobium chloropterum*, sp. nov. a. flower (natural size); b. pollen-masses (several times magnified).

FURTHER NOTE ON COINOCHELAMYS.

By S. LE M. MOORE, F.L.S.

A FEW months back, I had in this journal (1876, p. 321, t. 182) a short note on the above genus. On referring thither, it will be found that it differs from all other *Acanthaceæ* in having alternate branches and a 4-cleft stigma. In spite of these peculiarities, for



S. Moore del. Blair lith.

Dendrobium chloropterum. *Rchb. f. & S. Moore.*

Mintern Bros imp.

reasons to be shown below, I felt bound to follow the late Dr. Anderson and Mr. Bentham in considering it to be a peculiar *Acanthacea*. Quite recently, however, I have been looking over the specimens belonging to this order gathered in E. Tropical Africa by Dr. Schweinfurth, and transmitted to Kew. This collection literally teems with new species, and with species known hitherto only from the western side of the Continent, and I immediately recognised in it a *Coinochlamys* from Niamniam Land (Schweinfurth, Nos. 3030 and 3181), which is either a variety of *C. hirsuta*, T. And. or else a new specific form intermediate between that and *C. angolana*. The stamens in Schweinfurth's plant are five in number, the filaments being of unequal length as in *C. angolana*, and the stigma is precisely as in that species. When Professor Oliver saw the note, he immediately drew my attention to *Mostuea* in *Loganiaceæ*, which, besides being a compatriot, has the stigma, placenta, ovules, and fruit of the supposed *Acanthacea*. It was exceedingly unfortunate that Anderson should have described the anthers as didynamous, and that Bentham should have followed him, though owing to the scantiness of typical material it was most probably without examination that this was done. By good fortune, Soyaux's specimen, the type of *C. angolana*, had good fruits and seeds; but while examining the latter, so impressed was I with the alleged didynamy of the stamens, an allegation to some extent borne out by the inequality of the filaments in *C. angolana*, that I mistook for cotyledons what on re-examination proves to be a mass of fleshy albumen, and, failing to separate the embryo, interpreted this as the radicle. The embryo is very small relatively to the albumen, and it has a curiously long radicle, which is a character of some species of *Mostuea*. The ovules cannot be described as retinaculate, although a small piece of placental tissue is seen at their back; the placentas are, in fact, much as shown in Oliver's figure of *Mostuea* (*Leptocladus*, Oliv.) in 'Proc. Linn. Soc.,' viii., t. 12, f. 3.

Under these circumstances, it is plain that *Coinochlamys* does not belong to *Acanthacea* at all, but that it agrees as to structure in so many points with *Mostuea* that it must be referred to the immediate proximity of the latter in *Loganiaceæ*. I am not prepared to decide whether the characters are of generic value; should they be so, its autonomy will be based on the peculiar inflorescence, partite calyx, and unequal-lengthed stamens.

I may mention that in fig. *d* of the plate accompanying the note, the placenta is drawn too near the base of the ovarian cavity, and that the albumen has a dark line running down the middle, making it look suspiciously like two cotyledons. In Schweinfurth's plant, some, at least, of the flowers have a small subulate bract barely 1 mm. in length, and a very minute sixth flower was present in the involucre I opened. Finally small interpetiolar stipules are to be seen, which are especially plain in *C. angolana*.

The following emendations will have to be made in the generic diagnosis:—'Stamina 5, medio tubo affixa, inclusa; filamenta parum inæqualia.' 'Ovula in quoque loculo 2, collateralia, septo

affixa.' 'Semina 2, vel 4, plano-convexa, sericeo-pubescentia; albumen copiosum, carnosum; embryo parvus, radícula elongata.'

ON DISPUTED QUESTIONS OF BOTANICAL NOMENCLATURE.

BY JOHN BALL, F.R.S., &c.

I WISH to add a few words to the discussion which has been carried on for some time past in the pages of this journal, mainly in reply to the observations of Mr. Hiern in the number for March (pp. 72-74.)

We are all agreed that the multiplication of synonyms is a serious and growing evil and inconvenience, and that it is a reproach to our science that botanists should so frequently use different names when they mean the same thing. The question is, whether any rules likely to abate the mischief can be agreed upon, and if so what they should be. Those who, in the name of liberty, object to the establishment of any fixed rules for the future, must be content to see the existing confusion increased and aggravated.

It is obvious that the object of any rules to be adopted must be twofold,—to help us to deal with the names already in existence, so that the same species shall for the future be known to all botanists by the same name, and to prevent the unnecessary introduction of new names for plants already known and described. With reference to the point under discussion, it will be more convenient to discuss in the first instance the latter part of the subject.

When a botanist has to deal with a plant which he believes to be new and undescribed, he is forced to distinguish it from others belonging to the same genus by a new specific name. If it should turn out that the plant has been already named and described, the new name will become a superfluous synonym. Hundreds,—nay, thousands,—of such synonyms may be found in every systematic work, and it is impossible absolutely to prevent their recurrence; but the multiplication of herbaria and of good descriptive works will render such cases more and more rare. We are all agreed that, as a general rule, the older name is in such instances entitled to preference over the newer one, so that there is no motive to induce any one to coin without necessity a new name that is merely destined to be swept into the dust-heap of superfluous synonyms.

The case is different when a systematic botanist comes to the conclusion that a species already known and described should be placed in a different genus from that in which it was ranked by the first describer, or by other preceding authors. Three different views have been maintained as to what should be done in such a case. M. Caruel holds that the writer proposing a new generic name for the plant is absolutely free to give it whatever specific designation he thinks proper. Mr. Hiern, if I understand him aright, thinks that some one among the specific names previously

applied to the plant should be selected at the option of the writer. M. A. de Candolle and those who agree with him maintain that the specific designation given by the first describer of the plant is, as a general rule, entitled to preference.

The best test of the applicability of these views is to consider the consequences which their adoption would entail for the future. It is pretty certain that different opinions as to the limits of genera will long continue to prevail among botanists; but it may be safely predicted that those embodied in the great work now approaching completion, the 'Genera Plantarum' of Bentham and Hooker, will find many followers among botanists of all countries. In the numerous instances where generic limits previously admitted have been modified in that work, the authors have in some cases indicated the specific name which each species, not previously admitted to the genus which they have adopted, should hereafter bear; but more frequently they have omitted to do so. If M. Caruel's views are to prevail, there is nothing to prevent anyone having a taste in that direction from coining new names by the hundred for plants which he has never studied, nay, of which he has never even seen a specimen. Mr. Hiern's proposition, as I understand it, is more limited; but in so far as it leaves liberty of choice among various specific names hitherto in use, it fails to secure the great desideratum of unanimity among botanists. One writer will prefer one specific name, another will choose a different one,—who, in the absence of a fixed rule, is to decide between them? The rule which I advocate has at least two strong recommendations—that it will leave no room for future divergence between writers working apart in different countries; and that even though they may differ as to the genus in which a given plant should be placed, the preservation of the same specific name will generally mark the identity of the species intended by both.

Like most general rules, that here advocated is liable to exceptions; easily stated, however, and free from ambiguity. 1. If the older specific name involves a statement wholly untrue and misleading, it loses its claim to preference, just as it would do if the plant were retained in the genus adopted by the first describer. 2. If the older specific name of a plant newly placed in a given genus has been already applied to a species of that genus, the plant must take the specific name next entitled to priority, and if there be none, must receive a new designation. 3. Where, either from the want of adequate materials, or from complete misunderstanding of its structure and affinities, a name has been given at random to a plant in a group with which it has no real relation, it cannot be said that the species has been *described*, and the name so given has no claim to subsequent recognition.

Nearly all the objections urged to the rule, as here sought to be defined, apply not so much to the course which should be followed for the future to avoid creating new synonyms, as to the somewhat different question as to how we are to deal with those already in existence. For plants retained in the genus to which they were first ascribed, the rule of preferring the older name, where this is

not positively misleading, is now generally admitted. Yet where a name not the oldest has been generally adopted in modern works of authority, most botanists will agree that it is best to adhere to it; while in cases where there is a difference among modern writers, the rule is strictly enforced. It often happens that the older name is not very accurate, or is less appropriate than a later one, but the balance of convenience is clearly seen to favour the adoption of an uniform rule. When it is proposed to refer a plant to a different genus from that heretofore adopted, if we are not to give the rein to individual fancy, there are but two alternative rules to guide us in selecting its future specific name. We may apply to existing names the same rule that has been above advocated as a guide for future writers, and, subject to the exceptions already mentioned, prefer the specific name given by the first describer of the species; or we may hold that when a writer recognises the propriety of placing a plant in a given genus, he is bound to adopt the specific name first applied in conjunction with the name of that genus by a preceding writer. At first sight it would seem that it did not much matter which rule were adopted, provided either should obtain the general recognition of botanists; but there are two weighty objections to the second alternative rule which deserve consideration. Those who hold that M. DeCandolle's rule should serve as a guide to future botanical writers, may fairly urge that we deprive that rule of its chief sanction, if new names, hereafter given in defiance of it, are to have an absolute claim to recognition by subsequent writers. Further, there would remain the great inconvenience that where writers differed as to the proper generic name, the same plant would appear in future under names absolutely and entirely different. To take the common case of a botanist referring to local floras and catalogues for the purpose of ascertaining the geographical distribution of a plant, and, for an instance, let this be the *Arenaria diandra* of Gussone, cited by me in former paper. The same plant would appear in one list as *Arenaria diandra*, in another as *Spergularia patens*, and in a third as *Lepigonum salsugineum*. The result of insisting on the preservation of the older specific name, whatever genus were adopted, would in this and other like cases spare the already overburdened memory of the worker, and help him at once to identify the plant in question. In all cases, however, I think the maxim, *quicquid non movere* should apply, and a name sanctioned by the general agreement of modern writers of authority should not be altered.

NOTES ON RUBI.

(No III.)

BY CHARLES C. BABINGTON, F.R.S., &c.

(Continued from p. 117).

8. RUBUS PYGMEUS, *Weihe*.—If the specimen in Wirtgen's 'Herb. Rub.' (cd. 2, no. 82) is correctly named, as I can hardly

believe,—and Focke decides that it is not, he giving it the new name of *R. pygmaeopsis* (p. 364),—our plant bears a wrong name, although it agrees well with the figure and description in the ‘Rubi Germ.’ I am inclined to think that we are right, and Wirtgen is wrong. Focke does not seem to be acquainted with Weihe’s plant. My specimens from Tonbridge Wells appear to agree exactly with the *R. praeurtorum* of Boulay (‘Ronces des Vosges,’ p. 97, sp. 78.)

9. *R. KOEHLERI*, *Weihe*.—The specimen so named in the “Set” agrees with others similarly named by Mr. Bloxam, all of which I believe are *R. pallidus*, *Weihe*. Genevier thinks that our *R. pallidus* is closely allied to *R. mutabilis*, which will be noticed presently; but, judging from a specimen received from him, I see no cause for giving up the view expressed in my ‘Rubi’ that *R. mutabilis* is very near to our *R. scaber*; and, indeed, the specimen named *R. pallidus* by Genevier for Baker is our *R. pallidus*, and not, I think, in any way allied to *R. mutabilis*.

10. *R. KOEHLERI*, β . *INFESTUS*, *Bab.*—In 1867 I received from Mr. Baker a very spinous bramble, gathered at St. Ann’s Hill, Surrey, which the ticket states Mr. Bloxam called *R. foliosus*, and M. Genevier *R. melanoxyton*. It seems to me to be very far too rough a plant for the former, and appears to be a form of *R. Koehleri*; nor can I detect its relationship to *R. melanoxyton*, of which there are two specimens in Wirtgen’s ‘Herb. Ruborum.’ Probably M. Genevier has been deceived by imperfect specimens. The specimens in the “Set” may be the plant of Wirtgen, but the many short setæ on the stem seem to show its relationship to plants like *R. Hystric*, and near it accordingly I have placed the specimen in question. Genevier places the true *R. melanoxyton* amongst plants some of which seem to belong to our *Koehleriani* and others to the *Bellardiani*. Wirtgen considers his plant to range with the *Spectabiles*, and the analytical table given by Genevier shows how close its characters, when thus tabulated (although that, of course, has not much weight), bring it to *R. mucronulatus*, near which it probably should be placed.

11. *R. OBLIQUUS*, *Blox.*—I possess a good series of this plant kindly given to me by Mr. Briggs in 1870, and gathered near Plymouth. They appear to me not to be the *R. obliquus*, Wirtg., of which I have authentic specimens (‘Herb. Rub.’ ed. 1, 98; ed. 2, 102.) Mr. Briggs had Bloxam’s authority for the name; they therefore are the *R. obliquus*, *Blox.*, as described in the ‘Journ. of Bot.’ (viii., 69.) I agree with Mr. Briggs in the opinion (‘J. of B.’ ix., 368) that *R. obliquus*, *Blox.*, is very nearly allied to, if not identical with, *R. mutabilis*, *Genev.*, of which I possess an authentic specimen. I also now do not consider it to be so nearly allied to *R. scaber* as I formerly did (‘Rubi,’ 187), but, as suggested by Mr. Briggs, probably a distinct species belonging to the *Koehleriani* rather than the *Radulae*. If such is its true position, it may perhaps be placed between *R. diversifolius* and *R. Lejeunii*. It is manifestly considered to be allied to the latter by M. Genevier, for

he places only one species, *R. Lejeunii*, Bor. = *R. plinthostylus*, Genev., between *R. mutabilis*, Genev., and *R. Lejeunii*, W. & N. It is true that he removes *R. diversifolius*, Lindl., far away from them, considering it to be one of the *Cæsi*. In this view of *R. diversifolius* I cannot agree with him, although Mr. Baker manifestly does so. Dr. Focke also places a part of my *R. diversifolius* (that form figured in this journal, viii., t. 107) amongst the *Cæsi*, under the name of *R. myriacanthus*, Focke. As that name was only published in 1871, and Lindley's *R. diversifolius* in 1835, Focke manifestly considers the typical form of Lindley's plant as distinct, although I do not find any notice of it in his book. My opinion is that *R. diversifolius* and *R. Lejeunii* are more correctly placed in the group *Koehleriani*.

R. mutabilis differs from *R. diversifolius* by having traces of glaucous bloom on the barren stem, an obovate-acuminate terminal leaflet, stalked and not imbricate basal leaflets, a long pyramidal panicle with much longer axillary subcorymbose branches and unequal setæ. From *R. Lejeunii*, by the bloom on the much more prickly stem, on which the prickles are more unequal and the aciculi not so distinct from them, the leaves rugose above and very much more hairy or even felted beneath. The panicle is narrower, its axillary branches somewhat compound, the branch and its branchlets being nearly corymbose, its prickles very strong and much more abundant, and springing from long, narrow, compressed bases. Also, Mr. Briggs states that linear, but sometimes slightly leaf-like, points to the sepals may be found.

Following the plan adopted in my 'Manual,' I should thus characterise the plant, and place it between my *R. diversifolius* and *R. Lejeunii*:—

R. mutabilis, Genev.; stem arcuate-prostrate angular sparingly pilose and setose, prickles moderate unequal sub-patent from a long compressed base, aciculi strong very unequal mostly short, leaflets rugose above doubly and mostly lobate-dentate very densely hairy or felted beneath, *terminal leaflet obovate-acuminate, basal leaflets stalked, not imbricate; panicle long narrow-pyramidal leafy nearly to the top its branches and branchlets subcorymbose subpatent, its rachis very prickly aciculate and setose its prickles very strong from large compressed bases numerous, sepals ovate felted setose reflexed with rather leaf-like points.*—*R. obliquus*, Blox., not Wirtg.—Stem often with glaucous bloom. "Petals greenish-white. Filaments white. Styles greenish."—Abundant near Plymouth.

12. *R. CAVATIFOLIUS*, Müll.—The Rev. Augustin Ley has sent me a very interesting bramble found near Trellech, Monmouthshire, in August, 1876, which is very near *R. pallidus*, but probably is the *R. cavatifolius*, Müll., as published in Boulay's 'Ronces Vosgiennes,' pp. 67 and 132, sp. 49.) It agrees very well with the Abbe Boulay's description, and my specimen is exceedingly like those from France. *R. cavatifolius* is not noticed by Focke in his

'Synopsis.' Compared with *R. pallidus*, its stem is so armed as to seem sub-glabrous; its leaflets are not felted beneath, and differ much in shape, the terminal one being very much rounder and more cordate; the panicle more abrupt, partly on account of the shortness of the terminal peduncle. I know nothing about the colour of the floral organs or the shape of the petals. It seems to be another well-marked form of *R. Koehleri*, which may perhaps be characterised as follows:—

R. cavatifolius, Müll.; stem arcuate-prostrate angular furrowed subglabrous, prickles many very unequal declining from a compressed base, aciculi and setæ very short rather unequal, hairs very few, leaves quinate, leaflets unequally and rather doubly but finely dentate-serrate even above pale green and hairy on the veins beneath, terminal leaflet cordate cuspidate-attenuate (excluding the long point they are scarcely longer than broad), basal leaflets not imbricate stalked, panicle oblong truncate, leafy below its terminal peduncle much shorter than the lateral ones, axillary branches subracemose its prickles long slender its aciculi setæ and hairs many, sepals ovate-attenuate reflexed.

Unfortunately I have only seen a single specimen of this plant.

(To be continued.)

SHORT NOTES.

EICHLERIA, Hartog (see p. 72.)—As I find that *Eichleria* is already preoccupied, my genus of that name must be altered, and I name it MURIEA, after Dr. James Murie, F.L.S., &c., Assistant-Secretary to the Linnean Society. I have carefully examined *Cryptogyne*, Hook. f., and find it to possess the floral symmetry of *Chrysophyllum oliviforme*, with the addition of five scales in front of the stamens. These do not influence the position of the carpels, and though described doubtfully as staminodes by Sir Jos. Hooker, are certainly mere emergences from the "corolla-tube."—M. M. HARTOG.

Notices of Books and Memoirs.

NEW GENERA AND SPECIES OF PHANEROGAMOUS PLANTS PUBLISHED IN PERIODICALS IN GREAT BRITAIN DURING THE YEAR 1877.

This list comprehends the new genera and species of Flowering Plants published, during 1877, in the following periodicals:—'Botanical Magazine,' 'Gardeners' Chronicle,' 'Icones Plantarum,'

'Journal of Botany,' and 'Transactions' and 'Journal of the Linnean Society of London.'

Of the 'Icones Plantarum,' the first part of vol. iii. of the new series, containing plates 1201-1225, was published on June 1st, and the second part, with plates 1226-1250, on December 1st. As these dates are given merely on the temporary paper covers, which are usually destroyed, it is well to record them here.

Part 4 of vol. i. of the new series of the Linnean Society's 'Transactions,' bears the printed date, "December, 1876," but was not published till January, 1877; and the new species contained in it are therefore included in this catalogue.

Dr. I. B. Balfour's Rodriguez novelties were published in the Linnean Society's 'Journal' on May 31st, thus ante-dating by fully two months Mr. Baker's 'Flora of Mauritius,' although, from the manner in which this latter work is referred to by Dr. Balfour, it would be naturally inferred to have been previously published.

There are several other species considered new, but to which no specific appellations have been given, in the first part of Mr. Ball's *Spicilegium Floræ Maroccanæ* ('Journ. Linn. Soc.,' xvi., pp. 281-376). Also, in Mr. Baker's *Systema Iridacearum* ('Journ. Linn. Soc.,' xvi., pp. 61-180) are a good many names without descriptions,* which are consequently omitted in the following list.

ABROTANELLA RHYNOCARPA, *Balf. f.* (Compositæ).—Rodriguez. (Journ. Linn. Soc., xvi., p. 16.)

ACER VAN-VOLKEMII, *Mast.* (Sapindacæ).—Caucasus. (Gard. Chron., i., p. 72.)

ÆCHMEA VEITCHII, *Baker* (Bromeliacæ).—New Grenada. (Bot. Mag., t. 6329.)

ÆOLANTHUS ZANZIBARICUS, *S. Moore.*—Zanzibar. (Journ. Bot., p. 68.)

ÆRUA CONGESTA, *Balf. f.* (Amaranthacæ).—Rodriguez. (Journ. Linn. Soc., xvi., p. 20.)

AGAVE CARIBÆA, *Hort. Kew.* (Amaryllidæ).—Locality doubtful. (Gard. Chron., ii., p. 683.)

A. CORDEROYI, *Hort. Peacock.*—Locality doubtful. (Gard. Chron., ii., p. 398 and fig. 79.)

A. REGIA, *Hort. Saunders.*—Locality doubtful. (Gard. Chron., ii., p. 620 and fig. 124.)

A. SALMDYCKII, *Baker.*—Mexico. (Gard. Chron., ii., p. 490.)

A. VIRIDISSIMA, *Hort. Peacock.*—Mexico? (Gard. Chron., ii., p. 137.)

AGLAIA PIRIFERA, *Hance* (Rutacæ).—Cambodia. (Journ. Bot., p. 331.)

A. PYRAMIDATA, *Hance.*—Cambodia. (Journ. Bot., p. 331.)

* These have since been given in the 'Transactions of the Linnean Society' (ser. 2, vol. i., pp. 269-273), and will be therefore included in our next annual enumeration.

- ALLOPLECTUS PELTATUS, *Oliver* (Gesneraceæ.)—Costa Rica. (Bot. Mag., t. 6333.)
- ALOE CHLOROLEUCA, *Baker* (Liliaceæ.)—Cape. (Gard. Chron., ii., p. 38.)
- A. PLATYLEPIS, *Baker*.—Cape. (Gard. Chron., ii., p. 38.)
- A. TOMATOPHYLLOIDES, *Balf. f.*—Rodriguez. (Journ. Linn. Soc., xvi., p. 22.)
- A. TRICOLOR, *Baker*.—Cape Colony. (Bot. Mag., t. 6324.)
- ALSTRÆMERIA BURCHELLII, *Baker* (Amaryllideæ.)—Brazil. (Journ. Bot., p. 262.)
- A. GARDNERI, *Baker*.—Brazil. (Journ. Bot., p. 261.)
- A. PLATYPHYLLA, *Baker*.—Brazil. (Journ. Bot., p. 261.)
- A. SCABERULA, *Baker*.—Brazil. (Journ. Bot., p. 261.)
- A. ZAMIOIDES, *Baker*.—Brazil. (Journ. Bot., p. 262.)
- AMOMOPHYLLUM PATINII, *Engler* (Aroideæ.)—N. Grenada. (Gard. Chron., i., p. 139.)
- ANCRUMIA, *Haw. MSS.* (Liliaceæ.) *A. cuspidata*, *Haw.*—Chili. (Ic. Plant., t. 1227.)
- ANCYLANTHUS MONTEIROI, *Oliv.* (Rubiaceæ.)—Delagoa Bay. (Ic. Plant., t. 1208.)
- ANTHERICUM CORYMBOSUM, *Baker* (Liliaceæ.)—Somali-land. (Journ. Bot., p. 71.)
- A. INCONSPICUUM, *Baker*.—Somali-land. (Journ. Bot., p. 71.)
- ANTHURIUM SPATHIPHYLLUM, *N. E. Br.* (Aroideæ.)—Locality unknown. (Gard. Chron., i., p. 652.)
- ASTROCARYUM MINUS, *Trail* (Palmæ.)—Brazil. (Journ. Bot., p. 78.)
- BACTRIS ELEGANS, *Trail* (Palmæ.)—Brazil. (Journ. Bot., p. 3, tab. 184, fig. 1.)
- B. EUMORPHA, *Trail*.—Brazil. (Journ. Bot., p. 9, tab. 184, fig. 4.)
- B. INCOMMODA, *Trail*.—Brazil. (Journ. Bot., p. 43.)
- B. JURUENSIS, *Trail*.—Brazil. (Journ. Bot., p. 40.)
- B. MARAJA, *Trail*.—Brazil. (Journ. Bot., p. 43.)
- B. OLIGOCARPA, *Trail*.—Brazil. (Journ. Bot., p. 46.)
- B. PINANGA, *Trail*.—Brazil. (Journ. Bot., p. 41.)
- B. SPHEROCARPA, *Trail*.—Brazil. (Journ. Bot., p. 8, tab. 184, fig. 3.)
- B. SYAGROIDES, *Trail*.—Brazil. (Journ. Bot., p. 76.)
- BALFOURODENDRON, *Mello* (Rutaceæ, Toddaliæ.) *B. eburneum*, *Mello*.—Brazil. (Ic. Plant., t. 1204.)
- BARLERIA HILDEBRANDTII, *S. Moore* (Acanthaceæ.)—Somali-land. (Journ. Bot., p. 69.)
- BLEPHARIS PRATENSIS, *S. Moore* (Acanthaceæ.)—Zanzibar. (Journ. Bot., p. 294.)
- BOERHAAVIA SCHOMBURGKIANA, *Oliv.* (Nyctagineæ.)—S. Australia. (Ic. Plant., t. 1225.)
- BOMAREA OLIGANTHA, *Baker* (Amaryllideæ.)—Peru. (Gard. Chron., ii., p. 648.)
- BOSWELLIA NEGLECTA, *S. Moore* (Bursereæ.)—Somali-land. (Journ. Bot., p. 67, tab. 185.)
- BRIDELIA INSULANA, *Hance* (Euphorbiaceæ.)—Cambodia. (Journ. Bot., p. 337.)

- BUCHANANIA RETICULATA, *Hance* (Anacardiaceæ).—Cambodia. (Journ. Bot., p. 332.)
- CALLIPHURIA SUBEDENTATA, *Baker* (Amaryllidaceæ).—New Grenada. (Bot. Mag., t. 6289.)
- CALORHABDOS CAULOPTERA, *Hance* (Scrophulariaceæ).—China. (Journ. Bot., p. 298.)
- CARDIOSTIGMA, *Baker* (Irideæ) = *Gelasine longispatha*, Herb. (Journ. Linn. Soc., xvi., p. 102.)
- CATOPHERIA SPICATA, *Benth.* (Labiatae).—New Grenada. (Ic. Plant., t. 1215.)
- CEROPEGIA BARKLYI, *Hook. f.* (Asclepiadeæ).—S. Africa. (Bot. Mag., t. 6315.)
- CHIRONIA EXIGUA, *Oliv.* (Gentianaceæ).—S. Africa. (Ic. Plant., t. 1229.)
- CINNAMOMUM SERICANS, *Hance* (Lauraceæ).—Cambodia. (Journ. Bot., p. 336.)
- CLATHROSPERMUM BIOVULATUM, *S. Moore* (Anonaceæ).—Zanzibar. (Journ. Bot., p. 65.)
- CLEISOSTOMA VIRGINALE, *Hance*.—Hongkong. (Journ. Bot., p. 38.)
- CLEISTANTHUS TOMENTOSUS, *Hance* (Euphorbiaceæ).—Cambodia. (Journ. Bot., p. 337.)
- CLERODENDRON LACINIATUM, *Balf. f.* (Verbenaceæ).—Rodriguez. (Journ. Linn. Soc., xvi., p. 19.)
- CŒLOGYNE MEYERIANA, *Rehb. f.* (Orchideæ).—Locality doubtful. (Gard. Chron., ii., p. 134.)
- COMANTHOSPHACE, *S. Moore* (Labiatae).—Japan. (Journ. Bot., p. 293.)
- COFFEA AFZELII, *Hiern.* (Rubiaceæ).—Sierra Leone. (Trans. Linn. Soc., ser. 2, i., p. 174.)
- C. BREVIPES, *Hiern.*—Cameroons. (Trans. Linn. Soc., ser. 2, i., p. 172.)
- C. HYPOGLAUCA, *Welw.*—Angola. (Trans. Linn. Soc., ser. 2, i., p. 173.)
- C. JASMINOIDES, *Welw.*—W. Trop. Africa. (Trans. Linn. Soc., ser. 2, i., p. 175.)
- C. LIBERICA, "*Hort. Bull.*," *Hiern.*—W. Trop. Africa. (Trans. Linn. Soc., ser. 2, i., p. 171, tab. 24.)
- C. MELANOCARPA, *Welw.*—Angola. (Trans. Linn. Soc., ser. 2, i., p. 173.)
- C. RUPESTRIS, *Hiern.*—W. Trop. Africa. (Trans. Linn. Soc., ser. 2, i., p. 174.)
- C. SUBCORDATA, *Hiern.*—Old Calabar. (Trans. Linn. Soc., ser. 2, i., p. 174.)
- CYPRIPEDIUM ALBO-PURPUREUM, *Rehb. f.* (Orchideæ.) (Hybrid *C. Donbayanum* × *Schlimii.*) (Gard. Chron., ii., p. 38.)
- C. BOXALLI, *Rehb. f.*—Trop. Asia. (Gard. Chron., i., p. 367.)
- C. HAYNALDIANUM, *Rehb. f.*—Philippine Islands. (Gard. Chron., i., p. 272; Bot. Mag., t. 6296.)
- C. LUCIDUM, *Rehb. f.* (hybrid *C. villosum* × *Lowii.*) (Gard. Chron., ii., p. 521.)

- C. PATENS*, *Rehb. f.* (hybrid *C. barbatum* × *Hookerae*.) (Gard. Chron., ii., p. 456.)
- DACRYDIUM WESTLANDICUM*, *T. Kirk* (Coniferæ.)—New Zealand. (Ic. Plant., t. 1219.)
- DANAIS CORYMBOSA*, *Balf. f.* (Rubiaceæ.)—Rodriguez. (Journ. Linn. Soc., xvi., p. 13.)
- DECASPERMUM SERICEUM*, *Hance* (Myrtaceæ.)—Cambodia. (Journ. Bot., p. 334.)
- DENDROBIUM ARACHNOSTACHYUM*, *Rehb. f.* (Orchideæ.)—Not localised. (Gard. Chron. i., p. 334.)
- D. DACTYLODES*, *Reichenb. f.*—Samoa. (Journ. Bot., p. 132.)
- D. PETRI*, *Rehb. f.*—Polynesia. (Gard. Chron., i., p. 107.)
- D. PRÆCINCTUM*, *Rehb. f.*—India. (Gard. Chron., i., p. 750.)
- D. STRICKLANDIANUM*, *Rehb. f.*—Japan. (Gard. Chron., i., p. 749.)
- D. TIPULIFERUM*, *Rehb. f.*—Viti. (Gard. Chron., i., p. 72.)
- DRACÆNA SCHIZANTHA*, *Baker* (Liliaceæ.)—Somali-land. (Journ. Bot., p. 71.)
- DYCKIA FRIGIDA*, *Hook. f.* (Bromeliaceæ.)—Brazil. (Bot. Mag., t. 6294.)
- ELÆIS ODORA*, *Trail.* (Palmæ.)—Brazil. (Journ. Bot., p. 81.)
- ELEOCARPUS ARGYRODES*, *Hance* (Tiliaceæ.)—Cambodia. (Journ. Bot., p. 330.)
- EPICHARIS JUGLANS*, *Hance* (Meliaceæ.)—Cambodia. (Journ. Bot., p. 330.)
- EPIDENDRUM COXIANUM*, *Rehb. f.* (Orchideæ.)—Trop. Amer. (Gard. Chron., ii., p. 358.)
- ERIA CAROLETTÆ*, *Hance* (Orchideæ.)—Cambodia. (Journ. Bot., p. 337.)
- ETÆRIA WHITMEEI*, *Reichenb. f.*—Samoa. (Journ. Bot., p. 133.)
- EUGENIA BALFOURII*, *Baker* (Myrtaceæ.)—Rodriguez. (Journ. Linn. Soc., xvi., p. 13.)
- EXOCARYA*, *Benth.* (Cyperaceæ); *E. scleroides*, *Benth.*—N. S. Wales. (Ic. Plant., t. 1206.)
- EUPHORBIA DAPHNOIDES*, *Balf. f.* (Euphorbiaceæ.)—Rodriguez. (Journ. Linn. Soc., xvi., p. 21.)
- FICUS NORONHÆ*, *Oliv.* (Artocarpeæ.)—Fernando Noronha. (Ic. Plant. t. 1222.)
- FIMBRISTYLIS PYCNOSTACHYA*, *Hance* (Cyperaceæ.)—Cambodia. (Journ. Bot., p. 338.)
- GALACTIA ARGENTIFOLIA*, *S. Moore* (Leguminosæ.)—Zanzibar. (Journ. Bot., p. 291.)
- GASTERIA COLUBRINA*, *N. E. Br.* (Liliaceæ.)—Cape. (Gard. Chron., ii., p. 38.)
- GLOBBA SCHOMBURGKII*, *Hook. f.* (Zingiberaceæ.)—Siam. (Bot. Mag., t. 6298.)
- GONGORA GROSSA*, *Rehb., f.* (Orchideæ.)—Equador. (Gard. Chron., i., p. 781.)
- GRAMMATOPHYLLUM KEMPLERIANUM*, *Rehb. f.* (Orchideæ.)—Madagascar. (Gard. Chron., i., p. 240.)

GREWIA ECTASICARPA, *S. Moore* (Sterculiaceæ.)—Zanzibar. (Journ. Bot., p. 67.)

HEPTAPLEURUM SCHIZOPHYLLUM, *Hance* (Araliaceæ.)—Cambodia. (Journ. Bot., p. 334.)

HESPERANTHA LONGITUBA, *Baker* (Irideæ.)—Cape. (Gard. Chron., i., p. 652.)

HESPEROXIPHION, *Baker* (Irideæ) = *Ferraria pusilla*, Link & Otto, and *Cypella peruviana*, Baker. (Journ. Linn. Soc., xvi., p. 127.)

HETERACHNE, *Benth.* (Gramineæ); *H. Gulliveri*, *Benth.* (Ic. Plant., t. 1250.)

HOMALONEMA PELTATA, *Mast.* (Aroideæ.)—Columbia. (Gard. Chron., i., p. 273, and fig. 46.)

HOPEA DEALBATA, *Hance* (Dipterocarpeæ.)—Cambodia. (Journ. Bot., p. 329.)

HUERNIA BREVIROSTRIS, *N. E. Br.* (Asclepiadeæ.)—Cape. (Gard. Chron., i., p. 780, fig. 124.)

HYPOESTES INCONSPICUA, *Balf. f.* (Acanthaceæ.)—Rodriguez. (Journ. Linn. Soc., xvi., p. 18.)

H. RODRIQUESIANA, *Balf. f.*—Rodriguez. (Journ. Linn. Soc., xvi., p. 18.)

HYPOXIS ARNOTTII, *Baker* (Hypoxidaceæ.)—Cape. (Gard. Chron., ii., p. 552.)

ISOGLOSSA BARLERIODES, *S. Moore* (Acanthaceæ.)—Somali-land. (Journ. Bot., p. 70.)

IRIS KASHMIRIANA, *Baker* (Irideæ.)—Kashmir. (Gard. Chron., ii., p. 744.)

I. ROSSII, *Baker.*—N. China. (Gard. Chron., ii., p. 809.)

KLATTIA, *Baker* (Irideæ) = *Witsenia partita*, Ker. (Journ. Linn. Soc., xvi., p. 110.)

LÆLIA CALOGLOSSA, *Rehb. f.* (Orchideæ) (hybrid *Cattleya labiata* × *Lalia crispa*, or *Boothiana*.) (Gard. Chron., i., p. 202.)

L. SEDENI, *Rehb. f.* (hybrid *Cattleya violacea* × *Lalia devoniana*.) (Gard. Chron., ii., p. 424.)

LAMPROTHAMNUS, *Hiern* (Rubiaceæ); *L. zanzuebaricus*, *Hiern.*—Zanzibar. (Ic. Plant., t. 1220.)

LANDOLPHIA CAPENSIS, *Oliv.* (Apocynaceæ.)—Transvaal, S. Africa. (Ic. Plant., t. 1228.)

LINOCIERA CAMBODIANA, *Hance* (Oleaceæ.)—Cambodia. (Journ. Bot., p. 335.)

LOBELIA VAGANS, *Balf. f.* (Campanulaceæ.)—Rodriguez. (Journ. Linn. Soc., xvi., p. 16.)

LYSIMACHIA FENUM-GRÆCUM, *Hance* (Primulaceæ.)—China. (Journ. Bot., p. 355.)

L. ALFREDI, *Hance.*—China. (Journ. Bot., p. 356.)

MABA SAMOENSIS, *Hiern* (Ebenaceæ.)—Samoa. (Journ. Bot., p. 99, tab. 186.)

MASDEBALLIA LATA, *Rehb. f.* (Orchideæ.)—Central America. (Gard. Chron., i., p. 653.)

M. LEHMANNI, *Rehb. f.*—Equador. (Gard. Chron., ii., p. 38.)

- M. RADIOSA, *Rehb. f.*—N. Grenada. (Gard. Chron., i., p. 684.)
- M. TRIGLOCHIN, *Rehb. f.*—Equador. (Gard. Chron., ii., p. 648.)
- M. XANTHODACTYLA, *Rehb. f.*—Trop. Amer. (Gard. Chron., ii., p. 552.)
- MELODORUM CLAVIPES, *Hance* (Anonaceæ).—Cambodia. (Journ. Bot., p. 328.)
- MEMECYLON PIERREI, *Hance* (Melastomaceæ).—Cambodia. (Journ. Bot., p. 334.)
- MESEMBRYANTHEMUM COOPERI, *Hook. f.* (Ficoideæ).—S. Africa. (Bot. Mag., t. 6312.)
- M. SUTHERLANDII, *Hook. f.*—Natal. (Bot. Mag., t. 6299.)
- MICROSTYLIS JOSEPHIANA, *Reichenb. f.*—Sikkim Himalaya. (Bot. Mag., t. 6325.)
- MITRASACME SETOSA (Loganiaceæ).—Cambodia. (Journ. Bot., p. 335.)
- MONTBRETIA POTTSII, *Baker* (Iridæ).—Cape. (Gard. Chron., ii., p. 424.)
- NESOGENES DECUMBENS, *Balf. f.* (Verbenaceæ).—Rodriguez. (Journ. Linn. Soc., xvi., p. 19.)
- ONCINOTIS HIRTA, *Oliv.* (Apocynaceæ).—W. Trop. Africa. (Ic. Plant., t. 1232.)
- OPHIORRHIZA FUCOSA, *Hance* (Rubiaceæ).—Cambodia. (Journ. Bot., p. 334.)
- ORMOCARPUM KIRKII, *S. Moore* (Leguminosæ).—E. Trop. Africa. (Journ. Bot., p. 291.)
- O. MIMOSOIDES, *S. Moore.*—E. Trop. Africa. (Journ. Bot., p. 291.)
- OXALIS NORONHÆ, *Oliv.* (Geraniaceæ).—Fernando Noronha. (Ic. Plant., t. 1226.)
- PANDANUS HETEROCARPUS, *Balf. f.* (Pandanaceæ).—Rodriguez. (Journ. Linn. Soc., xvi., p. 22.)
- P. TENUIFOLIUS.—Rodriguez. (Journ. Linn. Soc., xvi., p. 22.)
- PARINARIUM ANAMENSE, *Hance* (Rosaceæ).—Cochin China. (Journ. Bot., p. 333.)
- PEDICULARIS GLORIOSA, *Biss. & S. Moore* (Scrophulariaceæ).—Japan. (Journ. Bot., p. 295.)
- PENTAS PARVIFOLIA, *Hiern.* (Rubiaceæ).—Zanzibar. (Journ. Linn. Soc., xvi., p. 262, tab. 7.)
- PEPEROMIA HIRTA, *Balf. f.* (Piperaceæ).—Rodriguez. (Journ. Linn. Soc., xvi., p. 20.)
- P. RETICULATA, *Balf. f.*—Rodriguez. (Journ. Linn. Soc., xvi., p. 21.)
- P. RODRIGUESIANA, *Balf. fil.*—Rodriguez. (Journ. Linn. Soc., xvi., p. 21.)
- PEPLONIA AMAZONICA, *Benth.* (Asclepiadeæ).—Brazil. (Ic. Plant., t. 1234.)
- PESCATOREA BACKHOUSIANA, *Rehb. f.* (Orchideæ).—Equador? (Gard. Chron., ii., p. 456.)
- PHEDRANASSA VIRIDIFLORA, *Baker* (Amaryllideæ).—Locality doubtful. (Gard. Chron., ii., p. 134.)

- PHALÆNOPSIS STOBARTIANA, *Rehb. f.* (Orchideæ.)—Locality doubtful. (Gard. Chron., ii., p. 392.)
- PHRAGMITES MACER, *Munro* (Gramineæ.)—Japan. (Journ. Bot., p. 350.)
- PIERREA, *Hance* (Samydacææ); *P. dictyoneura*, *Hance*.—Cambodia. (Journ. Bot. p. 339.)
- PILEA BALFOURII, *Baker* (Urticacææ.)—Rodriguez. (Journ. Linn. Soc., xvi., p. 20.)
- PISONIA VISCOSA, *Balf. f.* (Nyctagineæ.)—Rodriguez. (Journ. Linn. Soc., xvi., p. 19.)
- PITHECOLOBIUM ZANZIBARICUM, *S. Moore* (Leguminosæ.)—Zanzibar. (Journ. Bot., p. 292.)
- PLAGIOSETUM, *Benth.* (Gramineæ) = *Pennisetum refractum*, *F. Muell.*—(Ic. Plant., iii., p. 33.)
- PSIADIA RODRIGUESIANA, *Balf. f.* (Compositæ.)—Rodriguez. (Journ. Linn. Soc., xvi., p. 15.)
- PSYCHOTRIA? LANCEOLATA, *Balf. f.* (Rubiaceæ.)—Rodriguez. (Journ. Linn. Soc., xvi., p. 15.)
- PTEROSPERMUM PIERREI, *Hance* (Sterculiaceæ.)—Cambodia. (Journ. Bot., p. 329.)
- PYROSTRIA TRILOCULARIS, *Balf. f.* (Rubiaceæ.)—Rodriguez. (Journ. Linn. Soc., xvi., p. 14.)
- QUIVISIA LACINIATA, *Balf. f.* (Meliaceæ.)—Rodriguez. (Journ. Linn. Soc., xvi., p. 12.)
- RANDIA HETEROPHYLLA, *Balf. f.* (Rubiaceæ.)—Rodriguez. (Journ. Linn. Soc., xvi., p. 14.)
- REAUMURIA FLOYERI, *S. Moore* (Tamariscineæ.)—Persia. (Journ. Bot., p. 289.)
- RHIPSALIS PENDULIFLORA, *N. E. Br.* (Cactaceæ.)—Trop. America. (Gard. Chron., ii., p. 716.)
- RHODODENDRON QUINQUEFOLIUM, *Biss. & S. Moore* (Ericaceæ.)—Japan. (Journ. Bot., p. 292.)
- RONDELETIA BACKHOUSII, *Hook. f.* (Rubiaceæ.)—Trop. America. (Bot. Mag., t. 6290.)
- SARCOSTEMMA ODONTOLEPIS, *Balf. f.* (Asclepiadææ.)—Rodriguez. (Journ. Linn. Soc., xvi., p. 17.)
- SCLEROCARYA CASTANEA, *Baker* (Anacardiaceæ.)—Rodriguez. (Journ. Linn. Soc., xvi., p. 12.)
- SCYPHOCHLAMYS, *Balf. f.* (Rubiaceæ); *S. revoluta*, *Balf. f.*—Rodriguez. (Journ. Linn. Soc., xvi., p. 14.)
- SEBÆA OLDENLANDIODES, *S. Moore* (Gentianaceæ.)—Zanzibar. (Journ. Bot., p. 68.)
- SEMPERVIRUM GREENII, *Baker* (Crassulacææ.)—Locality doubtful. (Gard. Chron., ii., p. 230.)
- SENECIO CHEESEMANI, *Hook. f.* (Compositæ.)—New Zealand. (Ic. Plant., t. 1201.)
- SERICOCOMA PALLIDA, *S. Moore* (Amaranthaceæ.)—Somali-land. (Journ. Bot., p. 70.)
- S. SOMALENSIS, *S. Moore*.—Somali-land. (Journ. Bot., p. 70.)
- SOBRALIA CATTLEYA, *Rehb. f.* (Orchideæ.)—N. Grenada. (Gard. Chron., i., p. 72.)

- SOLANUM ACANTHODES, *Hook. f.* (Solanaceæ).—Brazil? (Bot. Mag., t. 6283.)
- SPATHOGLOTTIS PETRI, *Rehb. f.* (Orchideæ).—Polynesia. (Gard. Chron., ii., p. 392.)
- SPHENOSTIGMA, *Baker* (Irideæ) = *Atophia Sellowiana*, Klatt. (Journ. Linn. Soc., xvi., p. 124.)
- SPHINCTACANTHUS GRIFFITHII, *Benth.* (Acanthaceæ).—Bengal. (Ic. Plant., t. 1205.)
- SPORTELLA, *Hance* (Rosaceæ); *S. atalantoides*, *Hance.*—China. (Journ. Bot., p. 207.)
- STANHOPEA PULLA, *Rehb. f.* (Orchideæ).—Costa Rica. (Gard. Chron., i., p. 810.)
- STAPELIA PATENTIROSTRIS, *N. E. Br.* (Asclepiadeæ).—Cape. (Gard. Chron., i., p. 140, and fig. 21.)
- S. BAYFIELDI, *N. E. Br.*—Cape. (Gard. Chron., i., p. 431, and fig. 66.)
- S. UNGUIPETALA, *N. E. Br.*—Cape. (Gard. Chron., i., p. 334, and fig. 54.)
- STIPA PEKINENSIS, *Hance* (Gramineæ).—China. (Journ. Bot., p. 268.)
- STROBILANTHES FORMOSANA, *S. Moore* (Acanthaceæ).—Formosa. (Journ. Bot., p. 294.)
- TANULEPIS, *Balf. f.* (Asclepiadeæ); *T. sphenophylla*, *Balf. f.*—Rodriguez. (Journ. Linn. Soc., xvi., p. 17.)
- TELIPOGON CRESUS, *Rehb. f.* (Orchideæ).—N. Grenada. (Gard. Chron., i., p. 172.)
- TERMINALIA PAPILIO, *Hance* (Combretaceæ).—Cambodia. (Journ. Bot., p. 333.)
- TETRANTHERA MACROCALYX, *Hance* (Lauraceæ).—Cambodia. (Journ. Bot., p. 336.)
- THORELIA, *Hance* (Lythraceæ); *T. deglupta*, *Hance.*—Siam. (Journ. Bot., p. 268.)
- THRIXSPERMUM FREEMANNI, *Rehb. f.* (Orchideæ).—Assam. (Gard. Chron., i., p. 750.)
- TINNEA HETEROTYPICA, *S. Moore* (Labiataæ).—Somali-land. (Journ. Bot., p. 69.)
- TRICHLORA, *Baker* (Liliaceæ); *T. peruwiana*, *Baker.*—Peru. (Ic. Plant., t. 1237.)
- TRICHODERMA HELIOCHARIS, *S. Moore* (Boraginææ).—Somali-land. (Journ. Bot., p. 68.)
- TRICHOSTACHYS VAGINALIS, *Hiern* (Rubiaceæ).—W. Trop. Africa. (Journ. Linn. Soc., xvi., p. 263, tab. 8.)
- TRISTILLATEIA AFRICANA, *S. Moore* (Malpighiaceæ).—Zanzibar. (Journ. Bot., p. 290.)
- TRIUMFETTA ACTINOCARPA, *S. Moore* (Tiliaceæ).—Somali-land. (Journ. Bot., p. 66.)
- T. GRANDIDENS, *Hance.*—Cambodia. (Journ. Bot., p. 329.)
- UNONA VELUTINA, *Hance* (Anonaceæ).—Cambodia. (Journ. Bot., p. 328.)
- UVARIA ASTERIAS, *S. Moore* (Anonaceæ).—Zanzibar. (Journ. Bot., p. 289.)

VILLARSIA CAMBODIANA, *Hance* (Gentianaceæ.)—Cambodia. (Journ. Bot., p. 335.)

XYLOPIA PIERREI, *Hance* (Anonaceæ.)—Cambodia. (Journ. Bot., p. 328.)

ZANTHOXYLON PANICULATUM, *Balf. f.* (Rutaceæ.)—Rodriguez. (Journ. Linn. Soc., xvi., p. 12.)

ZYGOPETALUM CLAYII, *Rehb. f.* (hybrid *Z. maxillare* × *crinitum*.) (Gard. Chron., i., p. 684.)

Troisième Mémoire sur les Mucorinées. Par M. PH. VAN TIEGHEM. (Ann. des Sc. Nat., Sér. vi., tome iv., p. 312).

THIS third memoir is prefixed by some general observations on classification from the author's now well-known point of view, and by a study of some general questions bearing on the special group the knowledge of which he has done so much to advance. This study is at first concerned with the mutilation and fragmentation of reproductive cells. To deal with this, zygospores of *Sporodinia grandis* and of *Spinellus fusiger* were chosen on the one hand, and asexual spores of *Pilobolus Edipus*, *Phycomyces nitens*, and *Mortierella reticulata* on the other. A preliminary necessary condition was found to be that the body to be mutilated must be proximately homogeneous; so that with zygospores the experimentation must occur either before perfect maturity, or after commencement of germination when the oil has disappeared: a second condition is that the fragment be not too small.

The process was thus conducted:—Buddings from a zygospore, germinating in a humid atmosphere, were cut off as they appeared; after a time the contents of the zygospore divided into a number of spores, separated by interstitial matter: the same result was obtained by similar treatment of an asexual spore; and if Schizomycetous organisms were admitted into the culture-fluid, these endospores were produced without scission of buds.

The author then passes on to consider the cause which favours formation of zygospores, which he continues to find in the air being impoverished of oxygen. After this he details the differences in the germination, in different media, of spores and zygospores; and then he treats at length of the structure and mode of dehiscence of the sporangium in *Pilobolus* and *Pilaira*. Then follows the systematic portion, in which are described three new species of *Pilobolus*; a new genus (*Absidia*) with four species; two new specific forms referred to *Rhizopus*; a new *Helicostylum*, with relegation of *Circinella glomerata*, of the first memoir, to this genus; a *Thamnidium*; three new species of *Mortierella*, and the same number belonging to *Syncephalis*.

The new genus *Absidia* has, roughly speaking, the asexual growth of *Rhizopus* and the sexual growth of *Phycomyces*. From the former it differs chiefly in that the sporangiferous stolons have a parabolic form and are cuticularised throughout; that the sporangia alternate with the rootlets instead of being superposed to

them; that the form of the columella is conical and slender (not globular), and that this organ has a different history subsequent to escape of the spores; that the membrane of the spores is not cuticularised and coloured; and that the zygospores have a *Phycomyces*-like investment. The author finds that if a spore is kept in a nutritive medium it produces a mycelium; placed in a moist atmosphere, after having attained a certain size under proper nutrimental conditions, it gives origin directly to a sporange, without forming any mycelium. The zygospore behaves in a similar manner: these organs may sometimes, it was observed, be borne on the parabolic stolons.

Asexual spores, similar to the zygospores, are sometimes produced by a parthenogenetic process; these the author terms *azygospores*. The curving of the stolons is held to result from the contiguity of a foreign body, this tendency being distinguished as positive *somatropism*.

Below is the author's tribal arrangement of the group.

Mucorineæ.

No stylospores. A columella in the sporange, the membrane of which is	{	heterogeneous, <i>i. e.</i> formed of an upper cuticularised hood and a lower diffluent zone.	<i>Piloboleæ.</i>
Stylospores present. No columella in the sporange, which is	{	homogeneous, either all entirely persistent or all diffluent	<i>Mucoreæ.</i>
		(spherical and isolated.)	<i>Mortierelleæ.</i>
		(cylindric and grouped in capsule)	<i>Syncephalideæ.</i>

S. M.

Die Pilze des Weinstockes. G. FELIX VON THÜMEN. Vienna, 1878. (pp. 225, with 5 plates).

THIS monograph of the Fungi of the Vine is a work of interest not only to the scientific botanist, but also, though perhaps in a lesser degree, to all our cultivators. It contains an enumeration of some two hundred and twenty species of Fungi which occur upon the Vine, its leaves, fruit, stems, branches and roots, in various parts of the world. It treats of the Fungi found upon the following nine species of *Vitis*, viz.: *V. vinifera*, L. (150); *V. Labrusca*, L. (54); *V. æstivalis*, Mchx. (13); *V. vulpina*, L. (7); *V. riparia*, Mchx. (3); *V. cordifolia*, Mchx. (3); *V. rotundifolia*, Mchx. (2); *V. candicans*, Engelm. (1); *V. sylvestris*, Gmel. (2). Of the nineteen Fungi affecting the Grape itself, *Oidium Tuckeri* is of course the most important in a practical point of view. Baron Thümen appears to follow Fuckel in regarding it as the conidial form of *Sphærotheca castagnei*, Lév., and therefore distinct from the American *Erysiphe nectator*, Schw., which species does not seem to have been recorded since Schweinitz's time; while it is classed by Dr. Cooke, in 'The *Erysiphei* of the United States,' with the "species dubiæ." The author also considers it unconnected with

a variety of *Uncinula spiralis*, B. & C., that occurs sometimes upon the Grape in the United States.

Amongst the great number of Fungi upon the living and dead Vine-stems and branches are many new species. The *Spharixæ* are designated by their new generic appellations—*Cryptovalsa*, *Botryosphaeria*, *Bertia*, *Teichospora*, *Anthostomella*, *Rebentiochia*, *Valsaria*, &c., names much more familiar to continental botanists than to us in this country, who are somewhat slow in appreciating the advantages of this system of nomenclature.

Of the hymenomycetous Fungi twenty-two species are mentioned, mostly on the dead stems, including a small Agaric from the Cape of Good Hope, *Ag. proteus*, Kalkbr., allied to *Ag. variabilis*, P. Of the Fungi on living Vine-leaves one of the most interesting is a new species of *Uredo*, *U. Vitis*, Thm., which, like *Peronospora Vitis*, is of Transatlantic origin.

The difference between the American and European Vine-flora is very striking; so many Fungi occur in America that have not been met with in Europe, where Vines form such an important industry and mycologists are so much more numerous. Many of the old species of Schweinitz have never been met with here.

A figure is given of the curious mould which grows parasitically upon *Oidium Tuckeri*, the *Cicinnobolus Cesatii* of De Bary, a plant apparently common enough on the Continent, but as yet unobserved in Great Britain.

Baron von Thümen is to be congratulated upon the exhaustive manner in which he has compiled this monograph, which is accompanied by lithographic plates illustrating the structure and fructification of the more important species, whereby the value of the book as a work of reference to the student is materially enhanced.

CHARLES B. PLOWRIGHT.

On the Homologies of the Suspensor. By S. H. VINES. ('Quarterly Journal of Microsc. Science,' 1878, p. 58.)

THE author concludes "that the seta and foot of Mosses and Liverworts, the foot of the vascular Cryptogams (excluding *Equisetaceæ* so far), the suspensor of *Selaginella*, of Gymnosperms, and of Angiosperms, are derived from that cell, produced by the division of the oospore, to which, for the sake of clearness, the name of Embryophore has been given. These organs may, therefore, be regarded as truly homologous, and this view is not invalidated by the fact that the suspensor or the foot is developed, in some cases from the whole of the Embryophore, in others from a part of it. This fact merely renders the homology incomplete in certain cases." The term 'Embryophore' is applied to the cell which gives origin to the tissue maintaining temporary connection between the embryo and neighbouring structures, that of 'embryonic cell' to the special cell of embryo-formation,—a convenient piece of nomenclature. The Embryophore, we would observe, is not always produced by a process which, even in its widest sense,

can be called one of cell-division, as in *Ephedra*. The paper is evidently inspired by Kienitz-Gerloff's in 'Botanische Zeitung,' November, 1876. S. M.

Deuxième Note sur les Mouvements spontanés et réguliers du Ceratophyllum demersum. Par E. RODIER.

THE author has continued his examination of the movements of *Ceratophyllum* (see Journ. Bot., 1877, p. 248), by the observation of the torsion which accompanies the flexion of the distal internodes. In general, when examined at about six in the morning, a movement of torsion from left to right is proceeding; this then stops, and gives place to a movement from right to left, which continues up to about 11 a.m., that is, for about five hours; the experiments showed a mean of about 36° per hour, *i.e.*, of 180° or half the circumference during the whole time. The reverse torsion from left to right commences immediately the former ceases, and goes on at the rate of about 12° an hour,—one-third that of the morning; estimating its duration at $7\frac{1}{2}$ hours, its amount is 90° , or one-half that of the morning. Tables are given of these results, and show that there is by no means complete regularity in the movements.

M. Rodier's observations were stopped in November by the plant passing into its winter state, in which its movements are almost entirely suspended. The elongation of the terminal buds ceases, the last verticils of leaves remain closely imbricated, and the latter become stiffly curved, thicker, and larger, with the air-cavities swollen and full of gas. At the same time the axis becomes thickened and pink, and its cells are found to be crowded with starch and rounded. In short, we have here produced winter buds by which the plant is propagated. They are very easily detached from the old stems, and then readily float, and are carried by the stream. H. T.

We have Part 87 of F. von Mueller's 'Fragmenta,' which completes the tenth volume of this miscellany of Australian Botany. There is an useful index to vols. vi. to x. issued with the part.

The botanists of the west of France have been actively working at their interesting flora during the past two years, and M. Lloyd gives a summary of the principal results as a sort of appendix to his 'Flore de l'Ouest de la France,' the last edition of which is dated 1876. The tendency to make and name new species out of slight local forms seems very prevalent with some French botanists. Such are *Thalictrum Saratieri*, *Matthiola oyensis*, and *Viola Foucaudi*, which are properly referred to *T. minus*, *M. sinuata*, and *V. nana* by Lloyd. An interesting *Elatine*, from the tidal mud of the Loire at Trentemoult (Nantes), is named *E. inaperta*, Lloyd. It differs from all the other European species in its completely-closed flowers which never open, the three petals forming a rounded button over the ovary; the flowers are sessile, with two sepals and three

stamens, as in *F. triandra*, Schkuhr, which is its nearest European ally. M. Lloyd thinks the plant may prove to be a form of *F. americana*, Arn. (which also has closed flowers), and possibly introduced many years ago with *Ilysanthes gratiolooides* which grows with it. (See also a Note, by Prof. A. Gray, in 'Proc. Amer. Acad.,' April 5, 1878, p. 361.)

OTHER NEW BOOKS.—G. BENTHAM, assisted by F. VON MUELLER, 'Flora Australiensis,' vol. vii. *Roxburghiaceæ* to *Filices* (London, Lovell Reeve, 20s.)—SERENO WATSON, 'Bibliographical Index to N. American Botany,' part I., *Polypetalæ* (Washington, Smithsonian Institution, March, 1878.)—W. R. McNAB, 'Botany, Outlines of Morphology and Physiology' (London Science Class-Books; London, Longmans, 1878, 1s. 6d.)—E. HALLIER, 'Die Plastiden der niederen Pflanzen,' (Leipzig, Fues., 5m.)—T. HARTIG, 'Anatomie and Physiologie der Holzpflanzen' (Berlin. Springer, 20m.)—P. A. SACCARDO, 'Fungi Italici autographice delineati,' fasc. 1 to 8 Patavii, 32s.—E. STRASBURGER, 'Befruchtung und Zelltheilung' (Jena, H. Dabis, 7m.)—A. FRANCHET & L. SAVATIER, 'Enumeratio Plantarum in Japonia sponte crescentium,' vol. ii., pars 2 (Paris, Savy, 8s. 6d.)

ARTICLES IN JOURNALS.—MARCH, 1878.

Grevillea.—M. C. Cooke & J. B. Ellis, 'New-Jersey Fungi' (continued).—M. C. Cooke, 'New British Fungi.'—F. de Thuemen, 'Fungi Ægyptiaci collect. a G. Schweinfurth.'—Hazslinszky, '*Geaster orientalis*, n. sp.' (tab. 98).—Id., '*Belonia herculana*, n. sp.'—M. C. Cooke, 'Indian Fungi.'—A. Ernst, '*Simblum pilidiatum*, n. sp.'

Bot. Zeitung.—H. F. Jonkman, 'On the development of the prothallium in *Marattiaceæ*' (tab. 5, 6).—P. Krutizky, 'Description of an apparatus for estimating the amount of watery vapour absorbed by the plant.'—W. Breitenbach, '*Asparagus officinalis* a triœcious plant.'—K. Goebel, 'On some marine *Algæ*.'

Flora.—P. G. Strobl, 'Flora of the Nebrodes' (continued).—F. von Thuemen, 'Diagnoses of Thuemen's Mycotheca Universalis.'—Biography of S. Kurz.—S. Schulzer, 'Influence of light on Fungi.'—Rosbach, 'Localities for rare plants near Treves.'—N. W. P. Rauwenhoff, 'On the so-called horn-tissue.'—O. Bœckeler, 'Diagnoses of new and undescribed *Cyperaceæ*.'

Hedwigia.—C. Gobi, 'On a *Rivularia* causing the phenomenon of "wasserblüthe" in sea-water.'—M. C. Cooke, 'North American Fungi.'—Fischer v. Waldheim, '*Ustilago Thuemenii*.'

Magyar Novevnytani Lapok.—'Unpublished letters of early botanists: 1, Rembert Dodonæus to C. Clusius.'—J. Kunszt, 'Flora of the Upper Neogradian Country' (continued).

American Naturalist.—J. M. Anders, 'On the transpiration of plants.'

Oesterr. Bot. Zeitschrift.—F. Hauck, 'Alga of the Adriatic' (continued, tab. 1).—F. v. Hohnel, 'Remarks on the cuticle.'—G. v. Niessl, 'Species of *Sporormia*' (continued).—F. Antoine, 'Botany of Vienna Exhibition' (continued).—J. Freyer, '*Muscari* (*Bellevalia*, *Leopoldia*) *Weissii*, sp. nov.'—J. R. Stroecker, 'The molecular causes of plant-structures.'

Proceedings of Societies.

LINNEAN SOCIETY OF LONDON.

March 7, 1878.—Dr. Gwyn Jeffreys, Vice-President in the chair. — Mr. Charles P. Hobkirk, of Huddersfield, was elected a Fellow of the Society.—Mr. Thomas Christy exhibited and made remarks on a series of fruits, among which were Chinese Quinces, Chayottes, and a fingered Citron known in China as the "Claw of Buddha."—The following papers were read:—'On the Laws governing the production of Seed in *Wistaria sinensis*,' by Thos. Meehan. The author pointed out that the Chinese *Wistaria*, when supported, grows with wonderful rapidity, branches and flowers being plentiful, but that it seldom or never produces seeds. On the other hand, tree *Wistarias* seed abundantly, but send forth shoots very sparingly. In fact, in the one case vegetative, in the other reproductive, force predominates. Recent contributions incline to connect the above circumstances with insect agency and cross fertilization. Bees perforate the corolla from the outside instead of entering the mouth. From his observations, however, Mr. Meehan believes that the question at issue is not related to pollenization, but rather bears on the harmonious relation of the nutritive powers.—'Enumeration of the Fungi collected during the Arctic Expedition, 1875-76,' by the Rev. M. J. Berkeley. The series consists of twenty-six species, all determined save two left doubtful from condition of specimens. Of the above, seventeen are widely distributed already well-known forms, but seven are new and hitherto undescribed species. Of these last, *Agaricus Feildeni*, probably esculent, and *Urnula Hartii* are the most interesting. The occurrence of *Chatomium glabrum* on the walls of the cabin of H.M.S. 'Alert,' in great abundance, is very curious, and notably the smaller size of its sporidia in the Arctic specimens.

Botanical News.

It is intended to open the International Congress of Botany and Horticulture at Paris, on August 16th; it will last a week, and will be held at the rooms in the Rue de Grenelle, No. 84. The following matters are proposed for discussion:—The physiology of the root; gymnospermy; the reproduction of Hymenomycetes and

Ascomycetes; also, the organisation of botanical laboratories; the arrangement of botanical museums and herbaria; and the planning, classifying, and labelling of botanic gardens. It is desired to form an exhibition of herbaria, botanical instruments and apparatus, plans of laboratories and gardens, books, plates, drawings, diagrams, &c. Botanists intending to be present should send their names to the Organising Committee at the above address. Besides the sessions of the Congress, there will be organised excursions and visits to scientific establishments, the details of which will be published hereafter.

WE are pleased to learn that the Senate of the University of Cambridge has granted an assistant curator of the herbarium which has long been in need of such help.

THE vacancy caused at Kiel by Prof. Eichler's call to Berlin is filled by the appointment of Prof. Engler, of Munich. Prof. Schwendener, of Tübingen, also goes to Berlin.

THE death, in his sixtieth year, of MORITZ SEUBERT, Professor in the Polytechnic School at Karlsruhe, occurred on April 6th. He is known as the author of the first Flora of the Azores,—'Flora Azorica,' published in 1844, and founded on Hochstetter's collections made in 1838; this is illustrated with good plates, drawn by the author. He also published a monograph of the genus *Elatine* in the 'Nova Acta' for 1845, and elaborated many of the monocotyledonous Orders for the 'Flora Brasiliensis,' besides writing some good local Floras of S.W. Germany. Mr. H. C. Watson dedicated a genus to him, founded on *Bellis azorica*, but *Seubertia* has not been maintained by the authors of the 'Genera Plantarum.'

WE have also to note the death, at Friburg, of AUGUST JAEGER, a well-known Swiss bryologist, and author of several papers on the mosses of that country.

WE regret to record the death of THOMAS THOMSON, M.D., which occurred on 18th April. He was born in Glasgow in 1817, and was educated in the University of that city. He entered the service of the Hon. E. India Company as assistant-surgeon, and botanized in the N.W. provinces. In 1847, he was selected to accompany the mission to Tibet, which visited that country in 1848-49. At the end of that year he joined Dr. J. D. Hooker, at Darjiling, and they spent the year 1850 in travelling and collecting in the Khasia Mountains, returning together to England in the spring of 1851 with very large collections. The next few years was employed at Kew in naming and distributing these. Dr. Thomson was afterwards appointed to the Directorship of the Calcutta gardens, but remained there but a few years, returning to England about 1860, since when feeble health has prevented him from doing much botanical work. Dr. Thomson's most important contribution is the first volume (extending only from *Ranunculaceæ* to *Fumariaceæ*) of the elaborate "Flora Indica," of which he was joint author with Dr. (now Sir) J. D. Hooker, and which was published in 1855.

Original Articles.

A NEW KEY TO THE GENERA OF *AMARYLLIDACEÆ*.

By J. G. BAKER, F.L.S.

In the present paper I propose to attempt to construct a key to the genera of *Amaryllidaceæ*, in which flower-characters shall be used as prominently as possible. The genera of the Order are well and fully described in detail in three comparatively recent works, viz., Herbert's '*Amaryllidaceæ*,' published in 1837; the fifth volume of Kunth's '*Enumeratio*,' published in 1850; and the fragment of Salisbury's '*Genera Plantarum*,' which was issued by Dr. John Edward Gray in 1866. But still, for everyday working purposes, a key of the Order is greatly needed, partly because it is very difficult to judge from a long description, where nothing is emphasised, which characters are relied upon as differential, and partly because the primary arrangement and grouping used by these authors depends to a large extent upon fruit and seed-characters, and these are seldom shown either by living or dried specimens in the state in which they are commonly submitted to botanists for identification. And another point is, that not to speak of Salisbury, whose ideas of a genus were such that he proposes to make sixteen out of *Narcissus* as we commonly understand it, many of Herbert and Kunth's genera are limited by characters so faint that they are not at all likely to be adopted by general botanists, who have the whole vegetable kingdom to deal with. And one great good of these keys, whether they deal with genera or species, is that they are so well adapted to bring into prominence which of the separate individualities they deal with rest upon an unsubstantial diagnostic foundation. As I have lately dealt elsewhere with the *Agaveæ* and *Hypoxidaceæ*, what I propose to do now is simply to attempt to make a key for the *Amaryllidaceæ* proper and *Alstræmeriæ*, and to follow it up by a few explanatory remarks referring mainly to the reductions that seem needful in genera and species as they stand in Kunth, and the comparatively few novelties that have been discovered in the Order during the last thirty years.

Subordo I. *AMARYLLIDACEÆ VERÆ*. *Herbæ bulbosæ acaules, floribus umbellatis vel solitariis.*

Tribus I. *GALANTHÆÆ*. *Stamina epigyna, filamentis brevibus liberis, antheris apice dehiscentibus.*

I. *GALANTHUS*. *Perianthii segmenta interiora exterioribus multo breviora, cuneata, obtusa, profunde emarginata. Europa, Asia occidentalis.*

II. LEUCOJUM. Perianthii segmenta omnia consimilia æquilonga. *Europa, Asia occidentalis, Algeria, Mauritania.*

Tribus II. STRUMARIÆ. Stamina epigyna, filamentis elongatis liberis, antheris latere dehiscentibus.

III. STRUMARIA. Genus solum. *C. B. Spei.*

Tribus III. AMARYLLIDÆ. Stamina perigyna, filamentis liberis haud appendiculatis.

Subtribus I. ZEPHYRANTHÆ. Unifloræ, rarissime bifloræ, perianthio erecto, segmentis cum staminibus undique ab stylo divergentibus.

* *Filamenta brevissima.*

IV. HAYLOCKIA. Scapus brevissimus, hypogæus. Perianthium infundibulare. Stamina 6, uniseriata. Stigma trifidum. Fructus capsularis, seminibus nigris discoideis. *Monte Video.*

V. APODOLIRION. Scapus brevissimus, hypogæus. Perianthium infundibulare. Stamina 6, distincte biseriata. Stigma capitatum. Fructus ignotus. *C. B. Spei.*

VI. GETHYLLIS. Scapus brevissimus, hypogæus. Perianthium infundibulare. Stamina 6, vel plura, uniseriata. Stigma subcapitatum. Fructus baccatus, seminibus turgidis. *C. B. Spei.*

VII. COOPERIA. Scapus elongatus. Perianthium subtrotatum. Fructus capsularis, seminibus nigris discoideis. *Texas, Mexico.*

** *Filamenta producta.*

VIII. STERNBERGIA. Perianthii tubus brevis vel productus cylindricus. Stigma subcapitatum. Fructus subbaccatus, seminibus turgidis. Flores lutei. *Europa, Oriens, Mauritania.*

IX. ZEPHYRANTHES. Perianthii tubus brevis vel nullus. Stigma trifidum, stigmatibus subulatis. Fructus capsularis, seminibus nigris discoideis. Flores sæpissime albidii vel rubelli. *Amer. trop. et subtemperata.*

X. PYROLIRION. Perianthii tubus productus, late infundibularis. Stigma trifidum, stigmatibus magnis, apice cochleatis. Fructus capsularis, seminibus nigris discoideis. *Andes Peruvicæ et Bolivicæ.*

Subtribus II. HÆMANTHÆ. Flores umbellati, perianthii tubo brevi vel nullo, segmentis angustis cum staminibus undique ab stylo divergentibus.

* *Ovula in loculo 2 vel pauca. Semina turgida.*

XI. HÆMANTHUS. Umbella densiflora, capitata, pedicellis brevibus, bracteis verticillatis. Stigma subcapitatum. Antheræ versatiles. Fructus baccatus. *C. B. Spei, Africa tropicalis.*

XII. BUPHANE. Umbella multiflora, pedicellis elongatis, bracteis binis. Stigma capitatum. Antheræ versatiles. Fructus capsularis. *C. B. Spei, Africa tropicalis.*

XIII. HESSEA. Umbella pauciflora vel multiflora, pedicellis elongatis, bracteis binis. Stigma trifidum, stigmatibus subulatis. Antheræ basifixæ. Fructus capsularis. *C. B. Spei.*

XIV. CARPOLYZA. Umbella pauciflora, pedicellis elongatis, bracteis binis. Stigma trifidum. Antheræ minutæ, dorsifixæ. Fructus capsularis. *C. B. Spei.*

** *Ovula in loculo plura. Semina discoidea vel triquetra.*

XV. LAPIEDRA. Perianthium rotatum, album, tubo nullo vel brevissimo. Stigma capitatum. *Hispania, Mauritania.*

XVI. ANOIGANTHUS. Perianthium infundibulare, lutescens, tubo brevi. Stigma trifidum. *C. B. Spei.*

XVII. UNGERNIA. Perianthium tubuloso-campanulatum, minutum, tubo brevi. Stigma capitatum. *Persia.*

Subtribus III. CLIVIEÆ. Flores umbellati, tubo brevi vel raro segmentis æquilongo, segmentis obtusis conniventibus, genitalibus rectis vel declinatis.

XVIII. CLIVIA. Bulbus subnullus. Folia plura, lorata, persistentia. Semina in loculo solitaria, magna. *C. B. Spei.*

XIX. PHÆDRANASSA. Bulbus tunicatus. Folia 1-2, hysternthia, petiolata. Stamina vix exserta. Semina in loculo plura, discoidea. *Amer. Trop.*

XX. CALLIPSYCHE. Bulbus tunicatus. Folia 1-2, hysternthia, petiolata. Stamina longe exserta, declinata. Semina in loculo plura, discoidea. *Amer. trop.*

Subtribus IV. BRUNSVIGIÆ. Flores umbellati. Perianthii tubus brevis vel nullus, segmentis angustis cum genitalibus contiguis declinatis.

* *Folia petiolata. Ovula in loculo gemina erecta.*

XXI. GRIFFINIA. Genus solum. *Brasilia.*

** *Folia sessilia. Ovula in loculo plura, superposita.*

XXII. SPREKELIA. Perianthium bilabiatum, segmentis 3 inferioribus contiguis. *Amer. trop.*

XXIII. NERINE. Perianthium regulare. Ovarium parvum, oblongum. Folia subsynanthia. *C. B. Spei, Asia orientalis.*

XXIV. BRUNSVIGIA. Perianthium regulare. Ovarium magnum, turbinatum, angulatum. Folia hysternthia. *C. B. Spei.*

Subtribus V. AMARYLLIDÆ. Flores umbellati, perianthii tubo sæpissime brevi, segmentis latis oblongis vel obovatis.

XXV. AMARYLLIS. Perianthium infundibulare, genitalibus declinatis. Semina pauca, magna, turgida. *C. B. Spei.*

XXVI. HIPPEASTRUM. Perianthium infundibulare, genitalibus declinatis. Semina plura, nigra, discoidea. *Amer. trop. et subtemperata.*

XXVII. VALLOTA. Perianthium subrotatum, genitalibus vix declinatis. Semina plura, nigra, discoidea. *C. B. Spei.*

Subtribus VI. CRINEÆ. Flores umbellati, perianthii tubo elongato, segmentis angustis vel latis.

* *Perianthii tubus cylindricus.*

XXVIII. CRINUM. Filamenta sæpissime elongata. Stigma capitatum. Flores albi vel rubidi. *Reg. calidiores totius orbis.*

XXIX. CHLIDANTHUS. Filamenta brevissima. Stigma trifidum. Flores lutei. *Andes.*

** *Perianthii tubus infundibularis.*

XXX. URCEOLARIA. Folia oblonga, petiolata. Perianthium luteo-viride, segmentis lanceolatis, tubo æquilongis. *Andes.*

XXXI. PENTLANDIA. Folia linearia, sessilia. Perianthium coccineum, segmentis parvis oblongo-deltaideis. *Andes.*

XXXII. CYRTANTHUS. Folia sessilia, linearia, vel lorata. Perianthium rubellum, lutescens vel albidum, segmentis tubo 2-4-plo brevioribus. *C. B. Spei.*

Tribus IV. PANCRATIEÆ. Stamina perigyna, filamentis appendulatis, sæpissime deorsum in coronam monadelpham coalita.

* *Filamenta dentata, haud monodelpha.*

XXXIII. EUSTEPHIA. Flores rubro-virides. Perianthii tubus brevis, campanulatus; segmenta oblanceolata. Folia sessilia, linearia *Peruvia.*

XXXIV. VAGARIA. Flores albi. Perianthii tubus cylindricus; segmenta linearia. Folia sessilia, linearia. *Syria.*

XXXV. CALLIPHRURIA. Flores albi. Perianthii tubus infundibularis. Segmenta oblonga, tubo æquilonga. Folia petiolata, oblonga. *Columbia.*

** *Filamenta in coronam deorsum monodelpha.*
+ *Perianthii segmenta linearia.*

XXXVI. TAPEINANTHUS. Perianthii tubus brevissimus. Corona brevissima, filamentis divergentibus. Flores lutei. *Hispania.*

XXXVII. HYLINE. Perianthii tubus nullus. Corona brevissima, filamentis longis rectis. Flores albi. *Brasilia.*

XXXVIII. HYMENOCALLIS. Perianthii tubus cylindricus. Corona magnitudine mediocris, filamentis elongatis divergentibus. Semina magna bulbiformia. *America tropicalis et sub-temperata.*

XXXIX. ISMENE. Perianthii tubus cylindricus. Corona magna, filamentis brevibus inflexis. Semina magna, bulbiformia. *America tropicalis et subtemperata.*

XL. PANCRATIUM. Perianthii tubus cylindricus. Corona magna, filamentis brevibus. Semina plura atra. *Regiones tropicales et subtemp. totius orbis.*

XL I. PLACEA. Perianthii tubus nullus vel brevissimus. Corona parva, filamentis declinatis. Flores rubelli vel lutei. *Chili*.

XL II. ELISENA. Perianthii tubus cylindricus. Corona magna, filamentis productis declinatis. Flores albi. *Andes*.

++ *Perianthii segmenta oblonga.*

XL III. EUCHARIS. Perianthium rotatum. *Columbia*.

XL IV. CALOSTEMMA. Perianthium infundibulare. Ovarium 1-loculare, ovulis in loculo geminis collateralibus. *Australia*.

XL V. EURYCLEA. Perianthium infundibulare. Ovarium trilobulare, ovulis in loculo geminis collateralibus. *Asia tropicalis; Australia borealis*.

XL VI. LEPERIZA. Perianthium regulare, tubo brevi-oblongo. Stamina breviter exserta. Ovula plura, superposita. *Andes*.

XL VII. STENOMESSON. Perianthium regulare, tubo producto infundibulari. Stamina inclusa vel breviter exserta. Ovula plura, superposita. *Andes*.

XL VIII. EUCROSIA. Perianthium ringens. Stamina longe exserta. Ovula plura, superposita. *Andes*.

Tribus V. NARCISSEÆ. Stamina intus coronam petaloideam inserta, filamentis exappendiculatis.

XL IX. CALLITHAUMA. Perianthium infundibulare. *Andes Peruvia*.

L. NARCISSUS. Perianthium rotatum. *Europa, Asia, Mauritania, Algeria*.

Subordo II. ALSTRÆMERIÆ. Herba caulescentes, floribus sæpissime umbellatis, raro spicatis vel racemosis.

* *Rhizoma bulbosum vel tuberosum.*

LI. IXIOLIRION. Perianthium infundibulare, tubo nullo. Rhizoma bulbosum. Flores umbellati vel racemosi. *Asia occidentalis*.

LII. POLIANTHES. Perianthium tubuloso - infundibulare, tubo elongato. Rhizoma tuberosum. Flores gemini, spicati. *Asia tropicalis*.

** *Rhizoma nullum. Flores in umbellam simplicem vel compositam dispositi.*

LIII. ALSTRÆMERIA. Perianthium irregulare. *America australis*.

LIV. BOMAREA. Perianthium regulare, segmentis exterioribus interioribus difformibus. *America tropicalis, præsertim Andes*.

LV. LEONTOCHIR. Perianthium regulare, segmentis exterioribus interioribus conformibus. *Chili*.

REMARKS.

1. *Galanthus*.—Here I consider there are three species, viz., 1, *nivalis*, of which *Imperati*, Bert., *latifolius*, Ruprecht, and *reflexus*, Herb., are varieties; 2, *Elwesii*, Hook. fil., in 'Bot. Mag.,' t. 6166; and 3, *plicatus*. *G. Regina-Olgæ*, of Orphanides, I know by name only.

2. *Leucojum*.—Including *Erinosma* and *Acis*, as in Kunth, good as subgenera, and under the latter *Ruminia*, of Parlatore,—species 8 or 9. *L. Hernandezianum*, Camb., is evidently the same as *L. pulchellum*, Salisb., which is common in London gardens. Of the species of *Acis* in Kunth, I should join *grandiflorum* with *trichophyllum*. None of those figured by Jordan and Fourreau ('Icones,' figs. 103 to 108) seem distinct from those given in Kunth. *L. autumnale* is autumnal, all the others vernal. *L. hyemale* is a misleading name, as the plant flowers in April (not autumn, as stated by Kunth); *Ruminia niceænsis*, Jord. & Fourr., is identical with it.

3. *Strumaria*.—Including *Imhofia*. Seven species, *Baueriana* being conspecific with *linguaefolia*, and *Burchelliana* and *Bergiana* with *geminata*.

4. *Haylockia*.—Monotypic.

5. *Apodolirion*.—Three species, as described 'Journ. Bot.,' 1878, p. 74.

6. *Gethyllis*.—Four species known in flower, and one clearly distinct, and one doubtful in fruit only. *G. acaulis*, Blanco, is doubtless a *Curculigo*.

7. *Cooperia*.—Two species; *mexicana*, now known in flower, being identical with *Drummondii*.

8. *Sternbergia*.—Including *Oporanthus*; five species, Kunth's needing much reduction. *S. dalmatica*, *atnensis*, *citrina*, and perhaps even *Clusiana* seem to be the same species as *colchiciflora*, and *Fischeriana* and probably *erigua* to belong to *lutea*. Of new discoveries we have *S. macrantha*, J. Gay (*S. latifolia*, Boiss.), the finest plant in the genus, and *S. pulchella*, Boiss. & Blanche. *S. sicula*, Tineo, is a variety of *lutea*, and *S. erseapa*, Tineo, altogether doubtful.

9. *Zephyranthes*.—Two subgenera, as in Kunth. Species about fifteen, *Grahamiana* being a form of *sessilis*; *flavescens* and *acuminata* of *mesochloa*; *Lindleyana* and *nervosa*, M. & G., identical with *pallida*; and *texana* the same as *Habranthus Andersoni* var. *texanus*.

10. *Pyrolirion*.—The three species in Kunth are doubtfully distinct; *albicans* rests still solely on the authority of Feuillé; and there are two novelties still undescribed in Mandon's plants of the Bolivian Andes.

11. *Hæmanthus*.—Species about thirty, five of which are Tropical African, and the rest Cape. The structure of the flower is very uniform through the genus. Of the plants in Kunth, *concolor* and *Hookerianus* are probably the same as *sanguineus*,

strigosus, and *brevifolius* mere forms of *carneus*; *tenuifolius* the same as *abyssinicus*; and *H. coccineus*, Forsk. (*H. arabicus*, Roem.), of which there is a type-specimen in the Smithian herbarium, identical also with *abyssinicus*. Of published novelties since Kunth, there are *H. natalensis*, Hook, 'Bot. Mag.,' t. 5378; *H. cinnabarinus*, Decne., 'Bot. Mag.,' t. 5314; *H. deformis*, Hook fil., 'Bot. Mag.,' t. 5903; *H. rotularis*, *rupestris*, and *Katherina*, Baker; and there are four or five novelties in the group of *H. coccineus* still undescribed.

12. *Buphane*.—Two distinct species, *disticha* and *toxicaria* being identical, and a third (*guttata*) doubtful; *toxicaria* has been gathered lately in Zambesi-land by Dr. Meller, and on the banks of Lake Tanyanika by Lieut. Cameron.

13. *Hessea*.—Species two to three, *Dreyeana* being doubtfully distinct from *stellaris*. The plant described in detail by Kunth under *H. crispa* is this same *stellaris*, and *Amaryllis crispa*, Jacq., 'Hort. Schoen,' t. 72, is a distinct species.

14. *Carpolyza*.—Monotypic.

15. *Lapidra*.—Species two. *Martinezii*, imperfectly described by Kunth, is fully figured by Boissier, 'Voy. Hisp.,' t. 171; and a second very distinct species, yet undescribed, is in Schousboe's Mauritanian collection,

16. *Anoiganthus*.—Two species, as described 'Journ. Bot.,' 1878, p. 76.

17. *Ungernia*, Bunge, in 'Bull. Soc. Imp. Nat. Mosc.,' 1875, ii., 171. Monotypic.

18. *Clivia*.—Three species, the two additional to Kunth's being *C. Gardeni*, Hook., in 'Bot. Mag.,' t. 4895, and *Imantophyllum miniatum*, Hook., in 'Bot. Mag.,' t. 4783.

19. *Phædranassa*.—Three species, *chloracea*, *obtusa*, and *multiflora*, being mere forms of one; and the two novelties, *P. Carmioli*, Baker, in 'Ref. Bot.,' t. 46, and *P. viridiflora*, Baker.

20. *Callipsyche*.—Three species, the two additions being *C. aurantiaca*, Baker, in 'Ref. Bot.,' t. 167, and *C. mirabilis*, Baker, in 'Ref. Bot.,' t. 168.

21. *Griffinia*.—Seven species now known, the additions being *G. ornata*, Moore; *G. Blumenaria*, 'Bot. Mag.,' t. 5666; and *G. Liboniana*, Morren. *G. dryades*, Roem., the finest plant in the genus, mentioned in Kunth by name only, is figured and fully described by Sir Joseph Hooker from the Saunders' collection, 'Bot. Mag.,' t. 5786.

22. *Sprekelia*.—Only two good species; *glauca*, *ringens*, and *Karwinskii* being varieties of *formosissima*.

23. *Nerine*.—Including *Ammocharis* and *Lycoris*. Species, eighteen. I cannot make out any definite line of demarcation between these three. If we widen *Ammocharis*, as in Kunth, to take in *Nerine lucida* and *marginata*, it differs from the other two by its short, stout scape, and resembles *Brunsvigia* in habit but not in ovary and fruit. Additional species to those in Kunth are *Nerine japonica*, Miquel, and *Lycoris Sewerzowi*, Regel.

24. *Brunsvigia*.—Eight species; *B. Cooperi*, Baker, in 'Ref. Bot.,' t. 330, being added to those in Kunth.

25. *Amaryllis*.—Monotypic, *A. blanda* being a variety of *Belladonna*, and *A. staminea*, Seubert, a synonym of *Hippeastrum stylosum*, Herb.

26. *Hippeastrum*.—Including *Habranthus*, *Phycella*, and *Rhodophiala*, as in Kunth; and *Rhodolirion*, Philippi, in 'Linnæa,' xxix., p. 65. Species about fifty, those in Kunth needing to be much reduced, especially in *Habranthus*. Many novelties have been described by Philippi and others. For details, see 'Journ. Bot.,' 1878, p. 79.

27. *Vallota*.—Monotypic.

28. *Crinum*.—Species about fifty, those in Kunth needing little change. *C. Lindleyanum*, *undulatum*, *attenuatum*, *Commelyni*, and *graciliflorum* are scarcely more than varieties of *erubescens*. The principal novelties are *C. Moorei*, Hook. fil., in 'Bot. Mag.,' t. 6113; *C. Tinneanum*, of Kotschy and Peyritsch; *C. uniflorum*, F. Muller; *C. floridanum*, Fraser; and *C. Macowani*, Baker; and there are three or four others still undescribed. *C. brachynema*, Herb., imperfectly described by Kunth, which differs from all the rest by its short filaments, has now been introduced in a living state from Western India, and is figured 'Bot. Mag.,' t. 5937.

29. *Chlidanthus*.—Monotypic; *Ehrhenbergii* being, apparently, the same as *fragrans*, and *Cumingii* something totally different, probably *Hippeastrum advenum*.

30. *Urceolaria*, Herb.—(*Collania*, Schultes, a later name.) Monotypic; *fulva* being a mere form of *pendula*.

31. *Pentlandia*.—Monotypic.

32. *Cyrtanthus*.—Three sections,—*Cyrtanthus* proper, *Monella*, and *Gastronema*, with the last of which *Cyphonema* is identical. Species fifteen; *pallidus*, *striatus*, and *ventricosus* being, apparently, varieties of *angustifolius*; and the additions, *C. Mackenii*, Hook. fil.; *C. sanguineus*, Hook., in 'Bot. Mag.,' t. 5218; and *C. Macowani* and *Tuckii*, Baker.

33. *Eustephia*.—Monotypic. See 'Journ. Bot.,' 1878, p. 39.

34. *Vagaria*.—Monotypic. *Pancreatium parviflorum*, Kunth, is identical.

35. *Calliphurria*.—Species three; the additions being *C. edentata*, Baker, in 'Bot. Mag.,' t. 6289; and a third, still undescribed.

36. *Tapeinanthus* = *Carregnoa*, Boiss.—Monotypic.

37. *Hylina*.—Monotypic.

38. *Hymenocallis*.—Including *Choretetes*. Species ten to fifteen, those in Kunth needing great reduction. *H. Bonplandi* is a *Eucharis*.

39. *Ismene*.—Species five to six; *pedunculata*, *Macleanica*, and *virescens* being apparently identical. Two novelties yet undescribed. *I. deflexa* is probably a hybrid between *Ismene* and *Elisena*, such as Colonel Trevor Clarke has lately raised.

40. *Pancreatium*.—Species about a dozen: *carolinianum* being undistinguishable from *maritimum*; *malubathricum*, Herb., from

triflorum, Roxb.; and *cambayense*, Herb., from *longiflorum*. Additions are *P. parvum*, Dalzell, and *P. collinum*, Cosson & Durieu. *P. tortifolium*, Boiss., is *P. tortuosum*, Herb.; and *P. Chapmanni*, Harv., and *P. tenuifolium*, Hochst., are *P. trianthum*, Herb.

41. *Placea*.—Species four; the three additions being *P. lutea*, Germaini, and *Arzæ*, of Philippi.

42. *Elisena*.—Species two to three.

43. *Eucharis*.—Species two. *E. candida*, Planch., in 'Flore des Serres,' t. 788 and *E. grandiflora*, Planch., in 'Bot. Mag.,' t. 4791 (*E. amazonica*, Linden.)

44. *Calostemma*.—Species three. See 'Benth. Fl. Austral.,' vol. vi., p. 457.

45. *Eurycles*.—Species two; *australis* being the same as *amboinensis*.

46. *Leperiza*.—Species two; a second, still undescribed, imported lately from Ecuador by Messrs. E. G. Henderson & Son.

47. *Stenomesson*.—Including *Coburgia*. Species about ten, Kunth's needing great reduction. See Baker, in 'Ref. Bot.,' sub. t. 308. *Incarinata*, *splendens*, *bichroma*, *variegata*, *chæapoyensis*, *versicolor*, *lata*, and *miniata* appear to be mere forms of one species, and *recurvata*, *discolor*, *obragillensis*, *lutea*, and *Macleanica* of another. Additions are *S. Pearcei*, Baker, in 'Ref. Bot.,' t. 308, and *S. suspensum*, Baker, in 'Ref. Bot.,' t. 22.

48. *Eucrosia*.—Monotypic, the habitat being Ecuador, not Peru, as given in Kunth.

49. *Callithauma*.—Species two.

50. *Narcissus*.—Including *Corbularia*, *Ajax*, *Queltia*, *Ganymedes*, and *Hermione*. Species, twenty-one.

51. *Iviolirion*.—Monotypic; *tataricum* being a mere variety of *montanum*. It extends to Beloochistan and Afghanistan.

52. *Polianthes*.—Monotypic.

53. *Alstræmeria*.—Species twenty to thirty, or more, a large number of novelties from Chili having been described from Philippi and several from Brazil by myself ('Journ. Bot.,' 1877, p. 259.)

54. *Bomarea*.—Including *Sphaerine* and *Wichuræa*. Species about fifty, Kunth's needing to be greatly reduced, especially in the neighbourhood of *B. edulis*. A fine addition is *B. Carderi*, Masters, and there are many others still undescribed. *Sphaerine* and *Wichuræa* differ from *Bomarea* in habit alone. Both this genus and *Alstræmeria* greatly need re-monographing from present material.

55. *Leontochir*, Philippi.—'Desc. Nuev. Plant.,' p. 69. Monotypic.

ON A POINT IN BOTANICAL NOMENCLATURE.

BY HENRY TRIMEN, M.B., F.L.S., &c.

IN the discussion which has been carried on in these pages with regard to the scientific names of species, it is obvious that there are in reality very few points in dispute. Matters upon which the opinion of botanists is now practically unanimous, such as the claim of priority in date, the non-validity of *nomina nuda*, the inadmissibility of *nomina falsa*, of duplicate names, &c., need not, therefore, be further alluded to here.

In making some observations in opposition to the position ably defended by Mr. Ball (pp. 140-2), it is first necessary to call attention to the fact that the scientific name of a plant consists essentially of two words only, the first of which is that of the genus, and may be called the *generic half* of the name, whilst the second may be termed its *specific half*. If either of these halves be changed a *new name* necessarily results.

I may then state the questions at issue as follows:—

1. Ought an author to be *bound by law* to conserve the specific half of the name of a plant when he transfers the latter to a genus in which it has not been previously placed (or adopts such a transfer which has been already made without the bestowal of a new name), and when he consequently has to make a new name?

2. Ought an author, when he adopts a generic transfer which has been already made with the bestowal of a new name, to be *at liberty* to reject its specific half, and to make another (necessarily at least a third) new name, by restoring the specific half of the original name, and adding it to the generic half of the previous new one?

The “Lois” adopted by the Botanical Congress at Paris in 1867 answer the first question in the affirmative, but the greater part of the discussion in these pages has had reference mainly to the second, and it is to it that the following remarks are addressed.

Affirmation of the first, however, logically involves that of the second also, for it compels the opinion that, since the previous new name or names were made in defiance of law, they have no validity; consequently that a subsequent author is not only at liberty but even bound to supplant it or them by a new one duly compounded according to the statute.

Therefore if it could be shown that such a practice were undesirable, and led to much change and confusion, it would render it highly probable that the “law” itself was injudicious and should not be enforced. Mr. Ball has, however, very properly insisted on the desirability of some fixed rule in the matter. This is felt by all, and I would add that, in the interests of science, and with a view of attaining final unanimity, such a rule, if generally accepted, should be carried out rigorously, and with

less veneration for names "sanctioned by the general agreement of modern writers of authority" than Mr. Ball would accord.

But it appears to me that a rule does exist, and has been acted upon by most systematists from Linnæus downwards,—certainly by many more than have accepted the Paris "Law" of 1867. It is, indeed, with the object of putting forward more prominently than has yet been done in this discussion the practice so generally followed for many years, and to advocate the framing of a fixed rule founded upon it, that I have ventured to enter on this controversy again. This practice is, to employ the earliest published name the generic half of which is the name of the genus adopted, and thus to avoid making a new name by the resuscitation of the specific half of an older combination. It would be very easy to show, from the writings of the best systematic botanists, that this is the principle they recognize, though it has never been formulated into a distinct law.* This, however, could be readily done; it would be fully as clear and definite as the new rule advocated by Mr. Ball, and would possess the great advantage of not much disturbing the existing state of things.

For, indeed, the amount of change and the number of new names which would follow the proper and legitimate carrying out of the new rule would be very great; and it is no doubt the consciousness of this which has led Mr. Ball to stipulate beforehand that it is not to interfere with "names sanctioned by general agreement." But we may well demur to introducing a new law intended to bring about uniformity in nomenclature, coupled with an exception from its influence capable of almost indefinite extension, and which everybody would interpret for himself. If the law is a judicious one, let it be fairly and thoroughly carried out, with only the well-known and generally recognized grounds of exception; but do not let us introduce such an element of confusion as what is to be held to constitute "general agreement," and who are to be considered "modern writers of authority."

I have purposely avoided saying anything about the "authority" following a name, because, in my opinion, this is a matter which should be left wholly out of consideration in this connexion. Whether the name which will have necessarily to be appended to the combination adopted be that of the discoverer or first describer of the species or not, in no way enters into the question at issue; nothing more is indicated by the author's name than that he first duly published the combination and that it is used in the same sense as that in which he employed it. But it seems to be thought by some botanists that the appended authority ought in some way to be the name of the original describer, by a kind of right. So strongly has this been felt by some, that the idea has been extended

* Cryptogamists, however, ought perhaps to be excepted. Bentham states (*Fl. Austral. vii.* (1878), p. 699) that "the genera in Ferns have been thrown into such confusion and uncertainty that pteridologists acknowledge a right of priority in specific names, whatever may have been the genus under which they may have been first published."

even to the authors who described plants before Linnæus reformed nomenclature, whose names have been appended as authorities to the names of the species which they described. Few writers have gone so far as this, yet it is worth while for those who are disposed to think that it is the name of the first describer of a species that should follow its scientific title to remember that by far the great majority of the species to which *Linn.* is attached were neither discovered nor described by that master of method. The more, however, that this matter is looked into, the more clearly it appears desirable to insist that the history of a plant is one thing, the name which has to be adopted for it is another. The synonymy and history of a species must be worked out in detail, and require to be fully exhibited; they cannot be usefully amalgamated with the name.*

These matters are not unconnected with the position taken up by Mr. Ball, if we may add to his precepts his practice as exhibited in the recently-published '*Spicilegium Floræ Maroccanæ.*' † The new rule and the principles advocated have incidentally resulted in a nomenclature which cannot be considered an improvement on the old system. Instead of the binary nomenclature to which we are all accustomed, by the new system we have often four words in the name besides the authority. This has come about by the necessity of trying to avoid "making an author say what he has not said" (to use Prof. DeCandolle's words) which the new rule is very likely to effect. Let us take, for instance, the species Mr. Ball has employed in his paper as a typical case, *Arenaria diandra*, Guss. He refers the plant to *Spergularia*, and according to the practice advocated above he should take the earliest name in that genus, and call the plant *Spergularia patens*, Hochst. But by the new rule he is bound to restore the specific half of Gussone's name (though it is not very appropriate), and write *Spergularia diandra*. As Boissier has already done this, the name should be *S. diandra*, Boiss. But Mr. Ball thinks it proper to write "*S. diandra*, Guss. (sub *Arenaria.*)" It is clear that this name and authority *without the portion in brackets* does not express a true statement of fact; indeed it is making Gussone say what he has not said; his name is appended to a combination made by Boissier, and of which he might have disapproved. The portion in brackets is intended to explain this mis-statement; but after more than a century of the binominal nomenclature we really cannot go back to names five words long.

It is true that the above system of quotation is no necessary part of carrying out the new rule, but it has been followed by M. Boissier and some others who advocate its adoption as well as by Mr. Ball. It appears to spring from a reluctance to placing as the authority the name of a writer who may have merely made a transfer, and from a desire to give a piece of the history of the

* On this point, see some excellent observations, by Prof. A. Gray, in '*Journ. Bot.*,' 1864, p. 189-190 (extracted from '*Silliman's Journal.*')

† '*Journ. Linn. Soc. Lond.*,' vol. xvi,

plant along with its name. But even if the new rule became generally accepted, it is little likely that this system of quotation would be followed also. If we are to retain the binominal nomenclature, botanists will have to write *Spergularia diandra*, Boiss.; and if it be desired to give additional information, it must be done by appending synonyms (*Arenaria diandra*, Guss., *Spergularia patens*, Hochst., &c.) Unless this be done, we are certain to find persons writing the incorrect name, "*Spergularia diandra*, Guss."

The only reason given in favour of the new practice by Mr. Ball is that it would be a less tax on the memory if the same specific half were adhered to under all generic changes. But the argument is not a strong one. The whole question, it must be remembered, is one for the close student of systematic botany only. In the careful research which he must always make, he has less occasion to draw largely upon his memory than to use his judgment and his knowledge of bibliography. He aims at finality, completeness, and accuracy as to facts; simplicity and freedom from ambiguity in their expression. I think the new rule fails in helping to secure any one of these.

OBSERVATIONS ON THE GENUS *PHYLLACHNE*.

By BARON FERD. VON MUELLER, C.M.G., M.D., Ph.D., F.R.S.

SOME years ago I ventured to restore the genus *Phyllachne* ('Fragm. Phytogr. Austr.,' viii., 39-40), it being established in 1776 by the Forsters, whereas the younger Linné, only four years later, described the genus *Forstera*. The propriety of uniting these genera was suggested already by Swartz, in 1790 ('Schrader's Journal,' i., 273); but as at that time the laws of priority in naming plants were not rigorously adhered to, Willdenow (Suppl., iv., 148), in 1805, sacrificed the older name to the dictates of friendship, and maintained that of *Forstera* for the united genera. In this he was followed, as far as I am aware, by all subsequent writers on the subject, except A. L. and Adr. de Jussieu ('Annal. du Mus.,' xviii., 12, and 'Diction.,' v., 178), and Pfeiffer ('Nomenclat. Bot.,' ii., 691), until Mr. Bentham and Sir Joseph Hooker in their 'Genera Plantarum' severed again these two genera, Hooker having some years previously established on some species of *Phyllachne* his *Helophyllum* ('Handb. of the New Zeal. Flora,' i., 167-168.) As the dehiscence of the fruit of these plants is one only of degree, serving merely for sectional distinction, it must be admitted that the generic separation rests mainly or entirely on habit; while that again is of no avail in the closely-allied *Stylidium*, which is far more multiform in the external appearance of its species than *Phyllachne* adopted in its widest limitation. Under these circumstances, it is of particular interest to place on record an additional *Phyllachne*, which introduces another kind of habit into the genus, obliterating even to some extent the sectional characteristics adopted for *Phyllachne* and *Forstera*. The plant in

question was provisionally referred by Sir Joseph Hooker to *Stylidium* (as *S. subulatum*, 'Handbook,' i., 168), that celebrated investigator of New Zealand plants having only seen specimens very imperfectly in flower. I had long since expressed to some correspondents in New Zealand my belief, that this rare and remarkable plant would be found referable to *Forstera* (i.e., *Phyllachne*), the shortness and straightness of the column was indicative of that genus, and this anticipation can now be verified from perfect flowering specimens, which, on my solicitation, were very obligingly procured by Professor W. Petrie, M.A., of Otago.

The diagnosis is subjoined:—

Phyllachne (*Forstera*) *subulata*. — Acaulis foliis elongatis subulato-linearibus pedunculum longe superantibus confertis, calyce ebracteato glandulari puberulo 2-3-lobo, lobis 2 rotundatis vel duobus oblongatis et uno rotundato, corollæ lobis 4-5 tubo glandulari-puberulo duplo longioribus, columnam conspicue excedentibus, fauce inappendiculata, capsula ovata ad apicem tardissime dehiscente.

From the sea-level to the height of 2090 feet at Dunedin, Buff Hill and Invercargill, in tufts of *Oreobolus*; *Petrie*.

Longest leaves measuring nearly $1\frac{1}{2}$ inch. Peduncles half an inch long or shorter, almost glabrous. Lobes of the calyx about 1 line long (reminding of those of several *Stylidiums*), when round occasionally bilobulate. Lobes of the corolla oblong, not exceeding 2 lines. Column very similar to that of *P. clavigera*, immovable. Stigmas smooth. Fruit about one-third of an inch long. Seeds measuring in length half a line.

Speaking thus of a member of the *Stylideæ*, I may be allowed incidentally to remark that I see no reason for changing my views in reference to the true systematic position of *Donatia*, as expressed in the 'Fragm.' viii. 41, although its ripe fruit remains still unknown. I gave on that occasion several instances of Orders which contain genera with free and connate petals; I may here add that *Donatia* holds in this respect the same relation to other *Stylideæ* that *Dialypetalum* does to *Lobelia*, *Lysinema* to *Epacris*, and even some species of *Marianthus* to others.

I adhere also still to the view then enunciated, that *Candollea* could not possibly be kept generically apart from *Hibbertia*; and this opinion was strengthened by my recent journey in West Australia. Furthermore, there seems no reason why the great name of DeCandolle should not be given again to the large and lovely *Stylidium* of Swartz—science could not offer a more glorious tribute; while Loureiro's *Stylidium* should supersede *Marlea*; and the dedication by Gaertner, in *Forstera* ('De Fructibus,' i. t. 28), be renewed, if the plant typical for this genus (*Athechia*) among *Calycifloræ*, which has undeservedly sunk into oblivion,* could be traced anew in Forster's or Gaertner's collections.

Melbourne, January 21, 1878.

* It is merely mentioned by Roemer and Schultes ('Syst. Veg.' v. p. xxi. & 269).

NOTES ON RUBI.

(No IV.)

BY CHARLES C. BABINGTON, F.R.S., &c.

(Continued from p. 145).

13. RUBUS FUSCO-ATER, *Weihe*.—The ordinary forms of this bramble do not present much difficulty. Focke doubts the identity of our plant with that of *Weihe*. But there are two forms, both named by Mr. Bloxam and one of them described by him, which require attention. They are *R. Briggsii* and *R. Bagnallii*.

(1.) *R. Briggsii*, Blox., in 'J. of Bot.,' vii., 33, tab. 88, is a very beautiful plant which I have long known. It was shown to me as peculiar, in 1845, by Mr. Borrer, but he gave it no name. I still adhere to my published opinion that it is very closely allied to our *R. fusco-ater*. Mr. Bloxam also expressed the same opinion of it, but held it to be specifically distinct. There is nothing like it in my extensive collection of foreign Rubi.

(2.) *R. Bagnallii*, Blox. MS., may, I think, be identified with *R. emeristylus*, Müll., as illustrated by the specimens in Boulay's 'Ronces Vosgiennes' (No. 55), and described by the Abbé, on page 74 of his 'Descr. des Espèces.' I can detect very slight difference between our specimens and those of Boulay,—only that the stem of our plant is quite devoid of hairs, the leaves are more usually quinate, and the terminal leaflets on the flowering shoot are more decidedly cordate at the base. Boulay describes the leaves of his plant as simply dentate; but his specimens show the same tendency to double dentition as is found on our Warwickshire plant, viz., rather distant and somewhat larger and slightly reflexed teeth with patent smaller ones between them. I therefore think that *R. Bagnallii* must take the name of *R. emeristylus*.

But now comes the question: Is *R. Briggsii* distinct from *R. emeristylus*? For if they are not distinct, Bloxam's name, published in 1869, must give way to Müller's, which was used with an adequate description in 1867. Having failed in finding sufficient difference between *R. Briggsii* and *R. Bagnallii* to convince myself of their specific difference, I fear that both names must disappear, and be replaced by *R. emeristylus*. Indeed I fail to define the difference between them. They certainly present a different appearance, caused by *R. Bagnallii* being rather less hairy, its leaflets rather less round, and having fewer aciculi and setæ on the stem, in which respects it is the nearer of the two to *R. fusco-ater*. Perhaps when combined they may be distinguished as a species, in accordance with the views of Bloxam, Genevier, and Müller, as follows:—

R. emeristylus, Müll.; stem arcuate-prostrate angular hairy, prickles slightly declining unequal from a compressed base a few smaller, setæ aciculi and hairs very short nearly equal, leaflets rather irregularly and rather doubly dentate thick even above green and hairy on the veins beneath,

terminal leaflets orbicular-ovate acuminate with a cordate base, basal leaflets very shortly stalked imbricate, panicle often leafy nearly to its top its axillary branches corymbose its prickles small unequal declining its setæ aciculi and hairs many and unequal, sepals ovate-attenuate with a rather leaf-like point setose aciculate patent or adpressed to the fruit.

Mr. Warren says that typical specimens of his *R. dumetorum* γ *pilosus* ('J. of B.,' viii., 172) are in the Herb. Borr. from Faircocks and the Slate Houses, Henfield. I presume that he refers to the specimens which I named *R. fusco-ater* in that herbarium. If so, his plant is what we have recently called *R. Briggsii*. But a specimen named by him ν . *pilosus* for Mr. Bagnall appears much nearer to the *R. Bagnallii*, Blox. Of course this difference tends to confirm my idea that *R. Bagnallii* is not distinct from *R. Briggsii*. The true *R. Bagnallii* has much less and weaker armatures throughout, and its stem often seems nearly naked; the panicle, in the specimens which I have seen, is narrow and few-flowered. Unfortunately they are long past the flowering state, and the colour and shape of the petals is therefore undeterminable. On the specimens of *R. Briggsii* from the Slate Houses they are white, broadly ovate, very large and overlapping. The colour of the stamens and styles is also unknown to me. In a note appended to specimens sent to me, Mr. Bagnall remarks of *R. Bagnalli*: "I believe it to be a form of *R. fusco-ater* (evidently from a shady situation), much resembling *R. Briggsii*, Blox., which I refer also to *R. fusco-ater* as a variety or form." These plants may, perhaps, stand as varieties under *R. emersistylus* whether that is considered as distinct from or combined with *R. fusco-ater*.

α . *R. Bagnallii*; armature of the stem weak, prickles few short slender, aciculi setæ and hairs very short and inconspicuous, leaves rather thin with scattered hairs on the veins beneath nearly glabrous above. *R. Bagnallii*, Blox. MS., in the "Set" issued in 1876 (name only.)

β . *R. Briggsii*; armature stronger, prickles more abundant and stronger, aciculi setæ and hairs more unequal and more conspicuously passing into the prickles, leaves thick hairy on the veins beneath with many scattered hairs above.—*R. Briggsii*, Blox., in 'J. of B.,' vii., 33, t. 88.

α . In several places in Warwickshire; *Mr. J. Bagnall*.

β . Henfield, Sussex. Bickley Vale, Devon; *Mr. T. R. Archer Briggs*.

It will be seen that the characters are only comparative, and therefore of very little value.

14. *R. PYRAMIDALIS*, *Bab.*—Mr. Briggs finds this abundantly near Plymouth. Focke points out (p. 288) that there is an earlier *R. pyramidalis*, published by Kaltenbach in his 'Flora des Aachener Beckens' (p. 275) in 1845, and he has given me good specimens of it. He formerly called it *R. vestitus*, and circulated it to his friends

with that name as No. 65 of his 'Rubi Selecti.' It seems to be the *R. amplificatus* of Lees, published 1847, and therefore also more recently than Kaltenbach's name. I presume that we must drop my name, and adopt that of Lees, viz., *R. longithyriger*. But as all our nomenclature will have to be carefully examined with Focke's 'Synopsis' and his specimens, we may perhaps let that question rest for the present. Both that book and these specimens have come into my hands since this paper was prepared for the press, and I thought it best to print it nearly as it stood, as, except on questions of nomenclature, there will probably be but little to alter. I hope to examine this latter question with care at a later period of the year, when my time will, I hope, be more at my own disposal.

15. *R. GUENTHERI*, *Weihe*.—Doubts have arisen concerning the name of this plant, and its identity with that of Günther, which Weihe makes the type of his *R. Güntheri*, that is, the *R. glandulosus* of Günther's "Pl. exsic. Silis.," which I have not seen and do not know where to find. Even Focke does not seem to have seen that collection. The true *R. Güntheri*, Weihe, appears to be an eastern plant, whilst ours is western. Prof. Areschong and Dr. Focke agree in believing that ours is not the *R. Güntheri*, Weihe, but the *R. saltuum*, Focke. Genevier seems to agree with us in calling the western plant *R. Güntheri*, but then he separates from it the *R. cinerascens*, Bor. I have carefully studied his characters for the plants, and think that we cannot separate them. Nevertheless I believe that we are wrong in using the name of *R. Güntheri* for our plant, which is exactly the *R. saltuum*, Focke, published in 1870. *R. cinerascens*, Bor., was published in 1857, but there seems to be an earlier *R. cinerascens* of Weihe (in 'Lejeune et Courtois Prod. Fl. Belg.,' ii., 171) in 1831, which is closely allied to *R. apiculatus*, Weihe, but considered as distinct by those botanists, and referred to by Focke (p. 310.) Focke's 'Synopsis' is a work of such authority that we shall, I think, do well in adopting his name rather than the somewhat ambiguous one of Boreau. Weihe's name and plant seem to be little if at all known.

16. *R. FOLIOSUS*, *Weihe?*—I am unable to separate as species the specimens named *R. foliosus* and *R. atro-rubens* by Bloxam. Several specimens of each are now before me, most of them authenticated by him. Those named *R. foliosus* seem to me much more like *R. exsecatus*, Müll., than *R. foliosus*, Weihe. The markedly cordate terminal leaflet accords admirably with Müller's specimen (Wirtg. Herb. Rub., 179), but not with the *R. chlorothyrsus*, Focke, to which our *R. foliosus* is rather doubtfully referred by Dr. Focke. Neither is the armature of the stem of our plant like that of *R. chlorothyrsus*. Focke also places under the same head the *R. calvatus*, Blox., which I think belongs to quite a different section of the genus from our *R. foliosus*.

The *R. atro-rubens*, Blox., is apparently the *R. adornatus*, Müll., which was once called by that name by Wirtgen. Specimens of

Wirtgen's *R. atro-rubens* and Müller's *R. adornatus* will be found in the 'Herb. Ruborum.' Bloxam's *R. atro-rubens* agrees well with the specimens issued by Wirtgen, except that its panicle is much more setose and aciculate; but this is only a difference in the proportional abundance of those arms. It differs from our *R. foliosus* chiefly by its terminal leaflet being much less cordate and narrower at the base. Indeed one of the specimens from Bloxam is scarcely at all cordate and decidedly narrowed to that part. To this specimen Bloxam appended a (?) in 1869. But it seems quite connected with the others by intermediate forms.

If *R. adornatus* (*R. atro-rubens*, Blox.), is to be distinguished from our *R. foliosus*, it may be known by its terminal leaflet not being roundly cordate-acuminate, but rather broadly obovate-acuminate. But, in my opinion, we must place *R. adornatus* as the name of the species and *R. exsecatus* (*R. foliosus*, Blox.), as a form of it.

(To be continued.)

SHORT NOTES.

CALTHA RADICANS, Forst.—It is much to be wished that some botanist would visit the station given for this plant by Mr. G. Don, to see if it can be again found. The place ought not to be difficult to find, and a few hours' search give a valuable result. The locality is thus stated by Don: "I found this [*C. radicans*] about the year 1790, in a ditch that runs from the farmhouse called Haltoun, on the estate of Charles Gray, Esq., of Carse."—G. Don, in Headrick's 'Agriculture of Forfarshire,' Appendix, p. 25.—C. C. BABINGTON.

DIONÆA.—In noticing Fraustadt's paper on *Dionæa*, in Cohn's "Beitrag" ('Journ. Bot.,' 1877, p. 213), I stated that this author differed from M. DeCandolle in not finding a large cell at each side of the articulation at the base of the sensitive bristles. M. DeCandolle has been good enough to give me a preparation showing one of these 'cells of the articulation' in a very clear manner.—S. MOORE.

CENTAUREA JACEA, Linn., IN SUSSEX.—The Rev. E. N. Bloomfield has sent me a specimen of typical *C. Jacea*, gathered in a meadow near Guestling Rectory, about the year 1865. He also informs me that he found some more specimens in another meadow, in 1876, which he sent to Mr. Roper. I excluded it from my list because I thought it probable that the specimens collected by the late Mr. Borrer actually escaped from his own garden. It would appear, however, that this species may be really indigenous in the county.—W. B. HEMSLEY.

VEGETATION OF FUSI, JAPAN.—I recently went up Fuji [Fusi], and was astonished to find an *Arabis* and a large *Cnicus* growing among the cinders almost to the summit (12–13,000 feet.) I also saw very high up (6–7000) large specimens of an *Orobanche* among the cinders and scoriæ. The *Cryptomeria*, spite of its commonness, I believe to have been introduced. I have never found it in any of the natural forests. On and about Fuji I was struck by the poverty in *Glumaceæ*.—(Extract from a Letter from F. V. Dickins to W. T. Thiselton Dyer.)

Extracts and Notices of Books & Memoirs.

OFFICIAL REPORT FOR 1877 OF THE DEPARTMENT OF BOTANY IN THE BRITISH MUSEUM.

BY WILLIAM CARRUTHERS, F.R.S.

THE work of incorporating plants in the General Herbarium has been actively carried on during the past year. In its progress the plants of the following Natural Orders have been greatly increased, and more or less completely re-arranged:—*Ranunculaceæ*, *Caprifoliaceæ*, *Rubiaceæ*, *Campanulaceæ*, *Stylideæ*, *Goodenovieæ*, *Epacridaceæ*, *Plumbagineæ*, *Primulaceæ*, *Apocynaceæ*, *Asclepiadaceæ*, *Sapotaceæ*, *Selagineæ*, *Myoporineæ*, *Filices*, and *Fungi*.

The following collections have been either entirely or in part incorporated in the General Herbarium:—The plants of Eastern Tropical Africa, collected by Dr. Hildebrandt; of Rodriguez, by Dr. I. B. Balfour (in the "Transit of Venus" expedition); of West Tropical Africa, by Kalbreyer; of Lake Nyassa, by Simons; of North Eastern Asia, by Maximowicz; of Hong Kong, by the Rev. J. Lamont; of Australia, by Amalia Dietrich; of Martinique, by Hahn; of the voyage of H. M. S. "Sulphur," by Barclay; of the voyage of H. M. S. "Challenger," by Moseley. In addition to these, large series of plants by various collectors, of the orders *Rubiaceæ*, *Compositæ*, *Filices*, *Fungi*, *Algæ*, and *Lichenes*, have been incorporated with the General Herbarium.

The principal additions during the past year have been two extensive Herbaria; the one, the general Herbarium of the late R. J. Shuttleworth, of Berne; the other, the Herbarium of *Hepaticæ* formed by Dr. Hampe. The Shuttleworth Herbarium consists of more than 150,000 labelled specimens of Phanerogams, and over 20,000 of Cryptogams, from all parts of the world, a very large proportion of which will be valuable additions to the Museum collection, while the duplicates will be made into sets for exchange. Several important herbaria are incorporated in the Shuttleworth Herbarium; the most valuable of them is the Herbarium of Roemer, the joint author with Schultes of an edition of Linnæus'

'Systema Vegetabilium.' This Herbarium contains not only the types of the plants described by Roemer, but also numerous specimens communicated by his contemporaries of the novelties described by them. The European portion of the Shuttleworth Herbarium includes the extensive collections formed by Shuttleworth himself in Central Europe; by Frivaldsky, in Turkey; Richter, in Hungary; Mabilie and Debeaux, in Corsica; Bourgeau, in the Balearic Islands and the Spanish Pyrenees; Willkomm, in the south of Spain; besides the published collections of Reichenbach, Fries, Huet de Pavillon, &c., &c. Numerous critical notes by Shuttleworth greatly enhance the value of many of these specimens. The plants of the Mediterranean region are represented by collections from Algiers, by Auzendi and others; from Egypt, by Du Parquet; from the Levant, by Aucher-Eloy and Kotschy; and from Rhodes, by Bourgeau. After the European collections, Shuttleworth devoted much attention to the plants of North America; and he has amassed a very large series, especially from the Southern States, collected by Lindheimer, Beyrich, Fendler, Blodgett, but especially by Rugel, whose extensive collections, all carefully worked out and annotated by Shuttleworth, are a very valuable addition to the Museum Herbarium. The American collections include also the plants of Jurgensen, Hartweg, and Berlandier, from Mexico; of Hostmann, Linden, Gardner, Jameson, Matthews, and others from South America. The Asiatic portion of the Herbarium contains a very fine and extensive series of the plants of Zollinger, from Java and Japan; of Kollmann, from Java; of Cuming, from the Philippines; of Fortune, from China; of Walker and Lobb, from Singapore; of Campbell, Christie, Helfer, and Wallich, from India; and of Karelin and Kiriloff, from Songaria. From Africa, there are the plants of Schimper and Kotschy, from Nubia and Abyssinia; of Brunner, from Senegal and the Cape Verde Islands, and of Drège, Krauss, and others, from South Africa. The Australian collections comprise the plants of Drummond, Preiss, Sieber, and others. Several large genera, like *Hieracium* and *Salix*, and several Natural Orders, as *Cyperaceæ*, *Gramineæ*, and *Filices*, have received special attention, and are represented by a carefully named and often extensively annotated series of specimens. The Cryptogams include the collections of Schärer, Desmazières, Mougeot and Nestler, Kützing, Crome, Rugel, Braun, Schmidt and Kunze, Wartmann and Schenk, Salwey, and many others.

The herbarium of *Hepatica* formed by Dr. Hampe is not only very extensive, consisting of upwards of 6,000 labelled specimens, but it contains a very large proportion of authentic specimens, either the types of species described by Dr. Hampe or communicated by the describers, from all parts of the world: the whole collection is arranged according to Lindenberg and Gottsche's "Synopsis Hepaticarum."

Sets of the plants collected during the recent Government expeditions of the "Challenger;" of the "Discovery" and "Alert,"

in the Arctic regions; and of the "Transit of Venus" expedition to Rodriguez and Kerguelen's Land, have been received from the Lords of the Admiralty and the Council of the Royal Society, and incorporated in the Herbarium.

Valuable additions have been made to the structural collections by presentation from the Royal Gardens, Kew, by A. Robertson Luxford, Esq., and Dr. Selah Merrill.

Progress has been made in the separation of the study set of Robert Brown's [Australian] Herbarium, and of the set of Tropical African plants from the Herbarium of Dr. Welwitsch.

Extensive and important additions have been made during the year to the series of drawings and engravings of plants. Among them may be specially noted 180 original drawings by Ehret, the best botanical artist of his day; a valuable series of original drawings of Indian plants by Dr. de Crespigny; and 654 drawings by Chinese artists of Chinese plants, executed under the superintendence of the late John Reeves, Esq., and presented by Miss Reeves. Besides these, 7,287 published engravings of plants have been added to the collection.

Large additions have been made to the British Herbarium during the year. The collection of Lake Lancashire plants, formed by the late Miss Hodgson, illustrating her published Flora of that district, has been incorporated, together with specimens collected by Robert Brown from 1791 to 1795; Mr. J. G. Baker, Mr. R. A. Pryor, Mr. E. M. Holmes, the Messrs. Groves, Mr. J. C. Melvill, Mr. T. R. A. Briggs, Mr. T. Howse, Mr. M. Moggridge, and many others. The systematic arrangement in one series of the extensive collection of original drawings of British Fungi by Sowerby, W. G. Smith, and Mrs. Russell, has been completed. The specimens of British Fungi have been rearranged, and considerable progress has been made in laying down the British series of Mosses in the Wilson Herbarium.

The number of visits paid during the year to the Herbarium for scientific inquiry or research, was 1,297. The following foreign botanists may be specified as having used the Herbarium in connection with their various studies:—MM. Boissier and C. De Candolle, of Geneva; Count Castracane, of Rome; M. Bommer, of Brussels; and Senor Vidal, of Manila. Of British Botanists, the following may be specified:—Mr. W. P. Hiern, Mr. Geo. Bentham, Dr. M. T. Masters, Genl. Munro, Dr. I. B. Balfour, Rev. J. M. Crombie, Mr. J. G. Baker, Mr. C. B. Clarke, Professor Bentley, Dr. Braithwaite, Mr. B. D. Jackson, Mr. Larbalestier, Mr. Howse, Mr. E. M. Holmes, Mr. J. C. Mansel-Pleydell, Mr. M. M. Hartog, Mr. A. W. Bennett, Mr. F. Townsend, Mr. Joshua, Mr. R. A. Pryor, Mr. F. C. S. Roper, Mr. C. Packe, the Messrs. Groves, Mr. G. S. Boulger, and the Rev. W. W. Newbould.

EXTRACTS FROM THE REPORT OF THE CURATOR OF
THE BOTANICAL EXCHANGE CLUB FOR 1876.

“*Ranunculus triphyllus*, Wallr.” Ditch, Mitcham Common, Surrey, June, 1876; H. Groves. Mr. Baker says Mr. Hiern has seen this.—“*R. triphyllus*.” Pit in Park, Tabley, Cheshire, June, 1870. I follow Mr. Hiern in thus naming this specimen.—J. L. WARREN. Of Mr. Grove’s plant from Mitcham, Dr. Boswell says: “This plant is the one I had in view in describing *R. heterophyllus* in the third edition of ‘Engl. Botany.’ The carpels being glabrous or more or less hispid, I believe to be an inconstant character, and that this form is only distinguishable from *radians* and *Godronii* by its larger flowers.” Of the Tabley plant: “This is *heterophyllus*, Fries, ‘E. B.’, ed. iii. The carpels are conspicuously hispid, contrary to Mr. Hiern’s statement in ‘Journal of Botany.’”—J. T. BOSWELL.—*R. triphyllus*, from Mitcham; Mr. Groves. If this is indeed the *triphyllus* of Hiern, his idea of it is very different from mine. I call it *heterophyllus*, and in a not uncommon form. Both of Mr. Harbord Lewis’s plants I believe to be forms of my *heterophyllus*, not *radians*. I say the same of Mr. Baker’s two plants from Warwick.—C. C. BABINGTON.—The plant sent by Mr. Harbord Lewis as *R. capillaceus*, Thuill., from ditch at Crosby, Lancashire, seems to be *R. submersus*, i.e., *R. heterophyllus*, Bab., without floating leaves; but the specimens are too imperfect to enable me to be sure of the name: they have no mature fruit.—J. T. BOSWELL.

“*R. radians*.” Plentiful in a pond at Floors, Roxburgh, July, 1876.—ANDREW BROTHERSTON. With the note by Dr. Boswell appended: “*R. Godronii*. See the hairs on the under side of the floating leaves.”—I agree with Dr. Boswell, and say *Godronii*.—C. C. BABINGTON.

R. salsuginosus. Tweed, near Kelso, Roxburgh, July, 1875. This form is frequent in the Tweed.—ANDREW BROTHERSTON. To this note of Mr. Brotherston’s Dr. Boswell appended the following: “I don’t know what to call this; it is not *salsuginosus*, which is *R. confusus* without floating leaves. It reminds me of a plant from Hertfordshire, sent by Mr. T. B. Blow.”—Probably correct according to Hiern’s nomenclature, but a state of *confusus*.—C. C. BABINGTON.

Viola lactea, Sm., b. *intermedia*, Wats. By a hedge-bank, Egg Buckland Down (long ago enclosed), S. Devon, May 11, 1876; T. R. Archer Briggs. This seems quite the same as Mr. Watson’s plant mentioned in the ‘Bot. Exchange Club Report’ for 1875, p. 10, which was collected by the heathy way-side, north of Fleetpond, Hants, June, 1875, by Messrs. Watson and Warren, which I suggested might be *V. stricta*, Hornemann. Mr. Watson this year, besides a number of dried specimens, sent me living plants of the Fleetpond violet; and I think there can be no doubt that they are *lactea*, and not *stricta*. In *V. stricta* the flowering stems are elongated and straight in fruit; but this is not

so in the Surrey plant, although the specimens had not been exposed to any circumstances likely to induce their weak flexuous appearance. The petals are also narrower than in true *V. stricta*, and the flowers are of a very pale purplish-blue as in *V. lactea*, not "*liliacino-cærulei*," Koch, nor "*d'un bleu-violet*," Gren. and Godr.
—J. T. BOSWELL.

Saponaria officinalis, Linn. var. *puberula*, Syme. Hedgebank, Hightown, Lancashire, August 5, 1876.—J. W. BURTON. *Saponaria officinalis*, var. *puberula*, mihi. 'B. Ex. C. Report,' 1872-4, p. 11. Mr. H. C. Watson points out to me that in DC. 'Prod.,' vol. i., p. 365, this puberulent form is considered the type of the species, and that the glabrous variety is entered as '*β. glaberrima*'; also that in Smith's 'English Flora,' vol. ii., p. 285, the calyx is described as 'somewhat downy;' and that in Bertoloni's 'Flora Italica,' vol. iv., p. 535 (to which I have not access), the calyx is described as '*scabridus*.' I have not seen either British or foreign specimens except Mr. Brown's in which the calyx was not glabrous. Koch gives "*Calyce cylindricale glabro*" in italics, consequently an essential character, 'Syn. Floræ Germ. et Helv.,' ed. ii., p. 108. Grenier and Godron give "*Calice glabre*," 'Fl. de France,' vol. i., p. 225; Boissier "*glabra * * * calicis glabri*," and of his next species, '*S. Bodeana*,' he says: "*facies præcedentis sed pubescens*," 'Flora Orient.,' vol. i., p. 527. It therefore appears that the experience of these authors has been similar to my own.
—J. T. BOSWELL.

Stellaria umbrosa, Opitz; *S. Elizabethæ*, F. Schultz. Hedgebanks near Torquay, S. Devon, May, 1876.—F. TOWNSEND. This is an extension of the known range of this plant to the south-west, but no doubt if the plant were looked for it would prove to have a wide range. I have very little doubt that it is a good sub-species; the seeds are tubercled all over, and not merely round the margin, as in *S. eu-media*, and the plant is truly perennial. Instead of going on producing branches which flower until stopped by frost, as in *S. media*, *S. umbrosa* forms autumnal barren shoots very similar to *S. nemorum*. These remain through the winter, and do not flower till the following spring, as I have ascertained by bringing the plant into the garden and watching it. I sent a few specimens to the Club from Pirniss Wood, Balmuto, Fife, to show this autumnal and winter state.—J. T. BOSWELL.

Rosa hibernica, Sm., var. *Grovesii*, Baker. Barnes Common, Surrey, 1875-76.—H. & J. GROVES. Mr. Baker has drawn up the following description of this hitherto undescribed Rose, and forwarded it for insertion here:—*ROSA HIBERNICA*, var. *Grovesii*, Baker. An erect compact bush, from 3 to 5 feet in height. Prickles of the barren stem more slender and less hooked than in *canina*, $\frac{3}{8}$ -in. long, with a scar $\frac{3}{8}$ -in. long, passing down by gradual transitions into a few subulate, straight, slightly-declining aciculi, none of which are gland-tipped. Leaves of the barren shoot 3-4 in. long, glaucous, glabrous; stipules glabrous, with a few glands on the edge; common petiole with 4-6 minute aciculi, none of which are gland-tipped; leaflets oblong, $\frac{3}{4}$ -1 $\frac{1}{4}$ in. long, sharply, irregularly,

but not distinctly, doubly dentate; teeth rarely gland-tipped; end leaflets $1-1\frac{1}{4}$ in. long, $\frac{3}{4}-\frac{7}{8}$ in. broad, broadly rounded at the base. Flowers 1-3, usually solitary; peduncle naked, $\frac{3}{8}-\frac{1}{2}$ in. long; calyx-tube broad oblong, naked; segments $\frac{1}{2}-\frac{5}{8}$ in. long, naked on the back, with a distinct leafy point, some simple, some sparingly pinnate. Corolla milk-white, 18-21 lines across when expanded; petals an inch long. Styles densely pilose. Fruit broad ovoid, $\frac{5}{8}-\frac{3}{4}$ in. long, turning colour at the end of August, deep crimson-red, the spreading sepals fully persistent, still remaining attached in October. Connects *hibernica glabra* with *canina*, vars. *sub-cristata*, *Schultzii*, and *Hailstoni*.—J. G. BAKER.

(To be continued.)

Sur les Caractères et les Affinités des Oliniées. By M. J. DECAISNE.
Paris, 1877.

IN this pamphlet of fifteen pages M. Decaisne discusses in much detail the structure and relations of the African genus, *Olinia*, Thunb. (1799), which genus is very peculiar, and has been treated as the type of a separate Natural Order by Walker Arnott (1838), and other botanists. Opportunity has been taken of its having recently flowered in the garden of the Paris Museum to examine anew the flowers in the growing state, and to trace their development; and a full and clearly-figured analysis on an enlarged scale is given on a plate appended to the pamphlet.

In the first volume of the 'Genera Plantarum' (1867), Bentham and Hooker placed the genus, to which they assign but a single species, among the anomalous genera of *Lythrarieæ*, from which family it conspicuously differs by its sessile anthers, by its inferior ovary, and by its definite ovules. But more recently (1876), M. Baillon has ingeniously hit upon a different position for the genus by attaching it to *Rhamneæ*. A similar position had, however, been previously adopted by DeCandolle in the second volume of the 'Prodromus' (1825.) This idea does not recommend itself to M. Decaisne, and he finds that M. Baillon's diagnosis of the genus is erroneous in several important particulars. For instance, M. Decaisne shows that the incurved scales, which alternate with and are interior to the petals, and which arise from the top of the calyx-tube, are not valvate in æstivation, as stated by M. Baillon, but are quincuncial or imbricated. These scales M. Baillon considered to be the true petals, the sepals being represented by the organs which M. Decaisne calls the petals; and since the stamens are placed immediately within the scales and opposite to them, the affinity with *Rhamneæ* would easily be suggested.

M. Decaisne places side by side the characters of *Rhamneæ* and of *Olinia*, and thus exhibits so many and important divergences that it is impossible, on the face of the contrast, to conclude that the two groups are closely connected.

On the other hand, M. Decaisne discovers a complete agreement between the floral structure of *Olinia* and that of several

plants of the family of *Melastomaceæ*, especially that of the genus *Acanthella*, Hk. f., the flower of which he figures in a corner of his plate. The pamphlet includes a description of the species of the genus, which the author apparently considers should still rank as a distinct family, comprising five species; one of those species is new, and is here described as such for the first time. The species differ among themselves by the texture of the foliage, by the comparative density of the flowering cymes, by slight variations in the shape of the calyx-tube, and by other small characters.

It is evident that M. Decaisne's standard of a botanical species is considerably lower than that held by many botanists of the present day; for of his five species, four, which are South African, were described as varieties of one species in the second volume of the "Flora Capensis" of Harvey and Sonder (1861-62), and even the fifth species, which is Abyssinian, is probably identical with that which was described in the second volume of Oliver's "Flora of Tropical Africa" (1871) as belonging to the aggregate species of Sonder. M. Decaisne appears to have overlooked the last-mentioned work, in which the geographical range of the species is extended to Angola.

In order to complete the synonymy of the genus, it may be well to add that the genus *Plectronia* of Linnæus, as originally described by him in the year 1767, and as illustrated by the specimen which is still extant in his herbarium at the apartments of the Linnean Society of London, excluding, however, the plate of Burman quoted by him, is identical with Thunberg's genus *Olinia*; and that *Polyspharia? ligustrifolia*, Vatke, from Abyssinia, falsely referred by its author to *Rubiaceæ*, is a species of *Olinia*.

The following key, extracted from M. Decaisne's characters, may be useful for the discrimination of the species:—

Folia coriacea.

Cymæ densifloræ, terminales vel axillares.

Tubus calycinus cylindricus, denticulatus . . . 1. *O. cymosa*, Thunberg.

Tubus calycinus apice subconstrictus, denticulatus.

2. *O. capensis*, Klotzsch.

Tubus calycinus apice dilatatus, subinteger . . . 3. *O. acuminata*, Klotzsch.

Cymæ gracillimæ, axillares. Calyx obconicus, integer.

4. *O. micrantha*, Decaisne.

Folia submembranacea 5. *O. Rochetiana*, Adr. Juss.

W. P. H.

Bibliographical Index to North American Botany; or Citations of Authorities for all the recorded Indigenous and Naturalized Species of the Flora of North America. With a Chronological Arrangement of the Synonymy. By S. WATSON. Part I.—*Polypetalæ.* (Smithsonian Miscellaneous Collections, 258). Washington, March, 1878.

THIS is an admirable example of conscientious and well-directed labour, and indeed leaves nothing to be desired. Few books were more wanted by the systematic botanist than one which should collect together the extensive and fragmentary literature bearing

on the American flora, scattered as it is through a very large number of Government reports, separate papers, and catalogues.

“The territory embraced includes Greenland and the Arctic coast upon the north, and the borders of Mexico closely adjacent to the United States on the south, the habitat in the latter case being always indicated. For the flora of the region to the west of the Mississippi and northward, the citation of authorities is intended to be full and complete. The same may be said (with some unimportant exceptions) for the Atlantic States prior to 1840, the date of the conclusion of the first volume of Torrey & Gray’s ‘Flora of North America.’ For the subsequent period the publications of Torrey, Gray, and Chapman have been deemed sufficient in most cases. Others are referred to whenever there is special reason for so doing.”

The literature referred to is by no means confined to books dealing with the North American flora exclusively, but embraces all botanical works bearing upon or giving information about the species. Plates and figures are printed in a different type. The synonymy is copious, and properly arranged chronologically; moreover it has been carefully revised, and has the value of an original contribution to critical systematic botany.

It is convenient to English botanists to find the Orders arranged after Bentham & Hooker’s “Genera Plantarum.” (We find, however, *Paronychia* included, which those authors place in *Apetalæ*.) Under each Order the genera and species are placed alphabetically, and at the end of the larger genera cross-references are given.

The labour involved in the compilation of such a book must have been immense; and the author, who has little other reward, deserves and should receive the gratitude and hearty thanks of all who follow him for one of the best-planned and best executed books of its class, and one which is absolutely indispensable to everyone who has to work at North American botany.

This first volume extends to 470 pages, and includes 3038 species. The accurate printing of such a mass of figures and abbreviations is most creditable to the Cambridge Press. H. T.

La Morfologia Vegetale. Esposta da T. CARUEL. Pisa, 1878.
(8vo., pp. 434, with 87 figures in the text.)

THIS short introduction to morphological botany follows the course of the author’s lectures in the University of Pisa. It will be found to differ considerably in arrangement from other books of similar scope, and appears to treat a well-worn subject with freshness and originality. Prof. Caruel insists first on the distinction of the *thallus* and the *cormus*,—the latter a term with which we are familiar only in the compound word *cormophyte*,—and then reviews the varieties of size, form, structure, and development of each type. The reproductive processes of thallophytes and cormophytes follow. The two concluding chapters are occupied with the consideration of the succession of form, of heterogenesis, dichogamy, hybridism, evolution and similar topics, and with

classification. The author's principles lead him to separate the vegetable kingdom into five principal divisions:—1. *Phanerogamia*; 2. *Schistogamia* (= *Characeæ* only); 3. *Prothallogamia* (= Vascular Cryptogams; 4. *Bryogamia* (= Musci, &c.); 5. *Gymnogamia* (= Cellular Cryptogams.)

The book is written in an attractive style, and though its extent does not allow of a lengthy treatment, a number of subjects seem to be touched upon in a very instructive and suggestive manner. The figures are to a great extent original. H. T.

In a recent instalment of his "Contributions" ('Proc. American Acad.,' xiii., 361), Prof. A. Gray gives a synopsis of the American Elatines. The result of a careful examination of the existing material has been the discovery of two new species named *E. brachysperma* and *E. californica*. The same part contains two new genera of *Acanthaceæ*, *Carlwrightia* (= *Schaueria linearifolia*, Torr.), ingeniously dedicated to the indefatigable explorer, Charles Wright, and *Gatesia* (= *Justicia laterivrens*, Buckley), named after Dr. Hezekiah Gates. There are also many new species of *Astragalus* described.

Prof. Lange gives ('Videnskab. Medd. Naturhist.' Forening,' Copenhagen, 1877), descriptions of some new species collected in Spain and Portugal in recent years, especially by Hackel and Winkler in 1876.

The parts of Bentley and Trimen's "Medicinal Plants" have hitherto continued to be issued with regularity. Among the plants described and figured in Parts 26 to 32 are these:—*Aconitum ferox* and *A. heterophyllum*, *Gynocardia odorata*, *Garcinia indica* and *G. Hamburii*, *Galipea Cusparia*, *Pilocarpus pennatifolius*, *Citrus Bergamia*, *Lens esculenta*, *Butea frondosa*, *Astragalus gummifer*, *Liquidambar orientalis*, *Ferula Narthex*, *Carum Ajowan*, *Solenostemma Argel*, *Tylophora asthmatica*, *Capsicum fastigiatum*, *Nectandra Rodiæi*, *Amomum Melegueta*, *Alpinia officinarum*, *Andropogon Nardus*.

OTHER NEW BOOKS.—R. HENNEY, 'The Clydesdale Flora;' In Memoriam (4th) edition, with an Appendix by R. H. Paterson. (Hopkins, Glasgow, 1878, 3s. 6d.)—W. R. McNAB, 'Outlines of Classification of Plants' (London Science Class-Books; London, Longmans, 1878, 1s. 6d.)—S. O. LINDBERG, 'Monographia Metzgeriæ,' (Helsingfors, 1877.)—ID., 'Utkast till en Naturlig Gruppering af Europas bladmossor med toppsittande frukt (*Bryina acrocarpæ*.)' (Helsingfors, 1878.)—E. J. WARING, 'Bibliotheca therapeutica,' vol. i. (London, 1878, New Sydenham Society).—CAPT. SIR G. S. NARES, 'Narrative of a Voyage to the Polar Sea' [Appendix xiv. Botany, by Sir J. D. Hooker and others.] (Sampson Low, London, 1878).

ARTICLES IN JOURNALS.—APRIL, 1878.

Scottish Naturalist.—J. Stevenson, 'On *Ptychogaster albus*.'—J. Stirton, 'On certain Lichens belonging to the genus *Parmelia*' (continued.)

Midland Naturalist.—M. J. Berkeley, 'Memoir of Rev. A. Bloxam.'

Botaniska Notiser.—V. B. Wittrock, 'On *Linnaea borealis*' (continued).—Id., 'The December Flora of Upsala, 1877.'—E. Warming, 'List of Danish Botanical Literature for 1877.'

Bot. Zeitung.—C. Kellerman, E. v. Raumer, and M. Reess, 'Experiments on growth of *Drosera rotundifolia* with and without flesh.'—M. Traube, 'On the history of the mechanical theory of growth of organic cells.'—L. Celakovsky, 'On Chloranth in *Reseda lutea*' (tab.)

Hedvigia.—C. Gobi, 'Further notes on the "Wasser-blüthe" of sea-water.'

Flora.—C. Kraus, 'On some relations of light to the form and matter of plants.'—P. G. Strobl, 'Flora of the Nebrodes' (continued).—F. Hildebrand, 'C. Hillburg's dissertation on the structure and functions of secondary leaves.'—O. Böckeler, 'Diagnoses of new or undescribed *Cyperaceae*' (continued).—F. de Thuemen, 'New species of American Fungi' (*Thuemenia*, Rehm., n. gen.)

American Naturalist.—E. L. Greene, 'Rambles in New Mexico,' ii.

Oesterr. Bot. Zeitschr.—G. Strobl, 'On the Sicilian species of *Ranunculus* with tubercular roots.'—F. von Holtnel, 'Remarks on the cuticle' (continued).—F. Hauck, '*Alga* of the Adriatic' (continued).—L. von Vukotinovic, 'On *Crocus vittatus*, Schloss. & Vuk.'—V. von Borbas, 'Botanical notes.'—F. Antoine, 'Botany of the Vienna Exhibition' (continued.)

Magyar Nov. Lapok.—J. L. Holuby, 'On plants disappeared from the South Trencsinian district.'—J. Kunszt, 'Flora of the Upper Neogradian country' (continued).—L. Simkovics, '*Alnus barbata* near Eperjes.'

Nuovo Giorn. Bot. Ital. (15th April).—T. Caruel, 'On the floral structure and affinities of various monocotyledonous families.'—G. Gibelli, 'Answers to F. Delpino and G. Bertoloni.'—L. Radlkofer, 'On a special arillus in *Sapindaceae*.'—G. P. Papasogli, 'Genetical and histological study of the Olive.'—R. Pirotta, 'Monograph of the genus *Sporormia*.'

Bot. Tidsskrift (3, bd. ii, heft 2).—E. Warming, 'Biological and morphological notes' (continued).

Proceedings of Societies.

LINNEAN SOCIETY OF LONDON.

March 21, 1878. — William Carruthers, Esq., Vice-President, in the chair.—The following were elected Fellows of the Society:—John Evans, Esq., F.R.S.; C. P. Ogilvie, Esq.; Arthur Veitch, Esq.; Sydney H. Vines, Esq., B.A.—There was exhibited, on

behalf of G. T. Saul, Esq., an example of an enormous development of a mass of adventitious buds on the root of a species of *Berberis*.—The following papers were read:—‘The Variation in the Leaf of *Conium maculatum*,’ by John Gorham. The author has carefully registered and analyzed the minute distribution of the veins of the leaf, and he finds that a piece one-third of an inch long and one-fifth wide is an exact counterpart in its venation of the entire leaf and of the order; and he believes that the principle, further extended, may be useful in diagnosis where minute fragments of a leaf are inspected. — ‘On some Genera of *Olacaceæ*,’ by John Miers. The author describes a new genus, *Rhaptarrhena*, and single species, from Brazil, allied to *Aptandra*.^{*} He further treats of three genera, *Myoschilos*, *Arjona* and *Quinchamalium*. The first consists of a single species, the second of eight species, and the third of seven species. All of the above three genera possess a distinct though small calyx, with the addition of a separate calycle on which the calyx is seated. — ‘List of Fungi from Brisbane, Queensland, with description of new species,’ by the Rev. M. J. Berkeley and C. E. Broome. Some 120 species had been placed in the author’s hands by Messrs. L. A. Bernays and F. M. Bailey, of the Botanical Gardens, Brisbane. Among this series Agarics are scarce, as likewise *Clavariæ* and other fleshy Fungi, possibly on account of difficulty of their preservation. Among some thirty forms of *Polyporei* are several interesting species. *Neodictyon gracile* is alone representative in the series of the *Phalloidei*. Two species only of *Myxogastres* occur. Leaf-parasites are poorly represented. Three species of *Helvellacei* appear new, while there are some interesting examples of *Sphaeriacei*. *Hypoxyylon cetrarioides* of Currey, in perfect fruit, completes the author’s history of that plant. Several species are identical with those of Ceylon and South America, and several with those of Europe.

April 4. — W. Carruthers, Vice-President, in the chair. — The following gentlemen were elected Fellows of the Society:—F. M. Bailey, Esq., of Brisbane; A. Hewan, Esq., M.D.; G. Payne, jun., Esq.; and J. R. Reid, Esq. — Dr. H. Trimen exhibited the persistent base of the stem of *Cicuta virosa*, Linn., in its floating winter state, the example having been obtained near Yarmouth by Mr. H. G. Glasspoole. This was described by Dr. W. Watson and well figured by Ehret, in the ‘Philos. Trans.’ for 1746. — Mr. G. Murray showed, under the microscope, specimens of growing *Saprolegnia*, exhibiting terminal and interstitial oogonia. — The following papers were read:—‘On a Collection of Fungi from Texas,’ by M. C. Cooke. These had been obtained by Mr. Ravenel some years ago: the author has added a list of all the recorded species. Altogether the series is small, showing that there yet remains much unknown in the mycologic flora of what is probably one of the richest States of the Union. — ‘Remarks on the peculiar properties ascribed to a

^{*} This proves to be *Lissocarpa*, Benth., referred in the ‘Genera Plantarum’ (p. 671) to *Styracææ*.

Fungus by the Samoans,' by the Rev. Thos. Powell. Specimens of the fungus had been forwarded to the Rev. Mr. Berkeley for identification. The natives give the name "Limamea" to it. It destroys their Bread-fruit trees and the Chesnut (*Inocarpus edulis*), though not confined to them. They believe that an antidote to its ravages exists in the liliaceous plant, *Crinum asiaticum*, which they plant between the trees liable to be affected.

April 18.—Dr. J. Gwyn Jeffreys, F.R.S., Vice-President, in the chair. — The following gentlemen were elected Fellows of the Society: — Rev. A. A. Harland, M.A.; Rev. J. J. Muir, M.A.; W. G. Piper, Esq.; and Frederick Townsend, Esq., M.A. — The following botanical paper was read: — 'On the Mechanism for the Fertilization of *Meyenia erecta*, Benth.,' by R. Irwin Lynch. This West African Acanthaceous shrub has a funnel-shaped corolla, with hairy anthers midway in the tube, their backs pressed against the wall. The longer, slender, flexible style has its double-lipped stigma so formed and placed that pollen, to be effective, must touch the tubular lip. Insects, alighting and entering towards the nectar at the bottom of the flower, on their return so move the lever-lip of the stigma as to produce pollenization.

May 2.—W. B. Carpenter, F.R.S., Vice-President, in the chair. — The following gentlemen were elected Fellows of the Society: — M. César Chambre, Broad Street, City; and Thos. Comber, Esq., Redcliffe, Newton-le-Willows, Lancashire. The Foreign Members elected by ballot to fill the vacancies of those deceased during last year were: — Teodoro Caruel, Professor of Botany and Director of the Botanic Garden, Pisa; Dr. Ernest Cosson, of Paris; Dr. George Engelmann, of St. Louis, Missouri, U.S.; Dr. Edouard Fenzl, Professor of Botany at the University and Director of the Botanic Garden at Vienna; and Dr. Julius Sachs, Professor of Botany at the University and Director of the Botanic Gardens, Würzburg. — Mr. John R. Jackson exhibited a series of dried mounted specimens illustrating the peculiarities of *Yucca baccata*, Torrey. These were the fruits, leaves, and portions of the stem; the latter used as a substitute for soap by the inhabitants of Mexico. The plant in question extends from Southern Colorado far into Mexico. In the north it is acaulescent; southward it forms a trunk up to ten feet high. The fruit, which in the other Yuccas is capsular, is here a dark purple berry. It is eaten when fresh, both by Whites and Indians, and cured by the latter for winter provision. The plant is sometimes called the Rocky Mountain Banana (see Engelmann's Monograph of the genus). — The following papers were read: — 'On *Marupá*, a genus of the *Simarubacæ*,' by John Miers, Esq., F.R.S. This genus is founded upon a curious fruit observed by the author in the Brazilian productions contributed to the Paris Exhibition of 1857, partly under his charge, and ticketed '*Marupá ou Simrarouba*.' In the same collection was also a specimen of wood, likewise from Pará, named '*Marupá ou Páo Pombo*.' The fruit in question offers a resemblance to that of *Samadera indica*, described and figured by Gaertner, though a trifle smaller, but they differ in their external covering: in Gaertner's

specimen the fruit has a very thick, solid, homogeneous, integral pericarp; while in *Marupá* this is equally thick, but disintegral, consisting of three distinct parts, the outer one or pericarp being translucent, pergamineous, bladder-like, the inner one or endocarp being thin and membranaceous, while the intermediate copious mesocarp is mucilaginous; it contains a single seed or putamen, like that figured by Gaertner. In 1866 Signor Netto described a Brazilian plant under the designation of *Odina Francoana*, and bearing the vernacular name of 'Páo Pombo': this is considered by the author as congeneric with Netto's species, which cannot belong to *Odina*, as that genus is Anacardiaceous, and quite foreign to the American Continent. Netto's plant bears many small male monœcious flowers, the structure of which conforms with that originally defined by St. Hiliare as characteristic of the *Simarubaceæ*. The author concludes with a short diagnosis of the two species, which are severally illustrated by analytical drawings.* — 'On the Seed-structure and Germination of a Species of *Pachira*,' by Mr. R. Irwin Lynch. The seeds were received at Kew in July, 1877, labelled the 'Provision Tree.' They vary in size and form, are without albumen, and consist in bulk of but one fleshy, lobed cotyledon, the second being exceedingly diminutive and apparently functionless. Germination takes place in about a fortnight after sowing, and in one case observed the large persistent cotyledon did not appear to be exhausted for nearly six months. — 'On the Occurrence of Conidial Fructification in the *Mucorini*, illustrated by *Choanephora*,' by Dr. D. D. Cunningham, F.L.S. This paper is designed to show that this fungus, the *Cunninghamia infundibulifera*, Currey 'Jour. Linn. Soc.' xiii. p. 333, in place of being a member of the *Mucedines*, belongs to the *Mucorini*; and that De Bary's suggested analogy between the *Mucorini* and *Ascomycetes*, in respect of their fructification, is well founded, although the observations which originally suggested it have since been shown to be fallacious. The investigation of *Choanephora* has been carried on for some years as opportunity has permitted. Its presence on plants certainly accelerates decay greatly, but it is a cause, not a consequence, of advanced putrefaction. The author proceeds to describe in detail the various features and points of importance, and the following is given us as an abstract of the results at which he believes he has arrived. The results of study of the plant under normal conditions show that it possesses a mycelium and sexual reproductive apparatus of the recognised Mucorine type, but that the asexual fructification, in place of being sporangial, is of a truly conidial nature. Under other special conditions of nutrition and media employed, however, sporangial and chlamydosporous forms of fructification obtain. That the former of these two really belongs to the same plant as the zygospores and conidial forms is grounded on the following reasons:—

1. Conidia have given a mycelium producing such sporangia.
2. Spores from a sporangium have developed a mycelium bearing

* On this genus see 'Journ. Bot.,' 1873, p. 258.

the conidial form of fructification. 3. Sporangial filaments have been traced to the same mycelial tubes as conidiiferous ones. 4. Conditions securing the development of sporangial filaments on a mycelium produced from conidia have been in a great degree determined. 5. Prepared *Hibiscus* decoction exposed to the air may develop various moulds, but none producing such sporangia, save when *Choanephora* conidia have been introduced. Chlamydosporous fructification, again, is very rare. According to the detailed observations, then, *Choanephora* is a genus of Mucorine Fungi, capable of producing four kinds of fructification, as follows:—

- | | | |
|----------------------------|---|---------------------------|
| I. Sexual Fructification | . | Zygosporos. |
| | | { Conidia. |
| II. Asexual Fructification | . | { Sporangial spores. |
| | | { Chlamydophorous spores. |

These phenomena afford a possible explanation of certain otherwise conflicting conclusions which have been arrived at by such thoroughly competent observers as Brefeld, Van Tieghem, and Le Monnier. At all events it yields a note of warning that classification of fungal organisms, based alone on one form of fructification, may lead to false conclusions.

Botanical News.

AMONG the recently elected Fellows of the Royal Society botanists will see with great satisfaction the name of Mr. J. G. BAKER; a worthy recipient in all respects.

Mr. WILLIAM HILLHOUSE, of Trinity College, author of 'Contributions towards a new Flora of Bedfordshire, 1875,' and 'Bedfordshire Plant-List for 1876,' has been appointed Assistant Curator of the Cambridge Herbarium.

Mr. W. THISELTON DYER has been elected one of the Examiners in Botany in the University of London.

WE have to record the death of ROBERTO DE VISIANI, which occurred on May 4th, at the age of 77. He had been Professor of Botany and Director of the Botanic Garden at Padua for very many years, and his writings extend over a long period, commencing, in 1826, with the 'Stirpium Dalmaticarum Specimen.' The Dalmatian flora much occupied him; his 'Flora Dalmatica' was published in three vols., with another of plates in 1842-53, and Supplements have appeared in 1872 and as recently as last year, 1877. Visiani also wrote on the plants of Egypt, of Greece and of Servia, and was the author of many papers in various departments of Botany in the Italian scientific Journals. DeCandolle gave the name *Visiania* to a genus of *Oleaceæ* in 1844, and Gasparrini to one of *Ficææ* in the same year, but neither have been maintained.

Original Articles

ON THE NEW *AMARYLLIDACEÆ* OF THE WELWITSCH AND SCHWEINFURTH EXPEDITIONS.

BY J. G. BAKER, F.R.S.

(TAB. 197.)

THE following are the new *Amaryllidaceæ* contained in the sets I have seen of the plants gathered by Dr. Welwitsch in Angola, and Dr. Schweinfurth in Central Africa. Type specimens of all of the former may be seen at the British Museum, and of the latter at Kew.

CRYPTOSTEPHANUS, *Welw. MSS., genus novum*. Perianth narrowly funnel-shaped, the permanently ascending oblong-lanceolate segments half as long as the more or less curved tube. Anthers six, small, oblong, nearly sessile in a single series at the middle of the perianth-tube. Staminodia twelve, linear, two inserted at the base of each segment of the perianth, where they unite, running down the tube as an adnate strap-shaped process, from the middle of which the anther springs. Ovary inferior, three-celled; ovules several in a cell, axile, horizontal, superposed. Style short, erect, cylindrical. Stigma peltate, placed on the same level as the anthers. Fruit a globose scarlet berry. Seeds one to two in a cell, turgid, not seen fully mature.

C. DENSIFLORUS, *Welw. MSS.* Root-stock a "compact bulb-tuber." Leaves six to eight, cotemporary with the flowers, lorate, glaucescent, glabrous, moderately firm in texture, finally a foot long, three-eighths to half an inch broad. Scape central, moderately stout, compressed, ancipitous, six to eight inches long. Bracts in a whorl, as in *Hemanthus*, unequal, lanceolate, greenish, membranous, an inch long. Flowers, twenty to thirty or more, in a dense globose head; pedicels very short. Ovary green, round-oblong, one-sixth of an inch long. Limb dark-purple, more or less curved, under half an inch long; curved tube a quarter of an inch; segments one-eighth of an inch, slightly cucullate at the tip. Staminodia more than half as long as the perianth-segments. Anthers under a line long. Berry the size of a pea (about three-eighths of an inch diameter), bright scarlet. [TAB. 197].

Huilla, in bushy places, in dry, sandy soil near Lopollo, in the temperate region (3800-5500 feet), flowering in October and November, fruiting in January, *Welwitsch*, 4027!

This is certainly the most interesting new plant amongst all the hundred and twenty new bulbs which Dr. Welwitsch discovered in his Angolan expedition. Not to go beyond the

order for a comparison, the general habit is most like that of a small *Cyrtanthus*, the narrowly funnel-shaped tube of the perianth being quite similar, and, as in that genus, curving more in the outer flowers of the umbel; but the structure is totally different from that of any Amaryllid already known. By its corona, distinctly exterior to the whorl of stamens proper, the genus to which it approximates most of all is *Narcissus*. Here the staminodia palpably represent an outer whorl of stamens, for, as Dr. Welwitsch has noted and one of his specimens shows, they casually bear a small abortive anther at the tip. The alliance, both in habit and structure, is very close with *Tulbaghia*, in *Liliaceæ*, a genus the range of which Dr. Welwitsch found to extend from the Cape to Angola, and a new species, which Lieut. Cameron has lately discovered on the shores of Lake Tanganika. In *Tulbaghia*, however, the fruit is capsular, whilst here it closely resembles that of *Hæmanthus*. It is scarcely needful for me to explain that here, as in other cases, these descriptions are greatly indebted for their completeness to the careful notes which Dr. Welwitsch made from the living specimens.

HÆMANTHUS (NERISSA) ANGOLENSIS, *Welw. MSS., n. sp.* Bulb narrow, with a long neck; outer sheaths spotted with purple. Leaves developed on a special stem, as in *H. multiflorus* and *abyssinicus*, produced after the flowers; fully-developed channelled petioles six to nine inches long; lamina thin, oblong, acute, abruptly narrowed at the base, nine to twelve inches long, three to four inches broad; central main veins one-sixth to one-eighth of an inch apart; oblique cross-bars about half a line apart. Scape lateral, six to eight inches long. Umbel three to four inches in diameter, not so dense or so many-flowered as in *multiflorus* and *abyssinicus*. Bracts many, linear, reddish; pedicels three-quarters to an inch long. Ovary globose. perianth bright red; tube cylindrical, one-third of an inch long; segments linear, three-quarters of an inch long. Filaments rather longer than the perianth-segments. Anthers yellow, oblong, under a line long.

Golungo Alto, in primæval woods, 1000–2400 feet, flowering in February, *Welwitsch*, 4008! The species of this section of *Hæmanthus* have rapidly increased lately. There are two in Kunth, and another has been in cultivation several years. I described three new ones, not long ago, in the 'Gardeners' Chronicle.' We have now two more in cultivation at Kew, of which plates will be given in the 'Botanical Magazine;' and now here are two others, raising the total number to ten. This group is almost endemic in Tropical Africa, only one of the species reaching into Natal.

HÆMANTHUS (NERISSA) FILIFLORUS, *Hiern MSS., n. sp.* Leaves five to six, as in the last, produced on a special stem about a foot long, which is developed after the flowers; sheathing petiole not more than two to three inches long; lamina thin, oblong, finally a foot long by half a foot broad; central veins three-eighths to half an inch apart; oblique cross-bars much closer than in

H. angolensis, not more than a quarter of a line apart. Scape lateral, under a foot long, much spotted with purple. Umbel as dense as in *H. multiflorus*, five to six inches in diameter. Bracts unequal, reflexing, linear and lanceolate, reddish, an inch and a half to two inches long; pedicels an inch to an inch and a quarter long. Ovary globose. Perianth bright red; tube cylindrical, a quarter of an inch long; segments linear-subulate, twice as long as the tube. Filaments longer than the segments. Anthers oblong, yellow, three-quarters of a line long.

Pungo Andongo, flowering in October, *Welwitsch*, 4009! 4010! Closely allied to the old Sierra Leone *H. multiflorus*, from which it differs in leaf-veining and by its much smaller flowers, with very narrow segments.

CRINUM AMMOCHAROIDES, *Baker, n. sp.* Bulb globose, three to four inches in diameter, with brown membranous tunics, and a short neck. Leaves six to eight, lorate, probably distichous, ciliated, six to nine inches long at the flowering-time, an inch broad. Scape stout, lateral, not more than three to four inches long. Umbels eight to twelve-flowered; outer spathe-valves lanceolate, greenish, an inch and a half to two inches long; pedicels a quarter to half an inch long. Ovary oblong, a quarter to one-third of an inch long. Tube cylindrical, four to five inches long; segments red, linear, rotate, two and a half to three inches long. Filaments as long as the segments. Anthers linear, versatile, yellow, a quarter of an inch long. Style longer than the perianth-segments, declinate; stigma entire.

North Central Africa, *Schweinfurth*, 1370! 1787! Series iii., No. 208! A very distinct plant, connecting the *Crinum*s of the *asiaticum* group with *Buphane*. The leaves closely resemble those of *Nerine* (*Ammocharis*) *falcata* and its variety *coranica*.

CRINUM PAUCIFLORUM, *Baker, n. sp.* Bulb globose, about three inches in a diameter; tunics brown, membranous. Leaves five to six, linear, subcoriaceous, fifteen to eighteen inches long, a quarter of an inch broad; margin entire. Scape two to three inches long, one to two-flowered. Bract single, two to three inches long, tubular in the lower half, greenish, the free point linear. Ovary oblong, nearly sessile; ovules many, superposed. Tube curved, four inches long; segments ascending, oblong, acute, three inches long, an inch broad at the middle, white, with a distinct red central band outside. Filaments declinate, two-thirds as long as the perianth-segments. Anthers linear-oblong, a quarter of an inch long. Style declinate, falling about an inch short of the perianth-segments.

North Central Africa, in the Kingdom of Djur, *Schweinfurth*, 1975! Closely allied to *C. Broussonetii* and *C. distichum*, both of which inhabit the same region.

CRINUM BUPHANOIDES, *Welw. MSS., n. sp.* "Bulb the size of a child's head." Leaves lanceolate, glaucous, firm in texture, undulated, gradually narrowed to an acute point, fifteen to eighteen

inches long, two to two and a half inches broad, closely veined, ciliated with distinct linear scales half a line long. Flowers thirty to forty or more in an umbel, white, with a distinct keel of red down the back of the segments; outer bracts large, greenish, deltoid; pedicels a half to three-quarters of an inch long. Ovary oblong; tube three and a half to four inches long; segments lanceolate, two to two and a half inches long, a quarter of an inch broad. Filaments as long as the perianth-segments. Anthers a quarter of an inch long. Style red, longer than the perianth-segments.

Pungo Andongo, in sandy woods, at 2400–3800 feet, flowering in October, *Welwitsch*, 4014! General habit of *C. latifolium*, from which it differs by its narrow perianth-segments and distinctly scale-ciliated leaves of firm texture.

CRINUM VANILLODORUM, *Welw. MSS., n. sp.* “Bulb columnar, the size of a child’s head.” Leaves spreading, bright green, lanceolate, two to three feet long, two to two and a half inches broad at the middle, narrowed from the middle towards the base and an acute point, entire, and not at all ciliated at the edge, the main veins distant for the genus and connected by distinct cross-bars. Scape two to four feet long, three to six-flowered; outer bracts lanceolate, two and a half to three inches long. Ovary oblong, sessile. Perianth-tube curved, five to six inches long; segments of the limb oblong, pure white, not at all keeled with red, only the three outer faintly marked with green, about three inches long by an inch broad. Filaments white, declinate, falling about an inch short of the perianth-segments. Anthers linear, three-quarters of an inch long. Style reaching to the tip of the perianth-segments.

Golungo Alto, 1000–2400 feet, flowering in November, *Welwitsch*, 4020! 4021! Closely allied to the well-known *C. giganteum*, *Andr.*, of Sierra Leone. The name refers to the scent of the flowers.

CRINUM FIMBRIATULUM, *Baker, n. sp.* Leaves linear, two to five feet long, an inch broad at the base, tapering gradually to the point, glaucous green, deeply channelled down the face, minutely scale-ciliated at the edge; veins close, distinct. Scape two feet long, three to seven-flowered; outer bracts lanceolate, two to two and a half inches long. Ovary nearly sessile. Perianth-tube curved, four to five inches long; segments of the limb oblong, ascending, white, with a distinct red keel, two and a half inches long, an inch broad. Filaments declinate, falling about an inch short of the segments of the perianth. Anthers linear, three-eighths to half an inch long. Style about reaching to the tip of the perianth-segments.

Loanda, in meadows, at a low level (under 1000 feet), inundated in summer, flowering in March, *Welwitsch*, 4018! 4019! Of described species, comes near *C. Broussonetii*, *Herb.* (*C. yuccaeflorum*, *Salisb.*)





D Blair F.L.S. del et lith.

Mintern. Bro^s imp.

Cryptostephanus densiflorus, Welw.

BUPHANE ANGOLENSIS, Baker, *n. sp.* Bulb large, ovoid; tunics firm, brown. Leaves about six to a stem, lorate, bifarious, curved and adpressed to the ground, six to eight inches long, half to three-quarters of an inch broad, glaucous, fimbriato-ciliate. Scape stout, lateral, not more than one to two inches long; umbel six to eight-flowered; outer bracts lanceolate, one and a half to two inches long; pedicels very short. Flowers dull red. Ovary small, oblong. Perianth-tube cylindrical, two inches long; segments spreading, oblanceolate, obtuse, about an inch long. Filaments inserted at the throat of the tube, a quarter of an inch long. Anthers oblong, one-eighth of an inch long.

Huilla, in bushy, dampish pastures of the sub-temperate region (3800–5500 feet), flowering in October, *Welwitsch*, 4012! Very different from the two Cape species already known. Dr. *Welwitsch* found *B. toxicaria* in several provinces of Angola, and Lieutenant *Cameron* got it on the shores of Lake Tanganika.

CYRTANTHUS (MONELLA) *WELWITSCHII*, *Hiern MSS., n. sp.* Bulb ovoid, an inch in diameter. Leaves about four, cotemporary with the flowers, fleshy, linear, glabrous, glaucous, one to one and a half feet long, a quarter to one-third of an inch broad. Scape slender, as long as the leaves. Umbel three to eight-flowered; outer bracts linear, one and a half to two inches long; bracteoles subulate; pedicels one to two inches long. Ovary oblong, a quarter of an inch long; perianth red, one to one and a half inches long; segments linear, about as long as the more or less curved narrowly funnel-shaped tube. Stamens a little exerted from the perianth-tube, distinctly biseriate; anthers yellow, oblong, a line long. Style overtopping the anthers, with three spreading subulate branches. Capsule oblong, three-quarters of an inch long, three-valved down to the base. Seeds in a long row in each cell, oblique, discoid, black, half an inch long, a quarter of an inch broad.

Huilla, in damp places of the sub-temperate region (3800–5500 feet), in company with *Typha* and *Richardia*, flowering in November, *Welwitsch*, 4028! General habit of the well-known *C. angustifolius*, Ait., of the Cape, from which it differs by the perianth-segments reaching half-way down to the ovary.

EXPLANATION OF TAB. 197.—Fig. 1. *Cryptostephanus densiflorus*, Welw. 2. Longitudinal section of flower (enlarged.) 3. Transverse section of ovary (enlarged.) 4. Cluster of fruit (natural size.) 5. Vertical section of berry (natural size.)

ON SOME NEW MALAYAN CORYLACEÆ.

BY H. F. HANCE, Ph.D., Member of the Royal Botanic Societies of Ratisbon and Belgium, &c.

IN the summer of 1876, Dr. Scheffer was so kind as to send me, from the rich herbarium of Buitenzorg, a number of specimens of Malayan *Corylaceæ*, almost all unnamed, but many very rare and valuable, with full permission to describe such as I might consider new. After a patient examination and comparison of all these, I selected the following as being undescribed; and as a testimony to the care I bestowed on their study, I may say that Dr. Scheffer, to whom I communicated my views, has signified his assent, not only as to the species being new, but also in regard to the systematic position I have assigned each, except in the case of *Quercus rhoensis*, which, from my omission to indicate it by its number, he did not identify. The species described all belong to Miquel's 'Sumatran province,' or Wallace's 'Indo-Malayan region' of the Archipelago.

1. QUERCUS (*Cyclobalanus*, *Eucyclobalanus*) RAJAH, *sp. nov.*—*Ramis angulatis tenuiter tomentellis demum glabratis, foliis coriaceis ovalibus v. ovali-oblongis margine integerrimis basi in petiolum 3-4 linealem cuneato-angustatis apice rotundatis subitque breviter lineari-rostratis supra glabris lucidulis subtus opacis tomento squamoso-furfuraceo denso gilvo v. pallenti obtectis costa satis crassa supra elevata costulis ad utrumque latus circiter 10 sub angulo 50° egressis utrinque paululum prominentibus intra marginem obscure anastomosantibus 5-7 poll. longis 2½-3 poll. latis, fructibus secus pedunculum validum folio parum breviorum confertim sed singulatim dispositis sessilibus, cupulæ patelliformis 7 lin. diametro extus glabratae intus centro pulvinatum elevatae zonis concentricis 4 indistinctis integris, glandibus obovoideo-hemisphæricis dilute brunneis basi excavata pallida tomento brevi sericeo griseo plus minus persistenti tectis 9 lin. altis 10 lin. diametro columna styli apiculatis.*

Ex archipelago Malayano. (Herb. hort. Bogor., n. 11484.)

Nearest the Bangka *Q. Miqueliana*, Scheff. ! in Dr. Scheffer's opinion, in which I entirely concur. It is, however, perfectly well distinguished by the shape and colour of the leaves, their stouter costules, the sessile fruits, less numerous and distinct entire-edged cup-scales, and by the much paler tomentose acorns.

2. QUERCUS (*Pasania*, *Eupasania*) RHOENSIS, *sp. nov.*—*Ramis angulatis glabris lenticellatis, foliis coriaceis a basi cuneata elliptico-oblongis breviter acuminatis integerrimis glaberrimis costulis utrinque circ. 12 tenuibus angulo circ. 60° egressis supra impressis subtus elevatis, fructibus secus pedunculos canescentes terminales sæpius fasciculatos folia subduplo superantes ternatim aggregatis, cupulis cupuliformibus 5 lineas diametro canescentibus intus canosericis squamis distinctis adpressis, glandibus glandaceis lucidis ovoideis acuminatis 5 lin. diametro 5-6 lin. altis.*

Circa Rhio, seu Riouw, ins. Bintang, archipelagi Malayani, ad orientem ins. Singapur sitæ, legit cl. Teijsmann. (Herb. hort. Bogor, n. 11452.)

In foliage this is absolutely indistinguishable from *Q. spicata*, Sm., a very variable species, as any one who will refer to plates 1 to 4 of Oudeman's "Annotationes criticæ in Cupuliferas nonnullas javanicas" may see. I therefore at first felt disposed to regard it as merely a sub-species, or very distinct variety. But, after renewed examination, I am bound to say that, amongst a most extensive set of specimens of *Q. spicata*, from the continent of India, Java, Sumatra, Penang, and a very large number of the smaller and less-known islands of the Malay archipelago, which I have been enabled to compare, I have seen none at all with small and very acute acorns like those of the Rhio tree, which are indeed more like those of *Q. Hancei*, Benth. I therefore believe that it must be specifically distinguished.

I may here note that an Indian oak, *Q. Andersoni*, G. King, has recently, through some misapprehension, been stated by C. B. Clarke* as having been named by Sir Joseph Hooker. It was, however, found amongst the Sikkim collections of the late Dr. Thomas Anderson by Dr. King, the present director of the Calcutta Garden, who dedicated it to his deceased friend; and a paper regarding it, by Dr. King, was read before the Linnean Society on the 20th January, 1876, as mentioned at page 92 of the volume of this journal for the same year. Dr. Hooker had, in writing to Dr. King, observed that it was "very near to, if not identical with *Q. dealbata*, Hook. f. and Th.!" Dr. King, who had kindly sent me a specimen, and who himself stationed it next *Q. spicata*, being unable to concur in this opinion, asked mine. I replied, as I still think, that in my judgment its nearest allies are *Q. Irwinii*, Hance, and *Q. fenestrata*, Roxb. ! assuredly it is very distinct from *Q. dealbata*.

3. *QUERCUS* (*Pasania*, *Eupasania*) *SCYPHIGERA*, *sp. nov.*—Ramis adultis glabris, ramulis ferrugineo-tomentosis, foliis coriaceis oblongis margine integerrimis basi obtusis apice obtuse acuminatis adultis glabris utrinque opacis junioribus subtus præcipue in costa venisque parce ochraceo-tomentosis costulis utrinque 9–11 sub angulo 52° egressis tenuibus sed conspicuis subtus cum costa crassiuscula elevatis ante marginem sursum curvatis ac sensim evanescentibus 7–10 poll. longis 2–4 poll. latis petiolo 3–4 lineali; fructibus secus pedunculum gracilem folio longiorem solitariis v. geminatis pedicello crasso 2–3 lineali impositis, cupulæ hemisphæricæ 6–7 lin. altæ cinerascentis glabratae margine integerrimæ tenuis nigricantis intus basi rugosæ excavatæ squamulis 6–7 seriatis omnino inter se coalitis denticulos tantum minutos exhibentibus, glande semipollicari ovoidea acutiuscula castanea apice tenuiter sericea.

In insula Bangka legit Teijsmann (Herb. hort. Bogor, n. 11403.) The nearest allies of this species are *Q. bancana*, Scheff. ! and

* 'Journ. Linn. Soc.,' xv., 125.

Q. Amherstiana, Wall. ! between which it should be stationed. The cup-scales are a good deal like those of the first-named species, the foliage approaches that of the second, but both cup and acorn are considerably smaller than in either, and the latter of a much deeper hue.

4. *CASTANOPSIS* (*Callæocarpus*) *MITIFICA*, *sp. nov.*—Ramulis subtetibus purpurascensibus glaberrimis, foliis coriaceis oblongis integerrimis basi cuneatis apice obtusis 6–6½ poll. longis incl. petiolo semipollicari 2 poll. latis supra glaberrimis lucidulis subtus subopacis subargenteo-rufescentibus squamulis minutis albidis oculo fortius armato tantum conspicuis densissime obsitis subtiliter sed vix prominulo-reticulatis costulis in utroque latere circ. 12 tenuibus sub angulo 50° egressis marginem versus arcuatis subtus cum costa elevatis, fructibus pluribus secus ramum validum dense aggregatis, involucre abbreviato-piriformi v. obscrotiformi lateraliter compresso altero latere convexiusculo altero leviter sulcato crasse breviterque stipitato cinereo-tomentello pollicem alto latitudine majore 11–13 minore 8–9 lineali, ½ lin. crasso apice acervulis 4 cruciatim dispositis spinularum prismaticarum ½ lin. tantum longarum aucto zonulaque spinularum similium supra medium alteraque sæpissime fere oblitterata juxta medium angulos 4 rotundatos involucri semicirculariter circumdantibus concavitate sursum spectante prædito stigmatibus e vertice breviter protrusis, nucibus 3 castaniformibus duabus æquimagnis plano-convexis extremitates involucri occupantibus tertia minore trigona inter eas ad latus involucri convexiusculum cuneatim adfixa præter apicem tomentellum glaberrimis lucidis badiis hilo carpico opaco albido ruguloso trientem fere superficiei occupante pericarpio ligneo ½ lin. crasso, cotyledonibus ?

In insula Lingga, ad oram orientalem ins. Sumatræ, coll. Teijsmann. (Herb. hort. Bogor, n. 11457.)

Evidently very closely allied to *C. sumatrana*, A. DC., my specimens of which are, I regret to say, imperfect and inadequate for a proper comparison. It appears, however, to differ by the leaves being more lepidote beneath, by the peculiar shape of the involucre, the arrangement of the tubercles, and by the manner in which the perfectly smooth nuts are packed in the involucre, which I find invariable, and indicated indeed externally. Though outwardly uninjured, the nuts were destroyed within, so that I could not, unfortunately, determine the cotyledonar structure.

5. *CASTANOPSIS* (*Callæocarpus*) *SCHEFFERIANA*, *sp. nov.*—Ramulis teretibus cinereis glaberrimis, foliis rigide coriaceis glaberrimis lanceolato-ellipticis integerrimis acuminatis 3–3½ poll. longis 15–18 lin. latis in petiolum 9-linealem cuneato-attenuatis supra nitidissimis subtus parum lucidis rufescentibus rete venularum subtili sed vix prominulo costulis tenuibus ad utrumque latus 8–10 sub angulo circ. 50° egressis arcuatis ante marginem deliquescentibus, fructibus pluribus secus ramum validum sessilibus approximatis, involucre depresso subgloboso 14–18 lin. diametro lineam crasso cinereo-velutino zonis 5–6 approximatis transversis curvulis

continuis processicum prismaticorum 2 lin. aliorum basi confluentium sursum deorsumque curvatorum apice in spinam rigidam calvam nitidam desinentium undique obsessis stylis ex ipsius apice breviter exsertis maturitate 3-4 valvi, nucibus tribus uno reliquis multo majore mutua pressione ovoideo-complanatis dense fulvo-hirsutis hilo carpico trientem superficiei occupante ruguloso brunneo glaberrimo, pericarpio osseo, cotyledonibus ?

In ins. Lingga coll. Teijsmann. (Herb. hort. Bogor, n. 11441.)

Most nearly allied to *C. rhamnifolia*, Miq., but differs by its more rigid foliage, the shape of its involucre, the distinct zonate arrangement of the processes terminating in sharp smooth prickles, and the three nuts.

6. *QUERCUS DISCOCARPA*, Hance.—Fine specimens of this, communicated under nos. 3629, 11447, and 11486, hb. Bogor., enable me slightly to correct the diagnosis as follows:—Aculeis sæpe 3-4 lin. longis acicularibus refractis, glande matura cum cupula non connata. Unfortunately, not one of the fruit I have opened has enabled me to ascertain the cotyledonar structure. But, as I now know the species, I believe it must certainly be placed amongst the *Castanopses*, near *C. echidnocarpa*, rather than amongst the *Pasanix*, *Chlamylobalani*, where it has hitherto lain in my herbarium. So long, therefore, as the genus *Castanopsis* is admitted, the species must figure as *C. discocarpa*. On this subject, I am gratified to observe a growing disposition on the part of those writers who have good opportunities of studying Asiatic *Corylaceæ* to concur in the view I have long advocated as to the reunion of both *Castanea* and *Castanopsis* with *Quercus*. Mr. Kurz some time ago wrote:—"The differences between these genera are simply artificial ones:"* and, in a letter I received from Dr. Scheffer, he observes,—“Du reste, j'accepte pleinement votre opinion que *Castanopsis*, *Castanea*, et *Callaocarpus* doivent être fondus avec *Quercus*.” Latest of all, one of the most industrious and original of living botanists,—Professor Baillon,—than whom there are few if any less disposed “jurare in verba magistri,” remarks, in his recent revision of the genera of the family, “Les chênes peuvent à peine se distinguer génériquement des châtaigniers;”† and, whilst he unhesitatingly reduces *Castanopsis* to *Castanea*, in his list of genera he puts a mark of interrogation before the latter. It is strange that M. Baillon should have made no reference to the very important investigations of Oersted.

* 'Journ. As. Soc. Bengal,' xlv., 198.

† 'Hort. des Plantes,' vi., 230.

ON THE STRUCTURE AND AFFINITIES OF CHARACEÆ.

By ALFRED W. BENNETT, M.A., B.Sc., F.L.S.

THE position of the order *Characeæ* in the natural system has been one of the most fruitful subjects of discussion among cryptogamic botanists. Forming by themselves a small and perfectly natural group, their affinity is obviously not close with any other family of Cryptogams. Placed by Linnæus first of all among *Alga*, and afterwards transferred to a position among flowering plants, they were treated by most of the botanists who succeeded him as Phanerogams. A. L. de Jussieu considered them as monocotyledonous Phanerogams, referring them to *Naiadeæ*, as Robert Brown did to *Hydrocharideæ*; while others have traced a fancied affinity, among dicotyledonous Phanerogams, to *Halorageæ* (*Myriophyllum*), or *Ceratophyllaceæ*; and Richard erected them into a separate order of flowering plants. Even to the present day the *Characeæ* find a place in some phanerogamic floras, enjoying that distinction along with Vascular Cryptogams alone among flowerless plants; but this is probably due rather to the small number of species than to any supposed genetic affinity. Agardh placed them among *Confervaceæ*; Brongniart among the highest Cryptogams, near to *Filices* and *Marsileaceæ*; Le Maout and Decaisne located them between Vascular Cryptogams and *Muscineæ*; Lindley regarded them as an order of the alliance Algae; while Berkeley and the greater number of recent botanists treat them, under the name *Charales*, as forming a class by themselves intermediate between *Muscineæ* and Thallophytes. Caruel places them by themselves in the group *Schistogama*, between Phanerogams and Vascular Cryptogams. Finally, in the 4th edition of his 'Lehrbuch,' Sachs again degrades them into a family of *Carposporeæ*, the highest class of Thallophytes. From a conviction that this location arises from a mistaken view of certain points of structure, I am desirous of laying the following considerations before the readers of the 'Journal of Botany.'

The most complete records of original observations on the structure of the *Characeæ* are the following:—Thuret, "Sur les Anthéridies des Cryptogames," in 'Annales des Sciences Naturelles,' vol. xvi., 1851, p. 18; Montagne, "Multiplication des charagnes par division," 'Ann. des Sci. Nat.,' vol. xviii., 1852, p. 65; Nordstedt, "Några iakttagelser öfver Characeernas groning," in 'Lunds Univ. Arsskrift,' vol. ii.; Pringsheim, "Ueber die Vorkeime und die nacktfüssigen Zweige der Charen," in 'Jahrbuch für wissenschaftlichen Botanik,' vol. iii., 1863, p. 294; Wahlstedt, "On Characeernas Knoppar och öfvervintring," Lund, 1864; A. Braun, "Conspectus Systematicus Characearum Europearum," 1867; and De Bary, "Zur Keimungsgeschichte der Charen," in 'Botanische Zeitung,' 1875, p. 377 *et seq.* (translated with illustrations in 'Journal of Botany,' 1875, p. 298.) I am, however, acquainted with the two Swedish memoirs only through De Bary's paper.

In all recent systems of cryptogamic classification the greatest stress is justly laid on the structure of the reproductive organs; still it is impossible to neglect altogether the characters drawn from the vegetative organs. Indeed the primary classification of the vegetable kingdom into Thallophytes and Cormophytes depends wholly on characters of this kind. Now if we admit any primary classification of this nature, it is hardly open to doubt that the *Characeæ* must be placed distinctly, not in the lower, but in the upper of the two divisions. Lindley, while locating *Characeæ* among Thallogens, points out that "in them only do we find a symmetrical arrangement even of the divisions of the axis;" while even in the 4th edition of his 'Lehrbuch,' in which he places *Chara* among Thallophytes, Sachs still (p. 155) uses this genus as one of his typical illustrations of the formation of "leaves and leaf-forming axes." The more closely we examine the structure of the stem and branches of *Chara*, the more do we see how widely it diverges from anything that occurs among true Thallophytes; the stem forming a distinct axis, divided into definite nodes and internodes, and growing by an apical bud. In fact the polysymmetrical arrangement of the branches reminds one much more closely of Phanerogams than of even the highest *Algæ*. Even the spurious cortication* of certain *Florideæ* presents but little analogy to that of *Chara*.

The assignment of *Characeæ* to the class of Thallophytes which Sachs calls *Carposporeæ* is hardly more fortunate, and seems to have been chosen mainly because in this class are included all the most highly-organised Thallophytic forms. While admitting that the philosophic taxonomist will not insist too strongly on the invariability of even the most salient characters for the various groups, it is unfortunate that, in the most prominent characteristic of the *Carposporeæ*, *Characeæ* are almost wholly deficient. This characteristic is thus described by Sachs ('Lehrbuch,' 4th ed., p. 287):—"The common character of all plants belonging to this class, and that which distinguishes them from the *Zygosporeæ* and *Oosporeæ*, is the formation of a sporocarp, as the result of the impregnation of the female organ. This sporocarp consists, except in the simplest cases of all, of two essentially different parts, a fertile part, the immediate product of the female organ, and which produces eventually either a single or more usually a considerable number of carpospores, and an envelope or pericarp * * which is not derived directly from the female organ. * * * In all cases the consequence of fertilisation is not merely the further development of a single female cell, as in the *Zygosporeæ* and *Oosporeæ*, but the setting up of certain processes of growth * * * which results in the production of a body, the sporocarp or fructification, consisting of a large mass of tissue." The sporocarp of the *Carposporeæ* is, in fact, strictly analogous to the pseudocarp among Phanerogams, and furnishes its most typical illustration in the

* "Unächte Rinde," Cramer, Physiologisch-systematische Untersuchungen über Ceramiaceen. Zürich, 1863.

“cystocarp” of the *Florideæ*, and (inferentially) in the fructification or so-called “receptacle” of the *Basidiomycetes*. In order to make room for the *Characeæ* among *Carposporeæ*, Sachs has been obliged to insert in the above extract an exception in their case, where, he says, the processes of growth alluded to “do not go very far;” but even this guarded statement seems somewhat to overstep the mark. The cortex or enveloping tubes of the “nucule” of *Chara* and *Nitella* are formed at an early period, and attain their full development *before fertilisation*, simply hardening afterwards into the black shell in which the germinating spore is invested. The location of *Characeæ* among *Oosporeæ* would be equally forbidden by many weighty considerations.

If, therefore, we are compelled to exclude *Characeæ* altogether from the group of Thallophytes, the only alternatives left are to allow them to retain their place as a distinct group co-ordinate with Thallophytes, *Muscineæ*, and Vascular Cryptogams, or to place them among *Muscineæ*. The first of these alternatives has, as we have seen, the sanction of some high authorities; but are there any sufficient reasons against the latter and simpler course? The remarkable resemblance of the antherozoids to those of Mosses has been remarked by Thuret and others; but it has apparently been thought that the assumption of genetic affinity is forbidden by other considerations connected with the reproductive organs, and by the external form of the nutritive portion of the plant. Too much stress should not, however, be laid on the latter consideration, since within *Muscineæ* itself we have the transition from the thalloid *Marchantia* to the frondose *Jungermannia* and *Musci*; and the objection can hardly be sustained by those who place *Equisetaceæ* and *Selaginelleæ* within the same group, the Vascular Cryptogams, and *Basidiomycetes* and *Florideæ* even within the same class, the *Carposporeæ*. Among flowering plants it is admitted that the most abnormal development of the nutritive organs—adapting particular species or genera to live in exceptional circumstances, as in the case of *Myriophyllum*, *Cuscuta*, and *Lemna*,—should not exclude them from location even in the same natural order with plants which are otherwise nearly allied to them. Scarcely any of the plants hitherto recognised as *Muscineæ* are purely aquatic; and if we imagine a cormophyte destitute of vascular tissue gradually acquiring aquatic habits, the structure of *Chara* would be a very likely one for it to attain; the polysymmetry of *Characeæ* would appear to result from analogous causes to the bilateral symmetry of *Hepaticæ*. In the *Sphagnaceæ*, which nearly approach a true aquatic habit, we have a rudimentary cortication of the stem reminding one somewhat of that of *Chara*. On the other hand, the totally dissimilar structure, under somewhat similar conditions, of *Characeæ* from that of *Florideæ* or *Fucaceæ*, seems to indicate a wide genetic separation.

One other point of resemblance may be noted between *Characeæ* and *Muscineæ*, viz., that of the so-called “pro-embryo” of *Chara* to the protonema of Mosses. But first of all, let me point out what seems to me a misuse of the term “pro-embryo” in crypto-

gamic terminology, arising in great measure from the unfortunate use of the corresponding term "Vorkeim" by Pringsheim and other German writers. Both etymologically, and by homology with the pro-embryo or "suspensor" of Gymnosperms and Angiosperms, the use of the term should be confined to a structure intermediate between the act of impregnation and the formation of the multicellular embryo, such as appears to occur in *Selaginella* alone among flowerless plants. The so-called pro-embryo* (Vorkeim), on the contrary, of Mosses and *Chara* is a structure proceeding immediately from the spore, and anterior to the formation of the sexual organs. It is strictly homologous with the prothallium of Vascular Cryptogams; the difference being only of secondary importance that in the latter the prothallium produces immediately the archegonia and antheridia, while in *Muscinea* the leafy plant intervenes. If, however, the term prothallium is open to objection, there is none to the retention of protonema. A false analogy has even led some otherwise careful writers into the error of speaking of the "pro-embryo" and the leafy plant of *Chara* as exhibiting the two stages of an alternation of generations.† The phrase "alternation of generations" is, in fact, used with great vagueness by many cryptogamists. If we employ the term in its best accepted sense, as exhibited in Vascular Cryptogams, it simply describes the fact that the life-history of many plants can be divided into two distinct stages, separated by definite starting-points (Wendungspunkte); these two points being the act of impregnation of the female by the male element, and the germination in the soil of the spore produced non-sexually. The sexual generation consists of the stage intermediate between germination and impregnation; the non-sexual generation of the stage intermediate between impregnation and germination. In this sense, the "pro-embryo" of *Chara* and the protonema of Mosses are both a part only of the sexual generation,‡ although even Sachs often speaks vaguely of the protonema of Mosses "intervening" between the spore and the sexual generation. In both *Characeæ* and Mosses, the remainder of the sexual generation, or leafy plant, is produced on the protonema by lateral budding. The confusion to which I have just referred is no doubt increased by the extraordinary want of exactness in the use of the word "spore" by even some of the best writers on cryptogamic botany,—a practice which has thrown great confusion over many points of cryptogamic homology, and to which it is of the highest importance to attempt to put an end. Even Huxley and Martin § ('Course of Practical Instruction in Elementary Biology,' 4th edition, 1877) describe

* I must confess to having myself sanctioned the confusion by my rendering of Vorkeim by "pro-embryo" in relation to Cryptogams in the translations both of Sachs's and of Thomé's 'Lehrbuch.'

† Repeated by myself in my edition of Thomé's 'Lehrbuch.'

‡ This view is confirmed by the fact that in *Chara fragilis* branches are produced from the nodes of the stem—called by Pringsheim "pro-embryonic branches" (Zweigvorkeime)—altogether similar to the so-called "pro-embryo."

§ The same terminology is perpetuated in the 3rd edition (just published) of Hefrey's 'Elementary Course of Botany.'

the unimpregnated female organ of *Chara*—the homologue of the archegonium of the other higher Cryptogams—as a “sporangium.” It would be possible also to draw other analogies between the modes of vegetative reproduction in *Characeæ* and in Mosses.

Into the structure of the reproductive organs (archegonia and antheridia, or nucules and globules) of *Characeæ* it is needless to enter in detail. Although very different in many non-essential points, there is no essential difference in the process of fertilisation in *Characeæ* on the one hand and in *Muscineæ* and Vascular Cryptogams on the other hand. A female organ or carpogonium of somewhat complicated structure contains within it a cell, the contents of which constitute the “oosphere,” while a more or less open channel leads down to this central cell from the apex of the carpogonium. Impregnation takes place by the coalescence with a hyaline portion of this oosphere, of antherozoids consisting of minute corkscrew-shaped threads of protoplasm, which escape from an antheridium of complicated structure; the result being the development out of the fertilised germ-cell of a single “oospore,” or rudimentary embryo.

The most essential point in which *Characeæ* do exhibit a departure from all the higher Cryptogams is the absence of any true alternation of generations. In none of the other *Muscineæ*, nor in Vascular Cryptogams, does the “oospore,” or fertilised germ-cell, germinate in the soil and give rise immediately to a plant like the one which produced it, without the intervention of intermediate non-sexual germinating spores. If, however, we are justified—as I have attempted to show that we are—in considering the “pro-embryo” as an integral part of the sexual generation, this is the case with *Chara*. But this again would seem to be determined by habit, a true alternation of generations being rare among aquatic plants. The so-called “spore” of *Characeæ* unites, in fact, the properties of an “oospore” produced by impregnation, and of a non-sexual “spore” capable of germination. To complete the cycle of generations, we should expect the oospore to develop into an intermediate structure,—the non-sexual generation,—the development of which would terminate with the production of germinating spores. May we not, then, regard the *Characeæ* as an abnormal form of *Muscineæ*,—*i. e.*, of Cellular Cormophytes,—aquatic in their habit, in which the formation of the non-sexual generation is altogether suppressed?

Since writing the above, my attention has been called to two recent papers relating to the structure and affinities of *Characeæ*. Trevisan, in his “*Conspectus Ordinum Prothallophytarum*” (‘*Bull. Bot. Soc. Belg.*, 1877, p. 4), includes in his second “region” of *Anthogamæ* the two sub-divisions of *Bryophytæ* and *Phycophytæ*, the first of which embraces *Musci* and *Hepaticæ*, the second *Characeæ* only. Celakovsky has a paper in ‘*Flora*’ (1878, p. 49 *et seq.*), “*Ueber die morphologische Bedeutung der sogenannten Sporensprosschen der Characeen*,” in which he objects to the use of

this term applied by several German writers to the female organ of *Chara*, and contests the view of A. Braun and Sachs that the carpogonium must be regarded as a metamorphosed shoot. The "enclosed (behüllte) oogonium," as he prefers to term it, Celakovsky considers, on the contrary, to be a metamorphosed foliar structure or portion of a leaf, homologous to the ovule of Phanerogams.

NOTES ON RUBI.

(No. V.)

BY CHARLES C. BABINGTON, F.R.S., &c.

(Concluded from p. 178).

17. *RUBUS GLANDULOSUS*, *Bell.*—By the kindness of Mr. Bagnall I possess specimens of a plant gathered by him on Bromsgrove Lickey, and supposed to belong to *R. Koehleri* var. *infestus*, which now seems to me to be a form of the aggregate *R. glandulosus*, approaching closely to *R. rotundifolius*, Blox., and also to *R. deflexidens*, Boulay, but differing in some respects from them. The shape of the terminal leaflet is different: it is much broader in its lower half, and much more cordate at the base. Two of these specimens have the dentition described by Boulay: "Les dents grandes et fortement refractées qui terminent les principales nervures des f. caulinaires." On Mr. Bagnall's plant they seem to be as remarkable as on Boulay's specimen (No. 125). The stems of all the three have similar prickles and aciculi; but there are much fewer (indeed scarcely any) hairs on Mr. Bagnall's plant. My opinion now is that these three plants are forms of the segregate species, and that it must bear Mr. Bloxam's name, given to it and published nineteen years, sooner than that of Boulay, namely, *R. rotundifolius*.

Mr. Bagnall's plant differs from my short description of *R. rotundifolius* ('Rubi,' 252) by its terminal leaflets being not only duplicato-dentata, but duplicato-reflexi-dentata, in the manner described by Boulay. On none of my specimens of *R. rotundifolius* from Twycross, nor on the one from Cowley Park, are the leaves more than duplicato-patenti-dentata, for the teeth which terminate the chief veins are simply more prominent than the others, although showing a manifest tendency, but only a tendency, to be reflexed. On the plant from Bromsgrove Lickey the recurved hooks, formed by some of the primary teeth, are as remarkable as on the *R. deflexidens* of Boulay. It appears, therefore, that Mr. Bagnall's plant has differently shaped leaves from either of the others, and also a less hairy stem; that it agrees exactly with one of them in its dentition, and with both in most other respects.

18. *R. GLANDULOSUS* β . *HIRTUS*.—There are two plants in Mr. Bloxam's "Set" which seem to belong to the same species:—(1) That named *R. fuscus* (from Beaumaris) is apparently the former *R. fuscus* of Lees, Bloxam, and myself. I have been long convinced that it is not the *R. fuscus*, W. & N., but the *R. hirtus*,

of those authors. The other (2) bears the name of *R. hirtus*. It wants the barren stem, but apparently the very young panicle resembles that of the preceding (1); and it also is from Beaumaris. *R. flavidiolus*, Müll., is shown, by Boulay's specimen and description ('R. V.,' 83, and p. 102), to be the same. Of course *R. hirtus* is the older name.

R. Reuteri, Merc., of Reuter's 'Cat. Genev.,' 272, and 'Genev. R. L.,' 123, of which I possess an authentic specimen, is very closely allied to *R. hirtus*. It is exactly like specimens gathered by Mr. Purchas at Sellack and Penyard Park, in Hertfordshire, and agrees well with others distributed many years since by Mr. Baker as *R. rudis*, which he gathered between Thirsk and Topcliff, in Yorkshire; and also with one from Banchory, in Scotland, which I named *R. Kochleri* var. *infestus* for its collector, Mr. J. Sim. *R. Reuteri* differs chiefly from *R. hirtus* by its obovate-acuminate terminal leaflet, which is rather less hairy beneath, and less coarsely serrate; but I do not consider it as more than a form of *R. hirtus*.

19. *R. HETEROCLITUS*.—The specimen named *R. heteroclitus* in the "Set" is, on the first view, very like my authentic *R. heteroclitus* contained in the 'Herb. Rub.' (ed. 1, 119, and ed. 2, 54), but cannot really be the same. Wirtgen and Müller correctly refer their plant to the *Suberecti*; but that of Bloxam has not the peculiar clothing, or rather nakedness, of the sepals so characteristic of that group; nor does its stem, as shown by fine specimens, sent to me as authentic, by Mr. Bagnall, from New Park, Middleton, Warwickshire, at all agree with that of the *Suberecti*. Although, therefore, I am obliged to give my decided opinion that it is not *R. heteroclitus*, I am far less able to give it a certain name. But, without being able to decide with certainty the true place of the specimens from Bloxam and Bagnall, I think that they are closely allied to *R. villicaulis* β . *adscitus*, the *R. vulgaris* of Lindley's first edition.

20. *R. PURCHASII*, *Blox.*—It is unfortunatè that Mr. Bloxam did not describe, or at least characterise, this plant, of which I find a specimen in the "Set," and possess another from Mr. Purchas, for I do not know where to place it.

21. *R. DUMETORUM* var. *INTERMEDIUS*, *Warr.*—Mr. Bloxam used this name in the "Set," but it is now dropped by Mr. Warren in favour of *R. tuberculatus*, which is very fairly represented in the 'J. of B.' (viii., t. 106). The specimen in the "Set" probably does not belong to it, and is undeterminable.

22. *R. DUMETORUM* var. *CONCINNUS*.—The specimen issued by Mr. Bloxam, and authenticated by Mr. Warren, can hardly be a form of *R. tuberculatus*, to which his var. *concinus* is referred by the latter botanist in the 'J. of B.' (viii. 152), but seems rather to belong to my *R. corylifolius* γ . *purpureus*. It is far from being a satisfactory specimen. I possess specimens given by Mr. E. Lees many years since, and named by him *R. dumetorum* var. *glabratus*

(a synonym placed under *R. corylifolius* γ . *purpureus* in my 'Rubi'); and they are probably of the same gathering as those which Mr. Warren saw at Kew, and in Mr. Bloxam's collection ('J. of B.,' viii. 172). I see no reason to doubt their being correctly placed in my 'Rubi,' and that *R. dumetorum* var. *concinus* is the same as my *R. corylifolius* γ . *purpureus*.

23. *R. DUMETORUM* var. *INTENSUS* and var. *FEROX*.—Mr. Bloxam has issued specimens under these names in his "Set." I am inclined to consider them as belonging to the same species. They do not seem to me to agree with Mr. Warren's description of his var. *intensus*; but if the former of them is really var. *intensus* his idea of its being the *R. horrefactus*, Müll., is fully confirmed; that is if we may consider the specimens so-named by Genevier, and distributed by Baker, as correct. Dr. Focke does not notice *R. horrefactus*, and therefore we are deprived of his valuable help. Mr. Warren also refers to plants from Cadeby, in Leicestershire, distributed by Mr. Bloxam under the name of *R. diversifolius* (Lindl.), as being his var. *intensus*. I have one of those specimens before me, and am more inclined to refer it to the var. *diversifolius* of Mr. Warren's paper than to his var. *intensus*. It is, therefore, my opinion that *R. diversifolius*, Lindl., includes the forms mentioned by Mr. Warren as *R. dumetorum* δ . *diversifolius* and ϵ . *intensus*, and that *R. horrefactus*, Müll., is the same plant. The name *ferox*, given by Mr. Warren, 1869, but declared by him to be wrong in 1870, ought not to have been now revived. He says ('J. of B.,' viii. 175) that the *R. dumetorum* var. *ferox* of the 'Rubi German' is quite different from our *R. diversifolius*, Lindl., and, therefore, I may add, from the plants now under consideration.

THE CRYPTOGAMIC FLORA OF KENT.

By E. M. HOLMES, F.L.S.

(Continued from p. 120).

Fam. *Lichenacei*.

Tribe—*Caliciei*.

SPHINCTRINA TURBINATA, *Pers. Calicium turbinatum* (Jenner Fl. Tunbr.)

Parasitic on the thallus of *Pertusariæ*. E. B. 2520.

Tunbridge Wells Common; Jenner Fl. Tunbr. Trees near Sibertswold.

CALICIUM CHRYSOCEPHALUM, *Ach.*

On palings; rare.

On old pales, at Shipbourne; Jenner Fl. Tunbr.

C. PHEOCEPHALUM, *Borr.*

On old pales and timber in damp, shady places. E. B. 1540.

On a barn between Tunbridge Wells Common and Hurst Wood; Jenner Fl. Tunbr.

- C. TRICHALE, *Ach.* Var. *ferrugineum*, Borr. *C. ferrugineum.*
(Jenner Fl. Tunbr.)
On old oaks and palings.
On old pales at Shipbourne; *Jenner Fl. Tunbr.*
- C. HYPERELLUM, *Ach.*
On trunks of old trees; frequent. E. B. 1832. The fructification not common.
Wye; Hythe; Sibertswold. In fruit at Penshurst Park; Broome Park, near Sibertswold; and Chilstone Park, near Lenham.
In the barren state this formed the *Lepraria flava* of the early Lichenologists.
- C. TRACHELINUM, *Ach.* *C. sphærocephalum* (Jenner Fl. Tunbr.)
On trees and old pales. E. B. 414.
On decayed trees, near Westerham; Wye; Ashover Wood, near Penshurst.
Known from *C. quercinum* by the lower surface of the apothecia being of a reddish colour.
- C. QUERCINUM, *Pers.* *C. clavellum* (Jenner Fl. Tunbr.)
On old oaks and palings.
On old oaken rails near Penshurst; Ide Hill, near Sevenoaks. Lympne, near the canal.
- C. CURTUM, *Borr.*
On old palings and on dead wood. E. B. 2503.
Hythe, near Romney. On dead trees, near Otford.
- C. SUBTILE, *Pers.* *C. debile* (Jenner Fl. Tunbr.)
On dead trees and old timber. E. B. 2462.
On an old barn, between Tunbridge Wells Common and Hurst Wood.
- CONIOCYBE FURFURACEA, *Ach.*
On the roots of trees and sandy ground. E. B. 1539.
In sand-caves at Chiselhurst, *Howse.*
Known by its spherical spores from *Balicium citrinum.*
- TRACHYLIA TYMPANELLA, *Fr.* *Calicium tympanellum* (Jenner Fl. Tunbr.)
On old posts and palings; common. E. B. 810.
On old railings, near Penshurst; Brasted; on old gate-posts near Egerton; Dunk's Green, near Hadlow.

Tribe—*Spharophorei.*SPHÆROPHORON CORALLOIDES, *Pers.*

- On sandstone rocks; very rare. E. B. 114.
Hungershall rocks, sparingly; *Jenner Fl. Tunbr.!*
Found, in 1878, very sparingly and not in fruit on these rocks.
I have not observed it elsewhere in Kent.

[*S. compressum*, *Ach.*, which is abundant on some of the sand-rocks in Sussex, should be looked for in Kent. It may be recognised by the flattened stem and the apothecia developed laterally

on the underside of the tufts, which are almost always found on the perpendicular sides of damp, shady rocks, and rarely, as with the other species, on exposed rocks.]

Tribe III.—*Bæomycei*.

BÆOMYCES RUFUS, *D.C.*

On exposed clayey banks in woods, and on damp rocks; frequent. Winter and early spring. E. B. 373.

Brasted; Ightham Common; abundantly in fruit on the rocks on Rusthall Common in December, 1877.

B. ROSEUS, *Pers.*

On bare spots among heath, frequent; the fructification rare. E. B. 374.

Ightham Common, in fruit; abundantly in fruit at Toy's Hill, near Sevenoaks.

In the barren state may be known from *B. rufus* by its much whiter thallus, which is decidedly granular.

Tribe—*Cladonieï*.

CLADONIA PUNGENS, *Flk.*

On hilly slopes. E. B. 2444.

Kent, *Mr. R. S. Hill*; *Leighton's Lichen Flora*. Morant's Court Hill; Lydd Beach.

Much resembles *C. furcata*, from which it may be known by turning yellow when touched with a strong solution of caustic potash.

C. CERVICORNIS, *Schær.*

On rocky places. E. B. 2574.

Rusthall Common; *Jenner Fl. Tunbr.*

C. CARIOS, *Flk.* *C. ventricosa* var. *ε. cariosa*. (*Jenner Fl. Tunbr.*)

On the earth; rare. E. B. Suppl. 2761.

Horsmonden; *Jenner Fl. Tunbr.*

C. DELICATA, *Flk.*

On roots of trees, or decayed stumps in woods; frequent.

Stone Wood, near Greenhithe; on an old rail near Chelsfield.

Var. *subsquamosa*, *Nyl.* In damp shady woods; rare. Ightham Common.

C. ALCICORNIS, *Flk.*

On dry, heathy places; rare. September. *Dillenius*, t. xiv., fig. 12a.

Lydd Beach, abundantly, in fructification.

This species I have observed nowhere else in Kent. It grows on the mossy ridges of shingle. It is easily distinguished from *C. cervicornis* by the black fibres at the margin of the thallus, and by not being coloured yellow by a solution of caustic potash.

C. PYXIDATA, *Fr.* *Lichen pyxidatus* (*Fl. Metr.*)

Common everywhere. E. B. t. 1393.

Blackheath; *Fl. Metr.* Sydenham; Abbey Wood; Otford; Maidstone; Dover; Tunbridge Wells, &c.

Var. *cæspititia*, Flk. E. B. t. 1796. *Cladonia cæspititia* (Jenner Fl. Tunbr.) Hungershall Rocks; Oldbury Hill, Ightham; Jenner Fl. Tunbr.

Var. *fimbriata*, Hoffm. E. B. 2488. Greenhithe.

C. GRACILIS, Hoffm.

Dry, hilly, and heathy places.

Lydd Beach, abundantly in fruit.

Known by its crowded, slender, mostly simple brownish podetia.

(To be continued.)

Extracts and Notices of Books & Memoirs.

EXTRACTS FROM THE REPORT OF THE CURATOR OF THE BOTANICAL EXCHANGE CLUB FOR 1876.

(Continued from p. 184).

Rosa virginica, Rip., in Déséglise (not Extr. de l'Enum. des Rosiers, Journ. Bot., June, 1874, p. 167); Cat. Rais., no. 28, p. 57. Wood near Horsebridge, South Hants. August, 1876. This is a very large bush (about 15 ft. high), with the exception of one stem quite destitute of prickles. The name has been confirmed by M. Déséglise.—H. GROVES.—Except in having hairy styles, a Rose I collected at Gawton, Beer Ferris, S. Devon, September 13, 1875, agrees admirably with the above. Before I saw Mr. Groves's specimens I was at a loss what to name it, but suspected an approach to *R. systyla*, a view confirmed by M. Déséglise's arrangement, in which *virginica* appears among the *stylosæ*, immediately before *leucochroa*.—T. R. A. B.

Enanthe pimpinelloides, Linn. Cliffs near Sidmouth, South Devon, May 30, 1876. A most luxuriant form, growing in patches, with rose-tinted flowers and stems three feet high, in long coarse grass close to the edge of the sea-cliff. Most of the heads in bud only, but a few with a flower or two open. On August 11, 1876, I found this plant in some abundance in a large park-like field at Teffont, South Wilts, growing side by side with *Juncus conglomeratus*. This locality is eight or nine miles from the Dorset border, and its first recorded station in Wilts. Here the plants were all in fruit, and already quite destitute of root-leaves.—W. MOYLE ROGERS.

Arctium nemorosum, Lej. On quarry spoil-bank at Magheramorne, near Larne, Co. Antrim. August 24, 1876. One large plant only seen in flower, but abundance of root-leaves all round about. I am not aware of any other Irish Burdock having been with certainty referred to this species. Some years since, while strolling over a little island in Strangford Lough, Co. Down, I gathered a plant which I sent to Cambridge as probably *A. nemorosum*. Prof. Babington, after diagnosis, wrote me that it looked like the right plant, but too immature to be identified with certainty. I have

never since been on the island referred to at the proper time to search for better specimens.—S. A. STEWART.—Prof. Babington has certified to the Magheramorne specimens sent out through the Club being *A. nemorosum*.—T. R. A. B.

Hypochaeris glabra, Linn. Hedgebank just beyond the first hedgerow on right-hand side of main road from Hoylake to Little Meols, Hoylake, Wirral, Cheshire, July 1, 1876. A defined station to affirm a record for Wirral made in 1837.—J. HARBORD LEWIS.

Sonchus arvensis, Linn., b. *glabra*. Thames-side between Putney and Hammersmith, Surrey, August, 1873. I see your *Desiderata* List asks for this certainly rare form. I send a specimen. I never gathered the plant elsewhere. Here I rather impute its glabrousness to being tide-washed.—J. L. WARREN.

Crepis nicaensis, Balb. Upland pasture, Harlow Hill, near Harrogate, M. W. York, June 30th, 1876. For the last eight or ten years when at Harrogate, I had noticed in the above pasture a peculiar *Crepis* which I could never satisfy myself to be "*virens*." July 5th, this year, 1876, I sent a few dried specimens of it to Mr. J. G. Baker, for examination. I received the following reply: "I do not feel sure about the *Crepis*. The involucre is much more glandular than in ordinary *virens*. There is a closely-allied species called *nicaensis*, which has this more glandular involucre in combination with brown, instead of yellow, stigmas, achenes narrowed and scabrous at the top, and outer perianth spreading. Your specimens are rather too young to judge fairly of these last two points. *Nicaensis* comes between *biennis* and *virens*, and is likely enough to be introduced with foreign seed." July 11th, I sent to Mr. Baker a few of the most mature dried specimens I had, and also enclosed a few fresh-gathered ones. I received the following reply: "I feel satisfied now that the *Crepis* is really *nicaensis*. Fruiting involucre and achenes of yours agree with undoubted continental examples, and I find the beak being scabrous to be an inconstant character. I send 50 specimens for distribution.—THOMAS J. FOGGITT. On the north bank of the Tweed, near Spring Hall, Roxburgh. June, 1874–76. This is a very variable plant, as will be seen from specimens sent.—ANDREW BROTHERSTON. Occasionally seen about Plymouth, as an introduction with grass and clover seeds.—T. R. A. B. This plant seems to be becoming more frequent, though doubtless introduced with grass seeds. The flowers of Mr. Foggitt's specimens are considerably smaller than usual, and, if this be frequently the case, no doubt the plant would be liable to be passed over as *C. virens*.—J. T. BOSWELL.

Hieracium Dewari, mihi; *H. strictum* in part, Back. Stem sparingly leafy, slightly corymbosely or sub-corymbosely branched at the apex, scabrous, sparingly woolly, with spreading or retrorse white hairs; peduncles sparingly clothed with stellate down, with few black-based hairs and a very few black gland-tipped ones. Rosettes of radical leaves, produced on seedling plants, and in late autumn on plants which have flowered. Leaves of the rosette oval, rather abruptly attenuated into short sparingly woolly petioles, sub-acute, slightly denticulate, with the teeth often reduced to callous

protuberances, sparingly hairy, with rather long white hairs above, and distinctly ciliated with similar hairs round the margins, reticulated beneath, with a few soft white hairs most numerous on the midrib. Leaves sparingly distributed over the stem up to the inflorescence, not more crowded in the upper part, and, indeed, often more distant there than on the lower part of the stem; the lowest oval, or oval-obovate, or broadly-elliptical-obovate, gradually contracted into slender, distinct petioles; intermediate ones regularly oval, or broadly elliptical, narrowed at each end, semi-amplexicaul, but scarcely auricled; uppermost ones ovate, or ovate-lanceolate, amplexicaul, rounded at the base, acuminate; all sub-entire, or denticulate in the middle, with the teeth remote and often reduced merely to callous points, bright green, sub-glabrous, or with short distant, rather stiff, bristly hairs above, paler though not glaucous beneath, with the network formed of the ultimate veins apparent but not very distinct, with rather long stiff hairs on the veins and margins, and with shorter distant ones all over the lower surface. Anthodes rather small, few, in a simple corymb, or, if more numerous, in a lax panicle, with straggling branches, at the extremity of which there are a few sub-racemosely disposed anthodes. Pedicels short, incurved, usually with one or two minute bracts beneath the anthode. Pericline in flower sub-cylindrical from an obconic base, in fruit conical. Phyllaries few, in two irregular series; the outer ones very few, short, adpressed, sub-obtuse; the inner ones with pale margins, obtuse; all blackish-olive, rather sparingly clothed with short black hairs and longer black-based white ones, usually with a very few black gland-tipped hairs, rarely with any stellate down except at the very base. Ligules not ciliated at the apex. Styles fuscous. Achenes chestnut-brown. Plant bright green.

“Shores of Loch Long, and Inverarnon (probably in Dumbartonshire)? Inversnaid, Stirlingshire: and Killin, Perthshire.”—Dr. J. H. Balfour. “Lethensdene, Clackmannanshire, and Glen Devon, Perthshire.”—Dr. A. Dewar. “Lethensdene and Linmill, on the Black Devon and Glen of Sorrow (Tributary to the Devon), Clackmannanshire; Glen Devon, at the mouth of Glen Quay, and near the opening to Glen Eagles, Perthshire.”—Tom Drummond.

Scotland. Perennial. Late summer and autumn.

Leaves of the autumnal rosette with the lamina, 2 inches long; radical leaves in spring, scarcely forming a rosette, and often decayed before flowering, 3–8 inches long and 1–2½ inches broad, insensibly attenuated into the petiole; intermediate leaves, 2–5 inches long by ¾–2½ inches broad. Stem 1–3 feet high. Panicle branches, 2–8 inches long. Anthodes about the size of those of *H. vulgatum*. Pericline about ½-inch long by ¼-inch in diameter.

The British, or reputed British species of *Hieracia* to which *H. Dewari* is most nearly allied are *H. Juranum*, Fries, (Borreri, ‘E. B.’ ed. iii.), and *H. Gothicum*, Fries. No doubt it sometimes presents a superficial resemblance to *H. strictum*, Fries, but their physiological characters are widely different.

Like *H. Juranum* and *H. Gothicum*, it produces a rosette in seedling plants, and in old plants, at the base of the flowering stems in late autumn. In spring there is produced a more imperfect rosette, and some of the leaves at the very base of the stem commonly remain nearly to the time of flowering and sometimes even later, especially in shady places. The seedling rosette, the late autumnal rosette, the persistence of the lowest leaves, I have never met with in wild or cultivated specimens of *H. strictum*, *H. crocatum*, *H. corymbosum*, and *H. prananthoides*.

From *H. Juranum* it differs in having the stem scabrous, the leaves much less amplexicaul and without distinct auricles, not so conspicuously paler beneath and commonly more hairy above; the panicle when polycephalous does not produce numerous branches terminating in small corymbs, the anthodes are considerably larger, the perianth-segments not thickly clothed with short, thick, gland-tipped hairs, and the ligules not distinctly ciliated at the apex. In the garden *H. Dewari* flowers about a fortnight or three weeks later than *H. Juranum*. There is, however, a striking similarity between small specimens of the two in which the branches of the panicle terminate in solitary heads; and I should not be surprised to hear that *H. Dewari* was the plant Dickson had from Harehead Wood, Selkirk, and that he sent *H. Juranum* to Mr. Borrer from his own garden, believing it to be the same as the wild plant.

H. Dewari bears some resemblance to the broader-leaved states of *H. gothicum*, but differs in the leaves being semi-amplexicaul, with a greater tendency to be ovate in outline and less denticulate on the margins. I have never seen it with the distinctly-toothed leaves so frequent in *H. gothicum*. The leaves are of a much brighter green, and not so much paler beneath; they are also more hairy. The panicle when polycephalous has not the same tendency to produce branches terminating in corymbs. The anthodes are considerably smaller, the inner phyllaries less attenuated and much more hairy.

From *H. strictum* it differs (in addition to the points already stated) by having the stem scabrous, the leaves broader in the middle and more attenuated at each end; and more conspicuously by the long straggling branches of the polycephalous panicle. But the greatest stress must be laid on the fact of its producing a true rosette. All the specimens Mr. Backhouse has gone over in herbaria I have access to he has named *H. strictum*.

H. corymbosum, Fries, and *H. crocatum*, Fries, differ still more widely from *H. Dewari* than does *H. strictum*. Both, especially *H. corymbosum*, have the stem leaves much more numerous, more parallel-sided, and the polycephalous panicle with the branches ending in small corymbs. *H. crocatum* also has the pericline much larger, more abrupt at the base, and with far fewer hairs. *H. corymbosum* has the leaves more glabrous, and neither the one nor the other produces rosettes.

At one time I thought it might be *H. elatum*, of Fries; but as I now possess Lindeberg's 'Hieracia Scandinaviæ Exsiccata,' I can

say without hesitation that it is not No. 92 of that collection. I believe its nearest ally is *H. Dorrense*, Fries, but the polycephalous panicle is too different to permit me to join them. *H. Dorrense-protractum*, however (Lind., 'Hierac. Scand. Exsicc.,' Nos. 40-41), has a panicle more like *H. Dewari*: so I requested Mr. J. G. Baker to compare *H. Dewari* with Fries and Lager's specimens of *H. Doerense-protractum*, and his answer is: "I feel quite satisfied that your plant is distinct from these (*H. Dorrense* and *H. Doerense-protractum*)." Being unable to identify the plant with any described species, I am reluctantly forced to give it a provisional name, and have chosen for that purpose one to commemorate the late Dr. Andrew Dewar, of Dunfermline, to whose explorations of the botany of Clackmannan, Kinross, South Perth, and West Fife, we are much indebted. Few local botanists appear to have worked their district better, and been more careful to avoid erroneous records. Most of the specimens in British herbaria, previous to 1875 (when Mr. T. Drummond sent it to the Botanical Exchange Club as "*H. strictum*, broad-leaved form"), were sent by Dr. Dewar from Linmill and the Ochills under the name of *H. 'inuloides*,' Tausch, and *H. 'rigidum*,' Hartman. There is, however, no doubt that the plant was first collected in the Loch Lomond district by Dr. J. H. Balfour.

I am greatly indebted to Mr. Tom Drummond for taking me to the stations at Linmill, on the Black Devon, near Clackmannan and Glen of Sorrow, above Dollar, Clackmannanshire, and Glen Quay, close to where it enters Glen Devon. At Linmill the plant grows on the banks of the stream in an open wood, and many of the specimens are extremely luxuriant; it grows in company with *H. strictum*, which here flowers a fortnight later than *H. Dewari*. In the Glen of Sorrow the station is on ledges of rock. In Glen Quay it grows on ledges of rock and on landslips; and here, in 1876, it was in great profusion, growing in company with *H. gothicum*, and flowering at the same time. *H. strictum* grows in Glen Devon, about a mile and a half from the station for *H. Dewari*.

May not *H. Dewari* be the Scotch plant referred to by Fries in his 'Symbolæ' as *H. Dorrense*?—JOHN T. BOSWELL, Dec. 1, 1877.

[The description of *H. Dewari* was read at a meeting of the Bot. Soc. of Edinburgh, December, 1877.]

Gentiana Amarella, Linn., var. *præcox*, Smith. Riddlesdowns, near Croydon, Surrey, June 3, 1876. Sent, as although probably not rare when looked for, only recorded from Tring (as *verna*) and Lincoln. Scattered along a chalky bank, with *Polygala*, *Lotus*, &c.—A. BENNETT. I have found spring-flowering plants of the allied species, *G. campestris*, in the neighbourhood of Plymouth. They have also been met with in the Isle of Wight.—T. R. A. B.

Atriplex sinuata, Hoff. Coast at G. Coppard's Gap, West Sussex. August, 1876. In the last report of the Exchange Club (see p. 23) I hinted that this plant was probably introduced in this station by ships' ballast. This year I have confirmed this fact, having discovered a dozen more plants near and around a large square black building used for the storing of grain, a furlong nearer Brighton

than my three plants of last year. One day, seeing a ship unloading grain at this very point, I ascertained from the sailors that the cargo came from Russia. The plant has got a fair hold of the coast, and, if not unduly gathered, will spread. I regret my specimens are so poor, but I was too early this year for matured examples.—J. L. WARREN.

Rumex sylvestris, Wallr. Damp spot, Kelvedon, Essex. Sept., 1876.—E. G. VARENNE. This plant seems to me not true *sylvestris*, but a hybrid between *obtusifolius* and *nemorosus*, or, possibly, *conglomeratus*.—J. T. BOSWELL.

R. obtusifolius, Auct., var. *sylvestris*, Wallr. Bank of Forth, between Causeway Head and Cambuskenneth, Co. Clackmannan. September 12, 1826. There is a good deal of this plant on the north bank of the river; unfortunately it escaped notice till late in the season, and then only a few poor specimens could be got.—T. DRUMMOND. I think this the same as the Putney plant.—J. T. BOSWELL.

Rumex—hybrid? At the bottom of a coast-cliff, near Down-derry, St. Germans, E. Cornwall. July 24, 1876. A very curious plant, near *crispus* or *pratensis*. Much like the former in the greatly-waved leaves, though only the lower stem ones were noticed, the root-leaves being withered when it was found. The panicles grew very high. Some of the enlarged petals had short acute teeth. There was only one root at the spot. Probably a hybrid.—T. R. A. B. I think this must be referred to *R. crispus* var. *subcordatus*, Warren. It appears to fruit too freely to be a hybrid; still, as Mr. Briggs suggests, it may be one between *crispus* and *pratensis*.—J. T. BOSWELL.

Typha (? sp.) Shallow pool in the Tavy Valley, near Lopwell, S. Devon. July 27, 1876. I suppose *angustifolia* by the narrow leaves, &c., but the larger of the spikes seems in some measure to approach *T. latifolia*. In other cases I have also noticed intermediate features in *Typha* specimens collected in this neighbourhood.—T. R. A. B. This comes very near the *T. latifolia* β . *media*, but it is nearer the genuine *latifolia* than the Wimbledon plants mentioned in 'E. B.' ed. iii.—J. T. BOSWELL.

Potamogeton nitens, Web. I send examples of this pond-weed (gathered in June, July and Aug., 1875-6) from different parts of the Tweed and Teviot, where it is very common, I may say abundant, in the counties of Roxburgh, Berwick, and Northumberland. It is variable in appearance, like others of the family, as will be seen from specimens sent. In the description of the leaves in 'Student's Flora,' *recurved* is surely a misprint for *incurved*.—ANDREW BROTHERSTON. Very luxuriant specimens.—J. T. BOSWELL.

"*Potamogeton lucens*, Linn., b. *decipiens*." In the Wye, Sellack, Herefordshire. August 12, 1876.—AUGUSTIN LEY. I should like much to see a series of specimens of this plant, particularly some in fruit, and with the barren branches fully developed. I am inclined to name it *P. nitens*, though the leaves are less amplexicaul than they usually are in that plant, but they are too much so for

P. lucens. The serrated margins of the leaves and the small spikes separate it from *P. decipiens*.—J. T. BOSWELL.

Zannichellia polycarpa, Nolte. Brackish marsh near Belfast, Ireland.—S. A. STEWART. The plant I send to the Club was collected by me as *Z. brachystemon*, though the very short style and narrow carpels should have enlightened me; it is abundant in the brackish ditches of the ground reclaimed from the sea, adjoining the People's Park, Belfast. There were few flowers at the time, but the following I find on my notes: "Anther filaments about one-eighth inch long." Little attention seems to have been given to the Irish *Zannichellia*. Here, in my district, they are rare.—S. A. STEWART. This is *Z. polycarpa*, Nolte, apparently the true plant, of which I have been favoured with a specimen from Mr. H. C. Watson, collected by Prof. Reichenbach at Nolte's station, Heiligenhavn, Schleswig, which is a stouter plant, with more connivent, longer, smoother, and more sausage-like carpels with shorter styles than in the Orkney plant, which is no doubt var. *tenuissima*, Fries.—J. T. BOSWELL.

Habenaria viridis, Brown. Elevated rough pasture between Plympton and Dartmoor, S. Devon. July 15, 1876. Previously found this year on the border of Dartmoor, near Tavistock, by Mr. Francis Brent, of Plymouth.—T. R. A. B.

Trichonema Columna, Reich.—Still abundant on Dawlish Warren in April, 1876. I looked for it there in vain on March 23rd, the season being late. On April 26th, it was just opening into flower in two widely-separated parts of the warren, not a single specimen (that I could find) yet fruiting. By May 24th the plant had almost wholly disappeared, Mr. Briggs and I on that day having to search for an hour or more before we came on a few withered specimens (in fruit).—W. MOYLE ROGERS.

Carex Boeninghausenia, Weihe. Eskalt, near Whitehaven. Found by Mr. Hodgson, and sent to me by Rev. R. Wood, of Westward, who thought it nearer "*avillaris*." After carefully examining the specimens, it seemed to me to be *Boeninghausenia*. I sent a specimen to Mr. H. C. Watson, with the query, '*Avillaris* or *Boeninghausenia*?' His reply was, 'The *Carex* is *Boeninghausenia*.'—A. BENNETT.

(To be continued.)

Untersuchungen über die Entwicklungsgeschichte der Laubmoos-Kapsel und die Embryo-Entwicklung ciniger Polypodiaceen. Von Dr. KIENITZ-GERLOFF. (Botanische Zeitung, Jan. 1878. With three plates).

THE following is a summary of the author's exhaustive study of the development of the capsule of *Phascum cuspidatum*. We may, however, omit the first steps, since the observations of Hofmeister regarding them are found to be in the main correct, except that, after the formation of quadrant cells, each of these latter divides, by means of an anticlinal wall, into an inner (seen

in transverse section) four-sided and an outer three-sided cell. The former of these cells is now divided by a periclinal wall into an inner and an outer, and in this way a central square (*Grundquadrat*) makes its appearance. This method of growth corresponds closely with the process observed by the author himself in *Jungermannia*, and by Kuhn in *Andreaea*. Each of the eight peripheral cells is now segmented into an inner and an outer by a periclinal, and each of the new outer ones by a radial wall. So far the development of seta, apophysis, and capsule is uniform. In the seta, the peripheral cells first divide sometimes by radial, sometimes by periclinal, septa, and the same method of division is sometimes repeated, so that some irregularity is seen in the disposition of these cells: meanwhile those of the central-square become segmented in the same way as the primordial quadrants were. In the apophysis the process in the central square is the same, but in the peripheral cells, after the first radial septum, two periclinal septa are laid down, after which the new peripheral cells divide radially.

In the part destined to become the capsule, the peripheral cells divide at first radially, then periclinally, then radially again, then again periclinally, and finally radially. All these divisions occurring contemporaneously in cells of the same age, it follows that the outer bounding layer of the young capsule consists of sixty-four cells in cross section (that of the apophysis is formed almost always of thirty-two cells). While the process sketched above is going forwards, and the whole capsule is increasing in length, transverse walls appear principally in the (reckoning from outside) fourth layer of cells. The cells of this layer, which immediately border on the central square, are originally eight, a number which becomes doubled by each dividing radially, after which each daughter-cell divides periclinally. The two layers so formed constitute the outer spore-sac. At this time a periclinal wall makes its appearance in each cell of the central square, and the cells of the third layer from outside swell considerably, and, together with those of the two outermost layers, grow more quickly than before in all directions. The consequence of this is that the three outer layers become separated from the intrajacent ones, and this is the origin of the air-chamber. In the central square, the external layer of cells is the layer of the mother-cells of the spores (spore-layer); this forms the outer boundary of the columella—at this stage consisting of four cell-rows in transverse section.

In the development of the capsule, then, we see two processes. The one consisting in the differentiation, from a central square of four cells, of columella and spore-layer; to this portion of the capsule the author gives the term 'endothecium.' The remainder of the capsule, less differentiated but necessarily larger, comprising the capsule-wall of three cell-layers and the outer spore-sac of two layers with the intervening hollow space, the term 'amphithecium' is applied. The author also observes that this latter corresponds to the amphithecium of the higher Liver Mosses.

In the layers bounding externally the air-chamber of the young

capsule, and especially in the innermost of them, increase in size continues; the number of the constituent cells is doubled by means of radial walls, and the air-chamber enlarges. At the same time, the cells of the outer spore-sac increase to a moderate extent, and those of the spore-layer vigorously, by radial walls, the latter also enlarging in the direction of the radius, and thus pressing together the former. When the spore-layer consists of eight cells in transverse section, the cells of the columella commence dividing, the succession of segmentation corresponding with that seen in the original quadrant-cells. The outer layer resulting from this process constitutes the inner spore-sac; while it is going forward the rupture between the third and fourth layers advances inwards above and below; by this means are formed the two short columns which retain the tissues inside the air-chamber in connection with the top of the capsule and with the apophysis: each of them consists of four rows of cells in longitudinal section. Meanwhile the cells of the layer bounding the air-chamber externally become vaulted into that chamber, and rounded at the opposite side, so that intercellular spaces make their appearance between this and the second layer. Some of the cells of the third layer then divide radially, and whilst the two daughter-cells are vaulting inwards so as finally to encroach on their neighbours, the septum between them divides in the middle; thus is formed a stomate affording communication between the air-chamber and the intercellular space just mentioned.

The development of the sporogonium of *Ceratodon purpureum* is essentially similar (exception made for minor differences of structure) to that of *Phascum*. In this species, each of the last-formed (peripheral) cells of the young capsule undergoes periclinal division, so that the layer immediately bounding the central square is composed of eight cells in transverse section, the following one of sixteen, the next of thirty-two, and the two outermost of sixty-four cells. The formation of the air-chamber (between the fourth and fifth layer counting from outside) of the spore-layer, inner spore-sac, columella, and stomata is the same as in *Phascum*. The author has minutely worked out and figured the development of the peristome, the result being that the entire peristome belongs to the amphithecial region, the outer cells of this structure being continuations of the fourth or air-chamber-bounding layer, and its inner cells of the outer spore-sac.

In the growing capsule of *Funaria hygrometrica* the formation of the central square does not take place by means of two walls (an anticlinal and a periclinal) at right angles to each other, but by the laying down of a single periclinal wall. By a process similar to that which we have seen in *Ceratodon*, the amphithecium at length consists of nine layers. In the zone of the annulus, however, and beyond it is composed of only six layers. The peristome in this species is developed from the fourth, fifth, and sixth cell-layers (counting from the outside); it is, therefore, entirely amphithecial. Each cell of the central square divides by a periclinal and an anticlinal wall at right-angles to each other

into an inner and two outer cells. By this means a second small square is formed inside the central square. The four cells constituting this small square divide each by three longitudinal divisions perpendicular to each other; while each of the outer cells divides radially, and the daughter-cells are each of them segmented into three by two periclinal walls. The peripheral layer forms the spore-layer (as in the species before examined). The further multiplication of the cells of these layers takes place radially. The formation of the air-chamber is essentially the same as in *Phascum*. Whilst the cells of the inner layer of the wall swell up and assume a rounded form, the greater number of the cells become separated from the layer outside and inside them, and only in single places do they remain in connection either with the layer inside or outside them. Thus arise the two- to five-celled threads which connect the capsule-wall with the outer spore-sac. These threads are, at first, directed from above downwards and outwards; afterwards they are almost horizontal.

The portion of the paper occupied with the development of the embryo of *Polypodiaceæ* is copiously and very clearly illustrated, but it does not call for special remark.

The author then passes on to criticise Pringsheim's objection to his theory of revolution of the embryo; this objection is founded on the presumed fact of the seta being an axial structure, a view which is energetically denied.

S. M.

Botany; Morphology and Physiology. By W. R. M'NAB, M.D., F.L.S.

Botany: Classification of Plants. By W. R. M'NAB, M.D., F.L.S. (London Science Class-Books.) Longmans & Co. 1878.

THESE two small volumes are intended to serve conjointly "as a basis for the botanical teaching in the higher classes of schools, and also to supply the wants of medical and other students." The plan pursued is essentially different from that followed in most of the English elementary works on Botany at present in use, of which we may take Sir J. D. Hooker's "Primer of Botany" as the best exponent. Instead of occupying the attention of the beginner for the most part with details of the morphology of the various organs, and with the technical terms thus brought into use, Professor M'Nab plunges at once into the heart of his subject, and describes, in the first few pages, the structure of the histological cell, proceeding next to that of tissues. The plan is, in miniature, the same as that of Sachs's "Lehrbuch," and, indeed, of almost all German text-books. We believe it to be sound; and our own experience convinces us that it is the right course for young, as well as for more advanced, students. The two volumes form together, in fact, very much a condensed abstract of the fourth German edition of Sachs's Textbook, which has not yet appeared in an English dress, and which contains many material changes from the third. The chapters on Morphology and Physiology seem to us

very well done, as far as the limited space has permitted; Sachs has been here very closely followed, even in the details of the arrangement. It will no doubt strike the English reader as strange that, under the head of Morphology, while sections are given to the root, stem, and leaf, scarcely a word is said about the structure of the floral organs, or of the fruit and seed, the plan of the work requiring that these subjects be deferred till the 2nd volume, and treated of under the head of Flowering Plants. The misprints are exceedingly few, and errors and inaccuracies of a graver kind, such as find their way into the best text-books, commendably rare. The only one we have noticed to which it seems desirable to call attention is where, in the description of *Characeæ*, the "nucule," or archegonium, is spoken of as the "sporocarp." No possible correct use of terms will allow an unfertilised germ-cell to be designated a spore; but Professor M'Nab is not alone in this confusion of terms. Here and there we notice that the compulsory conciseness has led to a want of clearness or of an adequate definition of terms which will doubtless perplex the beginner. The least satisfactory part of the two volumes seems to us to be that on classification. The classification of Flowering Plants adopted is a modification of that used by Sachs, which will be bewildering to English students. It would have been better to have adopted the plan of the work which will undoubtedly become the text-book of classification in this country, the 'Genera Plantarum' of Bentham and Hooker. In Cryptogams Dr. M'Nab has also closely followed Sachs, even in the very questionable detail of making the *Characeæ* and *Basidiomycetes* both orders of the class *Carposporeæ*. In one important respect only is there a deviation, viz., in removing *Volvocineæ* (*Volvox* and *Eudorina*) from the *Zygosporææ*, and placing them in *Oosporeæ*, leaving *Pandorina* and allied forms to form the family *Pandorineæ* of *Zygosporææ*, as defined by Rostafinski, a deviation amply justified by Cohn's researches. The woodcuts are entirely taken from Sachs, Prantl, De Bary, and other German and French writers, and are, therefore, excellent. Many of these are, however, too large for the small-sized page, resulting in the inconvenience, where they are numerous, of the illustrations out-running the descriptive letterpress by many pages. The most serious defect of the work is the absence of any index or glossary; but the two little volumes deserve to become largely used for the purpose for which they are intended.

A. W. B.

The Clydesdale Flora. A Description of the Flowering Plants and Ferns of the Clyde District. By the late R. HENNEDY. In Memoriam edition, revised. Glasgow: H. Hopkins. 1878.

THIS is a fourth edition of a useful local 'Flora,' the author of which died in 1876. The dates of the previous editions are 1865, 1869, and 1874, and the present does not appear to have undergone any alterations. It, however, possesses an additional interest

from containing a short biographical sketch of the author, by Mr. William Simpson, who also gives a portrait. Roger Henedy was one of that class of self-taught naturalists whose enthusiasm triumphed over all obstacles and want of leisure. His herbarium is now in the Andersonian University of Glasgow, of which institution he was Professor for thirteen years. An appendix, by Professor R. H. Paterson, is added, in which are added some twenty or thirty species, the localities for some of which, however, appear to be beyond the limits of the Flora. It is to be hoped that the author took counsel with some botanists of experience before he decided to publish as a new species, *Pteris gracile*, Paterson, from Glen Rosa, Arran (p. 255); there is nothing in the diagnosis given to separate it from "a delicate variety" of the common Bracken.

H. T.

The second fasciculus of Beccari's "Malesia" (Genoa, 1877) is mainly devoted to monographic description of the *Icacineæ* and *Menispermaceæ* of the Indo-Malayan and Papuan Archipelago. Of the former Order there are fourteen genera and thirty-six species included; *Ryticaryum* (three species) is a new genus of the tribe *Mappiææ*, and *Polyporandia* (monotypic) of *Phytocreneæ*. In *Menispermaceæ* there are twenty-two genera and forty-five species, the new genera being *Archangelisia*, dedicated to Prof. Archangeli, of Florence, and founded on *Ananirta temniscata*, Miers, and a new species; *Macrococculus*; *Albertisia* (in honour of Signor D'Albertis, the Papuan traveller); and *Bania*. The remainder of the part is occupied by descriptions of new or rare Papuan plants of various affinities; there are several new genera—*Abauria* (*Leguminosæ*, *Casalpinieæ*), *Gigliolia* (*Palma*), *Gestrea* and *Leviera* (*Monimiaceæ*),—dedicated to Dr. Levier, of Florence. The plates represent the new genera of *Icacineæ* and a new species of *Pteleocarpa*, which genus the author would remove from that Order, and place in *Ehretieæ*.

In the "Icones Plantarum" for June, 1878, are figured some interesting species, including the Seychelles genus, *Medusagyne*, Baker (t. 1252.) There are also several plants collected by Dr. Schweinfurth in his last Central African journey, and some species of great interest from N. China, including *Brachybotrys*, Maxim., a new genus of *Borragineæ* (t. 1254), a new Saxifrage, *S. Rossii*, Oliver (t. 1258), and a new species of the curious genus of *Rosaceæ*, *E.ochorda*, *E. serratifolia*, S. Moore (t. 1255.)

OTHER NEW BOOKS.—A. GRAY, 'Synoptical Flora of N. America,' vol. ii., part 1. (Iverson & Co., New York, 6 dollars.)—J. MIERS, 'On the *Apocynaceæ* of S. America,' with some preliminary remarks on the whole family. With 35 plates. (Williams & Norgate, London, £1 5s.)—A. W. EICHLER, 'Blüthendiagramme construiert v. erlantert.' II. Theil. Apetale & Choripetale Dicotylen. (Engel-

mann, Leipzig.)—H. G. REICHENBACH, *fil.*, ‘*Xenia Orchilacea*,’ vol. iii. part I.—‘West Yorkshire’ (Geology, Physical Geography, and Botany of), by J. W. DAVIS & F. A. LEES. (Reeve & Co., £1 1s.)

ARTICLES IN JOURNALS.—MAY, 1878.

Bot. Zeitung.—H. Hoffmann, ‘Experiments in culture’ (continued; tab. 9.)—V. v. Borbas, ‘On certain type-specimens of *Thlaspi*.’—J. Sachs, ‘On the history of the mechanical theory of growth of organic cells.’—H. Solms-Laubach, ‘On the structure of the flower and fruit of the *Pandanaceæ*’ (tab. 10.)

Oesterr. Bot. Zeitschr.—F. de Thuemen, ‘Symbolæ ad flor. Mycologicam Austriacam,’ (ii.)—A. Kerner, ‘Distribution of Hungarian plants’ (continued.)—G. v. Niesse, ‘On *Sporormia*’ (continued.)—F. Antoine, ‘Botany of Vienna Exhibition’ (continued.)—J. R. Strohecker, ‘Chemical analysis of *Nostoc*.’—J. L. Holnby, ‘The Beckov Mountain.’

Hedwigia.—L. Rabenhorst, ‘On the Alga-Flora of the Auckland Islands.’

Flora.—S. Schulzer, ‘Mycological notes.’—P. G. Strobl, ‘Flora of the Nebrodes’ (continued).—Scharlok, ‘A critical *Primula* from Switzerland.’—A. Minks, ‘The *Microgonidium*.’—W. J. Behrends, ‘*Cerastium tetrandrum*, Curt., with remarks on the micropetalous *Cerastia* of the *Orthodon* group.’

Bull. Bot. Soc. Belg. (xvi., 3, May 2.)—A. Wesmael, ‘Account of Herborization of the Society in 1877’ (environs of Mons.)—A. Gravis, ‘Teratological notes’ (t. 1, 2.)—C. Lecoyer, ‘Morphological study of *Thalictrum*’ (t. 1-4.)—A. Déséglise, ‘Adventive Flora of Geneva.’

Ann. des Sc. Nat. (6, v., 1-3.)—A. Guillaud, ‘Researches on the comparative anatomy and development of the stem in Monocotyledons’ (t. 1-6.)—E. Warming, ‘On the Ovule.’

Bull. Soc. Bot. France (Session Mycologique at Paris, October, 1877.)—Boudier, ‘New species of Fungi’ (t. 4.)—‘List of species collected in forest of St. Germain, Oct. 22.’—M. C. Cooke, ‘On some allied species of *Æcidiacei*.’—Quélet, ‘Fungi recently observed in the Jura, Vosges, and New Paris’ (t. 5, 6.)—Lucond and X. Gillot, ‘Fungi collected in environs of Autun.’—‘List of species collected in forest of Villers Cotterets, Oct. 23.’—De Seynes, ‘Report of the Fungus Congress at Hereford.’—A. Moquin, ‘An abnormal habitat of a *Coprinus*.’—T. Howse, ‘List of *Hymenomyces* in neighbourhood of London.—List of species collected in the forest of Montmorency, Oct. 25.—M. Cornu, ‘On the Anthranose (disease of Vines), and *Cladosporium intricolum*.’—‘List of species collected in forest of Fontainebleau, Oct. 26.’

Botaniska Notiser (May 15.)—J. E. Zetterstedt, ‘The forward spring of 1878.’—V. B. Wittrock, ‘On *Linnaea borealis*’ (continued.)

Original Articles.

SPICILEGIA FLORÆ SINENSIS: DIAGNOSES OF NEW, AND HABITATS OF RARE OR HITHERTO UNRECORDED CHINESE PLANTS.

BY H. F. HANCE, Ph.D., Memb. Acad. Nat. Cur., &c., &c.

(Continued from p. 114.)

III.

1. *CAPPARIS* (*Eucapparis*, *corymbosæ*) *FLEXICAULIS*, *sp. nov.*
Fruticosa, caule ramisque valde flexuosis subangulatis glaberrimis
brunneis, spinis stipularibus brevibus recurvis, foliis membranaceis
glaberrimis e basi obtusa anguste oblongis apice emarginatis
penniveniis venis venularumque rete supra paulum conspicuis
costa tantum subtus prominula 1-1½ poll. longis 3-4 lin. latis
petiolo bilineali tomentoso, umbellis simplicibus axillaribus et
terminalibus sessilibus 5-6 floris, pedicellis capillaribus 3-4 lin.
longis cum omnibus florum partibus petalis ciliatis exceptis
glaberrimis, sepalis obovatis petalisque oblongis 2 lin. longis,
staminibus circ. 20 petala plus duplo superantibus, gynophoro 4-6
lineali, ovario ¼ lin. tantum longo ovoideo acuto, stylo subnullo.
In ins. Hai-nan, circa Hoi-hau, æst. 1877, coll. T. L. Bullock.
(Herb. prop. n. 20274.)

Closely allied to *C. sepiaria*, Linn., especially to the variety
retusella, Thw., but differs by the perfect smoothness of its stem
and leaves, and the form of the latter.

2. *Saponaria Vaccaria*, Linn. Prope Chin-kiang, prov. Kiang-su,
a. 1876, coll. W. G. Stronach. Not found before in China, but
occurs in Japan, though whether really wild there or not is
doubtful.

3. *Bergia ammannioides*, Roxb. In agris otiosis prope Cantonem,
d. 7 Sept. 1861, legit Sampson.

4. *Hibiscus Abelmoschus*, Linn. Ad ripas graminosas fluviorum
prov. Cantonensis, vulgaris.

5. *Hibiscus surattensis*, Linn. Ad Hoi-tau, ora occid. ins.
Hai-nan, m. Jan., 1866, coll. F. Fagg; circa Hoi-hau ejusdem
insulæ, vere 1877, leg. Bullock.

6. *Grewia hirsuta*, Vahl. In ripis montosis fl. West River, prov.
Cantonensis, neonon secus fl. North River, coll. Sampson et
Hance. Not, so far as I know, before recorded as a native of
China.

7. *Ailantus malabarica*, DC. In ditione Amoyensi, legi m.
Oct., 1857. For the determination of this species, quite new to the
Chinese flora, I am indebted to Mr. Bentham.

8. *Celastrus (Gymnosporia) Wallichiana*, Wt. & Arn. Ad Amoy, ipse legi Oct. 1857: in sepibus ad Pak-sha, ora maxime australi prov. Cantonensis, necnon in ins. Hai-nan, m. Nov. 1866, coll. Sampson et Hance: circa Hoi-hau, ejusdem insulæ, æst. 1877, invenit Bullock. Mr. Bentham named for me the Amoy plant, with which that from Hai-nan is precisely identical. It agrees well with Wight and Arnott's diagnosis, except that the branches are clothed with a ferruginous scurf-like pubescence composed of short thick jointed hairs, instead of having a polished bark, and the fruit is no larger than a pea, instead of equalling a hazel-nut. The arillode, which is white and conspicuous enough in the ripe seed, does not embrace its entire base, and extends somewhat less than half its length. Though restored in the 'Flora of British India,' I do not think *Gymnosporia* can be kept apart from *Celastrus*, on account of the Australian species, to which Mr. Bentham has already called attention. M. Baillon (Hist. des Pl., vi., 5) is distinctly of this opinion.

9. *VITIS (Cissus, Monostigma) PAPILLATA, sp. nov.* Scandens, ramis tenuibus angulatis sulcatis glabris, stipulis ovatis scariosis, foliis trifoliolatis petiolo 1-1 $\frac{1}{4}$ pollicari foliolis tenuiter membranaceis supra costa tantum parce hirtellis sub lente minute densissimeque squamulosis luci obversis confertissime pellucido-punctatis ovato-lanceolatis basi obtusiusculis apice acutis pauciserratis tenuiter penniveniis venis supra paulo conspicuis terminali 1 $\frac{1}{2}$ poll. longo petiolulo 4-lineali lateralibus 15 lin. longis petiolulo 2-lineali, cirrhis simplicibus elongatis, cymis axillaribus pedunculo glabro folia æquante v. superante fultis parvis trichotomis corymbosis dense paucifloris, bracteis parvis ovatis scariosis, floribus (in spec. suppetent. nondum expansis) tetrameris $\frac{1}{2}$ lin. longis, calyce cupulato explanato margine truncato scarioso ciliato, petalis oblongis extus glanduloso-tomentosis, stylo brevissimo, stigmatibus simplicibus. Circa Hoi-hau, ins. Hai-nan, leg. Bullock, a. 1877. (Herb. propr. n. 20297.)

This appears nearer to *V. reticulata*, Thw., which I have not seen, than to any other species I can find described. The specimen is too young for any details as to the fruit.

10. *Cardiospermum Halicacabum*, Linn. Circa Hoi-hau, ins. Hai-nan, æst. 1877, coll. Bullock. This is the first Chinese specimen I have seen; all those gathered in Hongkong and Canton province being referable to *C. microcarpum*, H. B. K.

11. *Smithia sensitiva*, Ait. In udis circa Cantonem, copiose, m. Nov., 1863, primus detexit Sampson. The specimens are exceedingly fine and luxuriant, the flowers larger than in the Assam plant.

12. *Uraria lagopoides*, DC. E prov. Fokien misit cl. de Grijs: in agro Cantonensi non infrequens. Found in various parts of the East Indies, the Malay archipelago, Polynesian islands, and Australia.

13. *Loropetalum chinense*, R. Br. In collinis prope Sai-nam, secus fl. North River, prov. Canton, d. 15 Sept., 1866, coll. Sampson et Hance.

I believe this is the most southerly station known for this plant.

14. *Callitriche verna*, Linn. (Hegelmaier Monogr. Callitr. t. iii., f. 10.) In oryzetis ins. Danorum, Whampœ, ipse detexi, m. Febr., 1861; in stagnis Cantonensibus, Martio 1869, invenit Sampson.

15. *EUGENIA (Syzygium) BULLOCKII*, *sp. nov.* Glaberrima, ramis cortice albido obductis, foliis brevissime petiolatis coriaceis oblongo-lanceolatis basi obsolete cordatis apice breviter obtuse acuminatis penniveniis venis utrinque subconspicuis subtus minute pustulatis utrinque opacis 4 poll. longis 1-1½ poll. latis, cymis terminalibus trichotomis densis folio triplo brevioribus, floribus subsessilibus, calyce obovoideo sub-bilineali margine integro, petalis calyptratim secedentibus. In ins. Hai-nan, circa Hoi-hau, coll. Bullock. (Herb. propr. n. 20289.)

Amongst the species at my disposal this seems nearest to the Singalese *E. Neesiana*, Wt.! but differs by the colour of its bark, the compact inflorescence, and other characters. I do not know of any Polynesian species like it, but the Ceylon *Syzygium umbrosum*, Thw.! is undoubtedly very close in affinity to *E. sandvicensis*, A. Gr.! and to an undescribed species with varnished spathulate emarginate leaves (Vieillard n. 2609) from New Caledonia. The existence of *Strongylocodon*, too, in Ceylon, the Hawaiian archipelago and New Caledonia, is another evidence of the relationship of these Floras.

16. *Ammannia (Rotala) pentandra*, Roxb. In oryzetis agri Cantonens, d. 18 Junii, 1866, invenit Sampson.

17. *Ammannia (Rotala) repens*, Roxb. In arvis humidis circa Cantonem, Oct. 1866, leg. Sampson.

18. *Ammannia (Rotala) octandra*, Linn. In herbis udis circa Amoy, ipse legi, m. Octobri, 1857.

19. *Ammannia (Euammannia) baccifera*, Linn. In ditone Cantonensi haud rara.

20. *PASSIFLORA HAINANENSIS*, *sp. nov.* Caule scandente glabro angulato-compresso, foliis subcoriaceis integerrimis margine revolutis anguste oblongis basi rotundatis apice obtusiusculis mucronulatis penniveniis supra glaberrimis lucidulis subtus opacis velutinis glandulosis 3-3½ poll. longis 9-14 lin. latis petiolo trilineali apice glandulas duas ovaes gerente, cirrhis simplicibus elongatis spiralibus, floribus 2-3-nis 9 lin. longis pedunculo 1-1½ poll. longo suffultis, bracteis setaceis, baccis ovalibus pubentibus. Ad Hoi-hau, ins. Hai-nan, æst. 1877, coll. T. L. Bullock. (Herb. propr. n. 20232.)

Allied to *P. Horsfieldii*, Bl., but differing in the form of the leaves and in the inflorescence.

21. *Trichosanthes palmata*, Roxb. In silvis densis ad angiportum Tsing-yün, fl. North River. prov. Cantonensis, m. Sept. 1866, legg. Sampson et Hance.

22. *Tetragonia expansa*, Ait. In litore marino ad Macao, satis copiose crescentem detexi, m. Junio, 1863; in ins. Ilha Verde dicta, portus Macaiensis, iterum legi, m. Nov., 1866. Not before, to my knowledge, recorded from China, though found in the Bonin islands and Japan.

23. *Enanthe stolonifera*, DC., var. (= *Dasyloma japonicum*, Miq.) In incultis circa Cantonem, a. 1864, leg. Sampson.

24. *Enanthe stolonifera*, DC., var. (= *Dasyloma bipinnatum*, Miq.) Secus fl. Lien-chau, prov. Cantonensis, m. Octobri, 1876, coll. Rev. J. C. Nevin.

25. *Geophila reniformis*, Don. In fissuris lapidum circa monasterium buddhisticum Fi-loi-tsz, d. 18, Sept., 1866: in silvis ad Ting-ü-shan, secus fl. West River, m. Julio, 1870, coll. Sampson et Hance.

Extensively distributed within the tropics, but not before detected in China.

26. *Paederia tomentosa*, Bl. ? In ins. Hai-nan, juxta Hoi-hau, æst. 1877, coll. Bullock. If Mr. Kurz is correct in reducing ('Journ. As. Soc. Bengal,' xlvii., 139) to the above-named species Miquel's *P. barbulate* and *P. densiflora*, the Hai-nan plant unquestionably belongs here. It is, however, almost quite glabrous, the inflorescence only being strigillose. I distinguish specifically the ovoid-berried plant from India (of which beautiful specimens were distributed in Hooker and Thomson's Khasia collections) from the round-fruited one referred by Bentham (Fl. Hongk., 162) to *P. fetida*, Linn. This name probably belongs to the first-mentioned plant; for Linnæus ascribes to it a "bacca ovata" ('Mant. Plant,' i., 52); and he appears, moreover, to have founded his species particularly on Rumphius' "*Convolvulus foetidus*," which that author describes as having the fruit "sensim oblonga," and figures it as ovoid ('Herb. amboyn.,' v., 436. t. 160.) I would propose the name of *P. chinensis* for the Chinese and Japanese plant, which is in reality much more nearly allied to *P. fetida* than to *P. tomentosa*, to which latter Mr. Kurz refers it with a mark of interrogation. Gaertner describes the fruit as "globosa l. ovata," but figures it as globose ('De fruct.,' iii., 85, t. 195), after a specimen in the Banksian herbarium, the native country of which he does not state.

27. *Eupatorium stachadosmum*, Hance. In prov. Cantonensi, ad fauces Tsing-yün, fl. North River, necnon ad fauces Yeung-shui, fl. Lien-chau, copiose crescentem, offendit m. Octobri, 1876, Rev. J. C. Nevin. The first time this has been found wild. The serratures of the leaves are frequently deeper than in the cultivated specimens, and the achene is destitute of glands.

28. *Artemisia parviflora*, Roxb. var. ? In arena litorea profunda ad Pak-sha, extremitate australi prov. Cantonensis, ipse legi, d. 20, Nov., 1866. I believe the specimens gathered, which look very different from the Indian plant, and approach somewhat to *A. scoparia*, W. & K., are referable to Roxburgh's species, but the leaves of the flowering stems are very fleshy, smooth, with narrow linear divaricate segments, those of the young sterile shoots canotomentose, with broader cuncate trifid lobes. I suspect this variation from the normal form is due to the locality where it grows, exposed to heavy gales, which blow the loose sand up in enormous hillocks all along the coast, and carry it in clouds inland. In *A. japonica*, Thunb., which, contrary to Miquel and Maximowicz's

opinion, I agree with Mr. Bentham in thinking probably distinct, the segments of the leaves of the sterile shoots are narrower than those of the flowering stems.

29. *SCÆVOLA* (*Crossotoma*) *HAINANENSIS*, *sp. nov.* Frutescens, caulibus diffusis cortice glabro suberoso cinereo obductis, ramulis novellis hirtulis, foliis sæpius fasciculatis spathulato-linearibus obtusis v. obtusiusculis glaberrimis 6-7 lin. longis 1-1½ lin. latis axillis cinereo-lanatis, floribus axillaribus solitariis sessilibus v. breviter pedunculatis bracteolis binis foliis homomorphis calycem duplo superantibus suffultis, calyce glaberrimo 1½ lineali lobis latis rotundatis tubo triplo brevioribus, corolla extus glabra 4-5 lin. longa, indusio ciliato.

Circa Hoi-hau, ins. Hai-nan, æst. 1877, coll. Bullock. (Herb. propr. n 20252.)

An interesting plant, very closely allied to *S. spinescens*, R. Br.! from which, however, it seems truly distinct by its woolly leaf-axils, sessile or sub-sessile flowers, foliar bractlets and developed calyx-tube. It is the only extra-Australian representative of the small section to which it belongs.

30. *Jasminum trinerve*, Vahl. In fruticetis prope pagum Sai-nam, secus fl. North River, prov. Cantonensis, d. 15, Sept., 1866, legg. Sampson et Hance; in ins. Hai-nan invenit Bullock.

Recorded only from Upper India and Java.

31. *Styrax serrulatum*, Roxb. In silvis densis circa monasterium buddhicum Filoi-tsz, secus fl. North River, prov. Cantonensis, d. 18, Sept., 1866, frf. coll. Sampson et Hance: in fruticetis paulo infra verticem montium Pak-wan, florif. invenit Sampson, sub fine Martii, 1868.

32. *Wrightia pubescens*, R. Br. Secus viam a portu Hoi-hau ad Kieng-chán, metropolin ins. Hai-nan ducentem, legi Novemb. 1866.

A shrub or small tree of about twelve feet, the foliage much like that of *W. tomentosa*, but only hairy beneath, and with small glandular guttules beneath, and a very delicate reticulation of deep purplish veinlets between the hairs; whilst the leaves of *W. tomentosa* are quite pannose on the under surface, so that the network cannot be seen. The branchlets, too, of the Chinese plant are quite smooth. The follicles green and not quite ripe when gathered, are eight inches long, quite soldered into one, drying black, and marked throughout their whole length with innumerable elevated striæ and interjacent furrows, the seeds 5 lines long, with a coma about an inch in length.

33. *Marsdenia? urceolata*, Dcne. In ins. Hai-nan, juxta Hoi-hau, a. 1877, leg. Bullock. I have seen no authentic specimens of this species, which had only been gathered in Cochin-china, but the present ones agree very well indeed with the diagnosis, except that the 4-5 flowered cymes have a very short common peduncle, instead of the flowers being quite sessile.

34. *Limnanthemum cristatum*, Griseb. In stagnis ditionis Amoyensis, legi Oct., 1857: prope Li-pau, secus fl. North River, prov. Cantonensis, m. Sept., 1866, coll. Sampson et Hance.

35. *Hydrolea zeylanica*, Vahl. In uliginosis extra Cantonem,

Oct., 1866, leg. Sampson. This is certainly identical with the Ceylon plant, the "capsula rugosa" by which Choisy sought to distinguish Loureiro's *H. inermis* being caused simply by the impregnation made on the thin parietes by the seeds. I sent good specimens of the Canton plant to Kew, but they must have been lost or mislaid, from the uncertainty Mr. Bennett felt as to Loureiro's name ('Journ. Linn. Soc.,' xi., 276.)

36. *Heliotropium brevifolium*, Wall. In collinis incultis circa Amoy, Oct., 1857; in subulosis ad mare pæninsulæ Macaiensis, copiose, autumnoque 1861-5 ego ipse legi. A critical plant, whose distribution is therefore doubtful. Dr. Anderson extends its area to the whole of the tropics of the old world and Australia, and unites with it *H. strigosum*, Willd., together with *H. tenue*, Wall., *H. tenuifolium*, R. Br., *H. fruticosum*, Forsk., and *H. parvifolium*, Edgw., but A. DeCandolle and Mr. Edgworth keep these species distinct. (Cfr. 'Linn. Journ.,' vi., 205.) Mr. Bentham, by restricting *H. strigosum*, so far as this continent is concerned, to Western Asia (Fl. Austral. iv., 397), appears to consider the Chinese species distinct. And Boissier ('Fl. Orient.,' iv., 143) omits the usual note of geographical area under *H. strigosum*, but refers to it *H. cordofanum*, Hochst. & Steud! and *H. bicolor*. Hochst. & Steud! both regarded by A. DeCandolle and by Bunge ('Über die Heliotropien d. mittelländ-orient. Flor.,' 54) after examination, as good species.

37. LETTSOMIA CHALMERSII, *sp. nov.* Caule volubili juniore canescente, foliis ovatis acutis basi leviter cordatis supra glaberrimis subtus cano-sericeis $2\frac{1}{2}$ - $3\frac{1}{2}$ poll. longis $1\frac{1}{2}$ - $2\frac{1}{2}$ poll. latis petiolo 1-2-pollicari cymis axillaribus densis 7-10-floris pedunculo canescente circ. $1\frac{1}{2}$ -pollicari fultis, bracteis oblongis obtusissimis cum calyce adpresso-incanis 5 lin. longis, sepalis ovato-oblongis obtusiusculis 2 exterioribus majoribus flori adpressis in fructu accrescentibus et intus rubescentibus glabris 4-6 lin. longis, corollæ candidæ hypocrateriformis extus adpresse sericeæ intus glaberrimæ tubo 3-lineali limbo 9 lin. longo ad basin fere 5-partito lobis lanceolatis acutiusculis rectis patentibus, staminibus declinatis lobis paulo brevioribus filamentis glabris basi triangulari-dilatata dense glanduloso-fimbriata, disco crasso annulari luteo, stylo glaberrimo stamina parum superante, stigmatе globoso-didymo, bacca globosa rubra biloculari, seminibus 4 v. abortu 2 subcompresso-rotundatis nigris glabris. Secus fl. West River, prov. Cantonensis, juxta Ting-ü-shan, Nov., 1874, coll. Rev. J. Chalmers. (Herb. propr., n. 20203.)

I have drawn up my character partly from the original dried plant in fruit, and partly from living ones in flower, raised from seed. Except for the exerted genitalia, the flowers are more like those of a Jasmine than a Convolvulus. Allied to *L. aggregata*, Wt., which, however, has a pink corolla, with less elongated lobes. Loureiro's *Argyreia acuta*, which is probably near the present species, is described as with lanceolate-ovate leaves, and a terminal lax panicle. Choisy, who says he has seen Loureiro's specimen, refers to it *L. festiva*, Wt., but the accuracy of this seems to be questioned. Although I have followed Mr. Bentham, who in the

'Genera' keeps *Lettsomia* apart from *Argyreia*, it must be admitted that these groups have no better claim to be distinguished than *Pharbitis* and *Batatas* have to be separated from *Ipomœa*. Dr. Wight was quite logical in re-establishing *Lettsomia*, because, unlike Mr. Bentham, he regarded a difference in the number of cells of the ovary and the ovules in each as sufficient grounds for the maintenance of a genus; but he also supposed that *Maripa*, *Legendrea*, *Blinkworthia* and *Humbertia* would be absorbed by it. And the habit of *Argyreia* and *Lettsomia* is so entirely the same that I think it would be far better to combine them.

38. *Hewittia bicolor*, Wt. & Arn. In ins. Hai-nan, juxta Hoi-hau, æst. 1877, coll. Bullock. Not to my knowledge previously gathered in China.

39. *Celsia coromandeliana*, Vahl. Ad strata limosa a fluvio West River anno præterito deposita, prope fauces Shiu-hing, prov. Cantonensis, d. 7 Febr., 1867, coll. Sampson. I am not aware of this species having been hitherto found on the Asiatic continent eastward of Birma.

40. *Linnophila heterophylla*, Benth. In stagno juxta pagum Pui-shui, secus fl. West River, prov. Cantonensis, 80 m. p. ab urbe, d. 9 Julii, 1870, coll. Sampson. The remaining species known from China have been enumerated by Maximowicz ('Mél. Biol. Acad. St. Pétersb.,' ix., 406.)

41. *Torenia parviflora*, Ham. In multis locis Chinæ australis. Corolla yellow, at anthesis not exceeding the calyx-teeth.

42. *Torenia flava*, Ham. Cum priori. Corolla deep yellow (not pale, as stated in the 'Prodromus'), with a purple blotch on each side, at anthesis exceeding the calyx-teeth by fully a third.

43. *T. cordifolia*, Roxb. Cum præcedentibus. Very like the last, but the corolla is white, with a purplish-blue spot on either side, its tube more exerted, throat less ampliate, and the calyx is straight not incurved, and very conspicuously winged, and the foliage is nearly that of *T. parviflora*. The inflorescence, on which subsections are founded in the 'Prodromus,' affords a very inconstant and untrustworthy character.

44. *Vandellia hirsuta*, Ham. Ad ripas fl. West River, prov. Cantonensis, d. 21 Julii, 1872, legg. Sampson et Hance.

45. *Strobilanthes scaber*, N. ab E. Prope Cantonem, coll. F. Parry; in montibus Pak-wan, supra urbem, Dec.-Jan., 1867-8, leg. Sampson; in ins. Danorum, Whampoæ, Dec., 1868, detexit filius meus Alfredus.

I find, with Mr. Bentham, in the capsules I have opened either five or six seeds, one cell usually containing three, the other two; but there are three retinacula in each.

46. *Hyptis suaveolens*, Poit. Prope Kieng-chaú, metropolin ins. Hai-nan, ad vias satis copiose, legi d. 17 Nov., 1866: circa Macao, passim in arenosis ad more pluries inveni.

47. *Dysophylla? tetraphylla*, Wt. In ins. Hai-nan, circa Hoi-hau, a. 1877, invenit Bullock. The spike in my specimen is not yet fully developed, but the plant agrees very well with Wight's character. The stem and leaves are clothed with dense appressed

hairs, and the leaves are longer and more truly linear (though rather obtuse than subulate) than represented in Wight's plate. ('Icon.,' iii., t. 1444.)

48. *Lamium petiolatum*, Royle. In Silver Island, Chin-kiang, Maio, 1863, invent Hay. Known previously from the Himalaya and Japan. Franchet and Savatier ('Enum. Pl. Jap.,' i., 381) refer the Japanese plant, which I have not seen, to *L. album*, Linn. In the present one, the pilose ring in the corolla-tube is certainly oblique, but yet I do not regard it as referable to that species, for the leaves are cuneate at the base and the calyx-teeth are greatly produced, whilst there is a marked difference in the aspect.

49. *Leucas lanata*, Benth. Ad Hoi-tau, ora occidua ins. Hai-nan, Jan., 1866, leg. F. Fagg. Undistinguishable from Dr. Thomson's Western Himalayan specimens.

50. *Leucas zeylanica*, R. Br. Ad Hoi-hau, ora septentr. ins. Hai-nan, coll. F. Fagg, Dec., 1865, Sampson et Hance, Nov., 1866. The more equal subulate less rigid calyx-teeth, closely placed and with acute sinuses and nerves conspicuously prolonged downwards into the hispid incurved tube give the flowers of *L. aspera*, Spr., a different appearance. In the present plant the calyx-tube, glabrous for the greater portion of its length, is shorter, more turbinate, less curved, quite truncate at the apex, the teeth distant and filiform, with their nerves soon evanescent. *L. linifolia*, Spr., which Dr. Thwaites seems to think may be also referable to *L. zeylanica*, is apparently well characterised by the canescent calyx, and the extreme obliquity given to its mouth by the protraction of the upper tooth. The foliage of all three is alike.

51. *Deeringia celosioides*, R. Br. Ad pagum Hoi-tau, ora occidua ins. Hai-nan, d. 31 Dec., 1865, coll. F. Fagg.

52. *Euphorbia Atoto*, Forst. In arena ins. Prata, ad oras Chinæ merid., Maio, 1858, coll. Wilford: ad Hoi-hau, ins. Hai-nan, vere 1877, leg. Bullock.

53. *Euphorbia bifida*, Hook. & Arn. Macaii, in declivitatibus herbosis ad mare, ipse legi, m. Decembri, 1866.

54. *Streblus asper*, Lour. Juxta Hoi-hau, ins. Hai-nan, 1877, leg. Bullock.

55. *Fatoua japonica*, Bl. Circa viculum Ho-au, prov. Cantonensis, a. 1856, coll. b. Krone, soc. rhenanæ apud Vinas missionarius; in incultis juxta ipsam urbem, autumnno 1875, invent Rev. J. C. Nevin.

The rudimentary pistil in the male flowers is usually split to the middle into two oblong lobes, but is sometimes altogether absent; the anthers are quite white. When ripe, the fruit splits downwards from the top, and shoots out the putamen elastically to a great distance. The leaves differ in shape in different specimens, and the varieties proposed by Bureau cannot, I think, be distinguished. Not heretofore recorded from China.

56. *Saururus Loureirii*, Dene. Ad ripas limosas canalium, Whampoæ, legi Maio, 1865, necnon in variis locis juxta Cantonem.

There seems no character to keep Turczaninow's *Saururoopsis* apart from this.

57. *Aristolochia Kämpferi*, Willd. In. Silver Island, Chin-kiang, Maio, 1863, coll. Hay. I have seen no Japanese specimens, and mine is not in good condition, but it seems to agree very well with Duchartre's diagnosis. It has not hitherto been recorded as a native of China. I have another *Aristolochia* from the woods of the Tsing-yün pass, probably allied to *A. indica*, Linn., but the leaves, borne on petioles three inches long, are more like those of a *Dioscorea*, ovate-oblong in contour, 6-7 inches long, 4 inches broad, with a wide sinus at the base, and rounded auricles $1\frac{1}{2}$ inch in length, produced downwards. The capsule is ovoid for $1\frac{1}{2}$ inch, and drawn out at the base into an equally long stipes splitting into as many divisions as the fruit. There are no flowers, and I cannot venture to characterise the plant.

58. *Habenaria sagittifera*, Rehb. fl. Circa Chi-fu, 1873, coll. C. C. Stuhlmann; prope Ta-chiao-sz, Chinæ bor., 1874, unicum specimen invenit Dr. O. F. a Moellendorff. Only known previously from Japan and Manchuria.

59. *Pollia japonica*, Thunb. In silvis supra cœnobium buddhicum Fi-loi-tsz, ad fauces fl. North River Tsing-yün dictas, m. Jul. 1865, detexit Sampson; Sept., 1866, coll. Sampson et Hance.

60. *Carex Royleana*, N. ab E. Circa Amoy, Martio, 1863, coll. C. F. M. de Grijs. Reduced latterly by Dr. Boott, who had formerly considered it distinct, to *C. breviculmis*, R. Br., from which it differs by the culms shorter in proportion to the leaves, the female spikes usually male at the summit, and the squamæ ovate and gradually attenuated into—not broadly shouldered and truncate at the base of—the cusps, which are much shorter, so that the spikes have not the aristate appearance of the other. The Chinese specimens agree in all respects with the beautiful plate ('Ill. Carex,' i., t. 19.)

61. *Carex tristachya*, Thunb. In rupibus humidis insulæ Danorum, Whampœ, primo inveni, Apr., 1861; in montibus Pak-wan, supra Cantonem, raram vidit Sampson. The late Dr. Boott determined this as his *C. monadelpa*, but he subsequently informed me that he considered me right in regarding the latter as identical with Thunberg's species. Schkuhr's figure ('Riedgr. Ww.,' 109) though representing a fragment only, is not uncharacteristic, but the male spike is erroneously coloured quite blackish.

62. *Panicum humile*, N. ab E. In agris requietis, Whampœ, ipse primum legi, m. Sept., 1863. The Chinese specimens are precisely similar to those from Ceylon, whence the species had, I believe, only been previously recorded.

63. *Pollinia imberbis*, N. ab E. In udis secus viam ad montes Pak-wan, extra Cantonem, ducentem, m. Jan., 1868, detexit Sampson.

In aspect rather resembling a dwarfed *Leersia* than an *Andropogonea*.

64. *Ischæmum? segetum*, Trin. Secus fl. Lien-chau, prov. Cantonensis, Octobri, 1876, coll. Rev. J. C. Nevin. I refer the Chinese grass to this species merely from its agreement with Trinius' brief character ('Mém. Acad. St. Pétersb.,' 6e. sér., ii., 294.) It is of a

decumbent habit, giving out a flowering peduncle at each node; the spikes are straw-coloured, the fertile glume quite destitute of hairs on the back, and the pedicelled floret tabescent and awnless.

65. *Anthistiria caudata*, N. ab E. In montibus Pak-wan, neonon in collibus demissis ad boream urbis Cantonis sitis, mm. Nov., 1867, Oct., 1868, coll. Sampson et Hance. A remarkably distinct and rare species.

66. *Calamagrostis arundinacea*, Roth. In monte Miao feng shan, Chinæ bor., m. Augusto 1874, coll. Dr. O. a Moellendorff: secus fl. Lien-chau, prov. Cantonensis, m. Oct., 1876, leg. Rev. J. C. Nevin. Though now recorded from the extreme north and south of the empire, I am not aware that this grass has been gathered before in China.

67. *Bromus japonicus*, Thunb. Juxta Chi-fu, a. 1873, leg. R. Swinhoe. Gathered previously at Kiu-kiang by Mr. Forbes's collector.

68. *Polypodium floccigerum*, β . *loriforme*, Mett. In rupibus secus fl. Lien-chau, prov. Cantonensis, m. Oct., 1876, coll. Rev. J. C. Nevin.

I have seen no authentic specimens, but these agree well in dimensions, venation, and the remaining characters, with Mettenius' description. This particular variety had only hitherto been found in Java.

69. *Helminthostachys dulcis*, Kaulf. In montosis prov. Cantonensis rara: specimina debeo benevolentiae Rev. R. H. Graves. Now first recorded from China.

70. *Lycopodium phlegmaria*, Linn. In arboribus silvarum ad Ting-ü-shan, secus fl. West River prov. Cantonensis, d. 10 Julii, 1870, leg. Sampson. China is not mentioned by Spring, in his monograph, amongst the habitats of this plant, as represented in the Hookerian herbarium.

NOTE.—The plant referred in the first fasciculus of these "Spicilegia,"—from the description only,—to *Pedicularis longiflora*, Rudolphi, is, according to M. Maximowicz, a distinct species which he has described under the name of *P. chinensis*. ('Mél. Biol. Acad. St. Pétersb.,' x., 87.)

ON *LYSIMACHIA CUSPIDATA*, BL., AND *LYSIMACHIA CUSPIDATA*, KLATT.

BY HENRY F. HANCE, Ph.D., F.L.S., Memb. Acad. Nat. Cur., &c.

In a paper which was recently printed in this Journal, I gave a list of the *Lysimachie* known to me—from the actual possession of specimens—as occurring in China.* Amongst them was the one figured by Klatt as *L. cuspidata*, Bl., which, as I pointed out,

* Trimen, 'Journ. Bot.,' (N.S.), vi., 357,

was asserted by the late Prof. Miquel to differ entirely from the Javanese plant. I left it, however, under the name assigned it by the Hamburg botanist, because I possessed no authentic example of the species referred to by Miquel. I have since, through Dr. Scheffer's courtesy, been favoured with a specimen, from the Buitenzorg Herbarium, of Blume's plant, labelled, my correspondent believes—though he is not quite certain of this—in the author's handwriting. From an examination of this, it is clear that, as Miquel states,* Blume's *L. cuspidata* is identical with the plant erroneously described and figured by Klatt † as *L. uliginosa*, Bl. This, with *L. evalvis*, Wall., *L. alternifolia*, Wall. (between which two it should apparently stand), *L. adoensis*, Hochst. & Steud., and *L. Linum-stellatum*, Linn., form Klatt's section *Asterolinon*. I confess there seems to me no adequate grounds for the retention of Link and Hoffmasegg's genus; ‡ but those who consider the diminutive petals and (usually only) much fewer seeds as sufficient to keep the two last-named species apart, and who think Klatt's divisions—as I do not—generally natural and well limited, might perhaps reserve for the others § the sectional name of *Pseudasterolinon*. It certainly does appear impossible to remove *Pelletiera verna*, A. St. Hil., judging from a comparison merely of St. Hilaire's own figures, || from *L. Linum-stellatum*, Linn., of which indeed Baudo surmised it might be only a variety; ¶ though it is acknowledged by Klatt, as well as by Endlicher and Duby. But when Sir Joseph Hooker, recognising this, places them together under *Asterolinon*, thus assigning to this very unstable group species with a 5-lobed corolla and others with three distinct petals, it is perplexing to trace the logical process by which he has been induced to resuscitate Duby's *Apochoris*, which has really no single character but free petals to distinguish it from *Lysimachia*, a large and ubiquitous genus, embracing plants with considerable diversity both of habit and floral structure, and with which, as it seems to me at least, Klatt with good reason re-combined it.**

* 'Ann. Mus. Lugd.-Bot.,' iv., 144.

† 'Der Gattung *Lysimachia*,' 39, t. 23.

‡ Which, by some oversight, Le Maout and Decaisne station in the tribe *Anagallideæ*, distinguished by its circumsciss capsule, or pyxis. ('Traité Élém. de Bot.,' 219.)

§ I find the stamens of *L. evalvis* distinctly connate into a short free cup or ring; those of *L. alternifolia* I have not examined: in both the seeds seem, judging only from dissection of the ovary, quite numerous.

|| 'Ann. Sc. Nat.,' 2e. sér. xi. t. 4, especially the abnormal petal detected by Decaisne, which presumably arose from cohesion, the normal condition in *Lysimachia*.

¶ 'Ann. Sc. Nat.,' 2e. sér. xx., 350.

** There are one or two inaccuracies in the revision of this Order in the 'Genera,' which testify to the work having been performed with great haste, doubtless under the pressure of multifarious engagements. E. gr. *Primula* is stated (ii., 631) to be divided by Duby into two sections; whereas Duby admits five, and Endlicher the two named. Ruprecht had perhaps a better conception of the natural subdivisions of *Primula* than any other writer; if, however, Schott's two sections, approved by Hooker, be admitted, they are undoubtedly insufficient; and a third, *Sphondylia*, agreeing with the first in the ptyxis of the leaves, and with the second in the abbreviated fruit, must be intercalated.

The plant mistaken by Klatt for Blume's *Lysimachia cuspidata* had not, I believe, been noticed by any previous writer. It has been very fairly described and figured by him,* though he is mistaken in supposing that it grows in Hongkong, or that Hongkong itself is situated in Northern China. I therefore desire to dedicate it to him, as the first describer, under the name of *L. KLATTIANA*. So far as I know, it has only yet been found in Northern and East-Central China, and its nearest relative is apparently *L. Alfredi*, Hance.

A SYNOPSIS OF THE SPECIES OF *DIAPHORANTHEMA*.

BY J. G. BAKER, F.R.S.

THE large genus *Tillandsia*, as monographed by the younger Schultes in the second part of the seventh volume of Roemer and Schultes's 'Systema Vegetabilium,' in 1830, has been much subdivided of late years. With the exception of *Catopsis*, Griseb. (*Pogonospermum*, A. Brong.), which differs from *Tillandsia* materially in the seeds, I prefer to regard the groups which have been separated (*Anoplophytum*, *Diaphoranthema*, *Allardtia*, *Platystachys*, *Phytarhiza*, *Wallisia*, and *Vriesea*) as of not more than sectional value. One of the best marked is *Diaphoranthema*, characterised by Beer, in 1857 ('Die Familie der Bromeliaceen,' p. 153.) Beer's synopsis of the species is not satisfactory, as out of eight which he defines not more than three will hold good, and there are several others which he does not mention at all. The head-quarters of *Diaphoranthema* is in the Argentine territory; and it was studied carefully a generation ago by the late Mr. Gillies, who gave names to the species he distinguished, and sent specimens to Sir W. J. Hooker, but never published them. I propose, therefore, to devote the present paper to a synopsis of the species which I have been able to see in the London herbaria.

Genus *Tillandsia*, Linn.

Sub-genus *Diaphoranthema*, (Beer).—Leaves subterete, persistently lepidote up to the top on both sides, not condensed into a rosette, but spread over the short, produced simple or forked, densely caespitose stems. Peduncle leafless or obscurely bracteate, sometimes 0. Flowers erect, 1–3, crowded if more than one. Petals violet, oblancoolate, shortly exserted from the calyx, not scaled at the base of the claw. Genitalia shorter than the petals.

1. *T. bryoides*, Griseb., in Lorentz Pl. Argent. Exsic., No. 128. *T. coarctata*, Gillies MSS. Stems 1–3 in. long, simple, or little or copiously branched. Leaves very tightly packed on the stems, 50–100 to a fully-developed simple stem, ascending, adpressed to the stem or rather spreading, subterete from a clasping lanceolate base one-twelfth of an inch broad, narrowed gradually from the top of the base to a fine point, the whole blade $\frac{1}{4}$ – $\frac{1}{3}$ -in. long,

* 'Der Gatt. *Lysimachia*,' 36, t. 20.

clothed with thin glittering adpressed pale-brown tomentum. Peduncle 0, or very short. Flowers 1-3. Bracts and sepals similar in shape and texture, $\frac{1}{4}$ - $\frac{1}{3}$ -in. long, thinly lepidote, distinctly ribbed. Corolla not seen. Cylindrical capsule under an inch long, the linear valves half-a-line broad.

On trees and bushes at the foot of the Cordillera, near Mendoza, *Gillies*. Cordova, *Lorentz*, 128! South Chili, *W. Lobb*! South Brazil, *Glazion*, 3124! Parana, *Christie*! General habit of *Lycopodium Selago*. What I take to be a stunted form of the same species has tightly imbricated, lanceolate, dirty-white, thicker leaves, not more than $\frac{1}{8}$ - $\frac{1}{6}$ -in. long.

2. *T. tricholepis*, Baker, n. sp. General habit of *T. bryoides*. Leafy stems reaching a length of 2-3 inches. Leaves as tightly packed as in the last, rather longer ($\frac{3}{8}$ - $\frac{1}{2}$ -in. long), narrowed gradually from a clasping lanceolate base to a fine hair-like point, ascending, erect or a little curved, densely scabrous throughout, with white, glittering, deflexed, acuminate lanceolate scales. Peduncle 1-2 inches long, 1-2-flowered, flexuose, with several closely-appressed, lanceolate bracts. Sepals and bracts oblong-lanceolate, naked, striated, $\frac{1}{4}$ - $\frac{1}{3}$ -in. long, the former deltoid at the tip. Capsule cylindrical, twice as long as the calyx, its valves about half-a-line broad.

Andes of Bolivia; on bushes, in the temperate region about Sorata, Poquerani, and San Pedro, at an elevation of 2500 to 2650 metres, *Mandon*, 1179!

3. *T. pusilla*, *Gillies* MSS. Stems under an inch long. Leaves about a dozen to a simple stem, squarrose or ascending, $\frac{1}{4}$ - $\frac{1}{3}$ -in. long, terete from a clasping lanceolate base, $\frac{1}{4}$ -line in thickness where they leave the stem, not hair-like at the point, densely clothed throughout with loose, chaffy, lanceolate, whitish, lepidote scales. Peduncle none, the solitary flowers springing from the base of the leaves at the end of the leafy stems. Sepals $\frac{1}{4}$ -in. long. Corolla and capsule not seen.

Mendoza, on bushes, *Gillies*! May be a very dwarf reduced form of the next.

4. *T. propinqua*, C. Gay, 'Fl. Chil.' vol. vi., p. 15. Stems 2-3 in. long, densely caespitose, often copiously branched. Leaves 20-30 to a fully-developed simple stem, $\frac{3}{8}$ - $\frac{3}{4}$ -in. long, ascending or spreading; subterete above the lanceolate clasping base, half-a-line in diameter above the base, not hair-pointed at the tip, the face distinctly deeply-channelled from the tip downwards, the whole surface densely coated with loose, chaffy, pale-brown, or whitish lepidote scales. Flowers often many to a stem, solitary, sessile, or shortly peduncled. Bract oblong, lepidote, $\frac{1}{4}$ -in. long, tightly clasping the calyx. Sepals lanceolate, naked, acute, $\frac{1}{3}$ -in. long. Capsule cylindrical, $\frac{1}{2}$ - $\frac{3}{4}$ -in. long, its valves $\frac{1}{2}$ -line broad.

Andes of Chili, *Cuming*, 167! *Bridges*, 534! *Herb. Reed*! Casa Cancha, *Wilkes' Expedition*. Cordoba, *Lorentz*, 129! Andes of Bolivia, temperate region, 4000 metres, *Mandon*, 1181!

T. lanuginosa, *Gillies* MSS., from trees and bushes at the foot of the Cordillera, near Mendoza, is evidently a form of the same

species, with more densely lepidote leaves, and a slender peduncle above an inch long.

5. *T. rectangula*, Baker. *T. propinqua* var. *rectangula*, Griseb. in Lorentz Pl. Argent. Exsic., No. 126-127. Leafy stems simple or forked, about an inch long. Leaves about a dozen to a fully-developed simple stem, half-an-inch long, linear-subulate from a clasping lanceolate base, spreading, half-a-line broad where they leave the stem, narrowed gradually from the base to the point, deeply channelled on the lower part of the face, thinly lepidote all over, with one deep lateral groove on each side in the lower half. Peduncle filiform, terminal, 1-flowered, about an inch long, with sometimes a bract at the middle. Bract that clasps the flower oblong, $\frac{1}{4}$ -in. long. Calyx $\frac{1}{3}$ -in. long; sepals obtuse. Capsules half-an-inch long; valves a line broad.

Argentine territory at Cordoba, Lorentz, 126! 127! Midway between *propinqua* and *rigida*.

6. *T. capillaris*, Ruiz & Pavon, 'Fl. Peruv.,' vol. iii., p. 42, t. 271, fig. c. *Diaphoranthema capillaris*, Beer Brom., p. 153. Leafy stems 2-3 in. long. Leaves about 20 to a fully-developed simple stem, subterete from a clasping lanceolate base, about an inch long, one-twelfth of an inch in diameter above the base, ascending, not hair-like at the tip, densely clothed with loose spreading, pale-brown lanceolate, lepidote scales. Peduncles 1-2-flowered, filiform, 2-3 in. long. Bract glossy, lanceolate, $\frac{1}{3}$ -in. long, tightly clasping the calyx. Sepals lanceolate, naked, $\frac{1}{3}$ -in. long. Capsule cylindrical, under an inch long, its valves half-a-line broad.

Andes of Peru, Pavon! The above description is taken from Pavon's copious type-specimens at the British Museum. I cannot separate from this specifically *T. virescens*, Ruiz & Pavon, 'Fl. Peruv.,' iii., p. 43, t. 270, fig. 5 (*Diaphoranthema virescens*, Beer), of which there are no type-specimens in the Museum herbarium. To the same species, I think, belong *T. incana*, Gillies MSS., from trees and bushes at the foot of the Cordillera of Mendoza, and a plant gathered by Mandon (No. 1178) in the temperate region of the Andes of Bolivia, at an elevation of 2700 metres. *T. capillaris* is about midway between *recurvata* and *propinqua*, differing from the former by its shorter, stouter, ascending, more densely lepidote leaves.

7. *T. retorta*, Griseb., in Lorentz Pl. Argent. Exsic., No. 125; *T. caspitosa*, Gillies MSS., non Leconte. Stems 1-2 inches long, simple or forked, bearing about a dozen squarrose rigidly coriaceous leaves, which are about an inch long, clasping the stem by a dilated lanceolate base, $\frac{1}{2}$ -line in diameter above the base, narrowed gradually to a fine point, clothed throughout with rather spreading, minute, lepidote scales. Peduncle none. Bracts and sepals lanceolate, acute, $\frac{1}{2}$ -in. long. Capsule above an inch long, with valves $\frac{1}{3}$ -in. broad.

Mendoza, Gillies! Cordoba, Lorentz, 125! Habit of *recurvata*, from which it differs by its shorter, stouter, much more rigidly-coriaceous leaves, with a thinner coating of scales, and by its sessile flower and very large capsules.

8. *T. erecta*, Gillies MSS. Leafy stems rigidly erect, simple or forked, $1\frac{1}{2}$ –2 in. long. Leaves about 20 to a simple stem, linear-subterete from a dilated lanceolate base, $\frac{1}{6}$ – $\frac{1}{4}$ in. broad, erect or rather spreading, 1 – $1\frac{1}{2}$ in. long, one-twelfth of an inch in diameter at the top of the dilated base, prominently ribbed vertically on the back in the lower part, narrowed gradually from the top of the dilated base to a subobtuse point, coated throughout with minute, adpressed, peltate, lepidote scales, with a white rim and a brown centre. Peduncle naked, 1-flowered, stiffly erect, 1 – $1\frac{1}{2}$ in. long. Bracts and sepals naked, lanceolate, ribbed, $\frac{1}{2}$ -in. long. Capsule cylindrical, twice as long as the sepals.

On trees and bushes at the foot of the Cordillera, near Mendoza, *Gillies!* *T. rigida*, Gillies MSS., is obviously a form of the same species without any peduncle. The species is marked in the group by its stout, crowded, suberect, rigidly-coriaceous, thinly-lepidote leaves, strongly ribbed on the back in the lower portion.

9. *T. recurvata*, Linn.! Schultes fil. 'Syst. Veg.,' vol. vii., part 2, p. 1202. *Diaphoranthema recurvata*, Beer, Brom., p. 156; *T. uniflora*, H. B. K. Nov. Gen., i., p. 290; *Diaphoranthema uniflora*, Beer; *Tillandsia Landbeckii*, Philippi, in 'Linnæa,' vol. xxxiii., p. 248. Densely cæspitose simple or forked stems 1 –2 in. long. Leaves 12–15 to a fully-developed simple stem, terete from a dilated, clasping, lanceolate base, spreading, 2–3 in. long, $\frac{1}{2}$ -line in diameter at the top of the base, clothed with dense, spreading, persistent, lepidote scales. Peduncle filiform, 1–3-flowered, 2–5-in. long, usually naked, rarely furnished with a bract apart from the flower. Bracts lanceolate, acute, $\frac{1}{2}$ – $\frac{3}{4}$ -in. long, more or less hairy. Sepals obtuse, $\frac{1}{3}$ -in. long. Capsule $\frac{3}{4}$ –1 in. long, its valves about one-twelfth of an inch broad.

This, the type-species of the group, is the most widely-spread of all the *Tillandsias*, as it extends from Florida and Mexico to Buenos Ayres and Chili, reaching in the Andes an elevation of 8000 feet. *T. monostachys*, Gillies MSS., which grows upon the Cactuses used as fences at Buenos Ayres, is evidently simply a dwarf form of *recurvata*, with leaves not more than 1 – $1\frac{1}{2}$ in. long, short peduncles, and generally solitary flowers. There are specimens of the species both in the Linnean and Gronovian herbaria.

10. *T. andicola*, Gillies MSS. Leafy stem produced to a length of about 3 inches, flexuose, bearing about 20 leaves. Leaves rigidly coriaceous, subterete from a clasping, lanceolate base, flexuose, the lower ones spreading, the upper ascending, 1 –2 in. long, the blade about one-sixteenth of an inch in diameter at the top of the dilated base, narrowed gradually from the middle to a subobtuse point, not perceptibly ribbed vertically on the back in the lower part, the whole lamina thinly coated with very small, fine, narrow, rather spreading, whitish, lepidote scales. Peduncle 1-flowered, bractless, lepidote throughout, above an inch long. Bract lanceolate, $\frac{1}{2}$ -in. long, pilose. Sepals naked, lanceolate, acute, $\frac{1}{2}$ -in. long, strongly-ribbed vertically. Capsule not seen.

Andes of Mendoza, *Gillies!* Longer stems than *recurvata*.

Leaves stouter and much more rigidly coriaceous in texture, with the vestiture almost pubescent.

11. *T. myosura*, Griseb., in Lorentz Pl. Argent. Exsic., No. 122. Stout produced simple or copiously forked, leafy stems $1\frac{1}{2}$ –3 in. long. Leaves 12–20 to a fully developed simple leafy stem, subterete from a dilated lanceolate base, spreading, reaching a length of 5–6 inches, rigidly coriaceous in texture, $\frac{1}{8}$ -in. in diameter at the top of the dilated clasping base, narrowed gradually from the middle to a subobtuse tip, densely coated throughout with reflexed dirty white short pubescence. Peduncle 1–3-flowered, 2–4 in. long, pubescent, with usually a bract about the middle. Bract at the base of the flower pubescent, oblong-lanceolate, acute, $\frac{1}{2}$ – $\frac{5}{8}$ in. long. Sepals obtuse, glabrous, under $\frac{1}{2}$ -in. long. Capsule cylindrical, 1– $1\frac{1}{4}$ in. long, with valves one-twelfth of an inch broad.

Andes of Bolivia, on trees, in rocky ground, near Lorata, between San Pedro and Coaconi, at an elevation of about 8000 feet above sea-level, Mandon, 1180! Cordoba, Lorentz, 122! Habit of *recurvata*, with very different, stouter, rigidly-coriaceous leaves, and different vestiture.

12. *T. fusca*, Baker, n. sp. Stout, woody, leafy stem, $\frac{1}{2}$ foot long, $\frac{1}{4}$ -in. diameter at the base, with several spreading or ascending branches. Dilated base of the leaves deltoid, $\frac{1}{4}$ – $\frac{1}{3}$ in. broad. Leaves spreading, $1\frac{1}{2}$ –2 in. long, subterete. $\frac{1}{4}$ – $\frac{1}{8}$ in. broad at the top of the dilated base, distinctly grooved down the face, narrowed from the middle to a subobtuse point, densely coated with spreading, linear, pale-brown scales. Peduncle about an inch long, 2–3-flowered, with a large lanceolate bract at the middle. Bracts lanceolate, $\frac{1}{2}$ in. long. Sepals lanceolate, glabrous, nearly as long as the bract. Capsule not seen.

Obragillo; a single specimen in Mr. Bentham's herbarium, gathered by the United States Exploring Expedition under Captain Wilkes. Well-marked from all the rest by its suffruticose habit and deltoid leaf-bases.

13. *T. Gilliesii*, Baker. *T. compressa*, Gillies MSS., non Bertero. Stems 1–2 in. long, simple or forked. Leaves distichous, squarrose, linear, about a dozen to a simple stem, 1–2 in. long, $\frac{1}{4}$ -in. broad at the clasping base, narrowed gradually from the base to the point, rigidly-coriaceous, deeply channelled down the face, measuring $\frac{1}{8}$ -in. in the lower part from the keel to the margin, densely finely lepidote on both sides all over. Peduncle 1–2-flowered, reaching a length of 4–5 in., sometimes suppressed, sometimes furnished with a small clasping bract at the middle. Bract that clasps the flower oblong, pointed, $\frac{1}{2}$ – $\frac{5}{8}$ -in. long. Calyx as long as the bract. Capsule cylindrical, an inch long.

Foot of the Cordillera of Mendoza, *Gillies!* Marked at a glance by the distichous arrangement of its stout rigidly coriaceous leaves.

14. *T. undulata*, Baker, n. sp. Leafy stems cæspitose, very short, $\frac{1}{2}$ – $\frac{3}{4}$ in. long, all simple. Leaves 12–20 to a stem, ascending, crowded, $\frac{3}{4}$ –1 in. long, subterete, from a clasping lanceolate base, not hair-tipped, densely clothed all over with minute spreading

chaffy scales. Peduncle 2-3 in. long, bearing 3-4 lanceolate striated clasping bracts. Spike laxly 3-6-flowered; rachis very flexuose; bracts $\frac{1}{4}$ in. long, lanceolate, tightly clasping the calyx, thinly lepidote. Calyx $\frac{1}{4}$ in., naked; sepals lanceolate. Capsule glabrous, cylindrical, 1-1 $\frac{1}{4}$ in. long; valves $\frac{1}{2}$ line broad.

Paraguay, at the mouth of the Rio Spañe, near Villa Concepcion, Balansa, 619!

Calyx and capsule of *T. recurvata*, from which it differs by its short leaves, numerous flowers, and remarkably zigzag spike-rachis.

EXCLUDED SPECIES.

Diaphoranthema versicolor, Beer, 'Brom.,' p. 155, founded on a figure of Sloane's, is *Tillandsia (Platystachys) tenuifolia*, Linn.

D. subulata, Beer *loc. cit.*, founded on 'Fl. Flum.,' vol. iii., t. 127, is *T. (Anoplophytum) stricta*, Soland.

D. biflora, Beer, p. 156, is *T. (Platystachys) biflora*, Ruiz & Pavon.

D. triflora, Beer, p. 155, founded on a figure of 'Flora Fluminensis' (tab. 134), much too vague to be safely determinable, belongs probably to section *Anoplophytum*, and is clearly not a *Diaphoranthema*.

CONSPECTUS POLYGALARUM EUROPÆARUM.

BY ALFRED W. BENNETT, M.A., B.Sc., F.L.S.

THE review of the British species and subspecies of *Polygala* which I contributed to the number of the 'Journal of Botany' for June, 1877 (vol. vi., p. 168), may be fitly followed by a sketch of the European species of the same genus. With the exception of the diagnoses in the 'Floras' of the various countries of Europe, the only general review of the European species with which I am acquainted is by H. G. Reichenbach, fil., in the 18th volume of the 'Icones Floræ Germanicæ et Helvicæ,' (1858); there is, also, one of the species of Western and Central Europe, by Dumortier, in the 'Bulletin de la Société Royale de Botanique de Belgique,' vol. vii., 1868, pp. 335-345; and the admirable one of the Italian species, by Caruel, in the 1st volume of the 'Nuovo Giornale Botanico Italiano' for 1869. The chief seat of the genus being the Tropics of both hemispheres, where only, besides the Cape of Good Hope, they attain the size of shrubs, the number of European species is small compared with that of most other similar areas, 20 out of about 300. New Zealand is the only country of any extent entirely wanting in the genus, and, indeed, in the Order. Accepting the Linnean limitations of the genus *Polygala*, it is the only one of 17 genera belonging to the Natural Order *Polygalaceæ* represented in Europe. Of the 20 European species, 13 belong to a group or subgenus which is distinctly European in its type; the remaining 7 species represent three distinct types, 5 of them

belonging to a group characteristically Asiatic in its distribution ; while the remaining two species are monotypic or nearly so, and have by some been erected into distinct genera. My materials, in addition to those named in the review referred to above, have been specimens kindly forwarded to me by Prof. Caruel, of Pisa, Mr. G. C. Joad, and others.

The following is a brief statement of the salient characteristics of the European species. There is at present, as far as I am aware, no satisfactory classification into sub-genera of the very numerous species (upwards of 300) included in the genus ; the one in the first volume of DeCandolle's 'Prodromus' (1824) is founded on very unsatisfactory characters. The minor divisions in Reichenbach's and Caruel's monographs may, for the most part, be accepted, but not so those in Dumortier's paper. A classification which brings together *P. comosa* and *oxyptera*, while separating *P. vulgaris*, *serpyllacea*, and *oxyptera* into three separate divisions, stands self-condemned as an attempt at a natural system. Especially unfortunate is his section of "Oppositifoliæ," including *P. mutabilis* and *serpyllacea*. Good tribal characters may, no doubt, be in some instances drawn from the character and arrangement of the foliage in this genus. In my account of the Brazilian species, in Martius's 'Flora Brasiliensis,' I have collected into a special division all those species in which some or all of the leaves are verticillate, and which appear to constitute a very natural group absolutely confined to the New World. But in the Old World it is doubtful whether any of the species have truly opposite leaves, even if we include the *P. oppositifolia* of the Cape, in which most of them are apparently so. In *P. serpyllacea (depressa)* it is not usual for even the lowest leaves to be exactly opposite ; and I am entirely unacquainted with any form answering to Dumortier's description of his *P. mutabilis*, in which he describes all the leaves on the sterile branches as opposite.

POLYGALARUM EUROPÆARUM CLAVIS.

I. Sectio EU-POLYGALA.

A. Perennes. Antheræ sessiles.

α. Alæ corollæ tubum æquantes vel eo longiores.

* Flores cærulei, rosei, vel albi.

a. Bracteæ quam pedicellos multo breviores ; racemus itaque non comosus.

1. *P. VULGARIS.* Non cæspitosa ; alæ ovales.

2. *P. CALCAREA.* Cæspitosa ; alæ capsula latiores.

3. *P. AMARA.* Cæspitosa ; alæ capsula angustiores.

4. *P. FOROJULENSIS.* Subcæspitosa ; alæ subrotundæ ; racemus abbreviatus.

b. Bracteæ pedicellum æquantes ; racemus i aque subcomosus.

5. *P. NICÆENSIS.* Alæ subrotundæ.

6. *P. PRESLI.* Alæ anguste oblongæ.

c. Bracteæ pedicello longiores; racemus itaque comosus.

7. *P. COMOSA*. Alæ ovales.

** Flores flavi.

8. *P. FLAVESCENS*. Racemus elongatus; alæ acuminatæ.

β. Alæ corollæ tubo longiores.

* Capsula sessilis.

9. *P. VENULOSA*. Alæ oblique ellipticæ.

** Capsula stipitata.

10. *P. MAJOR*. Alæ ovales.

11. *P. ANATOLICA*. Alæ anguste ovatæ, ciliatæ.

12. *P. ROSEA*. Bracteæ laterales ovatæ.

B. Annua. Filamenta superne libera.

13. *P. MONSPELIACA*. Caulis subsimplex; alæ oblongæ, acuminatæ.

II. Sectio PLEURANTHUS.

A. Antheræ sessiles. Perennis.

14. *P. SUPINA*. Alæ obovatæ, basi cuneatæ.

B. Filamenta superne libera. Perennes.

a. Arilodium 3-appendiculatum.

15. *P. SIBIRICA*. Racemus multiflorus; alæ sub-herbaceæ.

16. *P. SUBUNIFLORA*. Racemus 1-3 florus. Exigua.

β. Arilodium inappendiculatum.

17. *P. RUPESTRIS*. Alæ obovatæ, sub-herbaceæ.

C. Filamenta superne libera. Annua.

18. *P. EXILIS*. Exigua. Arilodium inappendiculatum.

III. Sectio CHAMÆBUXUS.

19. *P. CHAMÆBUXUS*.

IV. Sectio BRACHYTROPIS.

20. *P. MICROPHYLLA*.

Sectio I. EU-POLYGALA (*mih.*) (*Polygalon*, DC., *ex parte*).

Racemi terminales; bracteæ ante anthesim deciduæ. Sepala persistentia, omnia discreta; alæ petaloideæ. Petala lateralia elongata, cum carina plusquam dimidio coalita; carina galeata, sub-triloba, ad dorsum cristam magnam fimbriatam gerens. Antheræ plerumque sessiles, ad summum androphori postice secti insertæ. Ovarium glabrum vel ciliatum; stylus elongatus; stigma rostriforme vel cuculliforme vel rarius infundibuliforme. Capsula anguste alata, arilodium parvum, duabus appendicibus brevibus munitum, vel sub-inappendiculatum.

This section, which may be regarded as the typical one of the genus, is extremely well-marked by its slender herbaceous habit, terminal racemes, and coloured wing-sepals. With the exception

of the small and very distinct subsection which comprises *P. mont-peliaca* only, they are all perennial plants, with the anthers quite sessile on the split filament-sheath, and the arillode of the ripe seed furnished with three white fleshy appendages, less than half the length of the seed. The section is very distinctly European in its distribution, 13 out of the 20 European species belonging to it, while none extend beyond Western and Northern Asia and North Africa, and only two species of the section, *P. papilionacea* and *P. pruinosa*,* both natives of Asia Minor, are not found within the limits of the Continent. Both these species have been erroneously included in the European flora. The specimens bearing the name *P. papilionacea* in the Kew Herbarium (Munro, No. 84) are distinctly *P. major*, while the *P. pruinosa* of Boiss., 'Diag.,' i., 1, 8, included two different forms, subsequently separated by the author; the true *P. pruinosa* being confined to Phrygia, while the Grecian plant was subsequently ('Diag.,' ii., 1, 58) re-named *P. nicaensis* var. *tomentella*.

A. Perennials; anthers sessile; stigma hooded or beaked, the anterior lobe the largest; arillode 3-appendiculate.

a. Wing-sepals equal to or longer than corolla-tube.

* Flowers blue, rose-coloured, or white.

a. Bracts much shorter than the pedicel; the raceme, therefore, not comose.

1. *POLYGALA VULGARIS*, Linn. *P. caulibus ascendentibus vel decumbentibus; foliis ovalibus vel lanceolatis, imis minoribus, summis etiam lineari-lanceolatis; racemis terminalibus, pyramidalibus, sat densifloris; bracteis lateralibus quam pedicellum dimidio brevioribus; alis ovalibus vel obovatis, quam capsulam parum longioribus sed distincte latoribus, corollam subæquantibus, venis anastomosantibus; stylo acuto; capsula obcordata, subsessili, quam alas persistentes virides plerumque angustiore brevioribus; seminibus hirsutis; arillodio tribus brevibus obtusis appendicibus subæqualibus munito.*

One of the most widely distributed species of the genus, occurring throughout Europe with the exception of Sicily (according to Caruel), where it is apparently replaced by *P. Prestii*, and as far north as Scandinavia; in North Africa (not, however, named in Ball's 'Spicilegium Floræ Maroccanæ'), and in western temperate and subarctic Asia; growing in grassy situations, heaths, and hillsides, to a considerable altitude; flowers most usually blue, though not unfrequently white, pink, lilac, or purple. It is very difficult to define the limits of this species and *P. calcarea*, on the one hand, while in the south of Europe the more luxuriant forms appear to run insensibly into *P. comosa*. Of the numerous forms

* There is, also, in the Kew Herbarium, a single specimen of an apparently distinct undescribed species belonging to this section, from Persia, bearing the MS. name, *P. persica*.

to which distinct names have been given, some might be considered as well-marked² sub-species, while others do not even merit to be regarded as varieties. The synonymy is, in many cases, very obscure; but the following list will,⁶⁶ it is believed, be found to exhaust all the noteworthy forms.

Var. 1. *genuina*, Engl. Bot., ed. 3, tom. ii., p. 35; A. W. Benn. in Journ. Bot., 1877, p. 169; *P. vulgaris a. vera*, DC., Prodr., i., 325; subsp. *vulgaris* proper, var. 1, Hook., Stud. Flor., ed. 2, p. 48; *P. vulgaris*, Linn. sp., 986; DC., Prodr., i., 324; Reich. Pl. crit., i., 16; Koch, Fl. Germ., 99; Gr. et God., Fl. Fr., i., 195; Boiss., Fl. Or., i., 476; Led., Fl. Ross, i., 270; Bert., Fl. Ital., vii., 314; Boiss., Voy. Bot. Esp., ii., 81; Gris., Fl. Rum., i., 239; Fries., Fl. Scand., 38; Dmrt., Prodr. Fl. Belg., 31; Benth., Handb. Brit. Fl., i., 99; Hook., Stud. Fl., 46; Car., in Nuov. Giorn. Bot. It., i., 23; Dmrt., in Soc. Bot. Belg., 1868, p. 344. Caulibus erectis vel ascendentibus, rectis; foliis supernis lanceolatis; racemis 10–20 flor.; bractea centrali pedicellum florentem quasi æquante; alis oblongo-obovatis, capsula latioribus, venis copiose anastomosantibus; bracteis, alis, capsulaque eciliatis.

Figs. Reich., Pl. Crit., i., t. 25; Ic. Flor. Germ. et Helv., t. mcccxvi., f. 1; Oed., Fl. Dan., t. 516 (teste DC.); Benth., Handb. Brit. Flor., i., t. 124; Eng. Bot., ed. 3, t. clxxxv.; Journ. Bot., 1877, t. 189, f. 1 (ala, pistillum, semenque.)

No doubt the most widely-distributed form of the species, though probably not reaching so high an elevation as var. *depressa*.

P. vulgaris, var. *parviflora*, Coss. et Germ., Par., 72, Reich. Ic., t. mcccxvi. f. 3; *P. vulgaris* γ . *minor*, Led., Fl. Ross, i., 271, sunt formæ haud constantes, floribus minoribus, quæ in Gallia et Rossia crescunt.

P. dubia, Belyneck, Fl. Nam., p. 27, Dmrt., in Bull. Soc. Bot. Belg., 1868, p. 344, est forma varietatis typicæ alis paullo angustioribus.

Var. 2. *depressa*, Engl. Bot., 3rd ed., vol. ii., p. 38; Bab. Man., 7th ed., p. 44; Hook. Stud. Flor., 2nd ed., p. 49; Var. *b.*, Fries Nov. Fl. Suec. 223; A. W. Benn. in Journ. Bot., 1877, p. 169; *P. depressa*, Wenderoth, Schrift. d. Ges. Nat. Marburg, p. 1; Reich. Ic., vol. xviii., p. 90; Gr. et God., Fl. Fr., i., 196; Koch. Fl. Germ., 99; *P. serpyllacea*, Weihe, Flora, 1826, p. 745; *P. serpyllifolia*, Fischer-Ooster, Flora, 1854, p. 98 (non Poir.); *P. mutabilis*, Dmrt. Prodr. Fl. Belg., p. 31; *P. badensis*, Schimp., in Spenn. Frib., iii., p. 867 (teste Dumortier); *P. amara* γ . *cespitosa*, DC. Prodr., i., 325. Caulibus elongatis, tenuibus, flexuosis; foliis parvis, imis sæpius oppositis vel sub-oppositis; floribus in racemo paucioribus minoribusque quam in var. 1; bractea centrali quam pedicellum florentem brevior; alis latis, venis vix anastomosantibus; arillodii appendicibus brevibus, obtusis.

Figs. Wender, *l.c.*, t. 1; Reich, *l.c.*, t. mcccxlvii., f. 1; Engl. Bot., t. clxxxvii.; Coss. et Germ. Par. Atl., t. viii. f. B.; Journ. Bot., 1877, t. 189, f. 2 (ala, pistillum, semenque.)

Differs from var. 1 chiefly in its more wiry and slender habit and the tendency of the lower leaves on the branches, and especially those of the sterile branches, to be nearly or quite opposite; the flowers are also somewhat smaller and fewer, and the veins of the wing-sepals rather straighter and less anastomosing; the habitat is also distinctly more heathy and swampy. It appears to be very generally distributed throughout Continental Europe and the British Isles.

Var. 3. *ciliata*, Engl. Bot., 3rd ed., vol. ii., p. 36; Bab. Man., 7th ed., p. 44; Hook. Stud. Flor., 2nd ed., p. 48; A. W. Benn. in Journ. Bot., 1877, p. 170; *P. ciliata*, Lebel in Gr. et God. Fl. Fr., i., 195; Reich. Ic., xviii., p. 90 (non Linn.) Caulibus tenuibus, flexuosis; alis, et sæpe quoque bracteis, pedicello, capsulâque, ciliatis.

Figs. Reich. *l.c.*, t. mcccxlvi., f. 5; Journ. Bot., 1877, t. 189, f. 3 (ala.)

Scarcely distinguishable from var. 2 except in the ciliation of the wings and other parts of the flower, a character which may very probably not be constant. It is recorded from isolated localities in Germany, France, Spain, and England; but may probably be widely distributed through Central, Western, and Northern Europe.

Var. 4. *oxyptera*, Reich. Ic., xviii., 90; Koch Fl. Germ., 99; Engl. Bot., 3rd ed., ii., 36; Bab. Man., 7th ed., p. 44; Hook. Stud. Flor., 2nd ed., p. 48; A. W. Benn. in Journ. Bot., 1877, p. 170; *P. oxyptera*, Reich. Pl. Crit., i., 25; Koch Syn., ed. 1, 91; Fries Nov. Fl. Suec., 224; Fl. Scan., 59; Dmrt. Bull. Soc. Bot. Belg., 1868, p. 344; *P. angustata*, Schur Fl. Trans., 89; *P. monspeliaca*, Willd. (teste Reich.); non DC.; *P. dumensis* (?), Dmrt. in Bull. Bot. Soc. Belg., 1868, p. 344. Caulibus debilibus; foliis caulinis linearibus; floribus parvis, distantibus, demum pendulis; alis angustis, membranaceis, quam capsulam maturam longioribus et latioribus; stylo elongato; capsula infra rotundata, emarginata, ariliodii appendicibus brevibus, obtusis.

Figs. Reich. Pl. Crit., i., f. 46-49; Ic., t. mcccxlvi., f. 2; E. B. S., 2827; Engl. Bot., t. clxxxvi.; Journ. Bot., 1877, t. 189, f. 4 (ala, pistillum, semenque.)

Easily recognised, in its extreme form, by its smaller, more distant and deflexed flowers, and its longer style, together with the narrower wing-sepals, which last character this variety shares with a narrow-winged form of *P. vulgaris-genuina*, often mistaken for it. Its habitat appears to be somewhat arenaceous; it has been recorded from Germany, France, and the British Isles.

(To be continued.)

SHORT NOTES.

LATHYRUS HIRSUTUS, *L.*, IN KENT.—I found this species in a wood close to Southborough, near Tunbridge Wells. It was growing along the roadside for about forty yards, and for about ten yards into the wood. When I first noticed it, three years ago, it was not plentiful, but this year there is a good deal. Growing with it are *Vicia gracilis* in great quantity, and a few plants of *Lathyrus Nissolia* and *Vicia hirsuta*.—WILLIAM FAWCETT.

CAREX CAPILLARIS, *L.*, IN GORDALE.—I am glad to be able to add to the twelve counties and vice-counties enumerated in 'Topographical Botany,' for this graceful little Carex, a thirteenth comital division—Mid-West Yorkshire. It was discovered here only a few days ago, by Mr. William West, of Bradford, a promising young botanist; and yesterday I had the pleasure of seeing the plant myself; so that little uncertainty can now rest upon either name or station. It grows on the terrace-like mural scar of mountain limestone in Gordale (near Malham), at an altitude of about a thousand feet, on the left side of the gorge as it is ascended, above the great slope of *débris*, but about ten to twenty feet below the narrow plain of turf there crowning the summit of the precipitous cliffs. From the nature of the soil and subjacent rock, combined with the elevation, I have long looked for this Carex turning up on the Craven Scars; but although I have explored Gordale myself many times, the luck of discovering it has fallen (as it so often appears to do) to a comparative tyro. Like the *Helianthemum canum* found on the Malham Cove Scars, two miles distant, the Carex must be very local. The other rarity of these Scars so often found accompanying the Cistus and the Carex—I refer to *Potentilla alpestris*—is much more abundant and less restricted in its area than the other two; and I may say that the same is the case in Upper Teesdale, where the Carex is known in three stations, the Cistus in one only, and the Potentilla in nine. Until now the Cronkley Fell locality for *Carex capillaris* has been the most southerly and least elevated known in Great Britain. Gordale is somewhere about forty miles still further south, and the altitude at which the sedge grows about two hundred feet lower. Two other plants, rarely found at a like elevation, also occur in Gordale, within the limits of the superagrarian zone (above 900 feet), viz., *Hypericum montanum* and *Rhamnus catharticus*; so that in this locality, owing to favourable local circumstances, related doubtless to rock-nature and climate, the flora of two regions, alpine and agrarian, not merely meet, but conspicuously intermingle. Lowland species ascend higher, and montane species descend lower, in the Craven district than in any other part of West Yorkshire. The Carex "find" comes just in time for inclusion in the Flora forming volume second of 'West Yorkshire,' although of necessity unmentioned in the list of

Gordale species given intercurrently with physical geography description in the first volume of that work, just issued.—
F. ARNOLD LEES.

ARUM ITALICUM, *Mill.*, IN CORNWALL. — Mr. J. Ralfs, of Penzance, has determined the Arum in several localities in West Cornwall to be *A. italicum*. It grows in Love Lane, close to Penzance; at Trereife, by the road to the Land's End, abundantly; and in three or four spots between Leland and St. Ives. The ordinary species, *A. maculatum*, however, also occurs; but Mr. Ralfs has not been able to visit all the recorded stations, so as to trace the actual distribution of each species; he has not seen *A. maculatum* nearer Penzance than at Marazion; it also occurs near Helston and Truro. *A. italicum* grows in more shady spots than *A. maculatum*. This is a very interesting determination, and will necessitate a search throughout the West of England. In Jersey and Guernsey, as stated in 'J. Bot.,' 1871, p. 200, *A. italicum* appears to be the only species; at least during my short visit the other species could not be detected.—HENRY TRIMEN.

CAREX DIGITATA, *L.*, IN DERBYSHIRE. — When describing *Carex ornithopoda* as a British plant ('J. Bot.,' 1875, p. 195), it was mentioned that a specimen of *C. digitata* from Mansal Dale existed in Sowerby's herbarium, but that the species had not been observed in the county for many years. Mr. Whitehead now informs me of its rediscovery this summer in the same Dale, by Messrs. Percival and Rogers, and has kindly forwarded a specimen. With reference to *C. ornithopoda*, it is stated in Messrs. Davis & Lees' 'West Yorkshire' (i. p. 254) that this species was "known under the name of *digitata* in Salt's time, seventy-five years ago," and recently rediscovered.—HENRY TRIMEN.

Extracts and Notices of Books & Memoirs.

REPORT OF THE HERBARIUM OF THE ROYAL GARDENS, KEW, FOR 1877.

By SIR J. D. HOOKER, K.C.S.I., &c.

THE new building for the accommodation of the Herbarium was completed in the autumn, and the collections moved in without its being found necessary to close the building for use during even a single day. In the old building the principal changes have been the formation of two new libraries, about forty feet long, on the first and second floors, by throwing together five smaller rooms in each. This will allow the library to be re-arranged on the first and second floors in a compact and accessible manner, instead of

having the books scattered as formerly all over the building. Entirely new shelving has also been provided of a uniform height and pattern.

The most important collections received during the past year have been :—

1. The Indian herbarium of Mr. C. B. Clarke, which is a most munificent addition to our already unrivalled collections illustrating the flora of our Indian empire. This herbarium contains 25,000 numbers, representing about 5000 species. It was collected in the following provinces :—Plains of Bengal, Khasia, and Chitragong hills, Chota Nagpore, Dalhousie and Chumba, Kashmir to the Karakorum, Nilgheries. It contains a large number of field-notes, the exact locality and elevation of every plant, and some rough botanic analyses.

2. An herbarium of exceptional interest and extent, collected in tropical northern Africa by Dr. G. Schweinfurth, and containing about 700 species.

3. A very fine series of chiefly N. Asiatic and Japanese plants, 2000 in number, from the Imperial Garden of St. Petersburg.

The most important contributions are especially noticed below under the different geographical headings. The figures in brackets denote the number of species received from each contributor.

EUROPE.—Bornet, Dr. E.; *Algæ* (4). Braithwaite, Dr.; British *Sphagna* (purchased, 52). Bruxelles, Jardin Bot. de l'Etat, per M. Crépin; Cryptogams (1985). Burbidge, F. W.; lithographs (12). Cooke, M. C.; *Fungi* (purchased, 100). Crombie, Rev. J.; British Lichens (purchased, 100). Groves, Hy.; Italy (561). Groves, H. and J.; roses (2). Hanbury, D., executors of; sundry (73). Henriques, J. A.; Coimbra (11). Husnot, T.; France, *Musci* (50). Jaggi, J.; Switzerland (66). Joad, G. C.; Spain (6). Lange, Prof.; Copenhagen Garden (10). Leefe, Rev. J. E.; British Mosses and Lichens (120). Phillips, W.; *Fungi* (purchased, 50). Price, Miss Louisa; Italy (*Botrychium* 1). Rabenhorst, Dr. L.; *Algæ* (purchased, 40). Rabenhorst and Gottsche; *Hepaticæ* (purchased, 30). Ralfs, J.; Scilly (*Ophioglossum*, 1). Reichenbach, Prof.; Orchids, &c. (11). Thuemen, Baron von; *Mycotheca* (purchased, 300). Wittrock and Nordstedt; *Algæ* (100).

ASIA.—Aitchison, Dr.: N. W. India and Kashmir (163). Beddome, Col.; *Musci*, &c. (71). Bisset, J. P.; Japan (403). Clarke, C. B.; India (25,000). Dalzell, N. A.; India (2). Elwes, H. J.; Sikkim Alpines, &c. (97). Floyer, E. A.; Persian Gulf, &c. (15). Ford, Charles; Hong Kong (6). Franchet, A.; Japan (4). Godefroy-Lebeuf, A.; Cambodia (*Leguminosæ*, 93). Hance, Dr.; Cambodia (*Centrolepis*, &c., 3). Henderson, Col.; Himalaya (*Filices*, 8). King, Dr. G.; India (*Amonum*, 1). Lockwood, G.; India (53). Pinwill, W. S. C.; Malaya (*Filices*, &c.); India (*Musci*); Scind (*Gramineæ*), 396. Post, George E.; Syria (227). Robinson, W. Wellesley; Malaya, &c. (*Filices*, 10). Ross, John; North China (579). St. Petersburg, Imperial Botanical Garden:—Ussuri (246), Japan (647), Siberia (575), Turkestan (145), Daghestan (206), Levant (86). Wiggins, Captain; Siberia (27).

AFRICA.—Barkly, Sir H. ; *Stapeliæ*, *Pelargonias*, &c. (50). Bull, Wm. ; Liberia (14). Bolus, Harry ; Cape (*Ericacæ*, 44). Braun, Professor Alex. ; Abyssinia (*Subularia*, 1). Cosson, Dr. ; Algeria and Morocco (1104). Decaisne, Prof. ; *Olinia* (1). Freeman, A. ; Upper Nile (99). Gilpin, Miss Helen ; Madagascar (*Filices*, enumerated and described by Mr. Baker in the Journ. Linn. Soc., vol. xvi., ppp. 197–206), (72). Humboldt-Stiftung, Berlin, per Dr. G. Schweinfurth ; Tropical Africa (1705). Hurst, Captain, H. A. ; Egypt (30). Johnson, J. Y. ; Madeira (4). Horne, J. ; Johanna (89). Kirk, Dr. J. ; Tropical Africa (2). Leefe, Rev. J. E. ; Nubia and Abyssinia (215). Lisbon, Polytechnic School ; Welwitsch's Angolan plants, first instalment (185). McOwan, P. ; (Rev. J. Buchanan's *Glumales*), South Africa (142). Monteiro, J. (purchased), Delagoa Bay, &c. ; *Ancylanthus Monteiroi* is figured in 'Icones Plantarum,' t. 1208 (60). Mus. d'Histoire Nat., Paris ; Martinique (623). Royal Soc. (Dr. I. B. Balfour) ; Rodrigues *Musci* (91). Schweinfurth, Dr. ; Egypt and Arabia (purchased, 182) ; C. Pfund (Kordofan and Darfur) (purchased, 258). Veitch, Messrs. ; West Tropical Africa (74). Wollaston, T. V. ; St. Helena (9).

AMERICA. — *North America and West Indies*.—Admiralty (Arctic Expedition) ; Crypts. and Phanerogamia, Lower Cryptogams (125). Dawson, George M. ; B. N. Am. Bdy. Comm. (709). Eaton, Prof. *Filices* (2). Elwes, H. J. ; Utah and California (15). Farlow, Prof. W. G. ; N. American *Algæ* (50). Finlay, Dr. K. ; West Indian *Gramineæ* (124). Gray, Dr. Asa ; North America (148). Hooker, Sir J. D. ; North America (1000). Jenman, G. S. ; Jamaica (chiefly *Filices*, 216). Lefroy, Sir J. H. ; Bermuda (12). Moseley, H. N. ; Oregon (159). Murray, Andrew ; N. American *Coniferæ* (5). Robinson, H. E. Gov. ; Bahamas (83). United States, Department of Agriculture (per F. Watts) ; *Coniferæ* (37). *South America*.—Archavaleta, José ; Monte Video *Compositæ* (191). Barlee, H. E. ; F. P. ; Honduras (25). Capanema, Dr. ; Brazil (*Phyllostylon*, 1). Glaziou, A. ; Brazil (534). Gogorza, A. de ; Columbia (1). Grisebach, Prof. ; Argentine (535). Mitchell, E. O. ; Honduras (2). Prestoe, H. ; Trinidad (5). Portello, Dr. Francisco ; Brazilian Ferns, Mosses, Lichens, &c. (96). St. Petersburg, Imp. Bot. Garden ; Brazilian plants (170).

AUSTRALASIA. — Bennett, Executors of J. J. (Herb. Brown) ; Australia (in continuation, 614) ; Lichens (35). Berggren, Dr. S. ; New Zealand *Algæ* (176). Buchanan, J. ; New Zealand (2). Cheeseman, T. F. ; New Zealand (2). Enys, J. D. ; New Zealand *Filices* (9). Field, H. C. ; New Zealand *Filices* (4). Gordon, H. E., Sir Arthur ; Fiji (2). Hector, Dr. ; New Zealand (1). Kirk, T. ; New Zealand (204). Kurtz, F. ; Lord Auckland's Island (2). Moore, Chas. ; Lord Howe's Island (Ferns, 8). Mueller, Baron von ; various Australian plants (779). Powell, Rev. T. ; Samoa (80). St. John Maule, H. : Australia (1).

EXTRACTS FROM THE REPORT OF THE CURATOR OF
THE BOTANICAL EXCHANGE CLUB FOR 1876.

(Concluded from p. 218).

Carex aquatilis, Wahl., b. *Watsoni*. Banks of the Thurso River, Caithness. July, 1875. Clyde-side at Kenmure, 5 miles above Glasgow, June, 1876.—G. HORN. This seems really to be the type of the species.—J. T. BOSWELL.

C. xanthocarpa, Degland.; *C. fulva*, var. *sterilis*, 'E. B.,' ed. 3, vol. x., p. 153; *C. fulva*, Koch et Auct. plur. (non Smith). Marsh at Piggar, Swanbister, Orphir, Orkney. August, 1875. I found one or two tufts of this growing in company with *C. flava* and *C. fulva* (*Hornsuchianana*, Hoppe.) I have no doubt it is a hybrid between these two plants. It grows in much denser tufts than the latter, and the herbage is of a paler and yellower green; but its affinities and habit agree with *fulva*, Sm., not with *flava*, L. (See Mr. R. A. Pryor's remarks on this in 'Journal of Botany,' 1876, p. 366-370.) My experience has agreed with that of the late M. Boreau, for the plant has remained unchanged under cultivation for two years, but it has produced no mature fruit. The perigynium, either in the wild or in the cultivated Orkney plant, has not become inflated; the differences which *C. xanthocarpa* exhibits in different localities,—in some approaching more towards *C. flava*, and in others to *C. fulva*,—are indications of its hybrid origin, as well as its intermediate characters and habit, and, above all, its abortive fruit. The Orkney specimens are the only British ones of *C. xanthocarpa* that I have yet seen.—J. T. BOSWELL.

Anthoxanthum Puelii, Lec. et Lam. On peaty ground, near the south-eastern extremity of Lindow Common, Hundred of Macclesfield, Cheshire, the rifle-range being about a quarter of a mile N.W. August 26, 1876. (Vide 'Journ. Bot.,' October, 1876, p. 309.) It grew freely on peaty ground, which, I am of opinion, from its appearance, originally formed part of the adjacent waste bog, but has been reclaimed at some distant date. It is crossed by a cart-track, apparently used for conveying turf from the moss. Most of the ground in question was covered with grass and weeds, but there were some patches of potatoes. Extending over a length of from twenty to thirty yards, the *Anthoxanthum* grew in fair quantity, with all the appearance of being native, among grass and common weeds (no introduced plants.) It is, however, possible it may have been introduced with grass-seed. On closer examination of the specimens, I find some differ slightly from the example gathered by Mr. Briggs, and furnished me through the Exchange Club, in having all the parts rather larger, and the spikes and whole plant more robust. The peculiar scent is also stronger. All these differences may, however, be owing to the richness of the peat-soil on which they grew. The seeds of this grass may probably have been introduced when this part of the old bog was reclaimed.—ROBERT BROWN.

Alopecurus fulvus, Sm. South-west margin of the mill-pool at

Vale Bridge Common, near Hayward's Heath, East Sussex. September 2, 1876. There is no record for East Sussex in 'Topog. Bot.'—J. L. WARREN.

Sclerochloa procumbens, Beauv., var. Specimens of a perfectly upright form from clay fields, Kirkdale, north of Liverpool. September, 1874. The type is common in similar situations both sides of the Mersey; but the plant sent is so distinct in its general appearance as to render it worthy of notice. Besides the different habit of growth, the whole plant is far less rigid in its character.—H. S. FISHER. A curious form. I have one like it from Scarborough Pier, collected by Crawford.—J. T. BOSWELL.

Bromus asper, Murr., var. Southwick, W. Sussex. August 13, 1876. Not true *Benekenii* (i.e., not the Kensington Garden plant), but off the *serotinus* type in the *Benekenii* direction. Interesting as being a small example of *serotinus*, and yet with several lowest-node panicle branches, it being usually only the full and luxuriant specimens of *serotinus* which develop extra branchlets. The pales seem rather more equal than in ordinary *serotinus* also, and rather more uniformly hairy.—J. L. WARREN. I believe that the two forms, *serotinus* and *Benekenii*, are too much connected by intermediates to permit them to be ranked as more than varieties.—J. T. BOSWELL.

Senecio vulgaris, var. *hibernicus*, mihi. I now think the Cork plant, to which I gave the above name, must be *S. vernalis*, Waldstein and Kitabel. Until this spring I have never succeeded in getting it to survive the winter out of doors; but now it is in flower in the open ground, and has a very different habit from the unbranched individuals grown in pots, on which my opinion of its being a radiate form of *S. vulgaris*, L., was founded. It is, when well developed, a much-branched plant, with larger heads than *S. vulgaris*, and longer peduncles; the heads droop less than in examples of *S. vulgaris* of similar size, and the achenes are more oblong-fusiform, and the ligulate florets of the ray become revolute in the evening. I do not find this noticed in descriptions of *S. vernalis*; but it appears to occur in the allied species—for example, in the Madeiran *S. incrassatus*, Lowe (*S. crassifolius*, β . *Loweii*, D.C.), Lowe, 'Fl. Mad.' p. 446; also in *S. coronopifolius*, Desf., and *S. leucanthemifolius*, Poir. (teste 'Boissier Fl. Or.' vol. iii., p. 388.) The Cork plant agrees with Hungarian specimen of *S. vernalis*, but not with one from Smyrna (Balansa, No. 241); but Boissier says of it (*l. c.*), "Species foliorum divisione, caulibus plus minus elongatis et in excelsioribus nanis valde polymorpha." If the Cork plant be *S. vernalis*, it cannot well be indigenous, as the species is confined to S. E. Europe.—J. T. BOSWELL, May 17, 1878.

Mentha cardiaca. Hasley Common, Warwickshire, October, 1876.—H. BROMWICH. This is the first specimen of *M. cardiaca* which has come into my hands, except from a garden.—J. T. BOSWELL.

Symphytum asperrimum, Bieb., and *S. uplandicum*? Cultivated in Balmuto garden, 1876. I have been induced to send a few specimens of two forms of *Symphytum*, both of which I had under the name of *asperrimum*, but which seemed to me distinct, in consequence of some remarks on *S. asperrimum*, *patens* and *officinale*,

in the 'Journal of Botany,' 1876, by Mr. R. A. Pryor (p. 214), and Prof. Babington (p. 244). Neither has any claim to be considered a British plant. *S. asperrimum* I have from the neighbourhood of Bath, sent to the Botanical Society of London, by Mr. French, about twenty-five years ago; the other form I had sent from Bath by Mr. T. B. Flower and Mr. C. E. Broome, whilst I was writing the genus *Symphytum* in the third edition of 'English Botany,'—these were sent to me as *S. asperrimum*. I have also a specimen from the Rev. W. H. Purchas, labelled *Symphytum orientale?* by the River Bradford, near Yurlgrave, Derbyshire, July, 1876. Very probably this is the plant mentioned by Mr. Pryor in the 'Journal of Botany.' The plant which I consider true *asperrimum* has the veins of the leaves deeply impressed, so that they appear very rugose, the stem-leaves not decurrent, and with longer petioles, and even the floral leaves scarcely so, the flowers bright blue, with the apical portion not much wider than the tube, and furrowed. The other plant has the leaves less rugose and distinctly decurrent, though much less so than in *S. officinale*, the flowers pale blue, more dingy than in *asperrimum*, and the apical portion swollen until its diameter is much greater than that of the tube, and not at all furrowed. In flower it very closely resembles specimens of *S. uplandicum*, Nyman, which I have from Dr. Ahlberg, of Upsala; but unfortunately I have not seen fruiting specimens of this plant, which Fries considers to be the true *S. orientale* of Linnæus, and of which he says: "Medium inter *S. officinale* et *S. asperrimum*." The plant I have in cultivation differs from *S. officinale* in its greater size, ovate-cordate root-leaves slightly decurrent on the petiole, much less decurrent stem-leaves, and larger flowers; but, above all, by the calyx-segments in fruit becoming muricated as in *S. asperrimum*. The hairs on the branches are also stiffer than those of *S. officinale*, but much less so than in true *S. asperrimum*. With *S. orientale*, DC. Prod., it has no affinity.—J. T. BOSWELL.

Statice bahusiensis, Fries. Some time since, my attention was directed by the Rev. H. H. Higgins to the two forms of *Statice* growing on the Mersey shore at Bromborough, but I did not visit the locality until Mr. Robert Brown informed me that his attention had been drawn to the fact that specimens in the Edinburgh Herbarium, collected by the late Dr. Dickenson, proved to be the above species. On the 2nd of September, Mr. Brown and myself found that plant growing abundantly at the above locality intermixed with a few plants of typical *Limonium*. This is a welcome addition to our Cheshire Flora.—H. S. FISHER.

As an Appendix to the Report of Kew Gardens for 1877, lately published, — which contains much useful and interesting information on economic botany of an authentic character, — a list of the *Aroideæ* cultivated in the Gardens is given. This has been prepared by Mr. E. N. Brown, of the Kew Herbarium, and contains nearly 250 species.

THE 'Transactions of the Norfolk and Norwich Naturalists' Society' (vol. ii., p. 380) contains a list of plants observed near Cromer in the autumn of 1875, 1876, by Prof. C. C. Babington.

Baron von Mueller has commenced the 11th volume of his 'Fragmenta Phyt. Australiæ.' A new genus of *Sapindaceæ* — *Blepharocarya* — from Endeavour River, is very remarkable in having its small sessile dioecious flowers inserted over the interior of a coriaceous laciniate involucre, somewhat recalling the inflorescence of *Dorstenia* or *Pterisanthes*.

NEW BOOKS. — S. KURZ, 'Forest Flora of British Burma.' 2 vols. Calcutta, 1877 (30s.) — J. D. HOOKER and others, 'Flora of British India.' Part 5. L. Reeve, London (10s. 6d.) — W. M. WATTS, 'A School Flora.' London (2s. 6d.) — J. E. TAYLOR, 'Flowers.' London, Hardwicke & Bogue (7s. 6d.) — J. D. HOOKER, 'Student's Flora of the British Islands.' 2nd edition. London, Macmillan (10s. 6d.) — E. M. HOLMES, 'A Botanical Note-book.' W. Christy, London (3s.) — T. MEEHAN, 'The Native Flowers and Ferns of the United States,' illustrated by chromo-lithographs. Parts 1 & 2. Boston (50 cts. each). — A. & C. DODEL-PORT, 'Anatomisch-physiologische Atlas der Botanik.' Part 1. Six coloured diagrams. Schreiber, Esslingen (15 mk.) — O. KUNTZE, 'Cinchona, Arten, hybriden & Cultur der Chininbäume.' Haessel, Leipzig. — G. C. WITTSTEIN, 'The Organic Constituents of Plants and Vegetable Substances, and their Chemical Analysis.' Translated, with numerous additions, by Baron FERD. VON MUELLER. Melbourne, 1878. — H. BAILLON, 'Nouvelles Observations sur les *Olinia*.' Paris, 1878. — 'Monographiæ Plantarum: Prodromi nunc continuatio nunc revisio. Auct. ALPH. & CAS. DE CANDOLLE aliisque botanicis. Vol. I. *Smilacææ*, *Restiaceæ*, *Meliacææ*.' Masson, Paris, Junio, 1878 (30s.) — M. WILLKOMM & J. LANGE, 'Prodromus Floræ Hispanicæ,' vol. iii., pt. 3. Schweizerbart, Leipzig (9 mk.) — BOHNENSIEG & BURCK, 'Repertorium annum Lit. Bot. period. (1875).' Loosjes, Haarlem, 1878. — W. B. HEMSLEY, 'Diagnoses Plant. nov. vel minus cognit. Mexicanarum et centrali-Americanarum, Pars I. *Polypetalæ*.' London, July, 1878.

ARTICLES IN JOURNALS.—JUNE, 1878.

Grevillea. — M. C. Cooke, 'New British Fungi.' — Id., 'Ravenel's N. American Fungi.'

Journ. Linn. Soc. (Parts 96, 97, June 17th). — J. Ball, 'Spicilegium Floræ Maroccanæ' (concluded), (tt. 27, 28).

American Naturalist. — L. F. Ward, 'On the genealogy of plants.'

Oesterr. Bot. Zeitschr. — K. Mikosch, 'Influence of light, heat and moisture on the opening and shutting of the anthers in *Bulbocodium vernum*.' — F. Hauck, '*Algae* of the Adriatic' (continued,

tab. 2). — B. Stein, '*Primula Kernerii*, Goebel & St. (= *P. subauricula* × *villosa*).' — E. Hackel, 'Two critical Grasses from Greece.' — F. de Thuemen, 'Symbolæ ad flor. Mycologicam Austriacam' (continued). — W. Vatke, 'Plantæ in itin. Africano a Hildebrandt collect.—*Leguminosæ*.' — F. Antoine, 'Botany of the Vienna Exhibition' (continued).

Flora. — W. Nylander, 'Addenda nova ad Lichenographiam Europæam.' — A. Minks, 'The Microgonidium' (continued). — J. B. Keller, 'On Roses' (continued).

Bot. Zeitung. — H. Solms-Laubach, 'On the structure of the flower and fruit of the *Pandanaceæ*' (continued, tab. 10). — P. F. Reinsch, 'Botanical Notes from America.' — Oudemans, 'Note on *Sphæria Brassicæ*, Kl.' — E. Junger, 'Notes from old botanical works.' — H. Nebelung, 'Spectroscopic researches on the colouring matters of some fresh-water *Algæ*' (tab. 11).

Magyar Novenyt. Lapok. — 'Obituary notice of F. Schur.' — L. Simkovics, 'Three Violets new to Hungary.' — (Suppl.) F. Porcier, 'Enumeratio plant. distr. quondam Naszodiensis.'

Botanical News.

WE learn from the Report of Kew Gardens, recently published, that the post of Assistant to the Director of the Royal Botanic Gardens, Ceylon, lately vacated by Mr. Hartog, has been filled by the appointment of Mr. DANIEL MORRIS, B.A., of Trin. Coll., Dublin. Also that Mr. EVERARD IM THURM, B.A., of Exeter College, Oxford, has been appointed Curator of the British Guiana Museum, where a portion of the duties will consist in exploring the country.

No less than seventy-six ladies competed for the prizes in Botany at Apothecaries' Hall. Of these five were placed in the first and fifteen in the second class.

BARTHÉLÉMY CHARLES DU MORTIER, the venerable and eminent statesman and botanist of Belgium, died at his native town, Tournai, on July 9th, in his eighty-second year. As a politician he has for many years taken a very prominent part in public affairs, and was the acknowledged leader of the clerical party in the Chamber. As a botanist he ranks very high, and his writings show a powerful and original treatment of the portions of the science which he handled, as well as the possession of great critical sagacity in the matter of species. His earliest botanical treatise, the '*Commentationes Botanicæ*,' was published so long ago as 1822, and consists of descriptions of several new genera dedicated to Belgian botanists, few of which have been retained, a general arrangement of the vegetable kingdom on a new

“symmetrical” system, and a classification of the European *Jungermanniæ*. It is but quite recently that, after an interval of over fifty years, M. Du Mortier has returned to this group and given us his valuable ‘*Hepaticæ Europæ*.’ In 1827 he visited England to consult the Linnean herbarium, and on his return to Belgium he published his ‘*Florula Belgica*.’ After the year 1837 politics absorbed nearly all his time till 1862, when on the foundation of the Belgian Botanical Society he became the first President, and recommenced to publish on Botany. The ‘Bulletin’ of the Society contains numerous papers on the more critical genera and species of the Belgian flora, of which the most important are the ‘*Etude Agrostographique*’ and the ‘*Bouquet du litoral Belge*,’ both published in 1868. The now flourishing Jardin Botanique de l’Etat at Brussels owes its establishment on a satisfactory scientific basis mainly to the efforts of M. du Mortier. His name is appropriately commemorated in the genus of *Hepaticæ*, *Dumortiera*, as well as by several species dedicated to him.

THE death of GIOVANNI ZANARDINI occurred at Venice, where he was Professor of Botany, on April 24th, at the age of seventy-four. He was a distinguished algologist, and studied for many years the species of the Adriatic, upon which he has published several valuable memoirs. Zanardini was also the author of a Catalogue of Phanerogamous plants of Venetia, and of other papers. The genus *Zanardinia* is now referred to *Padina*.

WE have also to record the death of ELIAS BORSZCZOW, from typhus, on May 12th. He was Professor of Botany and Director of the Garden at Kiew, and as an author is best known for his fine memoir on the Galbanum- and Assafetida-yielding species of *Ferula* found in the Aralo-Caspian desert, which he visited in 1858. He also published an account of the *Calligoneæ* of the same region.

OUR obituary also contains the name of PHIL. JOH. FERDINAND SCHUR, who died in his eightieth year on May 28th. He was a native of Königsberg (Prussia), but resided for very many years at Hermanstadt in Transylvania. His numerous papers, from 1850 onwards, refer mainly to the botany of that province, and in 1866 he published an elaborate ‘*Enumeratio Plantarum Transsilvaniæ*,’ where he carries out views of the limits of species, so as to make up the large total of 4222 species of Phanerogams and Ferns for the district. A memoir, with portrait, will be found in the ‘*Oesterr. Bot. Zeitschr.*’ for January, 1876, and an obituary notice in the Hungarian Bot. Journal for last June.

THE first part of Curtis’s collection of the plants of the Southern United States (250 species) is now issued. The Curator of Harvard University Herbarium will receive applications for them at twenty dollars the set, and states that the specimens are well chosen, copious and perfect, all named, and with neat printed tickets.



Original Articles.

SUR UNE NOUVELLE ESPÈCE DE *SHEARERIA*.

PAR M. A. FRANCHET.

(TAB. 198).

SHEARERIA POLII, *n. sp.* — Annua, erecta, semi- vel vix pedalis, glabra; ramuli graciles, patentes vel arcuato erecti; folia alterna, sessilia, inferne longe attenuata, oblonga vel obovato-spathulata, obtusa vel etiam apice subemarginata, nervo excurrente mucronulata; capitula ad apicem ramulorum solitaria, basi nuda vel sæpius folio supremo contiguo bracteata, subsexflora; foliola involucri 5-6, subbiseriata, interioribus vix longioribus, ovato-lanceolata, margine pallidiori membranaceo subtiliter erosula et papillis ciliata, dorso distincte nervata; flores radii 3, feminei, fertiles, ligulati, ligulâ (pallide purpurascenti?) obovatâ, apice vix distincte emarginatâ; flores disci bisexuales, circiter 2-3, steriles, lutei, tubulosi, profunde 5-lobati, lobis lanceolatis acutis, margine tenuiter papillosis, cæterum glabri, floribus radii duplo breviores; stylus in fl. disc. et rad. bifidus, ramis lanceolato-cylindricis, subacutis; achæmium (juvenile) oblongum, inferne attenuatum, apice rotundatum, compressum, obscure 3-4-gonum, angulis membranaceis serie papillarum ciliatis.

A *Sheareria nana*, S. Moore, præcipue differt: foliis omnibus evolutis oblongo-spathulatis nec linearibus, squamæformibus; achæniis oblongis, nec e basi latiore apice angustatis; glabritie.

Nous n'avons pas vu les achanes murs de cette espèce. Dans leur jeune âge ils sont très comprimés et leurs angles sont surtout indiqués par une ligne de papilles d'un jaune d'or; dans toutes les fleurs le style est bifide, tandis que M. S. Moore dit que chez le *S. nana* le style des fleurs du disque est entier.

Autant que nous en pouvons juger sur le sec les ligules du *S. Polii* sont rosées ou d'un pourpre pâle; les capitules campanulés ne dépassent pas 4 mill. et les feuilles 15 à 20 mill. de longueur.

Cette espèce a été récoltée à Mé-chi, partie N. O. du Tché-Kiang, Chine, le 27 Sept., 1876, par M. Henri de Poli.

DESCRIPTION OF TAB. 198.—*Sheareria Polii*, Franch. (nat. size).— Fig. 1. Flower of the disk. Fig. 2. Style of disk-flower. Fig. 3. Flower of the ray. Fig. 4. Style of ray-flower. Fig. 5. Very young achene. Fig. 6. Scale of the involucre. (Figs. 1 to 6 much enlarged).

ON THE PLACE OF CHARACEÆ IN
THE NATURAL SYSTEM.

By PROF. T. CARUEL.

MR. BENNETT has discussed this subject in an interesting paper which appeared in the 'Journal of Botany' for July (p. 202), condensing in a few pages most of what has been written on the structure and affinities of *Characeæ*. He has incidentally mentioned the place I have given them, as forming a separate division (or primary group) between Phanerogams and Prothallogams; but as he has not recorded my reasons for so doing, perhaps some explanation on my part will not come amiss.

In my recent book on Morphology* I have tried to bring into full light the fact that all vegetable organisms (except the very lowest) are represented in every species by three different forms, in alternating generations, *viz.*, a neutral form, producing, either directly or indirectly, two sexual forms, which by their action on each other reproduce the neutral form. Now these present different and even opposite characters, according to the various series of plants; and of such I have availed myself to define better those large primary divisions of the vegetable kingdom that, under different names, are now admitted by all botanists. In Bryogams (Mosses), and those Gymnogams that are trimorphous (such as *Oedogoniaceæ*), the female form is indefinite in its evolution, and organized so as to produce in succession a long series of arche-gonia and thence embryos (or of oogonia), and of antheridia, which last produce the phytozoa or male form; while the neutral form is, on the contrary, definite in its evolution, in Mosses beginning as an embryo, and terminating shortly by the formation of the urn at one end. In the remainder of the vegetable world the process is reversed: it is the neutral form that is indefinite, while the female forms (gemmule in Phanerogams, prothallus in Ferns and their allies) are definite, only once producing the embryo of the neutral form. And such is the case with *Characeæ*, which can therefore by no means be brought together either with Mosses or with *Algæ*.

Much stress has been laid on the supposed similarity between *Characeæ* and Mosses, from the circumstance that these last, when they are cormophytes, begin by a filamentous thallus, on which subsequently buds are formed; and *Characeæ* have been deemed to act likewise. But notwithstanding the high authority of those who support this view of the case, I own I cannot side with them. A careful examination of the process of germination in *Characeæ*, as exposed by Pringsheim and De Bary, shows indeed the lateral formation of buds on a previous simple shoot; but as this contemporaneously gives out leaves on the other side, it can be considered in no other light than as a stem, and nowise as

* Shortly noticed at p. 176.—[ED.]

homologous with the thallus (protonema) of Mosses, however it may resemble it in general appearance.

On comparing *Characeæ* with Prothallogam, we find a resemblance in the structure of the phytozoa, and in the main points of the process of germination, in both the neutral plant originating crosswise and directly from the top of the embryo or of the oospore. But there is a wide difference in the total absence of anything like the sexual prothallus so peculiar to the Prothallogam, as also in the complex organisation of the antherocyst compared to the simpler antheridium, and of the oogemma compared to the archeogonium, and in the very different origin of both, which in *Characeæ* proceed directly from the neutral form and not from spores produced by it; on the other hand, comparing them with Phanerogams, we find a marked resemblance of structure, coupled with the same origin, between the oogemma of the one and the gemmule (misnamed ovule) of the other; and I perfectly agree with Celakovsky in considering them homologous organisms. There is, moreover, a similarity of origin in the male forms of both the groups, equally proceeding from bodies which are modifications of leaves. But alongside with these analogies we have such differences in the structure of the male apparatus, and in the process of formation of the neutral plant, which in Phanerogams begins as an embryo placed lengthwise at the end of a proembryo, that there is no need to insist on the necessity of separating *Characeæ* from Phanerogams as well as from Prothallogam.

Then what remains to be done with them, except to recognize simply that they have a right to stand by themselves as a distinct group, equal in rank to the four others generally admitted? Sachs was the first to think so, and I am sorry to see he has altered his opinion, on grounds quite insufficient, as Mr. Bennett has well shown. As a distinct group, the position of my Schistogams can be nowhere but between Phanerogams and Prothallogam, in a *morphological* system of classification, such as ours all essentially are.

One last word on a more general subject. As none of the primary groups that I have admitted in my classification—Phanerogams, Schistogams, Prothallogam, Bryogams, Gymnogams—are of my own making, it may be deemed superfluous, or even worse, for me to have given them new names (except the first one). I have been led to do so by the following considerations:—Firstly, in order to put forth more strongly the idea, which now-a-days will be disputed by very few, that the old class *Cryptogamia* of Linneus must be split up into a number of groups, each fully equivalent to the Phanerogams. Secondly, to do away, for these groups, with such names as Vascular Cryptogams and Cellular Cryptogams, which imply that they are subdivisions of some superior group. I really believe it would be a gain for science to let fall altogether the term Cryptogams, which in the present state of botany has nothing left it but a negative signification.

BOTANICAL NOMENCLATURE.

By WILLIAM MATHEWS, M.A.

It has recently been my misfortune to collate several catalogues of plants for the purpose of comparing the vegetation of the countries to which they refer. One cannot engage in such an undertaking without being painfully impressed by the confusion which exists in botanical nomenclature and in the practice of citing authorities, and of the necessity for a reform in both particulars. I venture therefore to say a few words upon a question which has lately been discussed in the pages of this Journal.

The authority which is attached to the name of an organic form may be regarded from one of two points of view—1st, as referring to the collocation of the two members of the double name, *i. e.*, of the left hand or generic, and of the right hand or specific member; 2ndly, as referring to the right hand or specific member only. The former practice has hitherto prevailed among botanists, the latter among zoologists. There is no *à priori* reason in the nature of things why the one convention is preferable to the other. It is simply a matter of convenience, and the question is, on which side does the balance of convenience lie? It is evident that there ought not to be two rules, the one for the vegetable, the other for the animal kingdom.

It follows from the second or zoological rule that the oldest *specific* name has the right of priority, and that it carries with it the initials of the author, however various the genera in which the organism may have been placed by the vagaries of subsequent describers. An exception may of course arise if the oldest specific name has a manifest impropriety in a new connection.

If the botanists who speak of this as “a new rule” will refer to a catalogue of shells, they will find the old Linnæan genus *Venus* now subdivided into many genera, one of which is *Cyprina* of Lamarck; but they will see the old *Venus islandica* of Linnæus described as *Cyprina islandica*, LINN., not *Cyprina islandica*, LAM. (Forbes & Hanley, ‘British Mollusca,’ vol. i. p. 441).

Or take a catalogue of insects (I have before me both editions of Staudinger’s ‘Lepidoptera of Europe’), and turn to the old Linnæan genus *Papilio*. The Peacock Butterfly, now placed in the genus *Vanessa* of Fabricius, stands as *Vanessa Io*, LINN., not *Vanessa Io*, FAB.; and so on to the end of the chapter. A difficulty arises when an author makes an existing specific name the name of a new genus. Thus Fabricius changes the name of the Goat Moth, *Bombyx Cossus*, Linn., into *Cossus ligniperda*. In the first edition of his ‘Catalogue’ (1861) Staudinger gives *Cossus ligniperda*, Fab., but in the second (1871) he boldly reduplicates the earliest specific name, and writes *Cossus Cossus*, Linn.

The zoological rule has great advantages. It saves us from a host of useless authorities, and worse than useless synonyms; it ensures that the name of the first describer shall generally, if not

invariably, be associated with that of the organism; and it removes from vain and shallow authors the temptation to hand their names down to posterity as a reward for confusing the nomenclature. Indeed, so well has the rule worked in Entomology that insects may be, and frequently are, referred to, in conversation, by their specific names only.

Let us now examine the working of the other rule in the vegetable kingdom.

The first point to be noticed is that botanists often disagree as to what authority to attach to any given combination. The genus *Erodium* was founded by l'Héritier on a section of the Linnæan genus *Geranium*. If we search for the authority for *Erodium moschatum*, formerly *Geranium moschatum*, Linn., we find the following remarkable differences of opinion:—

Erodium moschatum, L'Hérit. in Ait. Hort. Kew. (Koch; Nyman, Sylloge.)

Erodium moschatum, Ait. (Reichenbach).

Erodium moschatum, L'Hérit. (Syme, English Bot.; Grenier & Godron, and most French Floras).

Erodium moschatum, Willd. (Bertoloni, Flor. Ital.; Munby, Cat. Plant. Alg.)

Erodium moschatum, Smith. (Bab. Man., ed. 7.)

Here we have at least three different designations of the same plant, in a case where a zoologist would have written *Erodium moschatum*, Linn., as a matter of course, and given himself no further trouble.* It is scarcely necessary to point out how misleading this is. "*Erodium moschatum*, L'Hérit.," "*Erodium moschatum*, Willd.," and "*Erodium moschatum*, Smith.," ought, according to all analogy, to stand for three different plants, and not for three different views of the authority for one.

A still more serious mischief than the confusion of authorities is the liberty which botanists have accorded to themselves, in moving a well-known plant into a new genus, of changing its specific name, and the frightful multiplication of synonyms of which this has been the cause. According to some of the correspondents of this Journal we ought to be grateful, rather than otherwise, for this exercise of the fancy.

The common Male Fern, *Polypodium Filix-mas* of Linnæus, has been placed in at least eight different genera, and received two specific names besides the first. It is a matter of accident rather than design that this plant has not as many specific names as generic, with sixty-four combinations of the two, and a different authority for each combination.

The nomenclature of Orchids is nearly as bad as that of Ferns. The common Frog Orchis stands in seven genera, but has happily only one specific name. With *Neotinea intacta* we are not so fortunate: this plant is an admirable instance of the logical

* On the correct authority for *Erodium moschatum* see a note at p. 282.—
[ED. JOURN. BOT.]

development of the botanical rule; it stands in five genera, has five specific names, and eight different collocations of the two.

According to the zoological rule, in the above and all similar cases, the earliest specific name would be adopted, and be followed by the initials of its author, whatever genus may be prefixed to it. The useless specific names and authorities would disappear from the nomenclature, but would remain in the synonymy for reference in case of need.

The instances in which the same plant appears in different catalogues, under disguises affording no clue to its identity, may be counted by scores. They are a great stumbling-block to students, and a positive scandal to science. Why, for example, should *Mespilus Amelanchier* of Linnæus appear in one place as *Pyrus Amelanchier*, Willd., and in another as *Aronia rotundifolia*, Pers., when it might so easily be written *Aronia Amelanchier*, Linn.?

In such a case as *Lotus Tetragonolobus*, Linn., where the specific name has been raised to generic rank, I imagine we should still write *Tetragonolobus purpureus*, Mœnch., and that scientific opinion is at present scarcely ripe for such a combination as *Tetragonolobus Tetragonolobus*, Linn., as Staudinger would write it.

I regard it as inevitable that there will ultimately be one system of nomenclature for all organised nature, and that the zoological rule will supersede the botanical.

A NEW SPECIES OF FRITILLARIA.

By H. G. REICHENBACH, *fil.*

WHEN naming, last year, the Fritillaries for our Botanic Garden, I came upon Bolander's no. 4654, "*Fritillaria lanceolata*, var." From this my specimen of *F. lanceolata*, Pursh, differed obviously in its three usually whorled leaves larger and narrower at the base, its larger flowers and its longer sepals, which were not suddenly contracted and had besides apparently very different nervation. As neither the last monograph of my excellent friend Mr. J. G. Baker nor the numerous publications of Prof. Asa Gray and Mr. Sereno Watson contained such a plant, I was inclined to consider it new; but unwilling to rely upon my own research alone, I applied to the first-named monographer for assistance. His opinion was the same as my own, but he placed the species near *F. biflora*, Lindl., a *Liliorhiza*; whilst I had thought it a *Gonio-carya*. The kindly added sketches of typical specimens proved the correctness of Mr. Baker's view; and I am thankful to him for permission to publish the species under our joint authority, dedicated to the excellent Dr. Asa Gray.

The plant is readily distinguished from *F. biflora*, Lindl., by the shorter and less acuminate sepals, much narrower bracts, and narrower and more acuminate leaves. Generally speaking, it is not unlike the taller specimens of *F. græca*, Boiss. & Sprun.

May the plant long enjoy its existence before it falls a victim to certain rapacious tourists, who, ignoring the present and future existence of other men as much entitled to the enjoyment of nature as themselves, delight in bringing home bulbs by the thousand. Thus has *F. tristis*, Heldr. & Sart., been destroyed at Athens by the Herr Hofgärtner Schmidt. Thus, as I was told at Limone in Piedmont, has *F. Moggridgii*, in the Valle Amellina, been totally eradicated by a well-known English bulb-amateur and tourist: his guide, Bartolomeo Viola, believing, no doubt, in *generatio equivoca*, wondered at there being no more flowers, as the gentleman had only twice taken every bulb! *Après nous le déluge.*

I add a short descriptive diagnosis:—

FRITILLARIA GRAYANA, *Rehb. f.*, & *Baker.*—Ultra spithamæa, gracilis, foliis in caule quinis seu quaternis infimis cuneato-ligulatis, breve acutis, inflorescentia uniflora seu biflora, bracteis linearibus, acutis, elongatis, floribus longe pedicellatis pedunculatisque, nutantibus (0·02 m. longis), sepalis externis ligulatis acutis, internis bene latioribus, omnibus apicibus scabris, foveis juleiformibus (? si recte video) filamentis antheras quater superantibus, stylo ad medium fere trifido.

Hab. California, 1866; *Bolander*, n. 4654!

ON AN ISLE OF WIGHT GENTIAN.

BY FRED. STRATTON, F. L. S.

ON the 23rd of May last I received from Dr. John Grieve, of Glasgow, who was then staying at Ventnor, some specimens of a Gentian which he had gathered on the down behind Steepphill Castle, and which he referred to the variety β . of *Gentiana Amarella*, L., noticed by Dr. Bromfield in the 'Flora Vectensis.' A few days afterwards I went to Steepphill, and was surprised at the great abundance of the plant. It grew mostly in large patches from five to ten feet across, and was, from its profusion and the dark brownish purple leaves and calyces, a conspicuous feature in the herbage of the chalk down.

There are several characters in which this Gentian differs from both its nearest allies, *G. Amarella* and *G. campestris*. First, the time of flowering, which in those constitutes them autumnal-flowering plants, in this places it amongst spring flowers. A considerable proportion of the plants had on the 27th of May well-advanced capsules (on the 17th of August only the withered stems and capsules full of ripe seed were to be found; a rather thick-set pyramidal form of ordinary *G. Amarella*, in full bloom, having taken the place of its early-flowering neighbour, and in almost equal abundance). This character, when it occurs in isolated plants and is unaccompanied by any other divergence from their

congeners, is not of any very great value; but it is of great importance when it is permanent and associated with marked differences from nearly-allied species, as, for instance, in another plant of the south side of the Isle of Wight, *Arum italicum*. The early appearance of the leaves of this, at the end of September, whilst the spadix with its red fruit is still an ornament of the woods, goes far to corroborate the testimony as to its status amongst species afforded by the other characters in which it differs from *A. maculatum*.

The early-flowering habit of this Gentian is accompanied by the following characters, which render it difficult to assign it to either of its likeliest relations:—Both the corolla and calyx are almost always 4-cleft; in the very few instances of a 5-cleft corolla the calyx is usually, but not invariably, 5-cleft also. The calyx-segments are very unequal, variable, and generally much larger than in *G. Amarella*, and more divergent than in either *G. Amarella* or *G. campestris*; in this respect resembling *G. germanica*, but it lacks the large corolla and larger stouter habit characteristic of that plant. Two of the segments are often so much larger than the others as to simulate the corresponding character in *G. campestris*, but even in their broadest state they do not spring from below the two narrower segments, nor do they clasp and conceal the latter, as in *G. campestris*. The whole plant is more slender, more branched, and shorter than either *G. Amarella* or *G. campestris*; few specimens are more than three inches in height, and all are branched mostly at or near the base. The seeds are roundish oval, dark brown, translucent, slightly polished and rugose, with one or two circular pits, probably caused by contact with the adjoining seeds.

Gentiana campestris is one of our very rarest Isle of Wight plants, and has not been seen at all for some years, the last record of its occurrence being that by Mr. R. Tucker in this Journal for 1870 (viii. p. 160); so that the probability of this plant being a hybrid between that species and *G. Amarella* is very slight. Mr. Tucker seems also to have met with a plant which he refers to *G. Amarella*, var. β ., and which he states occurred plentifully on Afton Down; but he does not give the time of its flowering, and his visits were paid, except in the year 1864, in the autumn. In the same volume of the Journal, Mr. T. R. Archer Briggs records (p. 223) finding a few specimens of an early-flowering state of *G. campestris* in the neighbourhood of Plymouth: it may, however, be noted that there seems to be no record of any large quantity of this latter species found flowering in the spring.

Dr. Trimen informs me that he collected a Gentian in flower on June 2nd, 1866, on White Horse Hill, Berks, which presents a very close resemblance to my Isle of Wight plant, but differs from it in some particulars. He at the time named his specimens *G. campestris*, and the plant appears under this name in Mr. Britten's Additions to the Berkshire flora in this Journal for 1873 (p. 139). I may add that Crépin, in his 'Flore de Belgique' (ed. 2, p. 140), speaks of *G. germanica* as varying with a 4-cleft corolla and calyx,

and also having occasionally two of the calyx-segments much larger than the others.

I have dried a good number of specimens for distribution through the Botanical Exchange Club.

NOTE ON THE PRECEDING COMMUNICATION.

BY HENRY TRIMEN, M.B., F.L.S.

WITH reference to the plant above referred to by Mr. Stratton, which I collected in the early summer of 1866, on White Horse Hill, Berkshire, as *Gentiana campestris*; though a subsequent examination has clearly shown that it is not that species, it is less easy to refer it distinctly to *G. Amarella*. Under this very variable species there is little difficulty, to my mind, in placing Mr. Stratton's certainly striking form from the Isle of Wight. On comparing his specimens with other spring-flowering ones from Croydon (A. Bennett) and Tring (E. Forster), both of which have also 4-merous flowers, the chief points of difference in the Isle of Wight plant are seen to be the much longer pedicels, more striking inequality of the calyx-segments, and larger and more branched habit; its occurrence in such abundance is also worthy of remark. Ray recorded in 1696 (Syn. Stirp. Brit., ed. 2, p. 156), under the name of *G. fugax verna seu præcox*, what was probably a similar early-flowering variety of *G. Amarella*; it was gathered near Kendal.

I may add a few remarks as to the nomenclature of these forms or varieties. Mr. Stratton had suggested attaching the name of Dr. Bromfield to his plant,—a most appropriate course, were it not that there appear to be already several existing names. There can be little doubt that it is *G. uliginosa*, Willd., which is very characteristically figured in Reichenbach's Plant. Crit., t. 58. Schur (Enum. Plant. Transylv., p. 461) places this under *G. Amarella* as var. *β. uliginosa*, and quotes yet another name as a synonym, *G. gracilis*, Nees. To the same form I refer specimens from Naples (Huet de Pavillon, n. 392) labelled *G. Columnæ*, Ten. Dillenius had long ago (Syn. Stirp. Brit., ed. 3, p. 275) rightly identified Columnæ's figure (Ephrasis, p. 221) of the Naples plant with Ray's plant above noted; but some subsequent writers have confounded it with *G. campestris*, which it clearly does not represent. Bertoloni does not consider (Fl. Ital., iii. 97) Tenore's species worth distinction even as a variety of *G. Amarella*, but then he treats *G. germanica* in a similar manner.

To return to my Berkshire specimens. These differ from all the above in the wider form of the corolla-tube with blunt segments, and in having oblong-spathulate obtuse leaves. All the flowers are 4-merous, and the pairs of calyx-segments very unequal.

The only other specimens I have seen which can be considered as probably the same are from Tyrol (Huter), and are labelled "*G. germanica*, var. *β. pygmaea*"; and on the whole I am more

inclined to place the Berks plant to *G. germanica* than to *G. Amarella*. Early-flowering states of the former have been already recorded. It is remarkable that the spring-flowering forms of both species should vary in precisely the same manner, with 4-merous flowers and two of the calyx-segments much increased in size.

CONSPECTUS POLYGALARUM EUROPÆARUM.

BY ALFRED W. BENNETT, M.A., B.Sc., F.L.S.

(Concluded from p. 246).

Var. 5. *angustifolia* : annua (?); differt a forma typica habitu graciliore, alis obovatis, capsula multo angustioribus. *P. angustifolia*, Lge., Pug., 317; Willk. et Lge., Fl. Hisp., iii., 557 (non H. B. K.) In Hispania boreali.

Var. 6. *grandiflora*, Bab. Man., 7th ed., 44; Engl. Bot., 3rd ed., ii., 35; Hook., Stud. Flor., 2nd ed., 48; A. W. Benn. in Journ. Bot., 1877, p. 171 (non DC.) Foliis supernis magnis, lanceolatis, marginibus incrassatis et paullo revolutis; alis late ellipticis, apiculatis; floribus magnis, cæruleis.

FIG. Journ. Bot., 1877, t. 190 et t. 189, f. 5 (ala.)

A very remarkable, almost shrubby form, with somewhat the habit of *P. Chamæbuxus*, the leaves decidedly coriaceous, and the root-leaves considerably smaller than the upper ones, the wing-sepals broad and usually distinctly apiculate. This variety has at present been gathered only on Ben Bulbin, Co. Sligo, Ireland, though a form approximating in some of its characters occurs in the Eastern Pyrenees.

Var. 7. *Carueliana* (sp.), Burn. MS. Caulibus tenuibus, debilibus, decumbentibus; foliis infimis obovatis, caulinis oblanceolatis vel lineari-lanceolatis; racemis laxis, haud comosis; bracteis parvis, membranaceis, ovato-lanceolatis; pedicellis gracilibus; sepalis exterioribus lanceolatis; alis viridibus, obliquis, lanceolatis.

This is a very remarkable form, kindly communicated to me by Prof. Caruel, gathered by E. Burnat under chestnut-trees between Carrara and Colonnata, and which I retain only after considerable hesitation simply as a variety of *P. vulgaris*. The green falcate wing-sepals are altogether peculiar among European forms, and present a striking resemblance to a prevalent tropical Asiatic type, with which, however, the plant cannot be associated, on account of the terminal racemes, sessile anthers, the form of the style, and other considerations. The habit is altogether that of *P. depressa*, and in no other essential character does it appear to differ from this protean species.

A striking form of *P. vulgaris*, which, however, I have not ventured to erect into a distinct variety, has been gathered by Mr. Bentham near Biarritz and Montauban, with linear-lanceolate coriaceous leaves, the margins revolute, and narrowly-elliptical wing-sepals.

Most of the varieties (α - η) of this species in DeCandolle's 'Prodromus' are probably mere local forms. γ . *elata* is identified by him with Schkuhr's *P. comosa*, and η . *grandiflora* is probably the same; δ . *verviana* is more likely a variety of *P. amara*.

2. *P. CALCAREA*, *F. Schultz*, Flora, 1837, p. 752, & 1838, p. 642; Koch, Fl. Germ., 100; Gr. et God., Fl. Fr., i., 196; Willk. et Lge., Fl. Hisp., iii., 555; Woods, Tour. Flor., 43; Reich., Ic., xviii., 89; Car. in Nuov. Giorn. Bot. It., i., 23; Dmrt. in Bull. Soc. Bot. Belg., 1868, p. 344; Engl. Bot., 3rd ed., ii., 38; Hook., Stud. Fl., 2nd ed., 49; Bab. Man., 7th ed., 44; A. W. Benn. in Journ. Bot., 1877, p. 172. *P. caulibus plurimis, ascendentibus vel decumbentibus; ramis florigeris e foliorum infimorum axillis; foliis radicalibus parvis, confertis, sub-coriaceis, obovatis; floribus cæruleis; bractea centrali pedicellum florentem excedente; racemis compactis, multifloris; alis ellipticis vel obovatis, quam capsulam longioribus et latioribus, vena centrali conspicua; capsula infra attenuata; arillodii appendicibus inæqualibus, seminis dimidium attingentibus.*

SYN. *P. amara*, Linn., Sp., ed. x., p. 1156 (teste Dmrt.), non Linn., Sp., ed. ii. 987 et multorum auctorum. *P. vulgaris* var. β ., Hook. et Arn., Brit. Flor., ed. viii., p. 52. *P. amarella*, Coss. et Germ., Par., 56; Dmrt., Prod. Fl. Belg., 31, non Crantz. *P. amblyptera* et *buxifolia a. glabra*, Reich., Pl. Crit., i., 26.

FIGS. Coss. et Germ., Atl. Par., t. vii., f. 4-6; Reich., Pl. Crit., i., 50; Ic., t. mcccclix., f. 1; E. B. S., t. 2764; Engl. Bot., t. clxxxviii.; Wooster, Alpine Plants, t. xlvi., f. 1; Journ. Bot., 1877, t. 189, f. 6 (ala, pistillum, semenque).

In Europa centrali et meridionali ab Anglia meridionali usque ad Italiam borealem, Hispaniam, et Transylvaniam; in calcareis, haud infrequens.

This species differs from *P. vulgaris* more in habit than in any well-defined characters. The flowering shoots springing from the axils of the lower leaves give it a strongly-marked, tufted, or cæspitose character of its own, and an umbellate appearance even when the lower leaves have died away; the lower leaves are somewhat fleshy, and they decrease gradually upwards on the stem. The flowers are large, and apparently always of a bright blue, the crest large and handsome, and the lateral petals fully equal to it in length. It is said not to have the bitter taste of the next species, which it approaches in some respects. Though widely distributed, it is local, and apparently confined to a calcareous soil.

3. *P. AMARA*, Linn., Sp., ed. ii., 987; Jacq., Enum. Vind., 262; DC., Prodr., i., 325; Reich., Pl. Crit., i., 24; Ic., xviii., p. 89; Koch, Fl. Germ., 100; Gr. et God., Fl. Fr., i., 196; Bert., Fl. It., vii., 321; Led., Fl. Ross., i., 272; Gris., Fl. Rum., i., 240; Boiss., Fl. Or., i., 476; Fries, Fl. Scan., 154, et Nov. Fl. Suec., 226; Hook., Stud. Fl., 2nd ed., 49; Woods, Tour. Flor., 42; Car. in Nuov. Giorn. Bot. It., i., 23; Dmrt. in Bull. Bot. Soc. Belg., viii., 343; A. W. Benn. in Journ. Bot., 1877, p. 173. *P.* caule simplice, erecto, humili; foliis imis grandibus, coriaceis, ovalibus vel ovatis, caulinis minoribus et angustioribus; floribus parvis, distantibus, cæruleis; alis ovalibus, quam capsulam maturam multo angustioribus et paullo brevioribus, venis subsimplicibus, haud anastomosantibus; stylo brevi, crasso, obtuso; capsula orbiculari; seminibus hirsutis, arillodii appendicibus brevibus, carnosis, $\frac{1}{4}$ -seminis attingentibus.

SYN. *P. austriaca*, Crantz, Stirp. Austr., fasc. v., 439; Reich., Pl. Crit., i., 23; Ic., xviii., 89; Gr. et God., Fl., Fr., i., 197; Dmrt. in Bull. Bot. Soc. Belg., 1868, p. 345. *P. vulgaris* δ . *austriaca*, Koch, Fl. Germ., 100. *P. amarella*, Crantz, Austr., fasc. v., 438 (non Coss. et Germ., Dmrt.); Reich., Pl. Crit., i., 24. *P. uliginosa*, Reich., Pl. Crit., i., 23; Hook., Stud. Flor., 1st ed., 47. *P. Lejeunii*, Bor. Fl. Cent., 2nd ed., vol. ii., 71. *P. verriana* (?) Lej., Spa., ii., 92. *P. vulgaris* δ . *verviana*, DC., Prodr., i., 325. *P. myrtifolia*, Fries, Nov. Fl. Suec., 227 (non Linn.); *P. decipiens*, Bess., Cont., ii., 73 (teste Benth.)

FIGS. Jacq., Austr., t. 412; Reich., Pl. Crit., f. 39, 42-44; Ic., t. mcccxlvi., f. 1, 3; Crantz, Stirp. Austr., fasc. v., t. 2, f. 4; Coss. et Germ., Par., Atl., t. 7, f. 1-3; Journ. Bot., 1877, t. 189. f. 7 (ala, pistillum, semenque.)

In Europa fere passim a Scandinavia usque ad Italiam et Hispaniam, et a Gallia usque ad Rossiam, in uliginosis et pascuis alpinis.

In its most typical form, this is a very well-marked species, characterised by the rosette of large fleshy leaves lying close on the ground, and the sudden transition from these to the much smaller stem-leaves. The stem is not more than from 2-4 inches high, the flowers about one-sixth of an inch long, much more distant than in either of the two preceding species, and pink, blue, or white. The wing-sepals are quite as narrow and decidedly shorter than in *P. oxyptera*, the style shorter, and the appendages to the arillode shorter and more fleshy than in *P. vulgaris*. It approaches the latter species in its larger root-leaves. The root and whole plant are described as having an intensely bitter taste.

Var. β . *alpestris*, DC., Prodr., i., 325; Koch, Fl. Germ., 100; Led., Fl. Ross., i., 773; Woods, Tour. Flor., 43; Willk. et Lge., Fl. Hisp., iii., 557. Planta humilior, foliis ellipticis, floribus minoribus. *P. alpestris*, Reich., Pl. Crit., i., 25; Ic., xviii., 89;

Boiss., Fl. Or., i., 476. *P. amara* β . *alpestris*, and δ . *alpina*, DC., Prodr., i., 325; Led., Fl. Ross., i., 773. *P. vulgaris* γ . *alpestris*, Woods, Tour. Flor., 43. *P. amara* *b. alpina*, Reich., Ic., xviii., 89. *P. Morrisiana*, Reich. Ic., xviii., 91. *P. hybrida*, Koch, Linnæa, xv., 706 (non DC.), teste Led.

FIGS. Reich., Pl. Crit., f. 45; Ic., mcccxlvi., f. 2, 3; mcccxlviii., f. 4.

In pratis alpinis.

Only distinguished from the typical form by its Alpine habit.

Var. γ . *uliginosa*, Engl. Bot., 3rd ed., ii., 40; Reich., Ic., xviii., 89; Woods, Tour. Flor., 43; Bab. Man., 7th ed., 45; A. W. Benn. in Journ. Bot., 1877, p. 174. *P. uliginosa*, Fries, Fl. Scan., 59; Gr. et God., Fl. Fr., i., 198. Planta nana, caule tenuiore, racemo densiore, capsula obcuneata.

FIGS. Reich. Pl. Crit., f. 40, 41; Ic., t. mcccxlviii., f. 2; Engl. Bot., t. 189.

In uliginosis in Europa boreali centralique.

Distinguished chiefly by the capsule being narrowed below, and by its distinctly more boggy habitat. The flowers are described as being always pink. The English (Teesdale) form is very dwarf, and the raceme is more compact; Reichenbach's description and figures are scarcely distinguishable from the typical *P. amara*.

The varieties of this species (α - ζ) named in DeCandolle's 'Prodrumus' are again very difficult to determine, and some of them probably only accidental forms. γ . *cespitosa* is almost certainly *P. depressa*.

4. *P. FOROJULENSIS*, Kern. in Oester. Botan. Zeitschr., 1874, p. 102.

P. foliis linearibus, imis latoribus, sat confertis; racemis abbreviatis, confertis, subconicis, haud comosis; bracteis parvis; floribus subsessilibus; sepalis exterioribus lanceolatis, quam alas $\frac{1}{2}$ brevioribus; alis subrotundis, brevissime unguiculatis, vix venatis; corollæ crista magna pulchra, exserta; petalis lateralibus quam cristam longioribus, pulchre dichotomo-venosis; capsula sessili, obcordato-obovata, quam alas duplo angustiore et brevior, anguste alata; seminibus parvis.

Ad rupes apricas in valle Tagliamento Alpium Venetianarum.

This *Polygala*, brought by Th. Pichler from a single spot in the Venetian Alps, and described by Kerner, seems to merit the rank of a distinct species. The very short crowded racemes, with almost sessile flowers, at the extremity of slender branches densely clothed with very narrow leaves, give it a habit of its own, which Kerner compares to that of dwarf specimens of *P. major*. The form of the wing-sepals resembles that of *P. nicaensis*, but the flower and whole plant are smaller, and there is no approach to a comose appearance of the raceme; the very short pedicels and other characters seem to distinguish it from the other species of this section. I have seen specimens only in the herbarium of the British Museum.

b. Bracts as long as pedicel; the raceme therefore subcomose.

5. *P. NICÆENSIS*, Risso, Flore de Nice, 54; Reich., Ic., xviii., 91; Koch, Flor. Germ., i., 98; Woods, Tour. Flor., 43; Moggr., Fl. Ment. t. 77; Car. in Nuov. Giorn. Bot. Ital., i., 21; non Boiss., Fl. Or., i., 475. *P. foliis oblongis vel lineari-lanceolatis, infimis parvis, subovatis; racemo laxo, subcomoso; bracteis lateralibus pedicellum subæquantibus, ciliatis; alis ovalibus, obovatis, vel subrotundis, roseis vel cæruleis; corolla quam alas sublongiore; ovarii stipite ovarium æquante; capsula obovata, quam alas brevior, sessili; arillodii appendicibus dimidium seminis attingentibus.*

SYN. *P. rosea*, Reich., Ic., xviii., 91; Gr. et God., Fl. Fr., i., 194; Bert., Fl. It., vii., 318; Woods, Tour. Flor., 43; Ball in Journ. Linn. Soc., vol. xvi., p. 350 (non Desf.). *P. amblyptera*, b. *pubescens*, et *P. burifolia*, b. *pubescens*, Reich., Pl. Crit., i., 26 (teste Reich. f.)

FIGS. Reich., Pl. Crit., f. 51; Ic., mcccclix., f. 2, 3; mccccl., f. 1; Moggr., Flor. Ment. t. 77.

In montosis montanis Galliæ meridionalis, Italiæque borealis et littorum Adriaticæ; necnon in Marocca.

In his 'Contributions to the Flora of Mentone,' Mr. J. T. Moggridge points out that intermediate forms occur between this species and *P. vulgaris* on the one hand, and *P. comosa* on the other hand: and that it is extremely difficult to draw up distinctive characters between them, the length of the lateral bracts being variable. The habit is that of *P. vulgaris*, but it is a larger plant. The colour of the flowers is a light blue or rose-colour, and it is best characterised by its nearly round wing-sepals, which often end in an abrupt apiculus. It has, with less excuse, been confounded, in Grenier & Godron's 'Flore de France,'* with *P. rosea*, Desf., and, as I think, by Boissier with *P. major*, Jacq. Both these species are readily distinguished by their much larger exerted corolla. The geographical range of the true *P. nicæensis* appears to be very limited, being nearly confined to the neighbourhood of the shores of the Mediterranean in the Alpes Maritimes, Piedmont, and Tuscany; with the exception of Koch's locality at Trieste, the identity of which seems to me somewhat doubtful. Ball's specimens from Marocco, in the Kew herbarium, also unquestionably belong to this species. All the localities given by Boissier in South-eastern Europe and Asia Minor should doubtless belong to *P. major*, as also possibly does Koch's, as well as Boissier's *P. nicæensis*, var. *tomentella* (= *P. pruinosa*, Boiss. in parte), from Greece.

6. *P. PRESLI*, Spreng., Syst., v., 531; Guss., Fl. Sic. Prodr., ii., 358; Fl. Sic., ii., 242; Bert., Fl. It., vii., 323; Woods, Tour. Flor., 47; Car. in Nuov. Giorn. Bot. It., i., 21. *P.*

* Ardoino, 'Flore des Alpes Maritimes,' identifies Grenier & Godron's plant with *P. comosa*.

foliis oblongo-lanceolatis, margine incrassatis, infimis minoribus, subobovatis; bracteis lateralibus pedicellum subæquantibus; sepalis exterioribus linearibus; alis anguste oblongis, acutis, corollæ tubum æquantibus; capsula subsessili; arillocii appendicibus brevibus.

SYN. *P. sicula*, Presl. *P. elongata*, Presl, Fl. Sic., i., 136; Spreng., Syst., iv., t. 263 (non Klein., Willd.)

FIG. Guss., Fl. Sic., t. 363.

In Sicilia; ubique in apricis demissis vel montosis.

This species, which has not yet been gathered on the Continent, comes nearest to *P. nicaensis*, from which it is, however, at once distinguished by the narrowness of all the sepals, and especially of the wing-sepals, which are often acuminate, and by the leaves being broader in proportion to their length: it approaches *P. major* in the greater length of the corolla in proportion to the wing-sepals, the crest being distinctly exerted. There is also a close affinity with *P. venulosa* of Greece. Caruel describes the wing-sepals as green or white, rarely rose-coloured, while the corolla is rose-coloured.

c. Bracts longer than pedicel; the raceme therefore comose.

7. *P. COMOSA*, Schkuhr, Bot. Handb., ii., 324; Reich., Pl. Crit., i., 27; Ic., xviii., 90; Koch, Fl. Germ., 99; Gr. & Godr., Fl. Fr., i., 195; Willk. et Lge., Fl. Hisp., iii., 557; Led., Fl. Ross, i., 271; Griseb., Fl. Rum., i., 239; Fries, Fl. Scan., 59, et Nov. Fl. Suec., 225; Boiss., Fl. Or., i., 475; Woods, Tour. Flor., 43; Car. in Nuov. Giorn. Bot. It., i., 22. *P. foliis lineari-lanceolatis, infimis subobovatis; bracteis subpersistentibus, pedicellum æquantibus, et ante anthesim quam alabastrum longioribus; alis ovalibus, corollam æquantibus, ovario basi et apice cuneiformi, ovarii stipitem æquante; stylo elongato; capsula breviter stipitata, obcordata, quam alas brevior sed sublatisiore; arillocii appendicibus dimidium seminis attingentibus vel longioribus.*

SYN. *P. vulgaris*, γ . *elata* and η . *grandiflora*, DC., Prodr., i., 325; *P. hybrida*, and *P. podolica*, *ibid.*, 325; Schur., Fl. Trans., 90; Led., Fl. Ross., i., 271. *P. corsica*, Bor. *P. pedemontana*, Perr. et Verl. in Bull. Soc. de Fr., x., 757.

FIGS. Reich., Pl. Crit., f. 54-56; Ic., t. mcccxlvi., f. 4.

Per Europam meridionalem et centralem usque ad Gothlandiam; in Insulis Britannicis non invenitur; in Italia rara; crescit quoque in Asia Minore, et Turkestan.

This species approaches very closely to the more luxuriant forms of *P. vulgaris*, from which it is difficult to distinguish it, except by the comose appearance of the unopened portion of the raceme caused by the longer bracts; the capsule has also a somewhat longer stipes, and the withered flowers have a tendency to

droop. The flowers are rose-coloured, blue, or white, and 4–5 mm. long. It should be looked for in South Britain.

P. intermedia, Schur (Transylvania), is a form of this species approaching *P. vulgaris*.

Var. β . *garrodiana*, Jord. et Fourr. MS.; foliis linearibus, paucioribus. In aridis Galliæ australis.

** Flowers yellow.

8. *P. FLAVESCENS*, DC., Hort. monsp., 134; Prodr., i., 324; Reich., Ic., xviii., 90; Bert. Fl. It., vii., 319; Guss., Fl. Sic., ii., 243; Woods, Tour. Flor., 43; Car. in Nuov. Giorn. Bot. It., i., 22. *P. caulibus ascendentibus, erectis, subramosis; foliis caulinis lineari-lanceolatis, infimis subobovatis; racemis multifloris, initio confertis, conicis, denique elongatis, comosis; floribus flavis; sepalis exterioribus linearibus; alis ovato-ellipticis, acuminatis, basi cuneatis, nervosis, quam corollam paullo longioribus; petalis lateralibus spathulatis, carinam multum excedentibus; ovario infra cuneato, breviter stipitato, stylo brevi, ciliato; capsula subsessili, obcordata, alata; seminibus hirsutis; arillogii appendicibus dimidium seminis attingentibus vel paullo excedentibus.*

FIGS. Seb., Pl. Rom., fasc. i., t. 1 (teste DC.); Reich., Ic., mcecl., f. 3.

Habitat in sylvaticis montosis Italiæ centralis, ab Etruria usque ad Campaniam, haud infrequens (Caruel).

A very distinct species, and apparently remarkably invariable and of very limited range.

β Wing-sepals shorter than corolla-tube.

* Capsule sessile.

9. *P. VENULOSA*, Sibth. et Sm., Prodr. Fl. Græc., ii., 52; DC. Prodr., i., 324; Boiss., Fl. Or., i., 473. *P. caulibus tenuibus, pubescentibus, decumbentibus vel subascendentibus; foliis puberulis, infimis parvis, ovato-oblongis, caulinis lanceolatis vel lineari-lanceolatis; racemis laxis, paucifloris, haud comosis; rachi puberula; bracteis parvis, ovato-lanceolatis, deciduis, pedicellum florigerum parum excedentibus; sepalis exterioribus ovato-lanceolatis; alis oblique ellipticis, obtusis vel mucronatis, venosis; corollæ tubo elongato, alas excedente; carinæ crista tenuiter fimbriata; petalis lateralibus carinam multo superantibus; antheris subsessilibus; ovario anguste obovato, sessili; stylo elongato, falcato; stigmatibus galeato; capsula sessili, obovata vel obcordata, late alata; seminibus hirsutis; arillogio carnoso, galeato, crista pilorum pulchre ornato, appendicibus brevissimis munito.*

SYN. *P. ascendens*, Clarke in Spreng., Neue Entdeck., iii., 165; DC., Prodr., i., 324.

FIG. Sibth. et Sm., Fl. Græc., vii., t. 669.

In saxosis Græciæ et insularum vicinarum.

This is a very interesting species, apparently confined to Greece and the islands of the Archipelago, and is there rare. From the species to which I consider it most nearly allied—characterised by their conspicuous corolla greatly exceeding the wing-sepals in length—it is distinguished by its much narrower flower, somewhat oblique wing-sepals, and sessile capsule. In general appearance it bears a close resemblance to *P. Preslii*, but is a smaller more pubescent plant, with smaller flowers. The oblique wing-sepals, the form of the summit of the style (falcate and not prolonged into a point), and the remarkable conspicuous elevated arillode, with only a trace of lateral appendages, would even seem to indicate an affinity with Asiatic or even African species, such as *P. persicariaefolia* or *eriptera*. The wing-branches spring from a very woody root-stock.

** Capsule stipitate.

10. *P. MAJOR*, Jacq., Fl. Austr., v., 6; DC., Prodr., i., 324; Reich., Pl. Crit., i., 27; Ic., xviii., 91; Koch, Fl. Germ., 98; Led., Fl. Ross., i., 270; Griseb., Fl. Rum., i., 240; Bert., Fl. It., vii., 318; Sm. et Sibth., Fl. Græc., ii., 52; Boiss., Fl. Or., i., 474; Car. in Nuov. Giorn. Bot. It., i., 20; Woods, Tour. Flor., 43. *P. ramis ascendentibus, validis, subramosis; foliis caulinis linearibus vel lineari-lanceolatis, infimis subobovatis; racemis comosis; bracteis lateralibus quam pedicellum duplo longioribus, ciliatis; sepalis exterioribus lanceolatis, leviter ciliatis; alis late ovalibus vel ovatis, venosis; corolla quam alas multo longiore; petalis lateralibus carinam multo excedentibus; ovarii stipite quam ovarium triplo vel quadruplo longiore; stylo elongato; capsula obcordata, late alata, quam stipitem duplo longiore; seminibus hirsutis; arillodio galeato, subcarnoso, subgaleato, appendicibus tribus munito, quarum dorsalis brevis, duæ laterales tamen dimidium seminis attingunt.*

SYN. *P. nicaensis*, Boiss., Fl. Or., i., 475 (non Riss.)

FIGS. Jacq., Fl. Austr., t. 413; Reich., Pl. Crit., f. 59, 60; Ic., t. mecl., f. 3.

Per Europam australem et orientalem ab Italia meridionali Austriacque usque ad Græciam Rossiamque centralem, necnon in Asia Minore, Armenia, Persiacque occidentali.

The largest and handsomest of European *Polygalas*, marked by its very stout branches and large rose-coloured flowers, with the crest extending considerably beyond the wing-sepals. The much more prominent arillode, with three distinct appendages, indicates an approximation to prevalent Asiatic and African forms. It is a distinctly Mediterranean type, though no locality is recorded from the southern shore; but the unfortunate confusion between this species, *P. nicaensis*, and *P. rosea*, renders its exact distribution

doubtful. The variety *Boissieri*, described as a distinct species by Cosson, seems hardly to merit this distinction; it is recorded only from Alpine localities in the Sierra Nevada. The variety *tomentella*, originally described by Boissier as a form of the Asiatic *P. pruinosa*, appears to me to have been erroneously referred by him subsequently to *P. nicaensis*.

P. neglecta, Kern. (Hungary), foliis rigidis, linearibus, is clearly, I think, a form of this species.

Var. β . *Boissieri*; foliis caulinis paucioribus angustioribus. *P. Boissieri*, Coss., Notes, 100; Willk. et Lge., Fl. Hisp., iii., 559 (sp.) *P. rosea*, Boiss., Voy. in Esp., ii., p. 81. Sierra Nevada in Hispania.

Var. γ . *batica*; caulibus debilibus; bracteis non comantibus; capsula obcordato-spathulata. *P. batica*, Willk. et Lge., Fl. Hisp., iii., 559. In sylvis Bæticæ australis.

Var. δ . *tomentella*: tota planta pilis mollioribus oblecta. *P. nicaensis*, var. *tomentella*, Boiss., Fl. Or., i., 475. *P. pruinosa* (in parte), Boiss., Diag., ser. 1, i., 8; Griseb., Fl. Rum., i., 240. Mr. J. S. Mill has gathered this form in Attica and N. Eubœa.

11. *P. ANATOLICA*, Boiss., Diag., ser. 2, i., 57; Fl. Or., i., 474. "P. caulibus erectis, subsimplicibus; foliis caulinis linearibus vel lineari-lanceolatis; racemis elongatis; alis anguste ovatis, basi cuneatis, leviter ciliatis; corolla alas multo excedente, pulchre cristata; ovario longe stipitato; capsula obcuneata vel obcordata, stipitem vix excedente."

In Bosnia et Crimea legitur; crescit quoque in Armenia, Georgia, et Asia Minore.

Closely allied to *P. major*; distinguished chiefly by its weaker habit, narrower and ciliated wing-sepals, and the flowers, which are not quite so large, somewhat drooping after withering.

VAR. β . *floribunda*, Boiss., Diagn., ser. 2, v., 49; Fl. Or., i., 474; racemis elongatis, densioribus. Crimea (?) et Armenia.

12. *P. ROSEA*, Desf., Atl., ii., 128; DC., Prodr., i., 324; Willk. et Lge., Fl. Hisp., iii., 558 (?); (non Reich.; Gr. et God.; Boiss., Voy. Bot. Esp., ii., 81; et aliorum auctorum). *P. caulibus cæspitosis, virgatis; floribus grandibus, insignibus, roseis; racemis elongatis, haud comosis laxiusculis; bracteis lateralibus ovatis, quam pedicellum dimidio brevioribus, capsula quam alas duplo brevior, profunde emarginata, quam stipitem plusquam bis longiore.*

FIG. Desf., Atl., t. 176.

In Hispania australi, rarissima; necnon in Algeria.

A very distinct species, and clearly belonging to the same

section, as *P. major*, with the corolla-tube exceeding the wing-sepals in length, and the capsule stipitate. It is strange how it has been confounded with *P. nicaensis*, a plant of a very different habit, with the corolla entirely included, except the tip of the crest, within the wing-sepals, and the capsule perfectly sessile. Yet this appears to have been done by Reichenbach, whose t. mecel., f. 1, in his 'Icones' (*P. rosea*), is identical with his *P. nicaensis*, and by Grenier & Godron in their 'Flore de France,' followed by Woods in his 'Tourist's Flora.' Caruel (Nuov. Giorn. Bot. It., i., 21) well points out that Desfontaines' drawing altogether forbids the identification of his plant with either of these species, and states that he has seen Desfontaines' type-specimens in Webb's herbarium, which agree altogether with his drawing. The true *P. rosea* appears to be an extremely rare plant, the only certain localities being Desfontaines' in Algeria, and Bourgeau's in the South of Spain. Its most characteristic distinction from *P. major*, which it resembles in habit and the size of the flower, in the broadly ovate short bracts, which altogether deprive the raceme of any comose character.

B. Annual. Filaments partially free; style funnel-shaped; arillode not appendiculate.

13. *P. MONSPELIACA*, Linn., Sp., ed. ii., 987; DC., Prodr., i. 325; Desf., Fl. Atl., ii., 129; Reich., Pl. Crit., i., 27; Ic., xviii., 88; (non Fl. Germ. exsicc., no. 2546); Gr. et God., Fl. Fr., i., 198; Bert., Fl. It., vii., 319; Willk. et Lge., Fl. Hisp., iii., 555; Boiss., Voy. Bot. Esp., ii., 82; Fl. Or., i., 469; Guss., Fl. Sic., ii., 242; Sm. et Sibth., Fl. Græc., ii., 52; Woods, Tour. Flor., 62; Car. in Nuov. Giorn. Bot. It., i., 24 (non Willd.); Ball in Linn. Journ., 1877, p. 350. *P. caule erecto, simpliciter aut basi ramoso; foliis lineari-lanceolatis, infimis oblongo-lanceolatis; bracteis lanceolatis, deciduis; floribus albidis; sepalis exterioribus linearibus; alis viridibus, oblongis, duplo longioribus quam latis, utrinque attenuatis, venis subparallelis non anastomosantibus præditis; corolla parva, quam alas dimidio brevior; petalis lateralibus linearibus, quam carinam multo longioribus; antherarum filamentis liberis, quam antheras duplo longioribus; stylo infundibuliformi, lobo antico maximo; capsula sessili, obcordata, valde inæquilaterali, quam alas dimidio brevior; arillodio minimo, galeato, inappendiculato.*

SYN. *P. glutumacea*, Sm. et Sibth., Fl. Græc., ii., 52; DC., Prodr., i., 325; *P. straminea*, Presl, Sic., i., 137; Spreng., Syst., iv., 2, 265. *Tricholopus monspeliacus*, Spach, Hist. Nat. des Veg., vii., 116.

FIGS. DC., Ic. Pl. Rar., t. 9; Reich., Pl. Crit., f. 57, 58; Ic., t. mcccxl., f. 1; Sibth., Fl. Græc., vii., t. 670; Brot., Phyt. Lus., t. 176; Link. et Hoff., Ic. Fl. Port., t. 55.

Per regionem Mediterraneam, a Lusitania usque ad Græciam; necnon in Africa boreali, Syriaque, in locis aridis.

A very distinct species, without any near affinity. Very difficult to examine satisfactorily in herbaria, owing to the extreme fugacity of the flower. Widely distributed throughout the countries bordering the Mediterranean. A very leafy form occurs in Italy and the South of France.

SECTIO II. PLEURANTHUS, (*mihl*), (*Polygalon*, DC., *ex parte*).

Racemi plerumque axillares vel extra-axillares, rarius terminales. Sepala persistentia, omnia discreta, superius inferioribus multo majus; alæ petaloideæ vel herbaceæ. Petala lateralialia a carina plusquam dimidio libera; carina galeata, distincte triloba, cristata. Filamenta plerumque supra libera, infra in vaginam coalita. Stylus brevis vel elongatus; stigma simplex vel rostræforme. Capsula late alata vel sæpius exalata; arillodium galeatum, inappendiculatum, vel tribus appendicibus subæqualibus munitum.

The species of this section are in general very well-marked from those of the preceding one by the axillary racemes, which cause a very distinct habit; *P. supina* and *Hohenackeriana*, however, form connecting links in this respect between the two. With the exception of these two species, the anthers are never completely sessile on the sheath or antherophore. The three external sepals are much more unequal than in the first section, the superior being much larger than the two inferior ones and often gibbous. The species are either annual or perennial. The largest subsection, consisting entirely of annuals, is characterised by the green oblique wing-sepals; but this is confined to Tropical Asia and Australia, with two or three species in Tropical Africa. The remaining species are distributed through Tropical and Temperate Asia and Eastern Europe, with a few species in Northern Asia, and one or two extending to Western Europe, Australia, and Tropical and Northern Africa. Out of nearly thirty species five only occur in Europe.

A. Anthers sessile; stigma beaked; wing-sepals petaloid.

14. *P. SUPINA*, Schreb., Dec., p. 19; DC., Prodr., i., 374; Griseb., Fl. Rum., i., 240; Led., Fl. Ross., i., 270; Boiss., Fl. Or., i., 471. *P.* caulibus filiformibus, puberulis, decumbentibus vel ascendentibus; foliis obovatis, obtusis, breviter petiolatis; racemis paucifloris, laxis, axillaribus; sepalis exterioribus ciliatis, inæqualibus, superiore quam inferius multo majore, basi gibboso; alis petaloideis, obovatis, basi cuneatis, corollam æquantibus; carinæ lobis lateralibus rotundatis; antheris sessilibus, in duabus phalangibus in filamentorum vaginam positis; ovario valde inæquilaterali; stylo elongato, stigmatate rostræformi; capsula obcordata, inæquilaterali; seminibus hirsutis, pyriformibus, appendicibus duabus munitis, dimidium seminis vix attingentibus.

SYN. *P. andrachnoides*, Willd., Sp., iii., 875. *P. Gundelsheimeri*, C. Koch in Linn., xix., 59. *P. hospita*, Heuff. in Maly, 316; et in Flora, 1853, p. 620; Neilr. Diagn., p. 20.

FIGS. Schreb., Dec., t. 10; Regel, Pl. Radd., t. vii., f. 14; Buxb., Cent., t. lxx., f. 2 (teste DC.)

Rossia meridionalis, Bosnia et Turk.; necnon in Armenia, Asia Minore, Syria, Persiaque.

A suffruticose plant, the short wiry branches rising from a very woody root-stock; the leaves much broader than in any species belonging to Sect. 1. The flowers about the size of *P. comosa*, but much paler; the whole of the corolla sometimes persistent till the seeds are ripe. This is the only species of the section with sessile anthers, except the nearly allied *P. Hohenackeriana*, which is widely distributed through Western Temperate Asia, and should be looked for in South-eastern Europe.

B. Filaments partially free. Wing-sepals petaloid or herbaceous. Perennial.

a. Arillode 3-appendiculate.

15. *P. SIBIRICA*, Linn., Sp., 987; DC., Prodr., i., 324; Led., Fl. Ross., i., 269; Gmel., Fl. Sib., iv., 64; Boiss., Fl. Or., i., 470; Hook., Fl. Brit. Ind., i., 205. *P.* caulibus numerosis, virgatis, erectis vel subdecumbentibus; foliis nitidis, lanceolatis vel ovalibus, vel infimis suborbicularibus, margine plus minus incrassatis; racemis axillaribus vel extra-axillaribus, laxis; bracteis lanceolatis, deciduis vel subpersistentibus; floribus longe pedicellatis; sepalis exterioribus lanceolatis, subæqualibus; alis oblique lanceolatis, basi angustatis, quam corollam brevioribus, subherbaceis; petalis lateralibus angustis, quam carinam pulchre ciliatam brevioribus; carinæ lobis lateralibus magnis, rotundatis; stylo curvato, elongato; capsula glabra, late alata; seminibus pilosis; arillodii tribus appendicibus quam semen multo brevioribus.

SYN. *P. japonica*, Houtt., Syst., 8; DC., Prodr., i., 324; Hassk. in Miq. Ann. Mus., i., 181; Benth., Flor. Austr., i., 139. *P. vulgaris*, Thunb., Fl. Japon., 277 (non Linn.) *P. elegans*, Wall., Cat., 4186; Hassk. in Miq. Ann. Mus., i., 176; Benth., Fl. Hongkong, 44. *P. Loureiri*, Gard. et Champ. in Kew Journ. Bot., i., 242. *P. myrsinites*, Royle, Ill., t. 19 A. *P. Khasiana*, Hassk. in Miq. Ann. Mus., i., 176. *P. monopetala*, Camb. in Jacq. Voy. Bot.. *Polygala*, sp. 3, Griff., Not., iv., 337. *P. veronica*, Muell., Pl. Vict., i., 184. *P. tenuifolia* (var.), Willd., Sp., iii., 879; DC., Prodr., i., 324. *P. Heyniana* (var.), Wall., Cat., 4184; W. & A., Prodr., i., 38; Hassk. in Miq. Ann. Mus., i., 160. *P. maculophos* (var.), Hassk., l. c., 167. *P. glomerata* (var.), Thw., Enum., 400 (non Lour.): *P. pedunculosa* (var.), Thw., Enum., 400.

FIGS. Led., Ic. Fl. Ross., t. 448; Gmel., Fl. Sib., iv., t. 32; Regel, Pl. Radd., t. vii., f. 23, 25, 26; Houtt., Syst., t. lxii., f. 1; Royle, Ill., t. 19 A; Camb. in Jacq. Voy. Bot., t. 27; Griff., Ic., t. 597; Regel, Pl. Radd., t. vii., f. 21, 22 (var. *ussuriensis*); f. 24 (var. *tenuifolia*).

In Rossia centrali australique; per Asiam borealem centralem-que et etiam tropicam distributa, necnon in Australia.

One of the most widely distributed species of the genus, ranging from Central Russia throughout Northern and Central Asia to Japan; throughout Temperate and Subtropical India to Ceylon; also in Tropical and Temperate Australia, reaching there the furthest south of any species. Its distribution has, however, been greatly obscured by its abundant synonymy. It varies greatly in the size and form of the leaves, and the form and degree of colouring of the wing-sepals; it is best recognized by the shining upper surface of the somewhat coriaceous leaves, the slender extra-axillary racemes, and the conspicuous erect flowers, about the size of those of the last species. There are some well-marked Asiatic varieties, but they do not belong to our flora.

16. *P. SUBUNIFLORA*, Boiss., *Diag.*, ii., 1, 59; *Fl. Or.*, i., 471. “*P. perennis minuta*; caulibus filiformibus, serpentibus, basi nudis, dein erectiusculis, densiuscule foliosis, glabris vel minute puberulis, subsimplicibus; foliis glabris, viridibus, obovatis, obtusis, basi breviter attenuatis, sessilibus, inferioribus minoribus; racemis ad 1–3 flores reductis; floribus pedicello eis vix brevioribus suffultis, folia vix excedentibus, cæruleis; alis oblongis, subincurvis, basi attenuatis, corollam breviter cristatam excedentibus, medio uninerviis, nervo virenti, ramuloso; petalis lateralibus quam carinam sublongioribus; ovario juniori ovato, sessili.”

Rarissima; ad nives supra fontem (Mauronéri) Stygis in monte Chelmos Arcadiæ, alt. 7000’.

I have never seen this little species, and know nothing of it beyond Boissier’s description, quoted above. It may be merely a dwarf alpine form of some other species. Boissier has apparently not himself seen the ripe capsule, and his description is hardly full enough to determine its affinities with certainty. It is possibly more nearly allied to *P. supina*. He describes the stem as two to three inches long, the leaves two to five lines, and the flowers the size of those of *P. alpestris* (*amara*, var.); and considers that the serpylliform root-stock, the form of the leaves, and the small number of flowers, remove it from near affinity to any other species.

β. Arillode not apendiculate.

17. *P. RUPESTRIS*, Pour., *Act. Toul.*, iii., 325; Reich., *l.c.*, xviii., 91; Gr. et God., *Fl. Fr.*, i., 198; Willk. et Lge., *Fl. Hisp.*, iii., 554; Ball in *Linn. Journ.*, 1877, p. 350. *P. caule basi per lignoso; ramis plurimis, virgatis, hirtellis; foliis subcoriaceis, lanceolatis, ellipticis, vel ovatis sæpe apiculatis, margine incrassatis; racemis axillaribus, valde paucifloris; bracteis parvis, ovatis; sepalis exterioribus pubescentibus, ciliatis; alis multo longioribus, obovatis, subherbaceis, margine membranaceis; floribus deflexis; petalis lateralibus angustis, porrectis, per $\frac{2}{3}$ liberis; carina pulchre fimbriato-*

cristata; filamentis superne liberis; stigmatè rostræformi; capsula emarginata, orbiculari, late alata, quam alas multo angustiore; seminibus hirsutis; arillodio galeato, inappendiculato.

SYN. *P. saxatilis*, Desf., Fl. Atl., ii., 128; DC., Prodr., i., 324; Boiss., Voy. Bot. Esp., ii., 81; Woods, Tour. Flor. 42. *Isolophus saxatilis*, Spach, Hist. Nat. des Veg., vii., 114.

FIGS. Desf., Atl., ii., t. 175; Reich., Ic., mcccii., f. 1.

In locis rupestribus et saxatilibus, Hispaniæ Galliæ australis, et Insularum Balearicarum; necnon in Africa boreali.

This interesting species is the only representative in Western Europe of the sub-section to which it belongs, and is very easily distinguished from all others by its axillary racemes, reduced frequently to only one or two flowers, and by the semi-herbaceous texture of the wing-sepals. The wiry stems spring from a very short woody root-stock. The species varies greatly in the form and size of the leaves, but they are always more or less coriaceous, and with a thickened margin. The distribution appears to be limited to the western shores of the Mediterranean, ascending to a height of 5000 feet. Sir J. D. Hooker records it from S. Marocco.

C. Filaments partially free. Annual.

18. *P. EXILIS*, DC., Hort. Monsp., 133; Prodr., i., 325; Reich., Pl. Crit., i., 28; Ic., xviii., 88; Gr. et God., Fl. Fr., i., 198; Bert., Fl. It., x., 521; Willk. et Lge., Fl. Hisp., iii., 554; Woods, Tour. Flor., 42; Car. in Nuov. Giorn. Bot. It., i., 24. *P. caule erecto, humili, copiose ramoso; foliis linearibus, infimis oblongioribus; racemis terminalibus et axillaribus, laxis, paucifloris, haud comosis; floribus minimis, pallidis; alis oblongis, uninerviis; corolla quam alas dimidio brevior; petalis lateralibus quam carinam brevioribus; crista parva, inconspicua; antherarum filamentis liberis quam antheras minimas multo longioribus; stylo infundibuliformi, apice subgaleato, lobo antico abbreviato; capsula sessili, obcordata, minima, quam alas subbreviore sed latiore; seminibus hirsutis; arillodio minimo, inappendiculato.*

SYN. *P. parviflora*, Lois. Desl., Not., 104 (non Poir). *P. linearis*, Lag. (teste DC.), (non Hook. f.). *P. nova*, Boiss. (teste DC.). *P. monspeliaca*, Reich., Fl. Germ. exsicc., no. 2546 (non DC.)

FIGS. Reich., Pl. Crit., f. 61; Ic., mcccxlvi., f. 2; Boiss., Fl. Eur., i. t. 474, f. 1 (teste DC.)

Crescit in Hispania, Gallia meridionali, Italiaque boreali.

Much the smallest of the European species, not reaching a greater height than three to four inches, and the flowers scarcely more than a line in length. It has all the appearance of a weed of agriculture, but its distribution is apparently much more restricted than that of *P. monspeliaca*. It has only been recorded from the

western of the countries bordering the Mediterranean on the north, and chiefly from Spain and the South of France; its only known Italian locality is in the neighbourhood of Venice.

Although usually placed near *P. monspeliaca*, I cannot discern the resemblance to that species. The axillary racemes and inappending arillode seem, on the contrary, to show an unmistakable affinity with this section, to which it appears to bear the same relationship as *P. monspeliaca* does to the first section; a view confirmed by the fact that *P. rupestris*, the species to which it is in many respects nearest, extends also to Western Europe.

Sectio III. CHAMÆBUXUS, Dill., Spach (gen.), DC.

Flores axillares, solitarii, vel racemis cymosis valde paucifloris dispositi; bracteæ ante anthesim deciduæ. Calyx deciduus; sepala exteriora inæqualia, membranacea, superius concavum; alæ petaloideæ. Carina galeata, cucullata, subtriloba, dorso cristam callosam haud fimbriatam gerens. Filamenta apice libera, basi tantum coalita: antheræ per rimas duas laterales dehiscentes. Stylus subcylindricus. Capsula alata, nuda. Semina albuminosa; arillodium carnosum, appendicibus tribus munitum.

This section, as above defined, is very limited in distribution and in the number of species. In Europe it is represented only by *P. Chamæbuxus*, and in Northern Africa by *P. Munbyana*, and Boissier and Cosson's *P. Webbiana* and *Balansa*, which species seem to me all to have a decided affinity with one another. I am more doubtful about another species usually placed in this section, *P. paucifolia* of North America, widely separated by geographical distribution, and differing in the fimbriated crest to the corolla and the scanty albumen. The handsome large-flowered South American shrubs included under this head in DeCandolle's 'Prodromus' have still less claim of affinity; and the same remark applies to the East Indian species referred to the genus by Hasskarl in Miquel's 'Annales Musæi Botanici Lugduni-Batavi,' and (as I now think, erroneously) by myself in Hooker's 'Flora of British India.' These shrubs have exalbuminous seeds and a conspicuous crest to the corolla, the only obvious resemblance to the European type being in the deciduous calyx.

19. *P. CHAMÆBUXUS*, Linn., Sp., 989; DC., Prodr., i., 331; Reich., Ic., xviii., 92; Koch, Fl. Germ., 100; Gr. et God., Fl. Fr., i., 199; Bert., Fl. It., vii., 324; Woods, Tour. Flor., 43; Dmrt. in Bull. Bot. Soc. Belg., 1868. *P. caule lignoso, suffruticoso, decumbente; foliis coriaceis, lanceolatis vel ellipticis, mucronatis, inferioribus minoribus, obovatis, retusis; floribus solitariis vel binis in foliorum axillis dispositis, insignibus, flavis; bracteis parvis, ovatis, deciduis; sepalis exterioribus ovalibus, inæqualibus, membranaceis, intus glandulosis, superiore valde concavo; alis obovatis, quam sepalis exteriora triplo longioribus, carinam æquantibus; petalis lateralibus cum carina per $\frac{2}{3}$ coalitis, et ea*

brevioribus; carina triloba, dorso crista callosa sed non fimbriata ornata; filamentis liberis longis; ovario glabro; stylo elongato, apice incrassato et falcato; capsula rotunda, emarginata, anguste alata; seminibus hirsutis; arilodio appendicibus tribus prædito, quarum duæ ventrales seminis dimidium attingunt, dorsalis abbreviata est.

SYN. *Chamabuxus alpestris*, Spach, Hist. Nat. des Veg., vii., 127; Willk. et Lge., Fl. Hisp., iii., 551; Car. in Nuov. Giorn. Bot. It., i., 20. *C. vulgaris*, Schur, Fl. Trans., 90.

FIGS. Jacq., Austr., t. 233; Reich., Ic., mecli., f. 2, 3.

Per Europam centralem a Gallia australi ad Italiam septentrionalem et Transylvaniam; in Alpibus Helveticis et Italianis frequens; in Britannia, Scandinavia, et Europa austro-orientali non invenitur, nec, ut videtur, in peninsula Iberica nec Pyrenæis. Localitas in ducatu Lucemburgensi est verisimiliter, ut cl. Ball censet, spuria.

The only European species of the section which, as mentioned above, is entirely unrepresented in Asia and America, extending only into Northern Africa. Willkomm and Lange record one old locality in Arragon, about which, however, there is, as they point out, considerable doubt.

β. rhodoptera, Ball MS. Alæ roseæ. In Alpibus meridionalibus.

Sectio IV. BRACHYTROPIS, Willk. (gen.), DC.

Racemi axillares, multiflori; sepala exteriora subinæqualia; alæ persistentes, petaloideæ; petala lateralia e carina fere libera, magna, convoluto-æquitantia, carina multo longiora; carina inclusa, ecristata; antheræ 8, in filamentorum vaginam subsessiles; ovarium breviter stipitatum, stylo apicem versus subrecurvato, stigmatibus inæqualiter profunde bilobo; capsula alata; semina parce albuminosa; arilodium carnosum, galeatum, appendicibus tribus brevissimis præditum.

One of the most distinct sections of the genus, and perfectly monotypic. I do not, however, see sufficient reason for following Willkomm and Lange in separating it altogether into a distinct genus. In the more essential characters connected with the stamens, pistil, and seeds, there is no great departure from the ordinary type of *Polygala*. The comparatively small included keel-petal resembles nothing else in the genus, while the form of the lateral petals is not unlike that in the South American genus *Bredemeyera*. The rigid nearly leafless habit reminds one of several South American species of *Polygala*.

20. P. MICROPHYLLA, Linn., Sp., 989; Prodr., i., 332. P. caulibus pluribus, fruticosis, ascendentibus, rectis, rigidis, sulcatis, glabris, subaphyllis; foliis parvis, 2—3-lin., lineari-lanceolatis, paucis, deciduis; racemis segregatis, in axillis

foliorum versus apicem ramorum dispositis; bracteis parvis, lanceolatis, cæruleis, subpersistentibus; floribus breviter pedicellatis, cæruleis: sepalis exterioribus lanceolatis, superiore parum majore; alis multoties majoribus, obovatis, pulchre venosis; petalis lateralibus fere liberis, oblique spatulatis, carinam multo excedentibus, quasi galeam includentem præbentibus; carina parva, inclusa, apiculata, omnino ecristata, atro-purpurea; antheris subsessilibus, poris duobus dehiscentibus: ovario parvo, elliptico; stylo elongato, apice infundibuliformi, antice lobum stigmaticum gerente; capsula glabra, obcordata, late alata; seminibus nigris, hirtellis: arillodio galeato, breviter appendiculato.

SYN. *P. juniperina*, Cav. in Ann. Cienc. Nat., vol. iv., 1801, p. 53 (teste DC.) *Brachytropis microphylla*, Willk. et Lge., Fl. Hisp., iii., 552.

FIGS. Hoffm. et Link., Fl. Port., t. 56; Brot., Phyt. Lus., t. 175. In Hispania occidentali et per totam Lusitaniam, sed, ut videtur, rara.

A very remarkable and altogether monotypic species, of very restricted distribution.

ADDENDA (see p. 244).

1. *P. VULGARIS*. *P. Vaillantii*, Bess. (Caucasus), and *P. pyxophylla*, Avé Lall. in Reich. Fl. Germ., 350 (Alps), are only slight varieties of this species. *P. vulgaris*, var. *apiculata*, Joad MS. (Calabria), alis ellipticis, apiculatis, is an interesting and distinct variety. The following additional references should be given:—*P. vulgaris*, Willk. et Lge., Fl. Hisp., iii., 556. Var. 2. *depressa*, *ibid.*, iii., 555. Var. 3. *ciliata*, *ibid.*, iii., 556.

At page 243, line 7, for "longiores" read "breviores."

SHORT NOTES.

ERODIUM MOSCHATUM (see p. 261).—The first publication of this name is in Aiton's 'Hortus Kewensis,' ed. 1, 1789, where (vol. ii. p. 414) it appears thus:—"Erodium moschatum, L'Herit., n. 13." Many subsequent systematic writers, having been unable to trace the name to any published book of L'Héritier's, have been led to refer the species to Aiton himself, and it appears as "*E. moschatum*, Aiton," in several Floras. The reference of the 'Hort. Kewensis' is, however, to L'Héritier's 'Geraniologia Brevior,' as it is termed in Dryander's Catalogue of the Banksian Library (vol. iii. p. 301). That collection, so rich in rare and unique treatises, contains a copy of the first sheet (pp. 16, 8vo) of this book, which gives descriptions, synonymy, and localities of twenty-six species of

Erodium. There are references in it to the beautiful plates of the author's folio 'Geraniologia,' which was published in 1787, 8, to which well-known work it was no doubt intended to serve instead of or preliminary to the full text, which was never published, but remains still in MS. in the Candollean library. The 'Geraniologia Brevior' also appears to have been never published, and the writer in the 'Hortus Kewensis' used without doubt the copy above referred to. It must always be remembered, in consulting or quoting the 'Hortus Kewensis,' that the botanical matter of both editions was entirely the work of the librarians of the Banksian collections, successively Solander (who died in 1782), Dryander till his death in 1810, and R. Brown. Hence in the first edition much MS. and unpublished matter was incorporated. With reference especially to L'Héritier, it is stated in the Preface (p. vi.) that references are frequently made to his works "under plants of which he has not yet published either descriptions or figures; these are taken from communications this gentleman frequently made, during the course of printing, of everything he had prepared for the press": the "Monographia de Geranio (not yet published)" is also given in the list of books quoted, p. xxi. From all this it is clear that those botanists are correct who write *Erodium moschatum*, L'Hérit. (in Ait. Hort. Kew., ed. 1, vol. ii., p. 414).—HENRY TRIMEN.

SIBTHORPIA EUROPEA.—I have discovered two new localities for *Sibthorpia europæa* in Sussex. On August 21st, in company with the Rev. E. N. Bloomfield, of Guestling, I found the plant in some plenty at Heathfield; also, more sparingly, at Dallington. This extends the eastward range of this species in Sussex about six miles, and carries it into a new drainage district, that of East Rother.—J. H. A. JENNER.

Notices of Books and Memoirs.

Forest Flora of British Burma. By S. KURZ. Calcutta. 1877. 2 vols.
Published by authority of the Government of India.

THOUGH dated last year, this has quite lately come to hand, and must have been almost the last work of the late energetic Curator of the Calcutta herbarium. The book forms a complete descriptive Flora of the woody plants of our possessions in Burma, —Chittagong, Prome, Martaban and Tenasserim, including the Andaman Islands, —and is intended to enable forest-officers to name the species met with. With this view the clear and simple plan of Bentham's Colonial Floras is followed; there are keys to orders, genera and species, short descriptions, and the arrangement is that familiar to English students. The native names are

given when trustworthy, and there is a full index to them. The only books referred to are Beddome's 'Flora Sylvatica' of South India, Brandis's 'Forest Flora of N. W. India,' and the new general 'Flora of India' as far as published. No synonyms are given. The descriptions are good and clearly written, the book is well printed, and it will form a very useful addition to the Indian botanist's library.

Considering how much of the country included has still to be examined, it is perhaps matter for surprise that so many as about 2000 trees and shrubs are here described; but we have to do with a very rich tropical vegetation, and there is little doubt that that number falls very far short of the whole amount of woody plants. Mr. Kurz himself added a large number of species in his short expeditions; and from the excellent account he has given in his Report published in 1876, and also in the Introduction to the present work, one can form a fair idea of the immense variety in the character of the forests which cover nearly the whole country, and extend from the Mangrove swamps of the sea to the dense woods of *Pinus Kasya*, reaching up to 7000 feet, on the Martaban hills. The prominent constituents of each kind of forest are enumerated in the author's introductory description, and exhibit the great variety of species which is met with in such tropical districts, contrasting greatly in this respect with the gregarious trees of the woods of temperate climes.

The systematic botanist will find some species described in this Flora for the first time; but it is probable that the greater part of the author's novelties were published by him in his series of papers in the Journal of the Asiatic Society of Bengal, which however was uncompleted at the time of his death.

H. T.

On the Apocynacea of South America, with some preliminary remarks on the whole family. With thirty-five plates to illustrate the structure of the Genera. By JOHN MIERS, F.R.S., &c. Williams & Norgate, London. 1878. (Quarto, pp. 278).

ANOTHER of Mr. Miers' elaborate and painstaking memoirs on the plants of South America is here offered to botanists, the result of many years' work, dating indeed from the time of the venerable author's residence in Brazil, we are afraid to say how many years ago. The volume is uniform with the 'Illustrations of S. American Plants' and 'Contributions to Botany,' and presents that minute discrimination and attention to generally neglected characters which distinguish all that comes from Mr. Miers' pen and pencil.

Only the S. American species of the Order are treated of here. Those of Brazil have been comparatively recently monographed by Müller in the 'Flora Brasiliensis,' in 1860; but the present author, though acknowledging the high merit of that memoir, considers that the species placed there under the great genera *Tabernaemontana* and *Echites*, are a heterogeneous host, massed together without any aids for satisfactory discrimination. One

object of his memoir, therefore, has been to subdivide these overgrown genera into uniform groups marked by peculiar and easily recognized characters. Those principally employed by the author are—the anther, by the form of which the whole Order is primarily divided into two great groups; the direction of the spiral convolution of the corolla-segments, the divisions of the disk, and especially the nature of the fruit and the development of the seeds so far as observations allow. To what extent this classification will be accepted by botanists remains to be seen: its author has had the advantage of studying the living plants in a wild state, and every one must admire the careful work evidenced throughout. Probably many will demur to recognizing so many as sixty-six S. American genera, of which twenty are here published for the first time (several are well-known plants however), and a proportionate number of new species. This amount is remarkably large when it is borne in mind that the author, from several causes (enfeebled health unfortunately being one), has been, to his great regret, prevented from examining the herbarium at Kew, which could not fail to have added considerably to the species here included. Hence those only of the British Museum and the author's own rich herbarium, along with published species, are included. Extreme differentiation of forms is, however, characteristic of all Mr. Miers' work, and is so clearly the result of an exhaustive examination of his material, that it seems ungenerous to raise objections to it.

In his Preliminary Remarks the author describes the structure of the reproductive organs of the group *Symphyanthereæ*, and comes to the conclusion that “the work of fertilization is effected without the aid or even the possibility of insect agency.” He believes the same to be also true of the *Asclepiadeæ*, in which he is opposed to the view held by R. Brown.

H. T.

An Elementary Course of Botany, Structural, Physiological and Systematic. By Prof. A. HENFREY. Third Edition, by M. T. MASTERS, M.D., F.R.S., &c. London, Van Voorst. 1878.

THE publication of a third edition of this well-tryed and valuable text-book requires little more than the remark that it has been as completely as possible brought up to date, so much indeed having been added and altered that the Editor says it may to some extent be considered a new book. This cannot be affirmed unconditionally, however; and though Dr. Masters speaks approvingly in his Preface of the plan of arrangement of the book, we scarcely think it one which he would have adopted if writing a new one. Henfrey's treatise at the time of its first appearance was in most respects admirable, but it ought never to have undergone “restoration” by however competent a hand. The portion devoted to the Cryptogams is still unduly small, scarcely one-tenth of the book: this has been revised, and the Fungi re-written by Mr. George Murray, of the British Museum, who has endeavoured to get as much as possible into this inadequate space, with perhaps some sacrifice of

clearness to brevity. The systematic description of the Orders of Phanerogams is very full, with many fresh intercalations, forming quite an encyclopædia of information. Taking the book as a whole, indeed, there is no English text-book of the size which contains so much varied and accurate information in all departments of Botany.

H. T.

Botanical Note-Book, a practical guide to a knowledge of Botany.
By E. M. HOLMES, F.L.S. London, Christy & Co. 1878.

THIS little book, which apart from the "schedules" contains about sixty pages only, is intended to help to the acquirement of such a practical acquaintance with Botany as shall enable a student to find out easily the Natural Order to which any flowering plant belongs, and to obtain a correct knowledge of the use of botanical terminology. It is exceedingly elementary, and suited to the needs rather of students of pharmaceutical than medical schools. Directions as to the mode of examining plants is followed by a Glossary of the terms applied to each organ, something on the plan of Lindley's 'Descriptive Botany,' but with the derivation and accentuation of each term given. This is carefully prepared, but a few slips should be corrected: under Albumen the word "seed" should be embryo; the fruits of the *Labiata* and *Boragineæ* can never be correctly termed pyrenes; there is no necessity for an oval leaf to be obtuse at the ends. The most attractive feature is two "charts," one of the main divisions of the vegetable kingdom and the other of British Natural Orders, which will save the student the trouble of making similar ones for himself—perhaps after all not an unmixed advantage. In the explanations of the charts more care should have been taken, so as to avoid such statements as that *Rhamnus* is apetalous, that the perianth of *Juncaceæ* is six-parted, and that *Cyperaceæ* are to be known from Grasses by the staminate flowers in the majority being arranged in the terminal spikelet and the bracts underneath each flower three or more in number. A useful Floral Calendar concludes the Note-Book.

H. T.

THE 76th Fasciculus of the 'Flora Brasiliensis' consists of the *Lemnaceæ* by Hegelmaier, and the *Araceæ* by Engler. It is dated 1st February, 1878. The morphology and anatomy of the Duck-weeds, by the former author, is illustrated by a fine plate. The flowers and fruit of *Lemna (Spirodela) polyrhiza* are drawn from North American specimens, as all those seen from Brazil are, like the British ones, barren. The *Araceæ* are elaborately treated, and illustrated by 51 plates, four of which are devoted to histology. *Pistia* is very fully exhibited in the last plate; Engler reduces all the described species to one.

Dr. A. Ernst, in his 'Estudios sobre la Flora y Fauna de Venezuela' (1877, Caracas), gives a general sketch of the Flora of that

rich country, followed by a complete catalogue of the Ferns (44 genera, 399 species, arranged after the 'Synopsis Filicum') and Orchids (78 genera, 412 species).

Messrs. Godwin & Salvin's forthcoming 'Biologia Centrali-Americana' will contain a full catalogue of the known species of plants of Central America by Mr. Hemsley. Among them are many previously undescribed, and of these at least a third have been drawn and lithographed. With the object of securing priority in the names, the author has recently issued Diagnoses of the new species of *Polypetalæ* (81 in number) in a small pamphlet. Of *Sedum* and *Fuchsia* a synopsis of all the species known from the regions in question is given. The name *microphylla* in *Polygala* is already occupied by a Spanish species.

Pringsheim's 'Jahrbuch für Wissenschaftliche Botanik' for 1878 contains:—G. Reinke on *Monostoma bulbosum*, Thm., and *Tetraspora lubrica*, Ktz. (t. 28); Woronin on *Plasmodiophora* [the cause of "Anbury" in Turnips, &c.], (tt. 29–32); R. Sadebeck on the development of the embryo of the Horsetails (*Equisetum*), (tt. 35–37); H. Bauke on the germination of the *Schizaceæ* (tt. 38–41). This part completes the 11th volume.

OTHER NEW BOOKS.—L. JUST, 'Botanischer Jahresbericht.' 1876. 4th and concluding part. Berlin, Eggers (18 mk.)—A. S. WILSON, 'The Botany of three historical records: Pharaoh's Dream, The Sower, and the King's Measure.' Edinburgh, Douglas, 1878.—'Atti della Società Crittogamologica Italiana.' Vol. I. 1878. Milan (15 lire).—G. Bentham, 'Handbook of the British Flora,' ed. 4. 1878. L. Reeve (12s.)

ARTICLES IN JOURNALS.—JULY, 1878.

Scottish Naturalist.—J. Stirton 'On certain Lichens belonging to the genus *Parmelia*' (continued).—Id., 'A new Scottish Lichen (*Lithographa Andrewii*).'
—S. Buchanan White, 'Flora of Glen Tilt.'

American Naturalist.—E. Potts, 'The runners of *Erythronium americanum*.'

Bot. Zeitung.—H. Nebelung, 'Spectroscopic researches on the colouring matters of some fresh-water *Algæ*' (continued).—P. Ascherson, 'On *Eriophorum alpinum*'; 'On *Colchicum Ritchii*, R. Br.'—'Oudemans, 'Thecaphora *Ammophila*, n. sp.'—A. de Bary, 'On Apogamous Ferns, and the phenomenon of Apogamy in general' (tab. 12).

Flora.—A. Minks, 'The Microgonidium' (continued).—G. Strobl, 'On the flora of the Nebrodes' (continued).—C. Kraus, 'Causes of the direction of growing shoots.'

Oesterr. Bot. Zeitschr.—W. Vatke, 'Plantæ in Africano a Hildebrandt coll.—*Leguminosæ*' (continued).—J. Wiesbaur, 'Bot. observations.'—J. Freyn, 'On *Ornithogalum Visianianum*, Tommas.'

— F. Hauck, 'Algae of the Adriatic' (continued). — M. Wetschky, 'On the flora of Hungary.' — H. Zukal, 'On the Lichen-question.' — E. Rathay, 'Preliminary Notice of *Cladosporium Roesleri*, Cattan, and the "black brand" of the Vine.' — F. Antoine, 'Botany of the Vienna Exhibition' (continued).

Hedwigia.— R. Wollny, 'On *Vaucheria*-galls.'

Annales des Sc. Nat. (6, v., nos. 4 & 5). — E. Warming, 'On the ovule' (continued), tt. 7-13. — P. Rauwenhoff, 'On the causes of abnormal forms of plants which grow in darkness' (tt. 14, 15).

Nuov. Giorn. Bot. Ital. (30th July). — F. Delpino, 'Defence of the doctrine of dichogamy.' — A. Todaro, 'Do the Oaks known in commerce under the names "Farnia" and "Rovere" grow in Sicily?' — L. Nicotra, 'Some observations on the flora of Messina.' — L. Haynald, 'De distributione geograph. *Castaneæ* in Hungaria'; with note by A. DeCandolle. — A. Borzi, 'Notes on biology and morphology of the phycochromaceous *Algae*' (tt. 7-10). — A. Piccone, 'Algological flora of Sardinia.'

Journ. Linn. Soc. Lond. (No. 98, 31st July). — M. M. Hartog, 'Morphological notes on certain species of *Thunbergia*.' — G. King, 'On the source of the winged Cardamom of Nepal.' — G. Dickie, 'Algae found during the Arctic Expedition.' — M. J. Berkeley, 'Enumeration of the Fungi collected during the Arctic Expedition.' — F. Darwin, 'Experiments on the nutrition of *Drosera rotundifolia*.' — I. B. Balfour, 'Observations on the genus *Pandanus*, with an enumeration of all described or named species.' — J. Miers, 'On the *Schæffieæ* and *Cervantesieæ*, distinct tribes of the *Styraceæ*' (tt. 1-4).

Botanical News.

DR. ODOARDO BECCARI has been appointed Director of the Botanic Garden and of the Botanical Collections of the Natural History Museum of Florence; and M. PEDICINO, of Portici, succeeds De Notaris at Rome.

The post of Professor of Systematic Botany and Director of the Botanic Garden at Vienna has been filled by the appointment of Prof. A. KERNER.

The French Academy has elected, as "Membres Correspondants" of the section of Botany, Dr. ASA GRAY in the room of Prof. A. Braun, and Mr. C. DARWIN in the place of M. Weddell.

The Gold Medal of Botany given by the Apothecaries' Company has been awarded to Mr. T. B. FRANKLIN EMINSON, of St. Mary's Hospital; the Silver Medal and Books to W. EGERTON STARLING, of Guy's.

The death of GUSTAV WALLIS, of Detmond, the well-known horticultural traveller, on June 20th, is recorded.

Original Articles.

ON *ARISTOLOCHIA LONGIFOLIA*, CHAMP.

By H. F. HANCE, PH. D.

THIS very fine species, characterized by Mr. Bentham as the handsomest of all the East Indian *Aristolochia**, is one of the rarest plants in Hong-Kong. The late Colonel Champion, its discoverer, never saw it but twice in bloom; and the only flower Mr. Bentham was able to examine had been too much crushed by undue pressure in drying to allow of his making out the structure of the stamens and styler column, so that up to the present time its exact position in the genus has remained uncertain. My excellent friend the Rev. James Lamont, who has added several most interesting species, which it has been my privilege to describe, to the flora of the island, during his five years' residence, has on different occasions been so fortunate as to meet with the plant; but the flowers he gave me were never in a condition to admit of proper examination. Indeed, very great care is necessary in drying them, as they are apt to get pulpy and rotten, unless the paper is very frequently changed. In 1877, at my request, Mr. Lamont put up a freshly-gathered flower or two in alcohol; and a dissection of these enables me to give a more precise character than has yet been published, and to determine the systematic place of the plant.

Aristolochia longifolia, Champ. Rhizomate crassiusculo cortice griseo obducto hinc inde fibras tuberoso-incrassatas emittente, caulibus pluribus decumbentibus v. erectiusculis subsimplicibus tomento denso sordide ferrugineo vestitis, foliis approximatis anguste lanceolatis v. lanceolato-oblongis basi obtusis apice acuminatis coriaceis supra glaberrimis venisque concoloribus subtiliter et fere æqualiter reticulatis subtus hirsutis parenchymate viridi costa valida nervis venulisque pallidis prominulis reticulatis 6-10 poll. longis 7-12 lin. latis petiolo 4-10 lineali, racemis 3-5-floris ex apice rhizomatis necnon ad caulium bases fasciculatis tomento sordide fulventi dense hirsutis, bracteis parvis lanceolatis, ovario oblongo subclavato hirsutissimo 5-lineali, perigonii extus ferrugineo-hirsutissimi valde 12-nervosi utriculo basilari haud distincto tubo semel refracto 2½ poll. longo inferne amplo supra flexuram parum constricto intus præter basin pilis articulatis consitam glaberrimo ore anulo calloso notato, limbi bilabiati extus reticulato-nervosi margine undulati 6-dentati labio superiore 10 lin. longo erecto intus glaberrimo inferiore saccato intus creberrime papillato-ruguloso, columna styli crassa oblonga in lobos

* Hook., 'Journ. Bot.,' vi. 117.

3 erectos parallelos rugosos apice subtruncato-obtusos stigmatibus undulatis marginatos divisa, antherarum 6 circa mediam columnam æquidistantium loculis apice contiguis basi subdiscretis.

It will be evident from the above diagnosis that the Chinese plant falls into the section *Siphisia* of Duchartre, as was conjectured by Bentham; but it does not fit exactly into either of his subdivisions. By its only once-bent perigone-tube it agrees rather with the second one (Klotzsch's *Nepenthesia**), from which it differs in habit, and in the perigone-limb being six- not three-toothed. In the two latter particulars it concords with the third subsection (Klotzsch's *Pentodon* †), which, however, has a twice-bent perigone-tube; but I do not think this latter character is of much value, for a little further prolongation of the tubular form, instead of its spreading out into a limb, would produce the difference, and in the present plant one lip only is erect, the other having the edges cohering, so as to form a sac, like that of *Cypripedium*. In the length of the lower sterile portion of the column, and its blunt flattened apex, it differs, I believe, from all other members of its section, and shows an approach to *Asterolytes*. Duchartre assigns parallel anther-cells to all *Aristolochia*, but here they are certainly distinctly, though slightly, divaricate at the base, whilst the two anthers adnate to each lobe of the column are no nearer to one another than to those of the adjacent lobes. It is undoubtedly a remarkable species, which I suppose should stand between *A. saccata*, Wall, and *A. Thwaitesii*, Hook. It appears to indicate that it might be better to unite the two subdivisions in which these are placed by Duchartre, and perhaps also to reduce *Asterolytes* to *Siphisia*.

ON SOME POINTS IN THE MORPHOLOGY OF *HALOPHILA*.

BY I. B. BALFOUR, Sc.D., F.L.S.

[Notes read at the Meeting of the British Association, August 19th, 1878. †]

Naiadaceæ present many peculiarities in organization. I need only refer to the terminal nature of the stamen in *Naias*, as described by Magnus, and to the character of the ovule in *Zostera*, *Ruppia*, &c., in support of the statement. In the morphology of *Halophila*, which I have recently been studying, there are several points of great interest, but I shall only here refer to two.

This genus includes a few marine plants, growing in widely spreading patches on sandy flats in the tropics, at the limits of ebb-tide. On looking at such a form as *H. ovalis*—the type of

* Klotzsch, 'Die *Aristolochiaceæ* d. Berliner herbariums,' t. ii., f. 11. Duchartre, 'Ann. sc. nat.,' 4e. sér., ii., t. 5, f. 6.

† Klotzsch, op. cit., t. ii., f. 12.

‡ A paper, with illustrations, on the genus *Halophila*, will appear in the forthcoming part of the Transactions of the Botanical Society of Edinburgh.

the genus—we observe a procumbent, freely branched, jointed stem: from almost every joint arises a branch, jointed and procumbent, like the axis from which it springs, and it in turn bears similar branches, which repeat the process. At the joints there is visible a pair of small sheathing scale-leaves, one on the under, and the other on the upper side of the procumbent stem; and in addition there is a pair of foliage-leaves on the upper side of the stem, with their bases somewhat embraced by the sheathing upper pair of scale-leaves. The arrangement is such that at first sight one might suppose we had stipulate leaves produced in pairs at successive joints on one procumbent branching axis.

But the arrangement is more complicated and, so far as I know, unique in the vegetable kingdom; and it is to this—a point briefly noticed by Irmisch* many years ago—I wish, in the first place, to direct attention.

Taking any one procumbent axis as the (relative) primary axis, we find it consists of alternating elongated and shortened internodes. Each internode bears a small sheathing scale-leaf, and as every alternate internode is shortened these scale-leaves are approximated so as to appear in pairs. In each pair the leaves are always placed opposite each other; the older, that of the inferior internode, being always on the under side of the stem. The successive pairs are not superposed, as has been hitherto believed, but are set on so that their median planes form an acute angle with one another and a less acute angle with the vertically bisecting plane of the primary axis. The (relative) primary axis, no matter how greatly it elongates, only bears those scale-leaves.

In the axil of the uppermost (younger) of each pair of scale-leaves on the (relative) primary axis there arises an extra-axillary leaf-bud, always on the side of the median plane of the subtending leaf, farther from the vertically bisecting plane of the primary axis. The secondary axis so developing begins with two shortened internodes, each of which bears a foliage-leaf. These foliage-leaves are always opposite one another, and are necessarily closely approximated on the axis. The third internode of the secondary axis is elongated, and bears a scale-leaf; and the fourth internode is shortened, and also bears a scale-leaf, these being placed opposite one another. Thus at the joint formed by the third and fourth nodes a pair of opposite scale-leaves occurs. Now it is curious to note that these scale-leaves are in series with the scale-leaves on the primary axis; and at every succeeding joint on the secondary axis a like pair of scale-leaves may be produced, and successive pairs will be set on at an acute angle with the preceding. We have, in fact, a repetition of what we observed on the primary axis. The upper scale-leaf of each pair on the secondary axis gives rise to an extra-axillary tertiary axis, the first pair of leaves on which are foliage-leaves, and all succeeding pairs are scale-leaves, and so on:

Now whilst the scale-leaves on all the axes are in series, the

* Bot. Zeit., xvii. (1859), 355 adnot.

foliage-leaves are not in series with the scale-leaves, but successive pairs of foliage-leaves primarily decussate; though subsequently, owing to changes in the progress of development, they are set on at a wide acute angle.

The peculiarity then in the arrangement of the leaves is this—the foliage-leaves are always produced as the first pair of leaves on lateral shoots arising in the axil of scale-leaves, and these shoots, as they elongate, thereafter produce only scale-leaves. I know of no instance of a similar arrangement.

The second point to which I wish to refer is connected with the morphology of the part of the flower.

The flowers are unisexual. The male flower consists of three stamens, connate by their filaments, and surrounded by a tripartite perianth, the segments of which alternate with the stamens. In the female flower three carpels are combined to form a one-celled, many-ovuled ovary, and the segments of the tripartite perianth alternate with the carpels.

The position of parts renders it probable that we have here a case—similar to that of *Salix* amongst *Dicotyledons*—of the same phyllomes forming carpels in one flower and stamens in the other. But whilst analogy supports this supposition the explanation is conceivable that whilst in the female the inner perianth of the typical monocotyledonous flower is present with the three carpels, in the male the outer perianth-whorl coupled with the inner staminal row, is represented.

SOME NOTES ON THE FLORA OF THE EXTREME SOUTH OF DEVON.

By T. R. ARCHER BRIGGS, F.L.S.

I HAVE recently spent a few days in investigating the botany of the portion of S. Devon that lies between Bigbury Bay on the west, and the Start Point on the east, and forms the bold stretch of land projecting into the English Channel on each side of the inlet running up to the town of Kingsbridge, and terminating on its western and eastern sides in the respective headlands of Bolt Head and Prawle Point. Comparatively little has been done by the botanist in this part of Devon, though its flora is of peculiar interest from the land being the most southerly in the county, and such of it as lies south of a line drawn from the village of Hope, a little north of Bolt Tail, to Hall Sands, near the Start Point, being on mica slate and gneiss. Rocks of similar formation do not occur elsewhere in the county, though they reappear in the adjoining one of Cornwall, to the south of the serpentine, at Lizard Point. My examination of the tract has been of too incomplete and cursory a nature to allow me to attempt anything like a full account of the plants growing in it. What I aim at doing in this paper is to name, and sometimes give particulars respecting, the rarer or

otherwise more than commonly interesting among the species that I noticed during four days' search in it with my brother, from July 30th to August 2nd of the present year.

Clematis Vitalba, Linn. About one mile from Kingsbridge, by the Dartmouth Road; Thurlestone Village; between Buckland and Bantham.

Ranunculus Lenormandi, F. Schultz. In a bog close to the coast on the hill-side, immediately east of Sewer Cove.

Berberis vulgaris, Linn. A single bush in a hedge by a lane near Lincombe away from houses.

Papaver Rhæas, Linn., b. *strigosum*. Seen in the district.

P. Argemone, Linn. In a potato patch at Thurlestone; one plant among potatoes at Prawle.

P. hybridum, Linn. With *P. Argemone* at Thurlestone; in a corn-field at Bolt Head.

Glaucium luteum, Scop. North Sands, near Salcombe. I have not found the Horned Poppy a common plant in S. Devon.

Chelidonium majus, Linn. Seen only in one spot between the hamlets of Buckland and Bantham. In Devon and Cornwall it seems always derived from former cultivation.

Fumaria pallidiflora, Jord. Bank by South Sands, near Salcombe, and between that and the village. One of the localities given for this plant by Dr. Boswell, in Eng. Bot., ed. 3, is Salcombe, on the authority of Prof. Babington. It is interesting to find it so persistent here. Ilfracombe is the only other place in the county where I have seen it; and this also is mentioned as a station in Eng. Bot. It seems partial to the neighbourhood of the sea.

F. confusa, Jord. This, the common Capreolate Fumitory of the county, was noticed in the district.

Sinapis alba, Linn. In a field of potatoes at West Alvington; and in one other spot. Looking more like a "colonist," less of a "casual," than about Plymouth.

Arabis hirsuta, Brown. In one spot in the churchyard at Kingsbridge.

Senebiera didyma, Pers. Kingsbridge; West Alvington; Thurlestone; Buckland. A plant that generally abounds in our villages, especially if situated near salt water.

Viola hirta, Linn. Only noticed about a mile and a half from Kingsbridge, by the Dartmouth road.

Drosera rotundifolia, Linn. In a bog on the hill-side, east of Sewer Cove. There are now few suitable spots for it in the highly cultivated and rich arable tract about Kingsbridge, forming part of the fertile South Hams of Devon.

Polygala depressa, Wender. Seen in one or two spots.

Mönchia erecta, Sm. Bolt Head.

Sagina ciliata, Fries. Sewer.

S. subulata, Wimm. Bolt Head; Prawle Point. It was interesting to see this species, that is common on Dartmoor, growing on the most southern headlands of the warm sea-coast.

Spergularia neglecta, Syme, E. B. Seen by the tidal water.

S. marginata, Syme. By the inlet at Blanks Mill.

S. rupestris, Lebel. Bolt Head, &c. The common species of the rocky coast in Devon and Cornwall.

Polycarpon tetraphyllum, Linn. In considerable quantity and for some yards below a wall and on a rocky bank at Buckland, a hamlet situated at the end of a small tidal inlet from the Avon estuary, in the parish of Thurlestone. In one spot it occurs with *Erodium maritimum* and *Malva rotundifolia*. The four places in which I have seen this in Devon and Cornwall are all in villages or hamlets, yet there is no ground for supposing it an introduction. One reason for its choosing such spots may be that it will only flourish in such dry or rocky places as support a scanty or minute vegetation incapable of crowding it out.

Malva moschata, Linn. Seen near Ford only.

M. rotundifolia, Linn. Prawle village; Buckland. One of the species most prone to grow near houses.

Geranium sanguineum, Linn. On the mica and gneiss formation very near Prawle Point. It is recorded by Keys from Bolt Head, but we did not see it there.

G. striatum, Linn. Seemingly quite established (as it is in several spots around Plymouth) on a hedgebank a short distance from an old house at Collapit, on the lower road from Kingsbridge to Salcombe.

G. rotundifolium, Linn. By the road to Loddiswell, immediately to the north of Kingsbridge; not seen elsewhere. *G. lucidum* in the same locality.

Erodium maritimum, Sm. Thurlestone and Bantham villages. This delights to grow on rocky cuttings about villages lying near the coast. Considering the proximity of the sea and the large influx of tidal water into the tract I was surprised to find this in so few spots; the allied *E. cicutarium* only at Thurlestone and Bantham; and *E. moschatum* not at all.

Medicago sativa, Linn. Quite established in considerable quantity on the edge of a piece of cultivated ground, near a mass of rock, a short distance from Prawle Point, associated with *Geranium sanguineum* and other native plants. It must have grown here for a considerable time.

M. denticulata, Willd. By the road-side close to North Sands, near Salcombe.

Trifolium medium, Linn. Near Prawle, in the mica and gneiss tract. Apparently not common.

T. fragiferum, Linn. Thurlestone, on the sands and in the turf between that and the village, in plenty. A considerable distance from any previously recorded station. Not found anywhere near Plymouth.

Lotus tenuis, Kit. Near Bolt Head.

Orobis tuberosus, Linn., b. *tenuifolius*. With the type, in a lane near Wolston.

Prunus Cerasus, Linn. In many spots in hedges.

Agrimonia odorata, Mill. Between West Alvington and Marlborough; also near Heddswell Cross, a little west of the former village; between Frogmoor and Ford. In the 'British Flora,'

ed. 7, published in 1855, there are five stations named for this, of which Start Point is one, so that it was long ago recorded from the neighbourhood. It is common all around Plymouth into Cornwall, and occurs over the country intervening between Plymouth and Kingsbridge.

Rubus rhamnifolius, W. & N. Near Ford.

R. ramosus, Blox. In a hedge, near Ford, between Kingsbridge and Prawle Point.

R. discolor, W. & N. One of the common *Rubi*.

R. villicaulis, W. & N., b. *derasus*, Babington; *R. adscitus*, G. Genev. Between Frogmoor and Ford. This abounds about Plymouth; and in walking from Modbury to Kingsbridge we found it one of the commonest Brambles.

R. umbrosus, Arrh. Hedge between West Alvington and Marlborough. Not typical, being one of the small-leaved forms.

R. diversifolius, Lindl. Salcombe, &c. This seems common in the tract.

R. corylifolius, Sm., a. *sublustris*, Lees. Near Prawle; between Frogmoor and Ford, &c. The well cultivated tract of country about Kingsbridge does not afford a large number of *Rubi*.

Rosa spinosissima, Linn. Bolt Head; Prawle Point. Very small at both places.

R. tomentosa, Sm. Near Prawle; between Ford and Chivelstone; between West Alvington and Marlborough.

R. micrantha, Sm. Between Chivelstone and Prawle; near Ford.

R. canina, Auct. The vars. *lutetiana*, *dumalis*, and *urbica*, were noted.

R. stylosa, Desv., a. *systyla*, Baker; *R. systyla*, Bast. Déséglise. Between West Alvington and Marlborough, and in a hedge close to Marlborough village; between Kingsbridge and Salcombe.

R. leucochroa, Desv. Apparently common. Between Kingsbridge and Salcombe; between Frogmoor and Prawle Point; near South Pool. A well-marked Rose that keeps up its characters well.

R. arvensis, Huds., b. *bibracteata*. Hedge between West Alvington and Hiddeswell Cross.

Pyrus Malus, Linn., a. *acerba*, and b. *mitis*. In hedges. Both at 550 feet, near Prawle.

Epilobium lanceolatum, S. & M. In considerable quantity close to Kingsbridge, on the north, by the road to Loddiswell. It also occurs within a mile of the town by the road to Churchstow, but this station is beyond the northern border of the district under consideration. This is also the case with Aveton Gifford, between Modbury and Kingsbridge, where we found it in plenty. We did not see it anywhere on the mica and gneiss.

Enothera odorata, Jacq. This seems established on a garden wall near Salcombe.

Fryngium maritimum, Linn. Thurlestone Sands.

Sison Anomum, Linn. In plenty about Kingsbridge; Thurlestone.

Pastinaca sativa, Linn. By the road to Dartmouth, near

Kingsbridge Cemetery; here in tolerable quantity, but not seen anywhere else.

Smyrniacum Olusatrum, Linn. In a few spots near houses, as an escape from ancient cultivation. I have never seen it but in this character.

Viburnum Opulus, Linn. Between Kingsbridge and Charleton. Not noticed anywhere else, nor did we see the allied *V. Lantana* in the district, though we found it in hedges at Churchstow, about two miles to the north-west of Kingsbridge, on the road to Aveton Gifford. This latter is a peculiarly local plant in S. Devon.

Rubia peregrina, Linn. Salcombe; Sewer.

Galium cruciatum, With. Apparently common. It has a local distribution in Devon, and I have never met with it in Cornwall.

G. verum, Linn., b. *ochroleucum*. Thurlestone Sands; in one spot covering a square yard, and appearing in others. I noticed some immature fruit, though this plant is suspected to be a hybrid by many.

G. tricorne, With. One plant among potatoes in a field at Thurlestone.

Valerianella Auricula, DC. In a barley-field at Heddiswell Cross, near West Alvington; among potatoes at Prawle.

Dipsacus sylvestris, Linn. Between Bolt Head and South Sands; Thurlestone; Chivelstone.

Carduus tenuiflorus, Curt. South Sands; Thurlestone. Not so general as we might expect from the maritime influences prevailing.

Arctium intermedium, Lange. Near Bolt Head.

Serratula tinctoria, Linn. Noticed only between Kingsbridge and Salcombe. A general paucity of sylvestral species in the tract.

Artemisia Absinthium, Linn. Thurlestone, sparingly near the church. In Devon and Cornwall, I believe, always derived from ancient cultivation.

Inula Conyza, DC. Common.

I. crithmoides, Linn. On a mass of rock by Sewer Cove. But few Devonian stations are recorded for this, and I have found it quite a rare and local plant.

Hieracium umbellatum, Linn. Local. This and *H. Pilosella* were the only species of the genus met with.

Specularia hybrida, A. DC. Thurlestone, one plant among potatoes.

Vinca minor, Linn. Spread from cultivation at East Town and South Pool.

Erythraea pulchella, Fries. In one spot between Kingsbridge and Salcombe.

Convolvulus Soldanella, Linn. Thurlestone Sands.

Hyoscyamus niger, Linn. North Sands, near Salcombe. Sparingly, as is usually the case with the Henbane.

Verbascum virgatum, With. In a grass-field, between Kingsbridge and Salcombe; one plant seen at Thurlestone.

Scrophularia Scorodonia, Linn. The abundance of this about

the town of Kingsbridge is a most noticeable feature in its botany. It must have been discovered here many years ago, for there is a specimen, labelled "Kingsbridge, Devon, Aug. 1845. C. Harper," among a collection of plants, in the possession of Mr. N. Easton, a gentleman of Plymouth; but its occurrence has been well-nigh lost sight of by the botanists of the neighbourhood. Not only did my brother and I find it in plenty on the hedge-banks all around the town, but occurring in many spots some miles beyond it. In a south-eastern direction we found it in plenty on to a little beyond Charleton, also near East Town, occurring again in considerable quantity in a hedge by the lane as you go up the hill from Frogmoor by the telegraph wires; also near the hamlet of Ford, ascending on a sheltered bank between that and Chivelstone, three to four miles from Kingsbridge, to 400 feet. South of Kingsbridge, on the lower road to Salcombe, we noticed it on to the little vale on the southern side of Collapit. On the south-west it occurred in plenty at West Alvington, and we discovered an outlying patch within a quarter of a mile of Marlborough village, at 320 feet, nearly four miles from Kingsbridge; and another close to the hamlet of Bantham, in the parish of Thurlestone, on the eastern bank of the Avon estuary. The flowers of *S. Scorodonia* are rather brighter-coloured than those of either *nodosa* or *Balbisi*, the purple taking more of a reddish tint; and it is decidedly the prettiest of the three species. We noticed wasps to be as partial to its flowers as they are to those of the other two. It must not be supposed that the mica-slate formation has anything to do with the occurrence of this plant, as it is not on this rock, but on the Devonian slate, that it grows in so great quantity.

Bartsia Odontites, Huds., a. *verna* and b. *serotina*. Both in the district.

B. viscosa, Linn. Starall Bottom; Prawle.

Mentha rotundifolia, Linn. Quite a common plant; more abundant than about Plymouth, and I am disposed to think indigenous in some spots.

M. sativa, Linn. A form of this approaching b. *paludosa* was seen between West Alvington and Marlborough. Out of the district, between Modbury and Aveton Gifford, excellent *paludosa* occurs.

M. Pulegium, Linn. In considerable quantity between Kingsbridge and Salcombe, near Collapit, growing in fields, and sparingly about the sides of the road; in an open turfy spot above Sewer Cove. Probably indigenous; if not so, certainly quite established. It occurs in very similar spots in the parish of Holbeton, lying between this and Plymouth, by Bigbury Bay. Very few Devonian stations are recorded for the Pennyroyal.

Salvia Verbenaca, Linn. Seen only near Salcombe.

Melittis Melissophyllum, Linn. Near Kingsbridge, by the lower road to Salcombe.

Stachys ambigua, Sm. Near Salcombe, and in one or two other spots.

Myosotis repens, Don. This would seem to be the common

Water Forget-me-not of the tract, as about Plymouth. *M. caespitosa* was seen likewise, but not *palustris*.

Anchusa sempervirens, Linn. Thurlestone, and in one or two other spots. I do not think it an indigenous species; though it is now common in Devon.

Cynoglossum officinale, Linn. Prawle, sparingly between the village and the point.

Pinguicula lusitanica, Linn. In the bog above Sewer Cove, with *Drosera* and *Narthecium*.

Centunculus minimus, Linn. On the damp turfy waste close to Prawle village.

Statice binerrosa, G. E. Sm. On the low cliffs by Sewer Cove; a form looking to me intermediate between vars. a. *occidentalis* and b. *intermedia*.

Rumex rupestris, Le Gall. In tolerable quantity on rocks at Sewer Cove. This is the most easterly station in the kingdom at which the plant has been certainly found. It keeps up its characters well here.

R. pratensis, M. & K. Bolt Head, &c.

Polygonum ariculare, Linn., c. *arenastrum*. Frogmoor.

P. Raii, Bab. Thurlestone Sands.

P. amphibium, Linn., b. *terrestre*. Flowering sparingly in a marsh at Thurlestone; South Sands, near Salcombe.

Euphorbia amygdaloides, Linn. Lane between Kingsbridge and Salcombe, &c.

E. portlandica, Linn. Sewer Cove.

Scilla autumnalis, Linn. Bolt Head; Prawle Point.

Allium vineale, Linn., c. *compactum*. Hedge-bank near Prawle Point.

Luzula Forsteri, DC. Between Kingsbridge and Salcombe; as also *L. sylvatica*.

Juncus maritimus, Sm. Marsh at Blanks Mill. A common plant in this part of England.

Scirpus Sarii, S. & M. Prawle. Another species, *S. acicularis*, we did not find anywhere in the tract about Kingsbridge, but discovered growing plentifully in pools and pits in a salt marsh by the Avon, at Aveton Gifford. So far as I know the only recorded station for *acicularis* in the county is that in the 'Flora Devoniensis,' "Streams at Rora, near Ilsington," near the border of Dartmoor.

S. Tabernemontani, Gmel. Marsh at Thurlestone.

Carex divulsa, Good. Common around Kingsbridge.

C. distans, Linn. Sewer Cove.

C. extensa, Good. Between Kingsbridge and Salcombe.

C. riparia, Curtis. Thurlestone.

Arena strigosa, Schreb. Two or three plants near Prawle village.

A. fatua, Linn. A common weed in corn, &c., about Kingsbridge.

Sclerochloa procumbens, Beauv. By the roadway on the eastern side of the tidal water below Kingsbridge.

S. loliacea, Woods. Wall-top at Bantham.

- Poa nemoralis*, Linn. On a wall at East Town.
Festuca Pseudo-myurus, Soyer. On a wall at Bantham.
F. ovina, Linn., form of. A densely caespitose form, with very glaucous wiry leaves, grows on Bolt Head. I take it to be the var. *c. glauca* of Eng. Bot. 3.
Bromus asper, Murr. Only seen about South Pool.
Triticum acutum, DC. Thurlestone Sands.
T. junceum, Linn. Thurlestone Sands.
Asplenium lanceolatum, Huds. Sewer; near Ford; Prawle.
Nephrodium amulum, Baker. Hedge-bank by a lane near Ford.

LIST OF BALANSA'S FERNS OF PARAGUAY, WITH
 DESCRIPTIONS OF THE NEW SPECIES.

By J. G. BAKER, F.R.S.

As very little has been known about the Ferns of Paraguay, and the plants recently collected there by Balansa have been widely distributed amongst the principal European herbaria, I send a list of the determinations of those included in the set which I have had the opportunity of studying. The numbers prefixed to the names are those under which the plants were sent out, and the second number in brackets indicates the position of the novelties, according to the sequence followed in our 'Synopsis Filicum.' Excluding of course the novelties, all the species are known already either in Brazil or the Argentine territory, except *Gymnogramme leptophylla*, which has been collected by Spruce and others in the Andine region but is new to the east side of Tropical America.

373. *Gleichenia pubescens*, H.B.K., with a small piece of *G. dichotoma*.

303. *Hemitelia setosa*, Mett.

304, 648, 648A. *Alsophila atrovirens*, Presl.

305. „ „ *plagiopteris*, Mart.

317. *Dicksonia cicutaria*, Sw.

316. „ „ var. *D. incisa*, Fée.

349. *Trichomanes crispum*, Sw.

307. *Ceratopteris thalictroides*, Brong.

389. *Cheilanthes radiata*, R. Br.

357, 357B. „ „ *chlorophylla*, Sw.

359. „ „ *microphylla*, Sw.

358 [36*]. *CHEILANTHES RECURVATA*, Baker, n. sp. Stipes densely tufted, glabrous, 4-6 in. long, slender, fragile, channelled down the face, with only a few small linear scales near the base. Lamina oblong-deltoid, green on both sides, glabrous, moderately firm in texture, 3-4-pinnate, 5-6 in. long, 3-5 in. broad. Rachises castaneous and quite naked, not flexuose. Pinnæ deltoid, the 3-4 lowest pairs subequal, rather produced on the lower side, 1½-2 in. long; pinnules linear, remote, spreading from the rachis at right

angles; tertiary segments sessile, roundish, distant, not more than half a line broad, crenate, with the edges much recurved, only the very lowest sometimes again compound, the end ones of the pinnules deeply flabellately cleft. Sori marginal, hidden by the recurved edge of the segments, the indusium only the very edge of the lamina slightly altered in texture.

Rocky slopes of the Cerro Lambare, November, 1876. A very distinct species, most like *C. Regnelliana*, Mett., but much more compound, and the small distant ultimate segments not so decidedly bullate. We have a closely-allied plant from Glaziou, not yet described, which differs by its remarkably flexuose rachises.

368. *Adiantum delicatulum*, Mart.
 371. „ *cuneatum*, L. & F.
 367, 370. „ *amulum*, Moore, = *cuneatum* var. *majus*, Baker, in Fl. Bras.
 366. „ *athiopicum*, Linn.
 372. *Pteris deflexa*, Link.
 385. „ *denticulata*, Sw.
 361, 364. „ *pedata*, Linn.
 362. „ *elegans*, Vellozo.
 360. *Cassebeera triphylla*, Kaulf.
 380. *Lomaria attenuata*, Willd.
 378. *Blechnum brasiliense*, Desv.
 326. „ *Lanceola*, Sw.
 379, 383. „ *occidentale*, Linn.
 381, 382. „ *unilaterale*, Willd.
 340. *Asplenium serratum*, Linn.
 384. „ *macronatum*, Presl.
 391. „ *formosum*, Willd.
 344, 344A. „ *micropteron*, Baker. This pretty little plant, a near ally of *A. fontanum*, was only known before from a single specimen gathered by Pearce at San Luis, in the Argentine territory.
 354. *Asplenium divergens*, Mett., doubtless not distinct specifically from *fragans*.
 355. „ *lunulatum*, Sw.
 356. „ *abscissum*, Willd.
 318. „ (*Athyrium*) *decurtatum*, Link.
 319, 319A. „ (*Diplazium*) *Shepherdi*, Spreng.
 339. *Scelopendrium brasiliense*, Kunze.
 338. „ *plantagineum*, Schrad.
 341. *Didymochlena lunulata*, Desv.
 323A. *Aspidium aculeatum* var. *phegopteroidum*, Baker, in Fl. Bras.
 309A. *Nephrodium caripense*, Hook.
 311, 315. „ *conterminum*, Desv.
 320, 321. „ *effusum*, Baker.
 314. „ *unitum*, R. Br.
 312, 312A, 653. „ *molle*, Desv.
 308. „ (*Sagenia*) *macrophyllum*, Baker.

313, 313A. *Polypodium (Phegopteris) conneaxum*, Kaulf.

667. „ *elasticum*, Rich.

386. „ *pectinatum*, Linn.

387. „ *chnoophorum*, Kunze.

388 [178*]. *POLYPODIUM PARAGUAYENSE*, Baker, n.sp. Rhizome wide-creeping. Scales small, lanceolate acuminate, bright brown, confined to the rhizome and very base of the stipes. Stipes wiry, brownish, naked, 2-3 in. long. Lamina oblong-lanceolate, simply pinnate, 12-15 in. long, 5-6 in. broad at the middle, moderately firm in texture, not elastic, green on both sides, obscurely pubescent. Rachis slender, wiry, brownish, finely pubescent. Pinnæ 30-40-jugate, linear, spreading almost horizontally, the largest $2\frac{1}{2}$ -3 in. long, $\frac{1}{4}$ in. broad, adnate by the whole dilated base, contiguous except the 3-4 lowest pairs, which are a little reduced, distinctly crenate, narrowed gradually from the middle to an acute point. Veins distinct, 30-40-jugate, all except the uppermost bearing 2-4 branches, the single sorus placed at the tip of the lowest anterior branch midway between the midrib and edge of the pinnæ. Sori uniserial, round, medial.

Forests at the base of the Cerro Pelado, near Villa Rica. Allied to *P. recurvatum*, Kaulf., from which it may be known at a glance by its distinct pinnate veins.

313. *Polypodium angustum*, Mett.

345. „ *incanum*, Sw.

345A. „ „ var. *squalidum*, Baker, in Fl. Bras.

329. „ *lepidopteris*, Kunze.

348A. „ *vacciniifolium*, L. & F.

347. „ *lycopodioides*, Linn.

365. „ *Phyllitidis*, Linn.

324. *Meniscium serratum*, Car.

377. *Vittaria lineata*, Sw.

330 [4*]. *NOTOCHLÆNA BALANSÆ*, Baker, n.sp. Rhizome stout, short-creeping, densely clothed with linear and at the growing point with subulate bright brown scales. Stipes contiguous, wiry, brown, $1\frac{1}{2}$ -3 in. long, matted with rusty brown tomentum, as is the rachis and lower surface of the lamina. Frond lanceolate, regularly bipinnate from the base nearly up to the tip, 6-8 in. long, $1-1\frac{1}{4}$ in. broad, firm in texture, green and nearly naked above, matted all over with tomentum beneath. Pinnæ subsessile, linear, ascending, $\frac{1}{2}-\frac{3}{4}$ in. long, $\frac{1}{4}-\frac{1}{3}$ in. broad, cut down all through to the midrib into spreading entire contiguous adnate linear-oblong obtuse pinnules. Veins hidden. Sori continuous all round the entire flat edge of the pinnules.

Escarped banks of the Rio Paraguay, at Assumption. General habit of *Cheilanthes micromera*.

351. *Gymnogramme leptophylla*, Desv.

327. „ *rufa*, Desv.

335, 337. „ *calomelanos*, Kaulf.

336. „ *trifoliata*, Desv.

333 [51*]. *GYMNOGRAMME (Ceropteris) LONGIPES*, Baker, n.sp. Caudex erect. Stipes tufted, bright castaneous, above a foot long,

with only a few small spreading lanceolate scales near the base. Lamina lanceolate, 2-3-pinnate, 1-2 ft. long, 2-4 in. broad, moderately firm in texture, green and glabrous on the upper surface, covered all over on the under side with bright yellow powder. Pinnæ nearly sessile, deltoid, the lower ones remote and diminished, the central ones 2-3 in. long, caudate, cut down below to the rachis into linear-oblong toothed or at the base compound pinnules. Veins close, distinct. Sori reaching from the midrib to the edge.

Assumption, in damp soil; and 334 a var. *concolor* of the same species, entirely destitute of the yellow meal. This would be a fine plant to introduce into cultivation. It comes midway between *trifoliata* and the *ochracea* variety of *calomelanos*.

390 [9*]. ACROSTICHUM (Elaphoglossum) TENERUM, Baker, n. sp. Rhizome short-creeping. Scales scarcely any. Stipe of barren frond, slender, stramineous, 2-5 in. long. Lamina linear, membranous, glabrous, bright green on both sides, 6-9 in. long, 1 in. broad at the middle, irregularly crenulate, narrowed gradually from the middle to both ends. Veins moderately close, distinct, simple or forked, rather ascending, produced from the midrib to the edge. Fertile frond as long as the barren one, but much narrower ($\frac{1}{4}$ in. broad), on a stipe of the same length.

Caaguazu, on the shady banks of rivers. Comes in between *A. simplex* and *Burchellii*.

376. *Lygodium venustum*, Sw.

374. *Osmunda cinnamomea*, Linn.

331. *Anemia Phyllitidis*, Sw.

332. „ *tomentosa*, Sw.

328. *Ophioglossum nudicaule*, Linn. fl.

1117. *Lycopodium cernuum*, Linn.

1118. „ *alopeuroides*, Linn.

1120. *Selaginella rupestris*, Spring.

1116. „ *convoluta*, Spring.

NOVAS GENERIS SHOREÆ SPECIES DUAS

PROPONIT HENR. F. HANCE, PH. D., Soc. Linn. Lond. sodalis, cet.

1. SHOREA PIERREI, *sp. nov.* Ramis cortice nigricanti glabro obductis, ramulis angulatis dense griseo-stellato-tomentosis, stipulis . . . ?, foliis rigide coriaceis ovato-oblongis basi lata obtusis apice breviter acuminatis 3-4 poll. longis $1\frac{1}{2}$ - $2\frac{1}{2}$ poll. latis utrinque glaberrimis lucidis costa costulisque supra impressis subtus elevatis his ad utrumque latus circ. 12 tenuibus angulo 52° egressis arcuatis petiolo 8-lineali glabro ruguloso, paniculæ 3-4 pollicaris dense cinereo-tomentosæ ramulis 8-10, floribus . . . ?, nuce breviter pedicellata ovoidea 4-lineali dense cinereo-tomentosa, calycis fructiferi basibus accretis dense cinereo-tomentosis lobis 2 majoribus 2 poll. longis 5 lin. latis minoribus ad $1-1\frac{1}{2}$ poll. longis

1½–2 lin. latis oblongis obtusis tenuiter 10-nervibus et reticulatis membranaceis flaventi-badiis dense glanduloso-pubescentibus.

In Cambodia a cl. Pierre detecta; sine numero vel loci natalis speciali indicatione, communicavit cl. inventor. (Herb. propr. n. 20173.)

Foliorum crassitudine venatione et aspectu refert *S. stipularem*, Thw. et *S. hypochram*, Hance; ab utraque calyce fructifero multo minore, ei *S. selanica*, Bl. non dissimili, recedit.

2. *SHOREA SCHEFFERIANA*, *sp. nov.* Ramulis tenuiter subochraceo-furfuracis, stipulis . . . ?, foliis membranaceis oblongis basi rotundatis v. cuneatis apice acuminatis 6–7 poll. longis 1¾–2½ poll. latis supra lucidulis præter costam stellato-tomentosam glaberrimis subtus opacis ochraceis costa valida costulisque subtus prominulis glaberrimis his ad utrumque latus 12–14 tenuibus angulo 40° egressis apice arcuatis nervulis transversis obtectis petiolo 8-lineali tomentello, panicularum axillarium 4–5 pollicarium stellato tomentellarum ramulis 10–12 patentibus 6–8-floris, floribus sessilibus, calycis canescenti-tomentosi laciniis imbricatis ovatis obtusis lineam longis, petalis ligulatis 7½ lin. longis ¾ lin. latis extus cano-sericeis intus glabris, staminibus circ. 20 antheris obtusis connectivo subulato 3-setigero, ovario hirsuto, stylo brevi glaberrimo stigmate simplici, fructu . . . ?

Ad Sambas, ins. Borneo, ubi indigenis *Tengkawang saloeng soeng* audit. Communicavit am. Dr. Scheffer, sub n. 6526.

Foliorum forma et textu accedit *S. selanica*, Bl., et *S. oblongifolia*, Thw.

Adnot.—Abhinc annos undecim accepi a cl. Teijsmann *Shorea* speciem alteram ex insula Borneo, nomine vernaculo *Tengkawang pinang* inscriptam, characteri *S. Martiniana*, Scheff.,* optime congruentem, nisi quod fructus, a specimine florifero sejunctas habuit calycinas lacinias majores oblongo-lineares, obtusissimas, circiter 12-nerves, rigide coriaceas, 5½ poll. longas, 17 lin. latas. Nescio an hic fructus diversæ speciei pertinuerit: am. Scheffer stirpi suæ lacinias calycinas fructiferas tantum bipollicares adscripsit.

ON THE PLACENTA OF PRIMULACEÆ.

By G. S. BOULGER, F.L.S.

In reading Dr. Masters' interesting paper on the Morphology of the *Primulaceæ* (Linn. Trans., series II., vol. i., part 5), I was much struck with the following passage on *Primula* (p. 288):—“Within the rudimentary pistil . . . the receptacle changes its former flat or depressed condition for a convex or dome-shaped appearance; the middle portion of this dome becomes covered with ovules from above downwards; the upper portion elongates into a naked cone; and the lower portion forms a stipes, which is apparently quite free from the walls of the pistil.”

* Scheffer, 'Observ. phytographicæ,' iii. 86.

I had just read in the English edition of Sachs' 'Text-Book,' p. 149, that—"Similar and equivalent lateral members usually arise on the common axial structure in acropetal or basifugal order, *i. e.* the younger a member is the nearer it is to the apex; counting from below upwards, the members occur in the order of their age. The lateral members which are formed from the punctum vegetations of an axial structure sufficiently near the growing apex are apparently always acropetal; but the order is disturbed when lengthening at the apex ceases and new formations occur at the primary meristem below, as in many flowers."

This last-mentioned disturbing influence is not apparent in *Primulacæ*, so that I doubted whether the ovules of that order were not all to be looked upon as adventitious, if not trichomic. On p. 497 Sachs says—"In a few cases the floral axis rises free within the spacious cavity of the ovary, and produces ovules laterally, as occurs in *Primulacæ*," illustrating the remark by figures of the floral development of *Anagallis arvensis*, which seem to correspond to Dr. Masters' account of *Primula*.

On p. 503 Sachs refers approvingly to Cramer's conclusions that the nucleus is a lateral structure on the funiculus, and that the ovule of *Primulacæ* being a whole leaf, the nucleus in this order is a formation on its surface, analogous, I suppose, to the common abnormal outgrowth from the midrib of cabbage-leaves. On turning for any further elucidation to Payer's 'Organogénie de la fleur,' I find, on p. 612, the following account of the pistil in *Samolus Valerandi*:—"Peu de temps après la naissance des étamines, le centre de la fleur se déprime et il en résulte une petite excavation, qui est l'origine du pistil. Cette petite excavation n'occupe pas tout le centre de la fleur; il y a entre elle et la base des étamines une sorte de chemin de halage sur lequel on voit bientôt poindre un bourrelet circulaire qui grandit rapidement, et forme une sorte de tuyau de cheminée au-dessus de l'excavation qui, de son côté, est devenue de plus en plus profonde. On a par suite au centre de la fleur un pistil formé à la partie inférieure par la coupe réceptaculaire, et à la partie supérieure par ce bourrelet devenu style. Pendant que ces modifications se produisent à l'extérieur, le fond de la coupe réceptaculaire qui était d'abord plat se bombe dans son milieu, et il en résulte un tubercule central qui grossit et se recouvre d'ovules du sommet à la base, en un mot un véritable placente central." The accompanying plates agree exactly with Dr. Masters'.

It is often the case, as Trécul has shown, that the fibro-vascular bundles are late formations in comparison with the cellular tubercles in which floral organs begin. This is only another way of saying that leaves first appear as a bulging out of the dermatogen, owing to a luxuriant growth of the underlying periblem, and that the extension of the fibro-vascular system into the plerome is a later phase. (See Sachs, *op. cit.*, p. 134). Nevertheless with the beautiful figures of Payer and Dr. Masters before one, and remembering what timely service the fibro-vascular bundles rendered Darwin in his unravelling of Orchids, it was

natural to lament the absence of more highly magnified dissections. On turning, therefore, to the English edition of Le Maout and Decaisne, p. 529, I was much struck by the figure representing the fruit of *Cyclamen* cut vertically, in which two sepals are cut away, and what are apparently two fibro-vascular bundles, each having three visible terminal branches, are represented on the surface of the section of the large central placenta. If this figure be correct,* and a similar structure occur in the other genera, it would seem that we have in this order five congenitally suppressed lateral branch tubercles to the axial placenta, *i. e.* five lateral growing-points. Possibly further suppressed branching, as indicated by the bundles, may give origin to further intercalary zones of growth, and the apparently abnormal basipetal development of the ovules may be thus explained.

SHORT NOTES.

RUMEX MAXIMUS.— You may be interested in a new locality for this plant. Having noticed some strongly cordate leaves (which I had decided to be those of *R. maximus*) at Alfriston, on the Cuckmere River, East Sussex, in June last, I went there on August 12th to see the fruit. I then found that both leaves and fruit correspond to *R. maximus* of very extreme form (as I think you will see from the specimens I now send you). I wish to draw attention to the strongly cordate or subcordate form of the leaves in all stages of growth; the shape of the very young leaves is especially striking. I could find no *R. Hydrolapathum* at this locality, and hardly anything at all approaching it. That species is also absent from Mr. Warren's Lewes locality for *R. maximus*, though abundant enough in other parts of the Ouse about Lewes. *R. maximus* does not with us attain the size, either in leaves or in stem, that *R. Hydrolapathum* does; it cannot therefore be correct to attribute its peculiar characteristics to luxuriance.— J. H. A. JENNER. [The specimens kindly sent with the above note are the best and most typical *R. maximus* I have seen from any part of England. The young leaves are broadly oval or sub-ovate, and remind one at first sight of *R. obtusifolius*. The county of Hants may also be added to the area of this plant in England, Mr. F. J. Warner having found it abundantly near Winchester.—ED. JOURN. Bot.]

RUBUS PURCHASII, *Blox.* (see p. 208). — This plant was found by the Rev. A. Bloxam and myself, in the hedge of a meadow near the Overhurst Farm, in the parish of Alstonfield, about two years ago. I had taken Mr. Bloxam, who was spending a few days here, to see *Rubus fissus* growing about the banks of a streamlet at

* A brief examination of some dried capsules of *Cyclamen* lead me to think Decaisne's figure to be perfectly accurate.

the lower end of the meadow opposite the farm-house in question, and on our way to the spot I noticed, and called Mr. B.'s attention to, this *Rubus*, as being one which I could not identify. Mr. Bloxam said that he could not name it, and in fact that it was new to him. We each took specimens, and on his return home Mr. B. wrote me, on Sept. 8, 1876, as follows:—"I have carefully examined the *Rubus* growing near *R. fissus*. It seems nearer allied to *R. glandulosus*, subv. *dentatus*, of Babington, p. 249 of his 'Rubi,' than any other *Rubus* that I know. It has the zigzag rachis of the *dentatus*, but it is much stronger in its armature. This may arise from its growing in an open situation, whereas the plant near Twycross is in a plantation." I next sent a specimen to the Hon. J. L. Warren, with a request for his opinion. In his reply, dated Sept. 10, 1876, he says:—"I fear I cannot help you in regard of the plant you now kindly enclose from Alstonfield. I think very likely (with Mr. Bloxam) that the form is undescribed, and I do not know at present any foreign name suitable. If I had to put it under a British one, it would go in my mind, with great doubt, to *R. fusco-ater*." After communicating this opinion to Mr. Bloxam, he (Mr. B.) wrote thus on Sept. 30, 1876:—"I can make nothing of the *Rubus* at present near you. It is a remarkable form; the upper part of the rachis is very glandular, but not so on the lower portion or on the barren stem. I have seen hundreds of specimens of '*fusco-ater*,' but I feel assured it has nothing to do with that. I shall call it at present *R. Purchasii*, unless I can make it out under some continental form or name." I will only add that there is very little of the plant, and that last year it was so cut in pruning the hedge that I could get no specimens. I hope to learn more of it hereafter.—W. H. PURCHAS.

ACERAS ANTHROPOPHORA, *Br.*, IN NORTHAMPTONSHIRE.—The only reliable habitats for this plant hitherto have been the quarries of Barnack and Southorpe, where it is very abundant. I was pleased to find it, in last May, on the quarries of Collyweston and Easton very plentifully, where it is associated with *Arabis hirsuta*, *Hippocrepis comosa*, and *Genista tinctoria*. The two latter are new records, and the *Arabis* is marked ? in 'Topographical Botany.' Collyweston is nearly six miles N.W. from Barnack, and is drained by the Welland; Southorpe being in the Nene system.—G. C. DRUCE.

Notices of Books and Memoirs.

The Student's Flora of the British Islands. By Sir J. D. HOOKER, K.C.S.I., C.B., &c. Second Edition. London: Macmillan. 1878. (Pp. 540.)

THE eight years that have elapsed since the publication of the first edition of this useful *Flora*, have, so far as British botany is concerned, been less prolific in close and critical work among our

native Phanerogams than some similar periods within the memory of living botanists. This is due not to botanists being less numerous or less keen, but to botanical work being diverted into other channels. There is an increasing class of cryptogamic specialists, especially of mycologists; the facility of foreign travel leads to much attention being paid to exotic plants which was formerly devoted to our own flora; but above all there is a new school of botanists rising, to whom the systematic study of British plants is quite uncongenial. In place of the old-fashioned botanizing in the field and the study of ordinal, generic and specific characters and differences, which have hitherto been the granular of botany to English students and formed the foundation of the knowledge of very nearly all the leading botanists in this country, the young student now substitutes a course of reading about investigations in development, histology, and growth which have been mainly carried out in the laboratories of other countries, and indulges in speculations on evolution and the acquirement of distinctive characters. It is unnecessary to express here any opinion as to the general results of this change. It is probable that in the future it will become still more marked; and the class of "good British botanists," of whom Watson, Borrer, Boswell and Babington may be cited as examples, is scarcely likely to be ever again so strongly and prominently represented as it has been.

The eminent author of the present text-book was never one of that fraternity; his work has been of a far wider scope. Hence one does not expect, in a new edition of the 'Student's Flora,' to find the amount of work and alteration which has made each successive edition of Babington's 'Manual' so interesting to the student of our native plants. Accordingly, beyond the intercalation of the additional species found to be British since 1870, and a general but slight revision of the text, there is little alteration in the book, and from the author's point of view no more could be required. The plan and general execution of the 'Flora' were all that could be wished, and no changes of a comprehensive character were needed. But more care might well have been expended on details, and especially on proof-correcting. Many of the numerous slips are no doubt due to haste, but one does not expect in a second edition to see those of the former one reproduced to so great an extent as is here the case. All the following (and many more might be cited) have been handed on from the first edition. Linn. is still given as the authority for *Erophila verna* and *Nuphar luteum*. The description of the fruit of *Sambucus* is singularly incorrect, and that of *Daphne Laureola* is called a drupe, whilst *D. Mezereum* is termed a berry. *Conium* has not a constricted commissure, and the general involucre of *Carum Carui* frequently consists of four or five leaves. The common Yarrow has not an elongate receptacle, nor has the fruit of *Lactuca virosa* a "cellular wing," whatever that may be. *Orobanche carulea* has four not five calyx-lobes; under *Atriplex laciniata* "cuneate" seems to be a misprint for connate, and under *Triticum caninum* "2-5-awned" for 2-5-nerved. Such things are very misleading to the student, and

his astonishment will be great to read that the wood of *Conifera* has no medullary rays, and that the male catkin of the Yew has but one anther; the short description of the female cone of *Juniperus* is incorrect in five or six points.

Such examples show how much the book needed a thorough revision by a botanist of the critical kind; perhaps one could scarcely expect the author to do it himself. It says much for the skill displayed in its preparation that, in spite of its many errors, one must still regard it as the most comprehensive and compact, and in some respects the best, book of its class. H. T.

The Organic Constituents of Plants and Vegetable Substances, and their Chemical Analysis. By Dr. G. C. WITTSTEIN. Authorised Translation from the German original, enlarged with numerous Additions by BARON FERD. VON MUELLER. Melbourne: M'Carron, Bird & Co. 1878. Pp. 330.

ABOUT twenty years ago Rochleder collected, in his 'Anleitung zur Analyse von Pflanzen und Pflanzentheilen,' the chief results which had up to that time been arrived at during the investigation of the organic constituents of plants, and placed before the student a sketch of the history of this branch of science and an outline of the methods which had been found of service for the extraction and examination of the active principles which plants contain. Ten years later, in 1868, Dr. Wittstein, of Munich, published his 'Anleitung zur chemischen Analyse von Pflanzentheilen auf ihre organischen Bestandtheile,' which formed a fitting supplement to Rochleder's work. It has now been translated by Baron von Mueller at his own private cost, and, with the many additions he has provided bringing the literature of the subject down to the present date, it forms a handy volume which will be of value as a work of reference both to the botanist and the chemist.

Two-thirds of the volume is devoted to a detailed description, in alphabetical order, of the proximate constituents of plants and vegetable substances, their properties, their mode of preparation, and qualitative examination. The old formulæ, now rarely to be met with in our text-books of chemistry, have been retained; the new formulæ are, however, given in the table of the molecular weights of organic compounds which follows next, so that they can easily be ascertained by a cross reference. He then gives a synopsis of the plants which yield the proximate constituents already referred to, as well as a list of the plants systematically arranged according to their Orders: here a cross reference would have been useful.

The second part of the work is devoted to a description of the apparatus employed in analysis and the chemical reagents required, and a consideration of the various methods of using them for the extraction of the active principle contained in the plant under investigation. Some of the expressions he employs are not quite in accordance with those in general use, such as "hypermanganate of potash," "oxyd of lead," "white of lead," "sulphuret of hydro-

gen," "tartarate of antimony," and "chloride of baryum," and should be corrected in a new edition. The atomic weights of carbonate of lime and oxalate of lime, given respectively as 625 and 1025, are not those adopted in other parts of the work, or in fact in any text-book of the present day, and will puzzle the student. When dealing with the preparation of certain substances, like cyanine or anthocyan, the method of preparing it is given; but we fail to find any reference to the flowers from which this curious body can with advantage be extracted. When we look up "Cellulose" we are referred to "Fibrin," which, however, is not given at all; the properties of cellulose are treated of under the heading "Fiber," where we seek in vain for any reference to Durin's remarkable observations on the conversion of cane-sugar into cellulose. By far the most interesting researches in the branch of organic chemistry treated of in this work are those which have resulted in the synthetical formation of some of the more important constituents of plants—for example, the synthesis of indigo effected by Emmerling and Engler, of alizarine by Graebe and Liebermann, and of conine by Hugo Schiff; we fail, however, to find any record of these very valuable contributions to our knowledge of plant-chemistry. The base occurring in *Mercurialis annua* and *M. perennis*, which had been termed, for want of a better name, mercurialine, was shown some time since by Schmidt to be monomethylamine. Monomethylamine is a body of very simple constitution, and the fact that its presence has been detected in a plant is one of the greatest importance and interest.

A series of tables of the specific gravity of alcohol of different degrees of concentration, of atomic and molecular weights, and of thermometric scales, form the conclusion of the volume.

A book of the kind which Baron von Mueller has aimed to provide for scientific students is much wanted. If a second edition of this translation of Wittstein should be called for, the translator may materially improve this work, in fact might produce the text-book which is at present sought for, by submitting these pages, at present singularly free from idiom, to an English friend for revision, and to the scrutiny of a reader acquainted with the form and style of the chemical nomenclature now in use.

W. F.

Monographiæ Phanerogamarum, Prodromi nunc Continuatio nunc Revisio. Auctoribus ALPHONSO ET CASIMIR DE CANDOLLE, aliisque botanicis ultra memoratis. Vol. I. *Smilacææ, Restiæææ, Meliæææ.* Parisiis, G. Masson. June, 1878.

THE conclusion of the 'Prodromus' with the seventeenth volume, in 1873, gave Prof. DeCandolle the opportunity of placing before botanists the reasons which rendered it impossible for him to continue that great work in a systematic manner.* The promise which he then also gave of publishing a sort of continuation in the form of monographs of natural families, in any

* See Journ. Bot., 1874, p. 58.

sequence in which they could be obtained from botanists, he now fulfils by the issue of this volume.

It will be seen from the title that of the three Orders comprised in the book two are monocotyledonous, and therefore are in continuation of the original 'Prodrromus'; the other, *Meliaceæ*, was treated in its proper sequence in the first volume of that work, dated 1824.

The changes to be noted in the character of the book result chiefly from the greater freedom of treatment allowed to the authors; two of the monographs are illustrated by plates of flower-analyses, and two have long introductions in French on points relating to the Order in general. These are useful additions to the old plan, the descriptions are also usually fuller, and there are more copious references to herbaria. In the book, as a book, there are some alterations also; the page is much larger, but as the type is also larger and more spread there is perhaps actually less matter in it; the specific names are printed in a thick type; and, what is of far greater importance, there is a complete index to species at the end of the volume.

When such changes were making it would have been easy to have initiated another. The want of a distinguishing type for the synonyms has been always felt in using the old volumes, and the innovation of italics would have been a greater improvement than the larger type and more bulky volume not uniform in size with its predecessors. It is to be regretted, too, that the printers have fallen into so many blunders which remain uncorrected; the list of errata given is by no means exhaustive.

Prof. A. DeCandolle himself fitly and worthily commences the new work by a very elaborate and careful monograph of the *Smilacææ*, a group which presents unusual difficulties to the systematist from the very imperfect state in which it is represented in even the best herbaria, both as to number of species and condition of specimens. M. DeCandolle has the following observations upon the collections he has examined:—"I have been struck with the existing poverty of the largest herbaria. That of Berlin, the most rich in *Smilacææ* of those which I have had for examination, contains only half of the described species; that of Kew, although I have not seen it, may probably possess more; but the herbaria of the Paris Museum, my own and that of the St. Petersburg garden, have less than half the species; the herbaria of Vienna, Munich, Florence, of M. Boissier and the Delessert herbarium follow these closely; whilst the others remain singularly below. It is extraordinary that herbaria do not grow in proportion to the facilities of travel. I will further add that I consider it a scandal to our time—so satisfied with itself—that the existing species of plants are not represented in some of the principal herbaria by at least four-fifths, and arranged in each family according to the best or most recent monograph. The condition in which one finds specimens is not less to be regretted. In *Smilacææ*, for instance, plants usually diœcious, a very large number of species are only known from

male examples, and some only by female ones. By the help of many different herbaria I have partially filled up the deficiencies, but there still remain far too many species of which the female flower is unknown."

In opposition to Mr. Bentham, but in accordance with many other botanists, *Smilacæ* here ranks as an order distinct from *Liliacæ*, a position to which it appears fully entitled. M. De Candolle gives an interesting account of the morphology of the leaves, inflorescence and flowers in the Order; he recognizes three genera, *Heterosmilax*, *Smilax*, and *Rhipogonum*, the first and last with but 5 species each, whilst *Smilax* possesses no less than 209. *Oligosmilax*, Seem., is reduced to *Heterosmilax*, and *Nemesia*, *Pleiösmilax* and *Coprosmanthus* to *Smilax*. This last great genus is divided into four sections defined by the number of stamens (six or more than six) the existence of two or one ovule in each cell of the ovary, and the concave or reflexed perianth-leaves of the male flower; in the further divisions the nature of the inflorescence affords characters. As to species of *Smilax*, Kunth's monograph, published in 1850, contained 193, of which 52 were doubtful and 12 more only known by name; of the 209 in the present memoir only 22 are doubtful or unknown. The species here described for the first time are 55 in number, whilst 30 of Kunth's have been reduced. The author says that he has abstained from publishing or even naming a number of new species, of which he has seen merely fragments in herbaria, as to do so would be to throw into science mere puzzles and difficulties. Would that all descriptive botanists had an equal restraint!

Restiacæ is another very troublesome family, which Dr. Masters has already much helped to elucidate by previous memoirs. In this complete monograph the sum of the genera is 20, and of the species 234. They are distributed between the Cape and Australia. South Africa has 13 genera and 156 species, Australia 10 genera and 77 species, only 3 of the genera and no species being common to both areas. A curious fact in geographical botany is the occurrence of a single species, *Leptocarpus chilensis*, at Arique, on the Rio Negro, in Chili. The Australian species have been quite recently monographed by Mr. Bentham in the last volume of his 'Flora Australiensis,' published this year; and Dr. Masters differs but slightly from that standard work, which is quoted throughout as "ined," though it has turned out to be the first published.

The *Meliacæ* occupy half the volume, and are monographed by Casimir DeCandolle. Since the original account in the 'Prodrômus' this order has been the subject of a fine memoir, in 1830, by A. de Jussieu; and of a revision, so far as genera are concerned, in 1862 by Hooker in the 'Genera Plantarum.' From this latter arrangement that here adopted does not greatly differ, but the genera *Cipadessa*, *Turræanthus* and *Azadirachta* are kept up, whilst *Calodryum* is reduced to *Quirisia*, *Epicharis* to *Dysoxylum*, *Milnea* to *Aglaiia*, and *Moschorhylum* to *Trichilia*. *Varæa* is transferred from the *Melica* to the *Trichileæ*. The number of new species is large, the standard of specific rank being considerably lower than

that followed in the British Colonial Floras, and the descriptions are very full.

The next volume is to be wholly occupied by Prof. Engler's monograph of *Aroidæ*. Would it not conduce to prompt publication if each Order were issued in a separate form with a separate index? It would surely be more convenient than having Families so unconnected as the three here given in one volume. H. T.

The 'Scientific Proceedings of the Royal Dublin Society' contains a Catalogue of the Flowering Plants and Ferns of Dublin and Wicklow, by Messrs. D. Moore and A. G. More.

Tricoilocaryon Barnardi is the name of a fossil fruit from the auriferous drifts of Victoria, described and figured by Baron von Mueller in the 'Mining Reports' of the colony for March, 1878. It is perhaps referable to *Sapindaceæ*.

In a paper in the 'Proceedings of the Royal Society of Victoria' Dr. J. Jamieson calls attention to a point in the respiration of plants not hitherto examined, namely, the transformations undergone by the oxygen. From various experiments and considerations he is led to believe (1) that the oxygen inhaled by plants, as well as by animals, enters first into some form of loose combination, as in the blood, whereby it is ozonized or rendered active, and is capable of being slowly given off to combine definitely with oxydizable substances; and (2) that plants contain a substance, other than chlorophyll, having some important points of analogy with the hæmoglobin of animals and acting like it as an ozone-transferer.

OTHER NEW BOOKS.—R. HARTIG, 'Die Zersetzungerscheinungen des Holzes der Nadelholzbäume und der Eiche' (21 tab.). Berlin, Springer, 1878 (36 m.).—REGEL, 'Tentamen Rosarum Monographiæ.' Schumacher, St. Petersburg, 1877 (2s. 6d.).—O. MÜLLER and G. PABST, 'Cryptogamen Flora: Lichens, Fungi, Hepaticæ.' Gera, Griesbach, 1877.—C. F. NYMAN, 'Conspectus Floræ Europææ: I. *Ranunculaceæ*—*Pomaceæ*.' Orebro, 1878 (2s. 6d.).—M. C. COOKE and L. QUELET, 'Clavis Synoptica Hymenomycetum Europæorum.' London, Hardwicke & Bogue, 1878 (7s. 6d.).—A. MAGNIN, 'Les Bactéries.' Paris, Savy, 1878.

ARTICLES IN JOURNALS.—AUGUST, 1878.

Bot. Zeitung.—A. de Bary, 'On Apogamous Ferns, and the phenomena of Apogamy in general' (concluded).—J. Borodin, 'On the influence of Light in the development of *Vaucheria sessilis*' (t. 12).

Flora.—W. Nylander, 'Symbolæ quædam ad lichenographiam Sahariensem.'—C. Kraus, 'Causes of the direction of growing shoots' (continued).—F. de Thuemen, 'Fungi austro-africani.'—M. Gandoger, 'Rosæ novæ Galliæ austro-orientalem colentes.'—Ahlburg, 'Origin of *Crinkgo biloba*.'

Oesterr. Bot. Zeitschr.—E. Rathay, 'On *Cladosporium Roesleri*, and the "black brand" of the Vine' (continued).—P. Ascherson, 'Further remarks on the eastern forms of *Schismus*, and on the plants of the Lesser Oasis' (*Chara succincta*, A. Br. ms., n. sp.).—C. J. von Klinggräff, '*Carex panicea* and *C. hirta*, forma *refracta*.'—V. von Borbas, 'On *Leucanthemum platylepis*.'—W. Vatke, 'Plantæ a Hildebrandt in Africa trop. collect.; *Leguminosæ*' (continued).—R. F. Solla, 'Summer Flora of the neighbourhood of Görz.'—F. Antoine, 'Botany of Vienna Exhibition' (continued).

Hedwigia.—L. Rabenhorst, 'Some New Fungi and Algæ.'

Annales des Sc. Nat. (ser. 6, vol. v., pt. 6).—C. Naudin, 'Eight years meteorological observations made in the experimental garden at Collioure.'—R. Moynier de Villepoix, 'Researches into the secretory canals of Umbelliferous fruits' (tt. 16, 17).

— (ser. 6, vol. vi., pts. 1 & 2).—C. Flahault, 'Researches in the terminal growth of the roots of Phanerogams' (tt. 1-8).

Magyar Novenytani Lapok.—L. Haynald, Obituary notice of Parlatore.

Proceedings of Societies.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE,
DUBLIN, 1878.

Section D. BIOLOGY. Department of *Zoology and Botany*.—*August 19th*.—Sir J. D. Hooker, Vice-President, in the chair.—"On the supposed Radiolarians and *Diatomaceæ* of the Coal Measures," by Prof. W. C. Williamson. The author called attention to the *Traquaria* of Mr. Carruthers, found in the lower coal measures of Lancashire and Yorkshire, which small spherical objects that observer believed to be radiolarians like those still living in existing seas. The author showed that the radiating projections with which these spheres are surrounded were not silicious spines like those of radiolarians, but extensions of a continuous membrane which enclosed the entire organism, and which, therefore, could not have the spicular nature attributed to them. He then demonstrated that within this external membrane is a second inner one, which latter is fitted with numerous small vegetable cells like those shown to exist in the interior of fossil spores and reproductive cryptogamous capsules found in the same beds as those which furnish the *Traquaria*. These conditions are so different from those existing in any known recent species of radiolarian as to lead Prof. Williamson to reject the idea of their radiolarian character. Their close organic resemblance to some obviously vegetable conceptacles found in the same coal measures suggest that the *Traquaria* are also vegetable structures. The mountain limestone deposits of some British localities contain a vast multitude of minute calcareous organisms which Mr. Sollas and other observers regarded as radio-

larians. These structures, however, seem to exhibit no satisfactory evidence of being so. In the first place, these organisms are now calcareous instead of silicious. It has been suggested that their silicious elements were removed and replaced by carbonate of lime, but this appears to be most improbable. Prof. Roscoe and Prof. Schorlemmer agree in stating that they would require overwhelming evidence before they would be prepared to accept such an explanation of the present condition of these objects, or of the fact of the substitution of carbonate of lime for silica, that such an explanation renders necessary. Count Castracane has published an account of a process by which he reduced numerous specimens of coals to very minute quantities of coal-ash, and has stated that he found in these ashes numerous marine and freshwater *Diatomaceæ*. Prof. Roscoe kindly allowed one of the ablest assistants in his laboratory at Owen's College to prepare analyses of a number of coals according to Count Castracane's method. The residual ashes of these preparations have been examined microscopically by Prof. Williamson, and in no one of them can a trace of a diatom be found. Beyond stating the fact, he is wholly unable to account for the discrepancy between his results and those of the Italian observer. So far as his present observations go, he finds himself compelled to conclude that we have no proof of the existence of radiolarians or of *Diatomaceæ* in the British carboniferous rocks.—

“On the Association of an Inconspicuous Corolla with Proterogynous Dichogamy in Insect-fertilized Flowers,” by Alex. S. Wilson, M.A., B.Sc. The majority of conspicuously-coloured flowers whose cross-fertilization depends on their being easily seen by insects, are proterandrous. Such plants have their flowers placed in close inflorescences, as, for example, in *Erica*, *Calluna*, *Vaccinium*, *Digitalis*, *Linaria*, *Gladiolus*, &c., and occasionally the flowers are secund, or placed on one side of the axis, thus becoming more conspicuous. In the indefinite mode of inflorescence the older flowers are placed at the lower part of the flowering axis; hence in the commonest form of inflorescence with proterandrous flowers, the lower flowers are in the second or female stage at the time when those in the upper part are in the first or male stage. In proterogynous dichogamy with indefinite inflorescence, the older flowers are in the second or male stage when the upper and younger flowers are in the female stage. In *Scrophularia nodosa* we have a plant in which proterogynous dichogamy is associated with an *inconspicuous* corolla. The stigma after fertilization is removed out of the pathway to the nectar by the bending back of the style on the outside of the corolla, while the stamens straighten out to occupy the place formerly held by the stigma. The corolla is small and obscurely coloured, being greenish, tipped with brown. The inflorescence is lax, and the flowers scattered all round the axis. The odour of the flowers and the presence of a nectariferous gland shows that the plant is fertilized by insects, and not by the wind. Among such inconspicuously-coloured flowers, proterogynous dichogamy seems to prevail, just as proterandry is characteristic of brightly-coloured flowers. Hitherto it has not been shown how an entomophilous

plant could advantageously possess a small uncoloured corolla, and be proterogynous. Watching the mode in which wasps visited the *Scrophularia nodosa* afforded the solution of the problem. The first flower visited by the wasp was the top one, and it passed irregularly downwards from flower to flower, and left the inflorescence by the lowest flower. Bees, when collecting honey, do the reverse, visiting the lowest flower first, and proceeding from flower to flower in regular succession from below upwards, leaving by the top flower. The order in which the flowers are visited is therefore of the greatest importance. In *Gladiolus*, for example, the bee begins at the lowest flower, and will deposit any pollen brought by it from a neighbouring spike, and as it passes upwards it will get from the *upper flowers* a fresh supply of pollen to apply to the lower flowers of another spike. In *Scrophularia nodosa* wasps, which are less highly specialized as honey collectors, chiefly visit the flowers and proceed from above downwards, leaving the inflorescence with pollen from the lower flowers to apply it to the stigma of the proterogynous upper flowers. Wasps differ from bees in one important point, *viz.*, that while bees are purely vegetable feeders, wasps add to a vegetable diet by preying largely on insects smaller than themselves. Throughout the animal kingdom Carnivora are endowed with keener powers of vision and scent than vegetable-feeding creatures. That keenness of vision which enables a wasp to descry its prey at a distance, aided by its acute sense of smell, in all probability also enables it to discover these obscure flowers, without the guidance afforded by a coloured corolla, the materials that would be required for its production being employed more economically by the plant, just as in cleistogamic flowers. The wasp also gains an advantage, as it has a better chance of finding honey in these obscure flowers on account of their being easily overlooked by insects less highly endowed as regards powers of scent and vision.—“Notes on Dimorphic Plants,” by A. S. Wilson. The author pointed out that *Erythraea Centaurium* was probably dimorphic, as it exhibited heterostyly, and had two kinds of pollen-grains. *Silene acaulis* was shown to have three kinds of flowers, male, female, and hermaphrodite, thus resembling *S. inflata*, which Axel has shown to be triceciously polygamous.—“Some Mechanical Arrangements subserving Cross-fertilization of Plants by Insects,” by A. S. Wilson. The plants considered were *Vinca minor*, *Pinguicula vulgaris*, and the foxglove, and the author described the various structural peculiarities in the different flowers.—“On the Amounts of Sugar contained in the Nectar of various Flowers,” by A. S. Wilson. Nectar is intended to provide an inducement to cause insects to visit the flowers. These insects confer great benefit on the flowers by assuring their cross-fertilization, bringing pollen from other plants and depositing it on their stigmas. The result of this is that the plant is enabled to produce seeds of much greater vigour than it otherwise would. The saccharine fluid is usually contained in the most secluded part of the flower, in order that it may be protected from rain, for, owing to the solubility and the diffusibility of sugar, were it not so protected it would speedily be

transferred to parts of the plant where it could be obtained by the insects without their serving the plant in the way of cross-fertilization. The colour, odour, and marking of flowers enable insects to find the nectar more easily. The importance of these insects will be apparent from the smallness of the amounts of sugar found in the flowers experimented on by Mr. Wilson. Flowers of fuchsia yielded a total of 7.59 mmg. of sugar—1.69 of this was fruit-sugar, and 5.9 apparently cane-sugar. Of red clover each head gave a total of 7.93 mmg., fruit 5.95, apparent cane-sugar 1.98. On each head of clover there are nearly sixty distinct florets. Calculating from these results, there was the astonishing industry of the bee brought out in an extraordinary manner, for in order to obtain the kilo of sugar 7,500,000 distinct flowers must be sucked. As honey contained roughly about 75 per cent. of sugar, a bee has then to make two and a half millions of visits in order to collect a pound of honey. It was rather a curious fact that nectar should contain cane-sugar, seeing that honey never did; indeed were a vendor to sell honey containing cane-sugar he would probably be prosecuted under the Adulteration Act. A change must therefore take place while the sugar is in the bee's possession—possibly through the action of the juices with which it comes in contact while in the honey-bag. As nectar is acid in its reaction it is, however, possible that the process of inversion may take place spontaneously. [The chemical portion of this paper was also communicated in more detail to Section B on August 15th.]—"On the Stipules of *Spergularia marina*," by Prof. Alex. Dickson. As is well known, certain genera of *Caryophyllaceæ*, of which *Spergularia* is one, are distinguished by the presence of stipulary appendages. On examining lately the stipules of *Spergularia marina*, I was struck with a peculiarity presented by them, which, if observed at all by descriptive botanists, has not received the attention it deserves on account of its remarkable character. The stipules are free from the petioles and wholly cellular in structure. From connation of those of opposite leaves they form interpetiolar stipules with more or less regularly though slightly bifid extremities. Lastly (and this is the important point), these stipules are united to each other round the backs of the petioles, so that a sheath is formed completely surrounding the axis and the two leaf-bases. This connation of stipules round the backs of the petioles is very interesting as being a rare phenomenon. Cases are not uncommon where the two stipules are connate on the inner side of the leaf-base, constituting the so-called "axillary stipule," e. g., *Potamogeton lucens*, &c., or on the opposite side of the axis from the leaf, e. g., *Ficus elastica*, *Astragalus alpina*, &c., constituting the "oppositifoliar" stipule; but the only reference to connation behind the leaf-base I can find is in the case of certain *Astragali*, by St. Hilaire, in his 'Morphologie.' In those species of *Astragalus* which I have examined I have not seen any one in which the stipules are actually connate in this way; but in some, e. g., *A. alopecuroides*, the bases of the stipules extend round the back till they meet—a condition just short of connation. In *Spergularia*, as we have seen, we have the interesting combination of the inter-

petiolar connation with connation round the back of the leaf. In 'English Botany' I observe that the condition is fairly enough represented by the artist, but, as I have already indicated, the morphological peculiarity does not seem to have impressed itself on the botanical mind. Dr. Bayley Balfour remarked that a good deal of confusion existed as to the application of the term "stipule," and showed that in some cases it was applied to structures of very different appearance, and perhaps even of varying morphological significance.—"On the Inflorescence of *Senebiera didyma*," by Prof. Alexander Dickson. When at Plymouth last August during the meeting of the British Association, I took the opportunity of examining *Senebiera didyma*, a weed which grows in great abundance on road-sides and waste places about the town, and I was much struck with a remarkable peculiarity in connection with its inflorescence. The inflorescence is, like that of the mass of cruciferous plants, racemose. The racemes are "oppositifoliar," and at first sight the arrangement seems to be analogous to that of the oppositifoliar inflorescences of *Vitis* or of *Alchemilla arvensis*, where the inflorescence is really terminal, but thrown to the side by preponderant development of a "usurping shoot," the axillary bud of the last leaf produced by the primary axis before ending in the inflorescence. This view seems further supported by the fact that of all the foliage leaves, that opposite the raceme is the only one apparently destitute of an axillary bud, which on this supposition would be represented by the "usurping shoot." If, however, the plant is more closely examined, a very remarkable condition is disclosed—one, indeed, which offers a morphological problem of considerable difficulty, and which, probably, can be effectually solved only by developmental study. The peculiarity consists in the constant occurrence of a solitary flower springing somewhere from the internode below the raceme either about half way down towards, or almost close to the level of the leaf below. So far as my observations go, the solitary flower is never quite as low as the level of the lower leaf. It might be supposed that from almost immediately above the second last leaf of the main axis, the bases of the terminal raceme of the "usurping shoot" and of the axillant leaf of the shoot had all become fused together. Now, although cases are known on the one hand, of adhesion between the base of a terminal flower and that of the usurping axis (*e. g.*, *Helianthemum vulgare*; Payer), and, on the other hand, between the base of an axillant leaf and that of the usurping shoot in its axil (*e. g.*, *Sedum* sp.; Payer), we do not know of connation of all three together. It is possible, but I think improbable. The view which, after careful consideration, occurs to me as most fully satisfying the conditions of this remarkable case, may be stated briefly in categorical form as follows:—1. The racemose inflorescence is terminal and properly begins just above the level of the second last leaf. It would thus include the afore-said solitary flower. 2. The raceme after producing one ebracteate flower, produces at its second node a foliage leaf from whose axil the "usurping shoot" springs. By such an explanation we can dispense with any cumbrous adhesion hypothesis such as I have

indicated above. The peculiarity is that the main axis does not, *per saltum*, pass from the condition of a leafy axis to that of an axis of inflorescence, but begins by producing one flower and then developing a foliage-leaf beyond which the series of flowers is uninterrupted. The "usurping shoot," as above indicated, represents the axillary bud of the foliage-leaf by which the raceme is interrupted.—"On the 6-celled Glands of *Cephalotus* and their similarity to the Glands of *Sarracenia purpurea*," by Prof. A. Dickson. The peculiar 6-celled glands found on the external surface of the pitcher and both surfaces of its lid and of the leaf in *Cephalotus* are very nearly identical with those on both surfaces of the pitcher of *S. purpurea*, originally described by Vogl. Hence the author suggested an affinity not hitherto suspected.—"Notes on *Naiadaceæ*," by I. B. Balfour. [This paper will be found *in extenso* at p. 290.] Dr. A. Dickson exhibited specimens of *Isoetes echinospora*, which he had collected on the muddy bottom of Loch Callater, Aberdeenshire, growing with *Potamogeton* in about two feet of water, remarkable for their slender and tapering leaves, which curve outwards.—Dr. D. Moore exhibited specimens of an *Isoetes* from Lough Bray, Co. Wicklow, with very long slender leaves. It was suggested by Prof. Suringar and Prof. McNab that it might prove to be *I. Malinverniana*, Ces. & De Not. of North Italy. [Subsequent examination of this plant has shown that this is not the case. The plant has long been known in Lough Bray, and considered to be a form of *Isoetes* with very long leaves. (See A. G. More in 'Recent Additions to Flora of Ireland.') Dr. Moore now considers the plant identical with the S. European *I. setacea*, Del.]—Dr. I. B. Balfour showed *Salix Sadleri* and *Carex frigida*, discovered in 1874 in Corrie Chandler, Aberdeenshire, by Mr. Sadler, and not again seen till the present year.—Mr. Britten, on behalf of Mr. J. H. A. Jenner, showed specimens of *Rumex marimus*, Schreb., from a new locality in East Sussex, which presented the characters of the plant in a very marked degree. [See p. 305.]—Mr. Price, of Chester, sent for exhibition leaves of *Cardamine pratensis* producing numerous gemmæ.

LINNEAN SOCIETY OF LONDON.

June 20th, 1878. — J. G. Allman, F.R.S., President, in the chair.—William Cattell, Esq., was elected a Fellow of the Society. G. Busk, Esq., W. Carruthers, Esq., Lieut.-Col. Grant, and Dr. J. Gwyn Jeffreys, were nominated Vice-Presidents. — Mr. J. R. Jackson exhibited three Gourds (fruits of *Lagenaria*, probably *L. vulgaris*) from Pekin. One of these had been used as a water-bottle, and evidently had been made to assume its handsome form by tying with cords while in a growing state. The other two were said to have been inserted into moulds while growing, and to have thus acquired their ornamental pattern, which was as sharp as if carved.—The following papers were read:—'On two kinds of Dimorphism in the *Rubiaceæ*.' This group is well known to be largely dimorphic, the dimorphism consisting in mere variations

in the length of the style and stamens. The two kinds of dimorphism now recorded by the author are as follows:— 1. Where the point of insertion of the stamens is altered, being in (a) high above the middle of the corolla-tube, in (b) at the very base of the corolla-tube, that is subepigynous instead of epicorolline. 2. Where there are two kinds of fruit, viz., (a) a large fruit corresponding to a sessile flower, and (b) a small fruit corresponding to a pedunculated flower. As an example of that under 1, *Adenosacme longifolia*, a shrub common in Sikkim and Khasia, is given; and of 2, *Randia uliginosa*, a small tree common in the swamps of Bengal. Most botanists have referred examples of the same species to different genera; hence some caution will hereafter be necessary in the discrimination and apportioning of characters to the species and genera of the *Rubiaceæ*.— ‘The *Stapeliæ* of Thunberg’s Herbarium,’ by N. E. Brown. Through the courtesy of Dr. Th. Fries, of the Upsala University, the authorities at Kew have had the advantage of the loan of portions of Thunberg’s herbarium, and Mr. Brown has examined the plants placed under the genus *Stapelia* by Thunberg. The species are eleven in number, of which only five belong to the genus as now understood. The other six belong to five different genera, two of which are now characterized for the first time, viz., *Trichocaulon* and *Diplocyatha*. Mr. Brown likewise gives descriptions of the curious plants *Sarcocodon speciosum*, from Somali-land, and *Huerniopsis decipiens*, from South Africa.

The FRENCH ASSOCIATION FOR THE ADVANCEMENT OF THE SCIENCES met at Paris during the week commencing August 23rd. The Botanical Section was presided over by Prof. Baillon, Prof. de Lanessan being Secretary. The following papers were read:— M. Merget, ‘On the part played by the stomata in the phenomena of inhalation and exhalation’; Dutailly, ‘On intramedullary formations in the *Plantagineæ*’; Abbé Rouchy, ‘On the variability of species under the influence of culture’; Baillon, ‘On the development of the ovular integuments’; Miquel, ‘On the germs in the atmosphere’; De Seynes, ‘On the conidial apparatus of *Polyporus sulphureus*’; E. Mer, ‘Some examples to illustrate antagonism of the influences exercised by heredity and surroundings’; Millardet, ‘Alterations produced by the *Phylloxera* on the roots of the Vine’; De Lanessan, ‘Organogeny of the inflorescence and female flower of the Hop’; E. Tison, ‘Structure of the bark of *Alstonia constricta*’; Baillon, ‘On *Negria*’; Dutailly, ‘Some peculiarities of structure in *Brassica*’; E. Tison, ‘Anatomical conditions of the dehiscence of the capsule in Henbane’; C. Blondeau, ‘On respiration and heat in plants’; E. Mussat, ‘On some plants of the group of *Inuleæ*’; Baillon, ‘On the andrœcium of *Cucurbitaceæ*’; D. Corenwinder, ‘On the influence of the leaves in the production of sugar in the Beet’; Sirodot, ‘On the development of *Batrachospermum*’; Poisson, ‘On the colouration of the seeds of Maize’;

Mer, 'On the appearance of starch and sugar in leaves'; Cornu, 'On an epidemic disease of insects produced by a Fungus'; Bail- lon, 'On the genus *Dedeia*'; Cornu, 'On the alternate generation of *Uredineæ*'; Nylander, 'On the algo-lichen theory'; G. Dutailly, 'On vessels considered as playing, in certain cases, the part of secretary canals'; De Lanessan, 'Researches in the histogeny of secondary axes.'

Botanical News.

The death is recorded, on May 31st, of Mr. A. THOZET, F.L.S., of Rockhampton, Queensland, at the age of fifty-two, well known as one of the most enthusiastic botanists of Australia. Besides the collection of plants for the herbarium, he had brought together in the grounds of his estate, called Muellerville, a very fine collection of tropical and subtropical species, both native and introduced. Mr. Thozet was by birth a Frenchman, but had lived for eighteen or nineteen years in the colony. His friend, Baron von Mueller, dedicated to him an Asclepiadaceous genus allied to *Hoya*, discovered by Mr. Thozet near Rockhampton, *Thozetia racemosa*; and he is also commemorated by several species of other genera.

We also notice the death of S. S. OLNEY, of Providence, Rhode Island, U.S.A., who for many years had closely studied the *Cyperaceæ*, especially the species of *Carex*. It is stated that he has left a large (indefinite) sum to Profs. Asa Gray and W. H. Canby, in trust, to be applied to the study, advancement and progress of Botany in the state of Rhode Island. We believe that Mr. Olney published nothing upon botany; but Prof. Gray has preserved his name in a species of *Scirpus*, named after him.

On July 25th died Prof. CHRISTIAN EDWARD LANGETHAL, of Jena, author of several botanico-agricultural works.

Messrs. Joshua and Holmes propose, if a sufficient number of subscribers can be found, to issue a series of microscopical slides, illustrating the principal Families, genera and subgenera of Lichens; and, if the enterprise meet with success, to follow this by a series of specimens of Lichens of which no figures have been published. The specimens will be as typical as can be procured, and will consist of sections of the apothecia, showing all the various parts; they will be very useful to those commencing the study of cryptogamic botany. For further particulars apply to Mr. Joshua, Cirencester; or Mr. Holmes, 30, Arthur Road, Holloway, N.

Dr. Nyman requests us to state that the first part of his "Conspectus Floræ Europææ" can be obtained by botanists direct from the author, Brunkeborg's Torg, 3, Stockholm, at 2s. 6d. each, or six copies for 12s. 6d.

Original Articles.

DESCRIPTIONS OF NEW AND LITTLE KNOWN LILLIACEÆ.

BY J. G. BAKER, F.R.S.

THE following are descriptions of new or obscurely-known *Liliaceæ* belonging to the tribes which I have monographed in the 'Journal of the Linnean Society', from specimens received from various sources during the last two or three years. The numbers prefixed to the names indicate the position of the plants in the sequence followed in my papers. Type specimens of all are in the herbaria of Kew or the British Museum.

3.* *TULBAGHIA CAMERONI*, *Baker*, n. sp. Bulb and leaves not seen. Scape slender, half a foot long. Spathe-valves lanceolate, membranous, an inch long. Umbels 3-4-flowered; pedicels $\frac{1}{2}$ in. long. Perianth whitish, $\frac{5}{8}$ in. long; tube oblong, $\frac{1}{4}$ in. long. Segments lanceolate, white, with a red-brown keel, 4-4 $\frac{1}{2}$ lines long, the inner adhering to the corona half a line higher up than the outer. Corona campanulate, subentire, $\frac{1}{2}$ in. deep to the base of inner segments, $\frac{1}{8}$ in. to base of outer. Ovary subglobose, $\frac{1}{8}$ in. long. Style not exerted from the corona.

Banks of Lake Tanyanika, *Lieut. Cameron!* A few years ago *Tulbaghia* was known at the Cape only. Now Cameron has found this species far within the tropical limits, and Dr. Welwitsch another in Angola.

10.* *MASSONIA CALVATA*, *Baker*, n. sp. Leaves 2, spreading, roundish, 2-3 in. long and broad; main ribs about 30; face when young tuberculato-hispid, when older smooth and glabrous. Corymb dense, sessile; outer bracts green, reaching to the top of the flowers; pedicels $\frac{1}{4}$ - $\frac{1}{2}$ in. long. Perianth white, $\frac{1}{2}$ in. long; segments lanceolate, equalling the tube. Filaments as long as the perianth-segments; anthers minute, oblong.

Cape Colony, eastern district, *Bolus*, 749!

10.* *MASSONIA ORIENTALIS*, *Baker*, n. sp. Leaves roundish, spreading, glabrous, smooth, obtuse, about 3 in. long and broad. Corymb dense, sessile; outer bracts oblong, acute, an inch long; pedicels $\frac{1}{4}$ - $\frac{1}{2}$ in. Perianth pure white, $\frac{5}{8}$ in. long; segments lanceolate, $\frac{1}{4}$ in. Filaments as long as the perianth-segments; anthers yellow, very minute.

Cape Colony, on sand-dunes at Port Elizabeth, *Bolus*, 2239! This and the last come near to one another, and to *M. Huttoni* and *versicolor*.

10.* *DIPCADI FILIFOLIUM*, Baker, n. sp. Bulb globose, 6–8 lines in diameter. Leaves 2, cotemporary with the flowers, subterete, erect, glabrous, nearly a foot long, not more than half a line in diameter. Scape slender, a foot or more long. Raceme very lax, 3–10-flowered; bracts obsolete; pedicels erecto-patent, the lower ones $\frac{1}{4}$ – $\frac{1}{3}$ in. long, the upper shorter. Perianth fulvous, 7–8 lines long; tube oblong, $\frac{1}{4}$ in.; inner segments oblong, obtuse, as long as the tube; outer linear, spreading, $4\frac{1}{2}$ –5 lines long. Capsule shortly stipitate, deeply lobed horizontally, $\frac{1}{4}$ in. long, $\frac{3}{8}$ in. in diameter.

Central Africa, in the kingdom of Djur, *Schweinfurth* 1947! Allied to the Abyssinian *D. minimum*, Webb, and Angolan *D. oxylobum*, Welw.

17.* *DIPCADI LANCEOLATUM*, Baker, n. sp. Bulb not seen. Leaves 4–5, cotemporary with the flowers, lanceolate, acute, glabrous, 4–5 in. long. Scape slender, erect, 8–18 in. long. Raceme very lax, $\frac{1}{2}$ –1 foot long; pedicels erecto-patent, 1–2 lines long; bracts linear, the lowest $\frac{3}{8}$ – $\frac{1}{2}$ in. long. Perianth greenish, 7–8 lines long; tube oblong, $\frac{1}{6}$ – $\frac{1}{5}$ in. long; inner segments flat, rather longer than the tube; outer subulate, $\frac{3}{8}$ – $\frac{1}{2}$ in. long, exceeding the inner by $\frac{1}{6}$ – $\frac{1}{5}$ in. Capsule not seen.

Central Africa, in the kingdom of Bongo, *Schweinfurth*, 1782! Near *D. erythraeum*, Webb, a plant of Egypt and Arabia.

16.* *LACHENALIA WRIGHTII*, Baker, n. sp. Bulb ovoid, under an inch in diameter. Leaf solitary, glabrous, fleshy, linear, reaching a foot in length, mottled with red-brown towards the base. Scape terete, 6–9 in. long, similarly mottled near the base. Raceme lax, 10–12-flowered, $1\frac{1}{2}$ –2 in. long, above an inch in diameter; bracts minute, deltoid; pedicels $\frac{1}{4}$ – $\frac{1}{3}$ in. long. Perianth campanulate; outer segments bright red-purple, $\frac{1}{4}$ in. long; inner whitish, a little larger. Stamens and style just protruded.

Cape Colony, *C. Wright*, 219! *Admiral Sir Fred. Grey*! Sand-flats at Cape Wynberg, *Bolus*! Allied to *L. Zeyheri*, *campanulata* and *convallarioides*.

72.* *ORNITHOGALUM (LEDEBOURIOPSIS) HAWORTHIOIDES*, Baker, n. sp. Bulb exactly like that of *Drimia haworthioides*, as figured in the 'Gardeners' Chronicle,' 1875, p. 366, t. 70. Leaves 5–6, produced at a different time to the flowers, lorate, thin, fleshy, glabrous, obtuse. Scape slender, glabrous, a foot long. Raceme very lax, slender, 20–30-flowered, half a foot long, under an inch in diameter; pedicels erecto-patent, $\frac{1}{4}$ – $\frac{1}{3}$ in.; bracts minute, lanceolate-deltoid, spurred above the base. Perianth campanulate, $\frac{1}{2}$ in. long; segments oblanceolate-spathulate, whitish, with a broad green keel, joined in a distinct cup at the base. Stamens included, distinctly perigynous; anthers minute, oblong.

Cape Colony, on hills near Graaf Reinet; Cave Mountain, at an elevation of 2900 feet, *Bolus*, 814! A very curious plant, allied to *O. anomalum* and *O. Cooperi*. Probably all three ought to be removed from *Ornithogalum* to constitute a new genus.

41.* *SCILLA* (*LEDEBOURIA*) *SPICATA*, *Baker*, n. sp. Bulb ovoid, an inch in diameter; tunics brown, membranous. Leaves 2, cotemporary with the flowers, erect, lanceolate, acute, 2-5 in. long, $\frac{1}{2}$ in. broad below the middle. Scape 4-6 in. long. Flowers in a dense spike 1-2 in. long, $\frac{1}{4}$ - $\frac{1}{3}$ in. in diameter; rachis thickened, rugose; bracts and pedicels obsolete. Perianth campanulate, bright purple, a line long. Stamens rather shorter than the perianth-segments; anthers subglobose, bright yellow.

Central Africa, in the kingdom of Djur, *Schweinfurth*, 1641! 1652!

1.* *URGINEA* *RIGIDIFOLIA*, *Baker*, n. sp. Bulb not seen. Leaves several, produced at a different time to the flowers, terete, rigid, glabrous, $\frac{1}{2}$ foot long. Scape slender, rigid, fragile, a foot long. Raceme lax, 5-6 in. long, $1\frac{1}{4}$ - $1\frac{1}{2}$ in. in diameter; pedicels slender, rigid, patent or ascending, cernuous at the tip, the lowest $\frac{1}{2}$ - $\frac{5}{8}$ in. long. Perianth campanulate, $\frac{1}{6}$ in. long, the segments oblong, white, with a brown-purple keel. Stamens a little shorter than the perianth-segments, the oblong anthers equalling in length the flattened filaments. Ovary ampullæform, narrowed into a short style.

Cape Colony, on the Karroo, near Graaf Reinet, *Bolus*, 783! Near *U. physodes* in flowers and inflorescence; very different in leaf.

16.* *FRITILLARIA* *OBLIQUA*, *Ker*, in *Bot. Mag.*, t. 857. Stem a foot or more long. Cauline leaves 10-12, lanceolate, ascending, glaucous-green, twisted, 4-5 in. long, $\frac{1}{2}$ - $\frac{3}{4}$ in. broad at the middle, the lowest subverticillate. Flowers 5-6 in a lax raceme; pedicels erecto-patent, the lower 2-3 in. long; bracts and bracteoles linear. Perianth an inch long, between funnel-shaped and campanulate, cernuous, dark purple, untessellated, glaucous externally; outer segments oblanceolate-oblong, $\frac{3}{8}$ in. broad; inner segments oblong, $\frac{1}{2}$ - $\frac{5}{8}$ in. broad; foveole obscure, linear, greenish, produced $\frac{1}{4}$ in. from the insertion of the filament. Stamens $\frac{3}{4}$ in. long; anther as long as the filament. Ovary oblong, green; style reaching to the tip of the perianth-segments, tripartite in the upper quarter.

This is an old garden plant, supposed to be lost, which is mentioned under *F. tulipifolia* in my monograph. Mr. Elwes has been successful in hunting it out, and I am indebted to him for living specimens, which show it to be a good species. Its origin has still to be ascertained.

20.* *FRITILLARIA* *RHODOCANAKIS*, *Orphan*. in *Atti Intern. Cong. Firenz.*, 1874, p. 214 (name only). Bulb globose, $\frac{1}{2}$ in. in diameter. Stem 1-flowered, 4-5 in. long. Leaves 4-5, all scattered, the lowest lanceolate, 2-3 in. long, 4-6 lines broad at the middle, the upper linear. Perianth campanulate, cernuous, $\frac{1}{2}$ - $\frac{5}{8}$ in. long, lurid purple in the lower part, yellowish-green upwards, untessellated, the outer segments oblong, the inner obovate, both $\frac{1}{4}$ in. broad, obscurely foveolate. Stamens half as long as the perianth; filaments $\frac{1}{4}$ in. long; anthers oblong. Style $\frac{1}{4}$ in. long, trifid in the upper half.

Isle of Hydra, gathered by Dr. von Heldreich. For specimens of this I am indebted to Prof. H. G. Reichenbach. It is a close ally to *P. græca*, Boiss. & Spruner, a species now well known in English gardens.

27.* ANTHERICUM (PHALANGIUM) SUPERPOSITUM, *Baker*, n. sp. Root-stock and root-leaves not seen. Peduncle 2-2½ feet long, stiffly erect, bearing several superposed rigidly coriaceous oblong leaves (3-6 in. long, 1-1¾ in. broad at the middle, acute, strongly-ribbed, with much-thickened margins), with petioles which clasp the stem for a length of 4-8 inches. Racemes 1-3, 2-3 in. long, lax; lower nodes ½ in. apart; upper ⅙ in.; bracts deltoid; pedicels articulated at the middle, the lowest 3-nate. Perianth greenish white, ⅙ in. long; segments oblong, persistent. Stamens falling a little short of the perianth-segments; anthers minute. Capsule subglobose, ⅙ in. in diameter; seeds triquetrous, many in each cell.

Central Africa, in Niam-niamland, *Schweinfurth*, iii. 174! A very distinct species.

28.* ANTHERICUM (PHALANGIUM) MONOPHYLLUM, *Baker*, n. sp. Root-stock subglobose, corm-like, crowned with numerous fine bristles, the root-fibres fleshy, cylindrical. Produced leaf 1 only (1 also rudimentary, hairy), linear, erect, rigidly coriaceous, acute, 6-9 in. long including the sheathing-base, ¼ in. broad, glabrous, strongly ribbed, the edge thickened, not at all ciliated. Peduncle about as long as the leaf. Raceme simple, moderately dense, 1-3 in. long; rachis finely pubescent; bracts ¼-⅔ in. long, lanceolate or linear from a deltoid base; pedicels all solitary, ascending, ⅓-¼ in. long, articulated at the middle. Perianth white, rotate, ⅔-½ in. long; segments lanceolate, distinctly 3-ribbed on the keel. Stamens falling ⅓ short of the perianth-segments; ⅙ in. linear anther equalling in length the glabrous filament. Style white, declinate, ¼-½ in. long, reaching to the tip of the perianth-segments.

North Central Africa, in the kingdom of Djur, *Schweinfurth*, 1793! Near the Guinea *A. pubirachis*.

54*. ANTHERICUM (TRACHYANDRA) OATESII, *Baker*, n. sp. Root-stock not seen complete; outer tunics produced as a membrane round its neck. Produced leaves 5-6, cotemporary with the flowers, terete above the sheathing base, ½ foot long, ½ line in diameter, clothed with fine soft deflexed white hairs as long as the diameter of the leaf. Scape as long as the leaves, pilose in the lower part, glabrous upwards. Raceme lax, simple, half a foot long, 1-1¼ in. in diameter; bracts minute, deltoid; pedicels erecto-patent, the lower ones ½-¾ in. long. Perianth white, fugacious; segments ¼ in. long, lanceolate, with a distinct 1-nerved or obscurely 2-3-nerved brown keel. Stamens falling a little short of the perianth-segments; filaments muricated; anthers oblong, very minute. Style declinate, just overtopping the anthers.

Matebele-land, South-east tropical Africa, *U. G. Oates, Esq!* Near the Abyssinian *A. Saltii* and Cape *A. pubescens*.

2.* *CHLOROPHYTUM PUSILLUM*, Schweinf, *Pl. Afric. Cent. Easic.*, No. 2043. Leaves membranous, oblong, glabrous, 2-3 in. long, $1\frac{1}{2}$ -2 in. broad, crisped at the margin, with a short broad petiole, the main veins $\frac{1}{12}$ in. apart in the centre of the blade. Raceme very dense, subspicate, 1-2 in. long; flowers from a node many; pedicels at most $\frac{1}{12}$ - $\frac{1}{8}$ in. long, articulated at the tip; lower bracts $\frac{1}{4}$ - $\frac{1}{3}$ in. long, lanceolate from a broad base, upper linear. Perianth whitish; segments lanceolate, $\frac{1}{8}$ in. long. Stamens a little shorter than the perianth-segments; anther as long as the filament. Style declinate. Capsule globose, deeply lobed horizontally, $\frac{1}{4}$ in. in diameter.

North Central Africa, in the kingdom of Djur, *Schweinfurth*, 2043! Near *C. Afzelii* of Sierra Leone.

5.* *CHLOROPHYTUM CILIATUM*, Baker, n. sp. Whole plant about a foot high. Rootstock densely bristly at the crown; root-fibres fleshy, cylindrical. Produced leaves 3-4, erect, lanceolate, without any distinct petiole, but clasping the stem by their narrowed base, half a foot long at the flowering time, an inch broad at the middle, narrowed gradually to an acute point, subcoriaceous in texture, turning black in drying, furnished with close distinct ribs, the edge thickened and ciliated by short distinct bristly hairs. Peduncle 3-6 in. long, with a small leaf at the middle. Racemes 1-3, dense, the central one 2-3 in. long; lower pedicels 3-4-nate, $\frac{1}{8}$ - $\frac{1}{6}$ in. long; bracts deltoid. Perianth greenish white, $\frac{1}{4}$ in. long. Stamens falling a little short of the perianth-segments; anther linear, as long as the filament. Capsule globose, deeply lobed horizontally, $\frac{3}{8}$ in. in diameter.

North Central Africa, in the kingdom of Djur, *Schweinfurth*, 1521! Near *C. breviscapum* and *macrophyllum*.

11.* *CHLOROPHYTUM LONGIPES*, Baker, n. sp. Rootstock crowned with a few bristles; root-fibres very long, cylindrical. Produced leaves lanceolate, membranous, glabrous, 1- $1\frac{1}{2}$ foot long, 2 in. broad at the middle, narrowed to an acute point and a short broad petiole, the margin pale and rather crisped; main veins 12 to 15 on each side of the midrib. Peduncle $1\frac{1}{2}$ -2 feet long, with only a single small bract-like leaf. Panicle ample, 1-2 feet long, with several simple ascending branches, the lowest sometimes a foot long; racemes very lax; pedicels articulated at the middle, the lower 5-6-nate, finally an inch long; lower bracts lanceolate, $\frac{1}{2}$ in. long; upper deltoid. Perianth $\frac{3}{8}$ - $\frac{1}{2}$ in. long, whitish; segments lanceolate, with 3 green ribs in the central third. Stamens $\frac{1}{3}$ - $\frac{1}{2}$ shorter than the perianth-segments. Style exceeding the stamens. Capsule oblong, $\frac{1}{2}$ in. long, deeply lobed horizontally. Seeds black, discoid, 5-6 in a cell.

North Central Africa in the kingdom of Djur, *Schweinfurth*, 1801! 2045! Allied to *C. Orchidastrum*, Lindl.

22.* *CHLOROPHYTUM MICRANTHUM*, Baker, n. sp. Rootstock densely crowned with fibres above an inch long; root-fibres slender. Produced leaves linear, glabrous, 4-6 in. long, $\frac{1}{4}$ in. broad. Peduncle naked, as long as the leaves. Racemes simple

or forked, very lax, 1-6 in. long; pedicels 1-2 lines long, articulated at the middle, the lower ones 3-4-nate; bracts minute, linear. Perianth $\frac{1}{8}$ in. long, greenish white; segments linear, reflexing. Stamens nearly as long as the perianth-segments; filaments glabrous; anthers minute, oblong. Capsule globose, deeply lobed horizontally, $\frac{1}{8}$ in. in diameter. Seeds black, discoid, 2 in a cell.

North Central Africa, in the kingdom of Djur, *Schweinfurth*, 1745!

22.* *CHLOROPHYTUM POLYSTACHYS*, *Baker*, n. sp. Rootstock crowned with a few bristles; root-fibres many, fleshy, cylindrical. Produced root-leaves many, linear, glabrous, moderately firm in texture, a foot long, $\frac{1}{4}$ - $\frac{1}{3}$ in. broad. Peduncle leafless, 9-12 in. long. Panicle lax, 6-9 in. long; branches ascending, the lower forked; racemes 2-3 in. long; rachis slender, glabrous, flexuose; pedicels articulated at the middle, the lower ones 3-4-nate, $\frac{1}{8}$ - $\frac{1}{4}$ in. long; bracts minute, deltoid. Perianth greenish white, $\frac{1}{6}$ - $\frac{1}{5}$ in. long. Stamens nearly as long as the perianth-segments; anthers minute, oblong. Style declinate, a little exserted.

North Central Africa, in the kingdom of Djur, *Schweinfurth*, 1838!

32.* *CHLOROPHYTUM MADAGASCARIENSE*, *Baker*, n. sp. Rootstock oblique, corm-like, crowned with setæ; root-fibres cylindrical. Produced root-leaves 6-7, linear, glabrous, about a foot long, $\frac{1}{2}$ - $\frac{3}{4}$ in. broad, acuminate, with 10-12 distinct ribs on each side of the midrib. Peduncle about a foot long, bearing 2-3 small linear brownish bract-like leaves. Raceme simple or slightly branched at the base, 3-6 in. long; rachis straight; pedicels articulated at the middle, 1-2 lines long, the lower geminate; bracts brownish, the lower lanceolate, $\frac{1}{4}$ - $\frac{1}{3}$ in. long, the upper deltoid. Perianth white, $4\frac{1}{2}$ -5 lines long; segments $\frac{1}{8}$ in. broad, laxly 3-4-nerved on the back; expanded flower rotate. Stamens falling a little short of the perianth-segments; anthers $\frac{1}{8}$ in. long, linear, exceeding the glabrous filaments. Style declinate, $\frac{1}{3}$ in. long.

Madagascar, *Hilsenberg and Bojer*! (Herb. Mus. Brit.) Allied to the Indian *C. attenuatum*.

33.* *CHLOROPHYTUM SUFFRUTICOSUM*, *Baker*, n. sp. Rootstock not seen. Produced leaves a dozen or more in a radical rosette, linear, $1\frac{1}{2}$ -2 feet long, $\frac{1}{2}$ - $\frac{3}{4}$ in. broad at the middle, moderately firm in texture, acuminate, glabrous, closely ribbed. Peduncle a foot long, leafless. Raceme simple, dense, 2-3 in. long; pedicels very short ($\frac{1}{12}$ - $\frac{1}{8}$ in.) ascending, articulated at the middle; lower bracts $\frac{1}{2}$ in. long, lanceolate from a dilated base; upper deltoid cuspidate. Perianth white, $\frac{1}{2}$ in. long; keel of the segments with 3 close ribs. Stamens nearly as long as the perianth-segments; anthers large, linear: filaments very short. Style declinate, not reaching to the top of the anthers.

Nyika country, South-east tropical Africa, *Revd. T. Wakefield*! Received through Colonel Grant, F.R.S.

NOTE ON *STIPA MICRANTHA* OF CAVANILLES.

BY BARON FERD. VON MUELLER, C.M.G., M.D., F.R.S.

IN the eighth volume of the 'Fragmenta Phytographiæ Australiæ,' p. 105 (1873), I ventured to re-establish Cavanilles' *Stipa micrantha*, referring to it as identical with *Dichelachne sciurea* (J. Hook., Fl. Nov. Zel., i., 294), of which Sir Joseph Hooker has furnished an excellent illustration (from the masterly hand of Mr. Fitch), in his 'Flora Tasmanianæ,' t. 158. I left it doubtful whether the *Agrostis sciurea* of R. Brown (Prodr. 171) belonged also to *Stipa micrantha*, or perhaps to the very closely allied *Stipa Dichelachne*. Bentham (Flora Austral., vii., 566) preferred to adhere to the view, doubtfully expressed by R. Brown, that Cavanilles' plant must be sought in a grass subsequently named *Stipa verticillata* of Nees (in Spreng. Cur. Poster. 30), of which *S. ramosissima* is a synonym.

In order that these discrepancies of opinion might be finally settled, I asked Dr. Colmeiro, the meritorious Director of the Natural History Museum and Botanic Garden of Madrid, to send me an original specimen of Cavanilles' plant, if such was there still extant. With his usual urbanity and obliging kindness, he has just sent me a panicle of the very specimen on which Cavanilles' figure is founded, and this now proves indisputably that I had rightly recognised the real *Stipa micrantha* in *Agrostis sciurea*, and this indeed as far back as 1853 (First Gen. Report, p. 20). Whether *Dichelachne* as a genus should be maintained or merge into *Stipa* remains optional to individual opinion; my own view being that by the extreme multiplication of genera nothing is gained, the memory unnecessarily over-taxed, and the ready view over collective groups of plants largely lost.

This is an apt opportunity to point out that in the 'Fragm. Phytogr. Austr.', viii., 282 (1874), I acknowledged, after a careful comparative examination of numerous *Cyperaceæ* and *Restiaceæ*, the inner glumes of *Gramineæ* to be mere secondary bracts.

ON A NEW INDIAN OAK; WITH REMARKS ON TWO OTHER SPECIES.

BY H. F. HANCE, PH. D., F.L.S., &c.

AT the close of the summer of 1877, just before leaving Calcutta for Penang, where he was prematurely cut off in the prime of life, that indefatigable and conscientious botanist, the late Mr. Sulpiz Kurz, sent me a few Indian oaks for examination. The only novelty in the very small collection was a curious species, ticketed in pencil, in Mr. Kurz's autograph, "*Castanea semicristata*, Kurz."

Apart from the question of the claims of *Castanea* and *Castanopsis* to generic rank, my own views regarding which are well known, the consolidated styles of the tree under consideration show that it does not fall under either group. As it has, moreover, unless I err, never been published, I desire to dedicate it to the memory of its discoverer, whose untimely death is a sad loss to Indian botany, Mr. Kurz's knowledge having been very sound, and his experience as a working naturalist unusually wide.

1. *QUERCUS* (*Cyclobalanus*, *Encleistocarpus*) KURZII, *sp. nov.*—*Ramulis teretibus cortice subsuberoso glaberrimo crebre lenticellato obductis, foliis membranaceo-coriaceis lanceolatis integerrimis attenuato-acuminatis supra lucidulis subtus ochraceo-pallentibus costa subtus prominula venis primariis ad utrumque latus 10–14 angulo 62° egressis arcuatis juxta marginem anastomosantibus cum secundariis tertiariisque vix tenuioribus reticulum densum utrinque elevatum efformantibus 4–5 poll. longis 1–1½ poll. latis petiolo 4-lineali, fructibus pluribus secus ramum 2 lin. diametro sessilibus subdistantibus, involucre ovoideo cinereo-tomentoso pollicem longo 6–7 lin. lato ½ lin. tantum crasso zonulis concentricis 6 haud distincte squamosis valde sinuato-curvatis marginibus erosulis verrucoso-incrassatis prædito demum irregulariter fisso, glande demum libera ovoidea castanea tenuiter fulvo-sericea basi hilo carpico ruguloso paulo pallidiore totam basin occupante notata, stylis in columnam brevem stigmatibus in globum coalitis, cotyledonibus intricato-plicatis.*

In Assamia coll. b. Kurz. (Herb. propr., n. 20495.)

The species stands next to *Q. Blumeana*, Korth., and *Q. encleistocarpa*, Korth., of which the second alone is known to me from specimens, but it is very distinct from either. The fruit is more like that of *Q. lanceifolia*, Roxb. and *Q. fissa*, Champ. (with which latter it agrees in its cotyledons), except for the close grey down of the involucre, which is like that of the callæocarpoid *Castanopses*; but both those species belong to *Pasania*, *Chlamylobalanus*.

2. *Quercus Griffithii*, Hook. f. & Th.—I am now of opinion, after the comparison of very good Khasia specimens, that this is truly distinct from my *Q. Fabri*, from which it differs by the more closely placed costules each running out into a sharp tooth, and the paler more convex cup-scales. In *Q. Fabri* the lobules into which the costules run are quite rounded and obtuse, and the cup-scales are of a deep reddish brown, very flat and appressed. The acorns of both are quite alike.

3. *Quercus semiserrata*, Roxb.—According to A. DeCandolle, Sir Joseph Hooker considers this identical with *Q. annulata*, Smith, which is certainly not different from *Q. glauca*, Thunb. This is a view in which I am unable to concur. Instead of the glaucous or glaucescent under surface of those of the latter tree, the leaves of *Q. semiserrata* have a yellowish submetallic tinge: again, the fruit is very different, and at least double the size of that in any form of *Q. glauca*; the much thicker cupule is more or less woolly-

tomentose externally, and clothed inside, except at the base, where the acorn is attached, by a thick felt-like lining of fulvous velvety tomentum; whilst the acorn, much more oblong in form than that of its ally, is of a rich deep bay brown, and even at full maturity is more or less covered with a tawny wool, which can only be removed by hard rubbing. None of these characters are met with in *Q. glauca*, and the two trees are in my judgment amply distinguished by them.

THE CRYPTOGAMIC FLORA OF KENT.

By E. M. HOLMES, F.L.S.

(Continued from p. 212.)

CLADONIA DEGENERANS, *Flk.*, var. *anomæa*, *Ach.* *Lichen anomæus*, E. B. t. 1867.

Woolwich Heath, Sir J. E. Smith; *E. Flora*, vol v., pt. 1, p. 238.

C. FURCATA, *Hoffm.*

Common on heathy places. *Dill.*, t. xvi., f. 27a, c.

Very like *C. pungens* in appearance, but differs in giving no reaction with solution of potash or chloride of lime.

Var. *recurva*, *Hoffm.* *Dill.*, t. xvi., f. 27d. Folkestone.

Differs only from the type in the recurved leafy podetia.

C. DIGITATA, *Hoffm.*

In mossy woods.

Ightham, *Ohkubo!*

Var. *ostreatiformis*, *Leight.* On palings in damp places; on palings near a pond in Penshurst Park.

Var. *macilenta*, *Hoffm.* On turfy heaths; frequent. E. B. 2028.

Ightham Common, Abbey Wood.

CLADINA RANGIFERINA, *Hoffm.* *Lichenoides tubulosum ramossissimum fruticuli specie candicans, corniculis rufescentibus.* *R. Syn.* iii., p. 67. *Lichen rangiferinus*, *Fl. Met.*

Common in heathy places. E. B. 173.

Blackheath and near Woolwich; *Dillenius* in *R. Syn.* l. c.

Keston Common; *Fl. Metr.!* Ightham Common; Chislehurst.

Exceedingly abundant and very fine on Keston Common, among the heath.

[*C. sylvatica*, *Hoffm.*, should be looked for in Kent. It resembles *C. rangiferina*, but the podetia are quite glabrous and turn yellow with solution of chloride of lime.]

Usnei.

USNEA BARBATA, *Fr.*

Var. *hirta*, *Fr.* Usually on trees or pales. E. B. 1354. Abundantly near the ponds on Lydd Beach.

Var. *plicata*, Fr. E. B. 257. On stunted bushes with the last. Lydd Beach.

Var. *florida*, Fr. E. B. 872. On the rock left hand of the rivulet, in the way from the High Rocks to Rusthall Common; *Forster Fl. Tunbr.* Lydd Beach.

Var. *rubiginea*, Ach. On trees in damp places; frequent. Thornnden Wood. On trees near the bridge in Hurst Wood, Tunbridge Wells. Trees near Lydd.

Easily recognised by the reddish tint which pervades the tufts; it appears to be by far the commonest form in this county.

Var. *ceratina*, Schær. On stunted blackthorn bushes, Lydd Beach; not common.

ALECTORIA JUBATA, Ach. *Parmelia jubata* (Forster Fl. Tunbr.) -
On rocks; very rare in Kent, and probably now extinct. E. B. t. 1880.

On the rocks in the little lane to Rusthall Common (from the High Rocks); *Forster Fl. Tunbr.*

Although this lichen is still abundant on one of the High Rocks, I have not been able to detect the least trace of it (1868) on the Kentish side of the stream that divides the two counties.

EVERNIA PRUNASTRI, L. *Parmelia prunastri* (Jenner Fl. Tunbr.)
Common on trees and railings. The fruit rather rare. E. B. t. 859.

In fructification at Brenchley; Hawkhurst; Redleaf (near Penshurst); *Jenner Fl. Tunbr.* On larch trees, sparingly, Wrotham. Without fructification at Abbey Wood, Bexley, Chelsfield, Penshurst, Edenbridge, Shoreham, Sevenoaks, Wye, Hothfield, Chislehurst.

This is one of the few foliaceous lichens that approach within 10 miles of London.

RAMALINA CALICARIS (*Hoffm.*)

Var. *canaliculata*, Fr. On trees in parks; frequent. Sandwich; Romney Marsh, near Hythe; in fruit in Hothfield Park.

Easily recognised by the slender channelled thallus.

Var. *subampliata*, Nyl. Romney Marsh.

R. FARINACEA (*L.*)

On trees, frequent; E. B. t. 889.

Bexley; Crofton Woods; Penshurst; Tunbridge Wells; Thornnden Wood; Hothfield; Postling.

Exceedingly rare in fructification. Leighton, in his "Lichen Flora of Great Britain," observes, "I have never seen any specimen in fructification." I met with a few specimens in fruit at Falmouth last year on trees near the sea, and am told by Mr. W. Curnow that he finds it also sparingly in the same position at Penzance. It may therefore be looked for near the sea in Kent as at Lympne, &c.

Resembles *R. canaliculata*, but has numerous small soredia on the margins.

R. FRAXINEA (L.)

Common on trees. E. B. 1781.

Wye; in fructification near Postling; Hothfield; and in Crofton Woods.

R. FASTIGIATA (Pers.)

On trees and bushes; common. E. B. 890 (lower left-hand figure).

Crofton Woods; Chelsfield; Sevenoaks; Wye; Hothfield; Postling.

R. POLLINARIA, Ach.

On barns, old palings, and trees; not common.

Maidstone, Rev. J. M. Crombie; *Leighton L. Fl.*, p. 95. Hothfield Park; Postling; Wye.

Var. *humilis*, Ach. Tunbridge Wells, Rev. J. M. Crombie; *Leighton L. Fl.*, p. 475.

R. EVERNOIDES, Nyl.

On palings and trees in parks; frequent. E. B. t. 1607.

Hothfield Park; Penshurst Park; very fine in the Park at Beechborough; on palings near Lydd.

*Cetrariei.*CETRARIA ACULEATA, Fr. *Lichen hispidus*, E. B.

On sandy and heathy places; very local.

Abundant on the sandhills between Sandwich and Deal; and the forms *muricata*, Ach. (E. B. 452), and *acanthella*, Ach., on Lydd Beach.

Peltigerei.

NEPHROMIUM LUSITANICUM, Schær.

On stunted bushes near the sea; very rare.

On stunted blackthorns on Lydd Beach.

This lichen grows in exactly the same way on the sandhills near Winchelsea in Sussex, in which county Dillenius first discovered it.

It is easily distinguished from the other British species by the yellow medulla, which turns red when touched with potash.

PELTIGERA CANINA (L.)

On hedge-banks and amongst moss in woods; common.

Abbey Wood; Hayes Common; Kemsing; Penshurst; Chelsfield; Sevenoaks; Bexley; Wye; Sandwich; in fruit near Wrotham.

P. RUFESCENS (Hoffm.) *Peltidea* (Jenner Fl. Tunbr.)

On banks and wall-tops, chiefly on limestone or calcareous soil; not common. E. B. t. 2300.

Between Lamberhurst and Goudhurst; *Jenner Fl. Tunbr.* Near Rusthall Common; Thornden Wood, near Canterbury.

The locality from Jenner Fl. T. is placed here with hesitation, for although the two towns are both in Kent, a considerable portion of the main road between them is in Sussex.

This species may be known from *P. canina* by its smaller size, reddish colour when damp, revolute apothecia, and thick nerves on the under surface of the thallus.

P. POLYDACTYLA, *Hoffm.*

On damp mossy banks in hilly districts.

Ightham, *Ohkubo!* Ide Hill, near Sevenoaks; Halstead; Lydd Beach.

Distinguished easily by its smooth not powdery dark grey thallus and numerous apothecia.

P. HORIZONTALIS (*L.*)

On damp rocks, among mosses, &c.; rare.

Ightham.

Known at once by the horizontally placed, flat apothecia.

Parmelici.

STICTINA LIMBATA (*Sm.*)

Usually on trees near streams in subalpine districts. E. B. t. 1104.

On stunted prostrate blackthorn bushes, Lydd Beach; rare.

S. FULIGINOSA (*Dicks.*)

Growing generally on trees and rocks in subalpine districts.

E. B. t. 1103.

On stunted blackthorn bushes, Lydd Beach; rare.

S. SCROBICULATA (*Scop.*)

On trees and rocks in subalpine districts. E. B. t. 497.

A single specimen on a tree at Ightham Common; *Howse!*

Extremely abundant at Lydd Beach, growing on the sandy ridges with *Cladonia gracilis*, *C. alcicornis*, &c.

The occurrence of the last three subalpine lichens a few feet above the level of the sea is worthy of note, for nowhere else in Kent have they been found as yet. The lichen-flora of this singular region is remarkable for the large number of species which are subalpine in character. Their presence here can only be accounted for by supposing the spores or gonidia to have been blown by the south-west wind either from the Dartmoor Hills or the New Forest, and to have been deposited on the low ground when the wind met the hills behind Romney Marsh. A few of these lichens such as *Cladonia gracilis*, *Cladonia alcicornis*, *Nephromium lusitanicum*, *Cetraria aculeata*, and *Stictina scrobiculata*, are to be found, the first three well-fruited, in abundance on the sandy ridges which are scattered over the pebbles. *Stictina limbata*, *S. fuliginosa*, and *Parmelia plumbea*, are found sparingly only on the stunted, prostrate blackthorns near the ponds, while *Physcia flavicans* and *Sticta pulmonacea* occur most profusely, the former on small erect bushes, growing with the subalpine moss *Antitrichia curtipendula*, in the greatest luxuriance, and the latter on the sand not far from the cultivated fields, while the pebbles themselves are abundantly covered with *Lecanora gibbosa* and *Lecidea petraea*. These with numerous Ramalinas and Parmelias form the

leading features in the lichen-flora of Lydd Beach, which may be called the most unique and certainly the richest district in Kent as regards lichens. The numerous species, which will be found recorded here and there in this list as being found at Lydd Beach, are the result of only two days' wandering in that locality. In all probability many were overlooked. *Stictina sylvatica* and *S. aurata* are quite as likely to occur there, as well as *Nephromium parile*, and should be searched for.

STICTA PULMONACEA, Ach.

On old trees in hilly districts, especially in damp localities; rare, except at Lydd Beach. E. B. t. 572.

On trees near Westenhanger; Beechborough, near Hythe. On sandy ground, Lydd Beach, covering nearly an acre of ground profusely, but not in fructification.

RICASOLIA LÆTEVIRENS (Lightf.).

On old trees in damp hilly woods; exceedingly rare in Kent. E. B. t. 294.

On a very old beech tree in Challock Wood, near Wye, sparingly.

PARMELIA CAPERATA (L.).

On trees, palings, &c.; very common; not observed in fruit. E. B. 654.

Swanscombe Wood; Bexley; Sevenoaks; Ightham; Wrotham; Postling; Wye.

Known by its wrinkled, pale yellow thallus.

P. OLIVACEA (L.).

One of the commonest lichens, on trees and palings. E. B. t. 2180.

Abbey Wood; Sidcup; Sevenoaks; Wrotham; Shoreham; Ightham; Hungershall Rocks, Tunbridge Wells; Penshurst; Edenbridge; Wye; Postling; Ashford; Folkestone; Chislehurst.

The thin brownish or greenish brown closely adherent thallus of this lichen is one of the few that are to be seen within the reach of London smoke.

P. FULGINOSA (Dub.).

On rocks; not common.

On sand rocks, Ightham Common and Rusthall Common.

This species closely resembles *P. olivacea*, but is much darker in colour. It may be known from it by the medulla turning crimson when touched with solution of chloride of lime.

P. PHYSODES (L.).

Common on old palings, fir trees, &c.; not common in fruit. E. B. t. 126.

Abbey Wood; Bexley; Edenbridge; Ightham.

Var. *recurva*, Leight. On the palings of Hill Park, Westerham, in fruit; Ightham.

Var. *labrosa*, Ach. Romney Marsh.

P. PERLATA (L.).

Common on trees, rocks, and walls. E. B. 341. Not observed in fruit.

Bexley; Wrotham; Ightham; Sevenoaks; Penshurst; Maidstone; Wye.

Var. *ciliata*, DC. *P. perforata*, E. B. 2423. Hungershall Rocks, with shields; *Jenner Fl. Tunbr.* I observed this in 1877 in the same locality, but without fruit. On palings near Lydd, in fruit; *Rev. J. M. Crombie.*

P. PERFORATA, Wulf. *P. reticulata*, Tayl.

On trees in damp shady woods, and in parks; frequent.

Wood near Selling; Hothfield Park; Beechborough Park; Penshurst Park, abundantly; Chilstone Park; Broome Park; Hungershall Wood.

Closely resembles *P. perlata* in appearance, and probably often overlooked for that species, but readily distinguished under a lens by the minutely cracked surface of the thallus, and by the medulla turning red when touched with solution of caustic potash.

P. TILIACEA (Ach.).

On trees, especially those with a smooth bark. E. B. t. 700. Not observed in fruit.

Hill Park, near Westerham; *Jenner Fl. Tunbr.* Eynsford.

Var. *scortea* (Ach.), E. B. t. 2065. On a hovel at Hill Park, near Westerham; *Mr. R. Scott.* Plaxtol; *Jenner Fl. Tunbr.*

Var. *rugosula*, Leight. On trees, Ightham.

Very similar in the young state to *P. lavigata*, but more closely adherent to the bark, and with the segments rounded at the apex, not forked, as in *lavigata*.

P. LÆVIGATA (Sm.).

On trees, especially firs, rocks and walls, frequent; not observed in fruit.

High Elms, near Chelsfield; Otford; Wrotham; Willesboro' Lees; Wye; Lenham.

An exceedingly variable plant, often sorediate, but generally distinguishable by its forked segments, and by being loosely attached to the tree or rock.

P. BORRERI (Turn.).

On trees; rare in fruit. E. B. 1780.

On Tunbridge Wells Common, with shields, which are rare in 1837; and *Mr. R. Scott* finds it with them, very fine, in Hill Park, near Westerham; *Jenner Fl. Tunbr.* Edenbridge; Tunbridge; Sevenoaks; Shoreham; Wrotham; Ightham; Bexley; Maidstone; Wye; Ashford; Postling; in fruit near Ashover Wood, Penshurst, in June, 1876.

Known by the small white soredia scattered over the thallus.

P. ACETABULUM (Neck); *P. corrugata* (Jenner Fl. Tunbr.).

On trees in parks, &c.; frequent in Kent. E. B. t. 1652.

On trees on Tunbridge Wells Common, without shields; *Jenner*

Fl. Tunbr. Near Rusthall Common; Boxley, near Maidstone; and Chilstone Park, near Lenham, sparingly. In fruit in Penshurst Park, on horse-chestnut trees, in June, 1875; in fruit abundantly in Broome Park, near Siberts-wold.

Known by its dark grey-green colour, cup-shaped segments, and wrinkled thallus.

P. SAXATILIS (L.).

On rocks and trees; frequent. E. B. t. 603.

In fruit on trees in Broome Park.

Var. *sulcata*, Tayl. On trees, Penshurst.

Var. *furfuracea*. On palings, Hill Park, Westerham.

A very variable species, known from *P. lavigata* by the medulla of the thallus turning red when touched with solution of caustic potash. The var. *furfuracea* resembles *P. aleurites*, from which the same test distinguishes it.

P. ALEURITES, Ach.

On posts and palings in damp places; rare in Kent. E. B. t. 858.

On wooden rails, near a pond in Penshurst Park; barren.

This plant, according to the Rev. J. M. Crombie, is more nearly allied to *Platysma*.

PHYSICIA FLAVICANS (Sw.). *Parmelia* (E. B.).

On trees; more rarely on rocks near the sea. Rare in Kent; not observed with apothecia. E. B. t. 2113.

Beechborough Park, sparingly; extremely fine and abundant in one spot on Lydd Beach.

P. PARIETINA (L.). *Parmelia* (E. B.).

On walls and trees, common. E. B. t. 194.

Sideup; Chelsfield; Wrotham; Brastead; Sevenoaks; Penshurst; Wye.

Var. *lychnea*, Ach. Chelsfield; Lullingstone Park, near Shoreham; Maidstone; abundantly on walls at Wrotham.

The var. *lychnea* much resembles *Lecanora candelaria*. The latter, however, does not turn red when touched with solution of caustic potash.

P. CILIARIS (L.). *Parmelia* (E. B.).

On trees, frequent, especially in parks and by road-sides.

Boxley Hill, near Maidstone; Edenbridge; Postling; Wrotham; in fructification near Moldash, and Brastead, and in Penshurst Park and Broome Park.

Var. *actinota*, Ach. E. B. 1352. Hythe.

P. PULVERULENTA (Schreb.).

On trees, common.

Beechborough; Postling; Wye; Boxley; Edenbridge; Wrotham.

Var. *pityrea* (Ach.). E. B. 2064. *Parmelia* (E. B.). On trees on Tunbridge Wells Common; Jenner *Fl. Tunbr.* Rochester, House! Lullingstone Park; Beechborough Park; Challock Wood, near Wye; Chelsfield; Boxley.

Var. *venusta*, Ach. Near Tunbridge Wells Common.

- P. **OBSCURA** (*Ehrh.*) *Parmelia cycloselis*, Ach. (*Jenner Fl. Tunbr.*).
 On elm trees, &c.; common. E. B. 1942.
 On trees on Tunbridge Wells Common.
 Otford; Wye; Chilstone Park.
- Var. *virella* (Ach.). E. B. t. 1696 (two upper figures). On trees.
 Bexley; Wrotham; Shoreham; Chelsfield; Boxley, near
 Maidstone; Wye.
- Var. *adglutinata* (Flk.). On old elm trees, &c. Lullingstone Park,
 Shoreham; Broome Park, near Kits Coty House, Maidstone.
 Not unfrequently in fruit.
- P. **STELLARIS** (*L.*).
 On trees and bushes; not very common. E. B. t. 1697.
 On dwarfed blackthorn bushes. Lydd Beach.
- Var. *tenella* (Scop.). E. B. t. 1351. On trees and bushes; very
 common. Sidcup; Brasted; Westerham; Wrotham; Chels-
 field; Penshurst; Maidstone; Broome Park; Postling;
 Willesboro' Lees; Beechborough.
- Var. *casia* (Hoffm.) *Parmelia* (E. B.). On roofs, walls, &c.;
 rare. E. B. 1052. On slate roofs at Pembury; *Jenner Fl.*
Tunbr. Roofs near Plaxtol; *Howse!*
- P. **EROSA**, *Borr.*
 On rocks and trees; not common. E. B. Suppl. t. 2807.
 On trees on Tunbridge Wells Common; Penshurst Park, &c.;
Jenner Fl. Tunbr.
 On trees. Dunton Green, *Howse!* Walls of Egerton churchyard.
 Known by its intricate, loosely-attached, minutely crenate,
 somewhat powdery fronds. I have never seen this species in fruit.
- P. **ASTROIDEA** (*Clem.*) *Parmelia Clementi* (*Jenner Fl. Tunbr.*).
 On trees; rare. E. B. 1779.
 On trees on Tunbridge Wells Common; *Jenner Fl. Tunbr.*
 In Broome Park, very fine and abundantly in fruit.
 Known from the last by the closely appressed thallus,
 almost entirely granulate in the centre, and leafy only at the
 circumference.
- Lecanorei.*
- P. **PANNARIA NIGRA** (*Huds.*) *Lichen niger*, E. B.
 On exposed chalk stones in damp places; not common.
 E. B. 1161.
 Wrotham; Undercliff, Folkestone.
- P. **PLUMBEEA**, (*Lightf.*) *Lichen plumbeus*, E. B.
 Usually found on trees and rocks in hedge-banks, &c.; very
 rare in Kent. (E. B. 353?) *Lightf. Fl. Scot.*, t. 26.
 On stunted blackthorn bushes almost level with the ground.
 Lydd Beach. Noticed in one spot only, but there were
 several well-fruited patches of the plant.
- SQUAMARIA SAXICOLA**, (*Poll.*) *Lichen saxicola*, E. B.
 On rocks and boulders; rare in Kent. E. B. 1695.
 On a sandstone boulder by the roadside near Otford.

The stone on which this specimen was found appeared to be one of those boulders belonging to a different geological formation which are here and there found scattered over the chalk in this district, particularly near Maidstone, and are supposed to have been deposited here by former glacial action.

PLACODIUM MURORUM (*Hoffm.*)

On walls, rocks, &c.; common.

Bexley; Sevenoaks; Boro' Green; Brasted; Penshurst; Wye; Hythe; Sandgate.

P. DECIPIENS, *Arn.*

On old walls; frequent in Kent.

Abundant on the walls of Eynsford Castle; wall near Boro' Green; Shoreham; Brasted.

Known from the last by its paler colour and scabrous thallus, and the areolate centre of the thallus.

P. CALLOPISMUM (*Ach.*)

On rocks and walls; less frequent than *P. murorum*. E. B. 2157, upper figure.

On a bridge between Staplehurst and Boughton Monchelsea; Bexley; on walls, Brasted; Hythe; Sandgate.

Known from *P. murorum* by its brighter orange colour and flattened appearance.

P. CITRINUM (*Ach.*)

On walls, rocks, &c. E. B. 1793.

Bexley; Brasted.

[*P. candicans* (*Dicks.*) and *P. variabile* (*Pers.*) should be looked for on rocks near the sea about Sandgate. The former occurs abundantly at Hastings in a somewhat similar situation.]

LECANORA VITELLINA, *Ach.*

On rocks, walls, stones, trees, &c. E. B. 1792.

On trees on Tunbridge Wells Common; *Jenner Fl. Tunbr.* Rusthall Common; Wrotham; Lydd.

Var. *epixantha* (*Nyl.*) On trees in Chilstone Park, near Lenham.

Known from *L. epixantha* (*Ach.*) and *L. phlogina* (*Ach.*) by its numerous spores, some of which are usually 1-septate.

L. CANDELARIA (*Ach.*)

On trees, pales, &c. E. B. 1794.

On trees on Tunbridge Wells Common bearing shields which are rare; *Jenner Fl. Tunbr.* Willesboro' Lees in fruit; Penshurst Park; Shoreham; Brasted.

Very similar in appearance to *Physcia parietina* var. *lychnea*, but easily distinguished by solution of caustic potash which tinges the latter dark red, but does not affect *L. candelaria*.

L. GLAUCOCARPA, var. *pruinosa* (*Sm.*)

On the mortar of walls, limestone rocks, &c. E. B. 2244.

Sandridge, near Sevenoaks.

L. TARTAREA (L.)

On rocks and trees, chiefly in subalpine or alpine districts.

On the rocks on Rusthall Common; *Forster Fl. Tunbr.* In a barren state on trees at Ightham, *Howse!*

In the barren state this lichen may be distinguished from *Pertusaria*, which the thallus much resembles, by the yellowish soredia, and from *L. parella* f. *Turneri* by turning red with solution of chloride of lime, while in *L. parella* and its varieties the apothecia only turns red with that reagent.

L. PARELLA (L.)

On walls, trees, rocks, &c.; not very common. E. B. 727.

On sandstone rocks, Ightham; on a wall, Brastead, near Rusthall Common.

Var. *pallescens* (L.) Ightham; on pebbles, Lydd Beach; on flints, Shoreham; Maidstone.

Var. *tumidula* (Pers.) Trees near Lympne; Chittingstone, near Peshurst.

Var. *Turneri* (Sm.) *Lecanora Turneri*, E. B. 857. With shields, which are rare, on a tree at Hawkhurst; *Jenner Fl. Tunbr.* Halstead with young apothecia; Tunbridge Wells.

L. RUPESTRIS (Scop.)

Var. *calva* (Dicks.) On walls, rocks, and stones; frequent. E. B. 948. Brastead; Shoreham; Maidstone; Folkestone.

Var. *viridi-flavescens* (Wulf.) Sevenoaks.

L. VARIA (Ehrh.)

On trees, palings, walls, &c.; common. E. B. 1666.

On trees on Tunbridge Wells Common; *Jenner Fl. Tunbr.* Greenhithe.

Var. *symmiecta* (Ach.) On palings near the railway station, Shoreham.

Var. *conizaa* (Ach.) *Lecanora expallens* (*Jenner Fl. Tunbr.*) On the barn between Tunbridge Wells Common and Hurst Wood; *Jenner Fl. Tunbr.*

L. ATRA (Huds.)

Common on walls, rocks, &c. E. B. 949.

Bexley; Edenbridge; Sevenoaks; Brastead; Maidstone; Rusthall Common; rocks near Fisher's Castle, Tunbridge Wells; Beverley Park, near Canterbury; Beechborough.

L. SULPHUREA (Hoffm.)

On rocks and walls; rather rare. E. B. 1186.

On a brick wall in a lane by Beverley Park, Canterbury, abundantly; rocks near the sea, Sandgate.

Easily recognised by its thick pale yellowish cracked thallus and deformed convex blackish apothecia.

L. EXPALLENS, Ach.

On old trees, &c.; not common.

In a wood near Selling; Ightham; Egerton.

Distinguished from *L. varia* var. *conizaa* by giving a reddish yellow colour with solution of chloride of lime.

- L. SUBFUSCA (*L.*)
 Common everywhere on trees, &c. E. B. 2109.
 Edenbridge; Bexley; Sevenoaks; Wye; Postling.
 Var. *allopšana*. On trees; very common. E. B. 2109. Black-
 heath; *Fl. Metr.* Edenbridge; Bexley; Sevenoaks; Wye;
 Postling.
 Var. *parisiensis*, Nyl. Chelsfield; Maidstone; Shoreham.
 Var. *intumescens* (Rebent.) Toy's Hill, near Sevenoaks.
 Var. *chlarona*, Ach. Toy's Hill.
 Var. *albella* (Pers.) Ightham; Bexley; Brasted.
 Var. *angulosa* (Ach.) Hurst Wood, near Tunbridge Wells.
- L. GALACTINA (*Ach.*)
 Common on walls and rocks about farms, &c.
 Maidstone; Shoreham; Wrotham; Toy's Hill; Brasted;
 Folkestone; Hythe.
- L. CALCAREA (*L.*) *Urceolaria calcarea* (Forster *Fl. Tunbr.*)
 On calcareous rocks and stones in walls, bridges, &c.; frequent.
 E. B. 1940.
 On the rocks on Rusthall Common; *Forster Fl. Tunbr.* In a
 quarry near Brasted; on a bridge at Penshurst; Sand-
 gate; very fine and abundant at Hythe.
- L. GIBBOSA (*Ach.*)
 On stones, &c.; not common in Kent. E. B. 1732.
 Lydd Beach; abundant on the pebbles.
 Known from *L. cinerea* by not being turned yellow by solution
 of potash.
- L. AURANTIACA (*Lightf.*) Var. *salicina* (Schrad.)
 On ash and other trees; rather rare in Kent or overlooked.
 E. B. 1305.
 On ash trees in Beechborough Park; Chislehurst; Halstead.
 This lichen, when moist, I have observed to frequently possess
 a powerful odour like sewage.
- L. FERRUGINEA (*Huds.*)
 On trees and rocks; not very common. E. B. 1650.
 Var. *corticola*, Leight. Seal Chart, near Sevenoaks; on gate-
 posts near Hythe; Broome Park, on wooden railings.
- L. ARENARIA (*Pevs.*)
 On greensand rocks; rare. E. B. 1040.
 Maidstone, Admiral Jones; *Mudd, Man.*
 I have only seen this lichen on greensand rock; never on any
 other geological formation.
- L. CERINA (*Ehrh.*)
 On old wooden rails and gates; frequent. E. B. 627.
 Wrotham; Brasted; Hythe; Sibertswold; on trees in Lulling-
 stone Park, near Shoreham.
 Distinguished from *L. aurantiaca* by the thin entire margin of
 the apothecia.

- L. PYRACEA (*Ach.*) Var. *ulmicola* (DC.)
 On old elms in parks, &c., especially where moisture has formed a track down the trunk; frequent. E. B. 1426.
 Wrotham; Hothfield; Eynsford; Lullingstone Park, near Shoreham.
- L. SOPHODES (*Ach.*) Var. *exigua*.
 On old oaks, &c. E. B. 1791.
 Chelsfield; Challocks Wood; Chilstone Park.
 Known from *L. atra* by its 1-septate spores.
- L. HÆMATOMMA, *Fhrh.*
 On trees; very rare. E. B. 223.
 On old trees in Penshurst Park, with young apothecia.
 Known from *Pertusaria velata* and *Lecidea polycarpa* in the barren state by turning yellow with solution of potash and with chloride of lime, and from *L. rubra* by its immersed, deformed apothecia. I have also observed *L. hæmatomma* in fruit on old trees near Shiere, in Surey.
 The *Lecidea hæmatomma* recorded in Forster Fl. Tunbr. as occurring at Rusthall Common is probably an error, although given as "Tunbridge" in Leighton L. Fl. on Forster's authority. I have never seen this lichen on Rusthall Common, and Forster remarks with regard to it, "*Lichen coccineus* of Dickson, but not the *hæmatomma* of E. Bot." *Lecidea coarctata* var. *globulosa* is, however, very frequent on the rocks at Rusthall Common, and may have been mistaken for it.
- URCEOLARIA SCRUPOSA (*L.*)
 On old walls, mosses, rocks, &c.; common. E. B. 266.
 On Rusthall Common; *Forster Fl. Tunbr.* On Tunbridge Wells Common; *Jenner Fl. Tunbr.* Wall near Hayes Common; Penshurst, on sandstone, Rusthall Common; on trees near Hungershall Rocks, Ightham.
 Known from *Lecanora gibbosa* by the thallus turning pale red with solution of chloride of lime, and by the murali-ocular spores.
- PERTUSARIA MULTIPUNCTATA (*Turn.*) *Variolaria multipunctata*, E.B.
 On trees, especially where the bark is decayed underneath; not common in Kent. E. B. 2061.
 Thornden Wood, near Canterbury; Toy's Hill.
 Often closely resembling some forms of *P. velata*, but easily distinguished by not turning bright red with solution of chloride of lime as *P. velata* does. Mudd makes *P. multipunctata* a variety of *P. globulifera*, from which it is quite distinct, the latter giving no reaction at all with caustic potash, while *P. multipunctata* turns yellow and then brown.
- P. DEALBATA (*Ach.*) *Isidium corallinum* (Forster Fl. Tunbr.)
 On subalpine rocks; rare in Kent. E. B. 1541.
 Rusthall Common, near the Cold Bath; *Forster Fl. Tunbr.*
 I have not observed this lichen on Rusthall Common.

P. COMMUNIS, DC.

On trees; frequent. E. B. 677.

Penshurst; Wrotham; Toy's Hill, Sevenoaks; Willesboro';
Lees; Postling.

P. FALLAX (*Pers.*)

On trees; very common. E. B. 1731; 1529.

St. Paul's Cray Common, *Howse!* Edenbridge; Toy's Hill,
Sevenoaks; Hothfield; Wye; Tunbridge Wells.

The form most common in the county is of a dark grey colour,
by which the patches are visible at some distance. On Toy's Hill
a curious form occurs in a damp wood, in which the apothecia
appear to have become cephaloid and abortive.

P. VELATA (*Turn.*) *Isidium coccodes* β *phymatodes* (Jenner Fl. Tunbr.)

On trees, especially in damp localities; comparatively common
in Kent, although considered rare in many counties. The
fructification rather rare. E. B. 2062.

Tunbridge Wells Common; *Jenner Fl. Tunbr.* Thornden
Wood; Hythe; Hurst Wood, near Tunbridge Wells; Ide
Hill; and Toy's Hill, near Sevenoaks. Ightham. In
fructification on a tree near the Hungershall Rocks,
sparingly, and abundantly on an old beech tree in Chal-
locks Wood, near Wye.

In the barren state this species is easily detected by immediately
turning a bright red (almost scarlet) with solution of chloride of
lime. It may also be recognised by its peculiar pale bluish grey
tint, to which the nearest approach is that of *P. multipunctata*.

P. FAGINEA (*L.*)

On trees, gates, and flints; very common. E. B. 1713. Not
observed in fruit in Kent.

Joyden Wood, near Bexley; Shoreham, on flints and trees;
Wrotham; Ightham; Sevenoaks; Toy's Hill; Penshurst;
Wye; Postling; Tunbridge Wells.

This species was formerly distinguished by its bitter taste, but
may be more correctly diagnosed by giving a dull purplish red
colour when touched first with solution of potash and then with
solution of chloride of lime. The colour is not always immediately
developed, and when dry is more of a brick-red tinge. I have
only seen this lichen in fruit at Lydford, in Devon.

P. GLOBULIFERA (*Turn.*)

On large trees; very common. E. B. 2008; 1714.

Not observed in fructification, which usually occurs only on very
old trees.

Ightham Common, *Howse!* Redleaf; Penshurst; Brastead
Chart; Postling; Maidstone; Ashford; Hothfield; Chal-
locks Wood; Toy's Hill, Sevenoaks; Wrotham; Lympne.

Of this species two forms are common in Kent—one with large
slightly-scattered soredia, which corresponds to *Variolaria discoidea*,
E. B. 1714, and the other with small crowded soredia, and which
appears to have gone under various names. These are easily

distinguished from *P. faginea* by giving no reaction either with solution of potash or chloride of lime.

P. LEIOPLACA (*Ach.*)

On young oaks in woods and coppices; frequent.

Toy's Hill; Ightham; Thornden and Bigberry Woods, near Canterbury; Challocks Wood, near Wye; Sibertswold.

Known by its pale yellow or whitish smooth polished thallus and scattered pustular apothecia.

[*P. pustulata* (*Ach.*), which closely resembles it, but is of a greyish or greyish olive colour, and contains usually more than one apothecium in the verrucæ, should be looked for on young oak trees in Kent. Also *P. melaleuca* (*Sm.*) on holly or other trees. It resembles *P. leioplaca*, but has much smaller and more numerous verrucæ, which have the ostiola lacerate. The thallus also is of a more decided yellow tint.]

PHLYCTIS AGELEA (*Ach.*)

On trees in woods, &c.; common. E. B. 1730.

Edenbridge; Penshurst; Ightham; Sibertswold; Newington; between Hythe and Lympne; Sevenoaks; Hungershall Wood.

P. ARGENA (*Ach.*)

On trees; frequent. Rare in fructification.

Ide Hill, near Sevenoaks; Penshurst; Joydens Wood; Wrotham; Sibertswold. In fruit at Biddenden; Beechborough; Selling; Hungershall Wood; and abundantly near Hythe.

Known from *P. agelæa* by its thallus variegated with patches of grey and white, and by the spores not being mucronate at either ends.

THELOTREMA LEPADINUM, *Ach.*

On old trees, rarely on rocks, in damp woods; rare in Kent.

Ightham Common, on an old oak tree.

LECIDEA OSTREATA, *Hoffm.* *Lecidea scalaris* (*Jenner Fl. Tunbr.*)

On old palings, rarely on trees; frequent in Kent. E. B. 1501.

On trees on Tunbridge Wells Common, sterile; *Jenner Fl. Tunbr.* Keston Common; Seal Chart; and Sandridge, near Sevenoaks; Penshurst; Westerham.

L. CARADOCENSIS, *Leight.*

On old palings, especially near the ground. *Ann. and Mag. Nat. Hist.*, Dec. 1864, t. 9, f. 6, 7, 10.

Seal Chart; and Hill Park, near Westerham; in fruit in both localities.

Known from *L. ostreata* by its darker colour, smaller, and more crowded scales, which are turned yellow by a solution of potash; also by its 1-3-septate spores.

L. LUCIDA, *Ach.*

In shady crevices in stone walls, and among rocks, &c., in hedgebanks; rare in fructification. E. B. 1550.

Ightham, in fruit.

Known by its lemon-coloured powdery thallus which much resembles that of *Coniocybe furfuracea* from which the character of the fructification distinguishes it.

L. SPODODES, *Nyl.*

On old pales; rare.

Between Cuxton and Cobham; sparingly.

L. DECOLORANS, *Flk.*

On the ground in hilly districts; frequent.

Ightham; St. Paul's Cray Common, *Howse!*

Var. *apochraa*. Abbey Wood, *Hanbury!*

L. QUERNEA (*Dicks.*)

On decaying posts and palings and old trees; frequent. Rare in fructification.

Bexley; Chislehurst; Sevenoaks; Wye; in fruit sparingly near Edenbridge; and near Wrotham, in excellent condition.

L. DUBIA, *Borr.*

On old palings; rare in Kent or overlooked. E. B. 2547.

Near Otford.

L. PARASEMA (*Ach.*)

On trees, old palings; less often on rocks and walls. E. B. 1450, in part.

On trees at Hungershall Rocks; *Jenner Fl. Tunbr.*

Var. *elaochroma*. E. B. 1450, in part. Chelsfield; Bexley;

Westerham; Ightham; Dunton Green; Beechborough.

[*L. protrusa*, Fr., which has a similar chemical reaction with the last, but a wrinkled, often sore-diate thallus, should be looked for on the rocks at Sandgate.]

L. ULIGINOSA (*Schrad.*)

On damp turfy earth in woods and on commons; frequent.

E. B. 1466.

Dartford Brent; Joydens Wood; Ightham; Thornden Wood.

Known by its simple spores from *L. milliaria*.

L. COARCTATA (*Sm.*)

On damp rocks, walls, &c.; frequent. E. B. 534.

Var. *glebulosa*. *L. glebulosa* (*Jenner Fl. Tunbr.*) On rocks on

Tunbridge Wells Common; and near the Hood Rocks on Rusthall Common.

Extremely variable in appearance, the apothecia often bright red when wet (see *L. hæmatomma*).

L. RIVULOSA, *Ach.*

On rocks in subalpine districts; rare in Kent. E. B. 1737.

On rocks on Ightham Common; *Jenner Fl. Tunbr.*

I have not observed this species in the above locality. It is easily known by its mouse-coloured thallus, with black apothecia having a wavy margin of the same colour as the thallus.

- L. CONTIGUA, *Fr.*
 On rocks; frequent.
 Ightham Common; Rusthall Common.
 Known from *L. confluens* by the prominent thick margin of the apothecia.
- L. CALCIVORA (*Ehrh.*)
 On chalk and calcareous rocks. E. B. 193.
 Charlton Wood chalk-pit! *Fl. Metr.*; Undercliff, Folkestone.
 The apothecia when dry appear to be sunken in the rock.
- L. CANESCENS (*Dicks.*)
 On trees, rocks, walls, &c.; rare in fruit. E. B. 582.
 Bexley; Dunton Green; Wye; Maidstone; Brasted; abundantly in fruit upon trees near Hythe and in Broome Park.
- L. DISCIFORMIS, *Fr.*
 On trees; not common in Kent.
 On trees at Toy's Hill, near Sevenoaks.
 Known from *L. parasema* by chloride of lime solution not colouring the thallus, and by the 1-septate spores from *L. endoleuca* and *L. incompta*.
- L. MYRIOCARPA, *DC.*
 On old trees; common.
 Northfleet; Penshurst; Selling; Westerham; Postling; Sibertswold; Broome Park; Crofton Woods, near Orpington; Wye.
- L. NIGRITULA, *Nyl.*
 On old fir trees, &c.; not common.
 Toy's Hill; Hythe.
 Very similar to *L. myriocarpa*, but the apothecia are scarcely margined and the spores small.
- L. VESICULARIS (*Hoffm.*)
 On earthy ledges on limestone rocks, &c.; not common.
 E. B. 1139.
 Folkestone; on a grassy spot between Sibertswold and Waldershare Park.
- L. CYRTELLA, *Ach.*
 On elder trees in damp shady situations; frequent. E. B. 2155.
 Beechborough; Sibertswold; Waldershare Park; Newington.
- L. DENIGRATA, *Fr.*
 On old pales, &c. E. B. Suppl. 2711.
 On old wooden rails near the Pembury Road, Tunbridge Wells.
- L. TRICOLOR (*With.*)
 On oak and birch trees; rather common. E. B. 1735.
 Joydens Wood; Halstead; Chilstone Park; Swanscombe Wood; Ightham; Saltwood Castle.
 Known by its thin grey thallus, and apothecia varying in colour from that of horn to brownish black.

- L. INCOMPTA, *Borr.*
On trees; not common. E. B. Supplt. 2699.
Near Hadlow.
- L. ALBO-ATRA (*Hoffm.*)
On old elm trees, &c.; frequent. E. B. 1892.
Near Eynsford Station; Brastead; Ightham.
Var. *epipolia* (Ach.) E. B. 1137. On walls at Plaxtol, *Howse!*
Sandown Castle, near Deal; Brastead.
- L. ABIETINA (*Ach.*)
On old oak and fir trees; rare in fruit. E. B. Supplt.
2642, f. 2.
Near Hungershall Rocks and on fir trees about Tunbridge
Wells; *Jenner Fl. Tunbr.*
- L. MELENA, *Nyl.*
On roots of trees on chalky banks; frequent.
Chelsford; Otford; Shoreham; Wrotham.
- L. AROMATICA, *Sm.*
On old walls; frequent. E. B. 1777.
Ightham; Barming; Boro' Green.
- L. SPHÆROIDES, *Smrf.*
On trees and mosses in damp woods.
Toy's Hill, *Howse!*
[*L. carneo-lutea* (Turn.), which grows on old elms near the sea,
&c., should be looked for in the neighbourhood of Dover and
Hythe.]
- L. PREMNEA, *Ach.*
On old trees; not common. E. B. 1682.
On trees on Tunbridge Wells Common; *Jenner Fl. Tunbr.* On
an old oak near the river, Penshurst; abundant in Cobham
Park on old oaks growing with *Opegrapha lyncea*.
Known by its 5-septate smaller spores and pruinose apothecia
from *L. grossa* (*L. premnea*, Fr.)
[*L. carneola*, Ach., with very small cup-shaped horny brown
apothecia, should be looked for on old oaks in Kent.]

(To be continued.)

SHORT NOTES.

BOTANICAL NOMENCLATURE. — Il parait de temps en temps, dans le 'Journal of Botany' et ailleurs, des articles sur la nomenclature botanique dans les quels on émet quelquefois des opinions contraires à celles que j'ai soutenu dans les 'Lois de la Nomenclature,' recommandées par le Congrès de 1867. Il s'est ainsi élevé des discussions aux quelles j'ai pris part occasionellent à l'origine, mais j'estime à present que ces questions perdent beaucoup de leur intérêt si on les discute ainsi par fragments, en

diverses langues, sans les rattacher aux principes et sans examiner leurs connexions. J'espère revenir une fois sur les points contestés, dans quelque 'Supplément' à mon ancien travail. En attendant je prie MM. les botanistes de vouloir bien ne pas considérer mon silence comme une preuve ou d'acquiescement à toute ce qui s'imprime ou d'indifférence à l'égard des auteurs.—ALPH. DE CANDOLLE, *Genève, Octobre 1, 1878.*

SCIRPUS SUPINUS.—Several years ago I called attention to the discovery of solitary subradical flowers in the axils of leaf-sheaths, in a form of *Scirpus supinus* which is rather widely spread in the United States; and I mentioned that I had detected traces of them in one East Indian specimen of that species, but not in European specimens. My object is to ask if any one has found them, or indeed looked for them. In our plant, toward the close of summer, they may almost always be found in small individuals, their very long capillary styles being rather conspicuous; but robust plants often want them.—ASA GRAY.

KENTISH CRYPTOGRAMS.—In Mr. Holmes' paper (sup. p. 211) I see Mr. R. S. Hill's name given as an authority for the occurrence of *Cladonia pungens* in Kent. Mr. Hill's specimens were collected near Basingstoke, in Hampshire. As this is not the only instance in which Mr. Leighton, in the 'Lichen Flora,' quotes Mr. Hill as an authority for Kentish Lichens, it may be well to note that in every instance where this is the case "*Kent*" should be read "*Hants.*"—F. I. WARNER.

SCILLA AUTUMNALIS IN ESSEX.—I can add one species to the Essex Flora, *Scilla autumnalis*, which I found abundantly in a sandy field about two miles south of Grays, and had it afterwards growing in my garden for two or three years.—A. R. WALLACE. [This tends to corroborate the locality from the Banksian herbarium given in this Journal for 1873, p. 341.]

MOLINIA CÆRULEA AS A MATERIAL FOR PAPER-MAKING.—It occurred to me, some years ago, that our common grass, *Molinia carulea*, might form a good material for paper-making, on account of its tenacity of fibre, freedom from knots, and the comparatively small quantity of silica in its composition,—characters which distinguish it from all our native grasses. I wrote to Mr. Jackson, of Kew, to inquire if it had ever been used for the purpose; in reply he informed me that so far as he knew it had not, and referred me to Mr. Thomas Routledge, of Sunderland, to whom I sent a small quantity of the grass. The result of Mr. Routledge's experiment is given in the following extracts from his letter:—"I have tested your *Molinia carulea*, the same giving me a better result than I anticipated, so far as a laboratory experiment is concerned; and I conclude that, taken as dried, and put up carefully in bundles free from weed and dirt, its value would be equal to Esparto, say at £5 per ton dry. I however must refrain from reporting positively as to its value for

paper-making from the result of so small an experiment: I should require at least a ton (more would be better) to test it practically and make paper from it. It may be worth more than the value I mention, but only a practical working trial into paper can properly test this point." The grass grows in the green parts of woods and on moorlands all over Scotland [and England], and could be cultivated where nothing else of any value will grow. As the plant is perennial, the only expense after the first outlay would be that of gathering in the crops.—A. CRAIG-CHRISTIE.

MIDDLESEX PLANTS.—Specimens of a large form of *Carex divisa*, Huds., and of *Juncus Gerardi*, Lois., have been brought to me by Dr. De Crespigny, who gathered them by a pond in Platt's Lane, Hampstead, this summer. Both of these species are not known to grow elsewhere in the county, though the former was formerly common in the Isle of Dogs. As both have usually decided tidal or semi-maritime proclivities, their occurrence at Hampstead is remarkable, and would perhaps, if followed out, be traceable to transportation (either accidental or intentional): this was probably the case with the maritime *Atriplex* at Hampstead, recorded in 'Journ. Bot.,' 1871, p. 33.—HENRY TRIMEN.

BARBAREA STRICTA IN MIDDLESEX.—Mr. Baker (Journ. Bot. ix. 213) mentions the occurrence of this plant by the Thames at Isleworth. I have found it this year in abundance at short intervals along the Duke's River, between Twickenham and Worton Lane. The different aspect of this plant from *B. vulgaris* (which is here associated with it) is very remarkable, especially when both are in a young state: this is partly attributable, as Mr. Baker observes, to the deeper colour of the petals, and still more to the yellow-green of the foliage. Dr. Boswell ('English Botany,' i. 174) describes the foliage as "dark green," and the petals as "paler yellow" than those of *B. vulgaris*; but in the Isleworth plant the exact contrary is the case.—JAMES BRITEN.

Notices of Books and Memoirs.

Conspectus Floræ Europææ. Auctore C. F. NYMAN. I. *Ranunculaceæ*
—*Pomaceæ*. Orebro (Sueciæ); typis officinæ Bohlinianæ.
1878. (8vo., pp. 240).

THAT great desideratum, a Flora of Europe, is not likely to be forthcoming at present; but as a precursor to it, and to a considerable extent supplying its place, Dr. Nyman's new treatise will be very welcome. It is more than twenty years since he published his 'Sylloge' (1854-55), an excellent book, which has proved its usefulness in the hands of everybody working at the plants of European countries, and served as the basis of arrangement for most herbaria. In this interval very much has been published,

and periodical botanical literature alone contains an amount of additional matter which is truly formidable in its proportions. The floras of the less-known countries, Iceland, Ireland, Spain, Greece, Turkey, and the eastern parts of Europe, have been in the same period carefully worked out by competent botanists, whilst in the north and west of Europe the industry of very numerous observers has resulted in a vast number of new forms and varieties being distinguished, synonymy rectified, distribution corrected and extended, and a considerable number of additional species in every district. To grapple with this mass of literature in various languages, and reduce it to a brief orderly summary, was a task which few would have the courage to face or the necessary qualifications to accomplish; and our thanks are due to the author for the masterly manner in which he has here effected it.

In the use of the 'Sylloge' there was one drawback felt by nearly all but the botanists of Scandinavia, namely, its arrangement, which was unfamiliar, and necessitated the constant use of the index. The Friesian system has been here supplanted by the Candollean, to which most systematic botanists are now quite accustomed. The book is also smaller, the type better, and printed in single lines instead of double columns, and every expedient tending to judicious condensation and brevity adopted. The formula on which each species is treated has been somewhat altered also, both in the way of addition and subtraction. The full quotation of the authorities for the names has been dropped—a change to be deprecated, though space is gained by it. On the other hand we have now reference under each species to published 'Exsiccata,' a very useful addition; the synonymy has been much extended and is well up to date (it is a pity that synonyms are not printed in italics as in the 'Sylloge'), and the sub-species or species of lower grade are readily distinguished by being printed in smaller type and having no number prefixed. References are given to the 'Sylloge' and its 'Supplement' (published in 1865) in cases where the special distribution of sub-species or varieties was given in those books but is not here repeated.

Condensation has been greatly studied, and on the whole the actual number of distribution-districts appears to be smaller than before. This has resulted partly from additional knowledge having shown many species to have a more general range; and also, in the case of montane or alpine species, from quoting the mountain-ranges specifically, "Pyren. Alpes. Carp.," instead of under the names of all the political divisions of Europe to which they belong—a change worthy of notice, as a step towards natural instead of artificial districts.

The author inclines to employ the genera founded on less marked characters, *e.g.*, *Pulsatilla*, *Ficaria*, *Batrachium*, but in his species-views he is by no means given to undue refinement, and the host of specific names of the ultra-critical school are merely given without remark under the species out of which they were carved, or are even intentionally omitted.

The botanist looking through the closely-printed pages before

us will naturally have his attention attracted towards the species of the country with which he is most familiar; and to the English botanist there is so much of interest in this first part of Dr. Nyman's 'Conspectus,' that when the book is completed we may be tempted to give a catalogue of the British flora as exhibited in its pages. The synonymy has been most carefully gone into; and if the author, as may be suspected, has occasionally misunderstood some of our species, there are many cases where English botanists will have to amend their nomenclature in accordance with his more accurate data. Our naturalised species are rarely noted, but special localities (counties) are often given for rarities, and Ireland is quoted usually as distinct from Britain.

A few notes may be made on some of our species. The West of France (and Jersey) *Ranunculus chærophyllus* is referred to *R. flabellatus*, Desf., var. *europæa*; the former species being considered restricted to the eastern Mediterranean. England is credited with all the sixteen species of *Batrachium* except *B. confervoides*, Fr., and *B. ololeucos*, F. S. *Caltha radicans*, Forst., is given for Scotland and East Finmark only. The distribution of *Arabis ciliata*, Br., stands as restricted to Ireland and Western England; and that of *Brassica monensis*, Huds., to West Britain and the Channel Islands, *Sinapis Cheiranthus*, M. K., with which our writers usually combine it, being in another genus. *Coronopus Ruellii*, All., takes the earlier name of *C. procumbens*, Gil. There is some difficulty in fitting our *Cerastia* to Nyman's views; besides *C. tetrandum* he gives as British *C. glutinosum*, Fr., and *C. pumilum*, Curt., but as he regards the latter as entirely littoral, it can scarcely be what is known as *pumilum* in England which is a plant of grassy downs, often but not always in maritime districts. *C. litigiosum*, De Lens, is also kept distinct, but is not given as a British species. *Stellaria glauca*, With. (1796), gives way to *S. palustris*, Ehrh. (1795), and *Sagina saxatilis*, Wimm. (1840), to *S. Linnæi*, Pr. (1835). *Oxalis stricta*, L., and *Trifolium stellatum*, L., are given as natives, and so, unfortunately, is *Erucastrum Pollichii*, Schp., a very rare casual here, with no claims to nativity. *Medicago sylvestris*, Fr., which occurs only in Sweden and England, is suggested to be an intermediate, originally of hybrid production, between *M. falcata* and *M. sativa*, analogous to *M. media*, P. It is a little surprising to see *Medicago denticulata* treated as a subspecies, next to *M. lappacea*, Desv., whilst *M. apiculata*, which we are accustomed to consider but a slight variety, stands as a separate full species. The nomenclature of the *Melilotus*-species has been changed, *M. arvensis*, Wallr., being altered to *M. officinalis*, Desv.; whilst *M. officinalis*, Willd., becomes *M. altissima*, Th.: does not this seem to be an injudicious application of the rules of priority? The name *Astragalus danicus*, Retz., properly supplants *A. Hypoglottis*, L., as Lange as shown. The extinct *Vicia levigata*, Sm., is put with a query under *V. lutea*, L. *Spiræa salicifolia*, L., inserted in some British Floras, is considered native in eastern Europe only. The treatment of the fruticose *Rubi* (51 species) will prove an interesting study, but space does not allow of notes

or extracts from it, or from the genus *Rosa*, where most of the almost innumerable names have been skilfully marshalled under species and subspecies.

This first part ends with the *Rosaceæ*. With the next, which will complete the Calycifloral Orders, there will be given some introductory and explanatory matter. H. T.

Clavis Synoptica Hymenomycetum Europæorum. By M. C. COOKE, M.A., A.L.S., and L. QUELET, M.D., O.A., Inst. et Sorb. Laur.

WITHOUT any introduction beyond the information conveyed by the title-page Messrs. Cooke and Quelet have presented students of Mycology with a *Clavis* of the European *Hymenomyces*. Though he is not told by the authors that any particular proficiency in the study is necessary for using the *Clavis*, trial of the book will soon convince the student that a very intimate knowledge of the *Hymenomyces* is the first thing required. At the outset one looks in vain for any definition of the nature or limits of the *Hymenomyces*, or of any of the orders or genera of that group of Fungi; and it is not until one arrives at the divisions and subdivisions of the subgenera that an attempt at describing the characters is found. The specific names are then given, followed by the name (or its usual abbreviation) of the author, and in most cases a reference to a figure in some well-known book; the species are then diagnosed very shortly. In the descriptions of the species we find no mention of the usual size of the plant—in many cases of quite as much use in identifying it as the frequently changing and varying colour, which is made one of the principal specific characters throughout the book. In neglecting mention of the microscopic characters of the species the authors are perhaps justified, since the book is probably intended chiefly for the field.]

After the genus *Agaricus*, and again after the other genera of the *Agaricini* and the *Thelephorei*, there is a list headed "Species Incertæ" in the first and last cases, and "Species dubiæ" in the second. Out of the 53 uncertain species of *Agaricus* given, Dr. Bonorden seems to have recorded 29; and out of the 7 dubious species of the other *Agaricini* five, while Dr. Sauter is guilty of the other two. The 6 uncertain species of the *Thelephorei* are divided between those two gentlemen again—3 each. Strangely, Dr.

Bonorden's 37 uncertain and dubious species, and Dr. Sauter's 6, were published in the same volume of 'Hedwigia' (we are not told, in the case of the *Thelephorei*, where they were published), and on turning to that volume (xv)—quoted in two different ways by the authors—we find, in each case, detailed descriptions of the plants, in most cases of greater length than is usual in descriptions of *Hymenomyces*. That more than half the uncertain and dubious species of European *Hymenomyces* should be recorded in one volume of 'Hedwigia,' and by one man, is no doubt surprising, but on what grounds they are so considered Messrs. Cooke and Quelet have not explained.

The usefulness of the book is farther impaired by the want of an index of the species. G. M.

The Plant-lore and Garden-craft of Shakespeare. By the Rev. HENRY N. ELLACOMBE, M.A., Vicar of Bitton, Gloucestershire.

UNDER this title Mr. Ellacombe has reprinted, with additions and corrections, a very interesting series of papers which originally appeared in the 'Garden' newspaper, and which well merited publication in a collected form. The subject is not a new one: a work bearing the title of 'Shakespeare's Garden' was noticed in the third volume of this Journal; but Mr. Ellacombe's book is in every way greatly in advance of his predecessor, and well deserves a place on the shelves of both the student of Shakespeare and the lover of plant-lore. A great deal of information in illustration of Shakespeare's numerous references to plants is brought together, with some remarks upon the cultivation of various species which are perhaps hardly in keeping with the general style of the book, but which have a value of their own from the fact that Mr. Ellacombe is well known as one of our most successful cultivators of herbaceous plants. Here and there, there are traces of hurried compilation, and the want of an index is a serious drawback to the usefulness of the volume, although the plants are arranged alphabetically; but the book as a whole is very satisfactory. We should perhaps mention that it is printed for the author, and can only be obtained by direct application to him. J. B.

Fascicles 77 and 78 of the 'Flora Brasiliensis' have appeared, dated respectively June and August, 1878. Fasc. 77 contains the *Rafflesiaceæ* (*Apodanthes* and *Pilostyles*), by Count Solms-Laubach, with one plate; and the *Nymphæaceæ*, by Caspary, with eleven plates. The latter memoir is treated with the careful elaboration characteristic of its author. Fasc. 78 consists of the *Cucurbitaceæ*, monographed by A. Cogniaux, of Brussels. This contains very numerous new species, and is illustrated by thirty-eight excellent plates.

Dr. D. Moore, of Glasnevin, gives complete lists of the Mosses and *Hepaticæ* found in Counties Dublin and Wicklow, in the 'Scientific Proceedings of the Royal Dublin Society.'

The Freshwater *Alge* and *Characeæ* collected by Berggren in the Sandwich Islands, in 1875, form the subject of a memoir by Nordstedt, in the Transactions of the Physiographical Society of Lund. Several new species are described and figured in the two accompanying plates, including a new *Nitella*, *N. havaiensis*, Nordst.

A chapter on the Botany of North Wales and list of its rare plants is given by Mr. Britten in Jenkinson's 'Guide to North Wales.'

OTHER NEW BOOKS.—W. W. SPICER, 'Handbook of the Plants of Tasmania.' J. Walsh & Sons, Hobart Town, 1878.—R. HOGG, 'Herefordshire Pomona,' Part I. Hardwicke & Bogue, Piccadilly, 1878 (15s.)—O. KIRCHNER, 'Kryptogamen-Flora von Schlesien,' Bd. 2, heft 1. *Alge*. Breslau, 1878 (7 mk.)—H. FIELD & R. H.

SEMPLE, 'Memoirs of the Botanic Garden at Chelsea.' London, Printed by Gilbert & Rivington, 1878. (Not published).

ARTICLES IN JOURNALS.—SEPTEMBER, 1878.

Grevillea.—M. C. Cooke, 'Californian Fungi.'—Id., 'Extra-European Fungi.'—Id., 'On *Chatophoma*.'—Id., 'Ravenel's American Fungi' (continued).—Id. and J. B. Ellis, 'New-Jersey Fungi' (continued).—J. E. Vize, 'Californian Fungi.'—W. Phillips, 'Californian Fungi.'—W. Arnell, 'A proposal of phænological observations on Mosses.'

American Naturalist.—E. Palmer, 'Plants used by the Indians of the United States.'

Bot. Zeitung.—C. Steinbrinck, 'Observations on the dehiscence of some dry pericarps, (t. 13).

Flora.—O. Drude, 'On the application of an analytical key and the arrangement of Families in the new German Floras.'—M. Gandoger, 'Rosæ novæ Galliæ' (continued).—H. Conwentz, 'On a red Foxglove with *Peloria* flowers.'

Oesterr. Bot. Zeit.—P. Ascherson, '*Typha minima* or *Laxmanni*?'—L. v. Vukitonovic, 'On *Anthyllis tricolor*, Vuk. — F. Hauck, '*Algæ* of the Adriatic' (continued—t. 3).—R. T. Solla, 'Midsummer Flora of neighbourhood of Görz' (continued).—F. Antoine, 'Botany of Vienna Exhibition' (continued).

Magyar Novenytani Lapok.—L. Simkovics, 'Additions to Flora of Kolozsvár and Torda' (several new hybrids, described in Latin).

Silliman's American Journal.—A. Gray, 'Forest Geography and Archæology.'

Bot. Notiser (15th Sept.).—S. O. Lindberg, 'On *Dichodontium*.'—O. G. Blomberg, 'On distribution of Scandinavian Lichens.'—V. B. Wittrock, 'On *Linnæa borealis*' (continued).

Botanical News.

DR. PFEFFER, of Basle, has become Professor at Tübingen, and DR. H. VÖCHTING, of Berne, fills his place at Basle.

THE BOTANICAL LOCALITY RECORD CLUB desires to enlarge its operations by the investigation of the geographical distribution of Mosses through the British Isles, on the plan of 'Topographical Botany.' A catalogue of British Mosses has already been issued by the Club, but the funds in hand do not at present allow of the publication of a Report on Mosses. Mr. C. P. Hobkirk, Huddersfield, and Mr. H. Boswell, Oxford, have consented to act as Recorders, and it is hoped that bryologists who are interested in the subject of distribution will send their names to either of these gentlemen or to Dr. H. F. Parsons, Goole.

Original Articles.

ON A NEW SPECIES OF *ISOETES* FROM IRELAND.

By D. MOORE, PH. D.

(TAB. 199.)

ISOETES MOREI.—Corm bilobed, somewhat crescent-shaped at base, the extremities of crescent præmorse, transverse section of corm panduræform in shape, nearly twice as long as broad, with a slight transverse median line from furrow to furrow widening in the centre, solid, of compact tissue; roots smooth, dichotomously branched; leaves numerous, as many as twenty from one corm occasionally, very long, varying from one to two feet or more, slender and flexible, tapering gradually to a setaceous point, semi-circular, with wide diaphanous sheaths involute at margin which nearly meet at base and partly overlap the sporangia, colour bright green, lacunes large, tissue loose; macrosporangia comparatively small, in *saccate* compartments at the bases of the outer leaves, each containing about twenty spores, veil well developed, arched and covering the sporangia two-thirds of their length; lingula *triangularly ovate-cordate*, as broad as long, of a *brownish colour in centre*, with diaphanous margins, the latter composed of layers of single cells and more or less entire according to the equal growth of the delicate cells; ligula short, ovoid, with glossopodium and glands rather indistinct; macrospores roundish or slightly triangular, granular on surface especially on basilar half; microspores smooth, or slightly crested on convex margin.

Hab.—Upper Lake Bray, County Wicklow, Ireland, where it is always submerged.

Compared with its nearest ally, *Isoetes lacustris*, this remarkable form differs in the following particulars:—First, in the leaves being more numerous on strong plants, from three to four times longer than they are in the normal state of that species, only half the diameter, more setaceous, lacunes longer, and tissue looser. Second, in the much broader sheaths of the leaves, which are more involute at their margins, each half of the diaphanous portion being equal in breadth to that of the more solid part of the leaf itself, and reaching farther up towards the top. Third, in the veil which covers the macrosporangia being one half longer, leaving only one-third of the spores naked. Fourth, in the macrosporangia being in more *saccate cavities* and *fewer* in number. Fifth, in the smaller microsporangia, which are nearly overlapped by the sheathing bases of the leaf.

Compared with *I. setacea*, Bosc., it differs, first, in being always

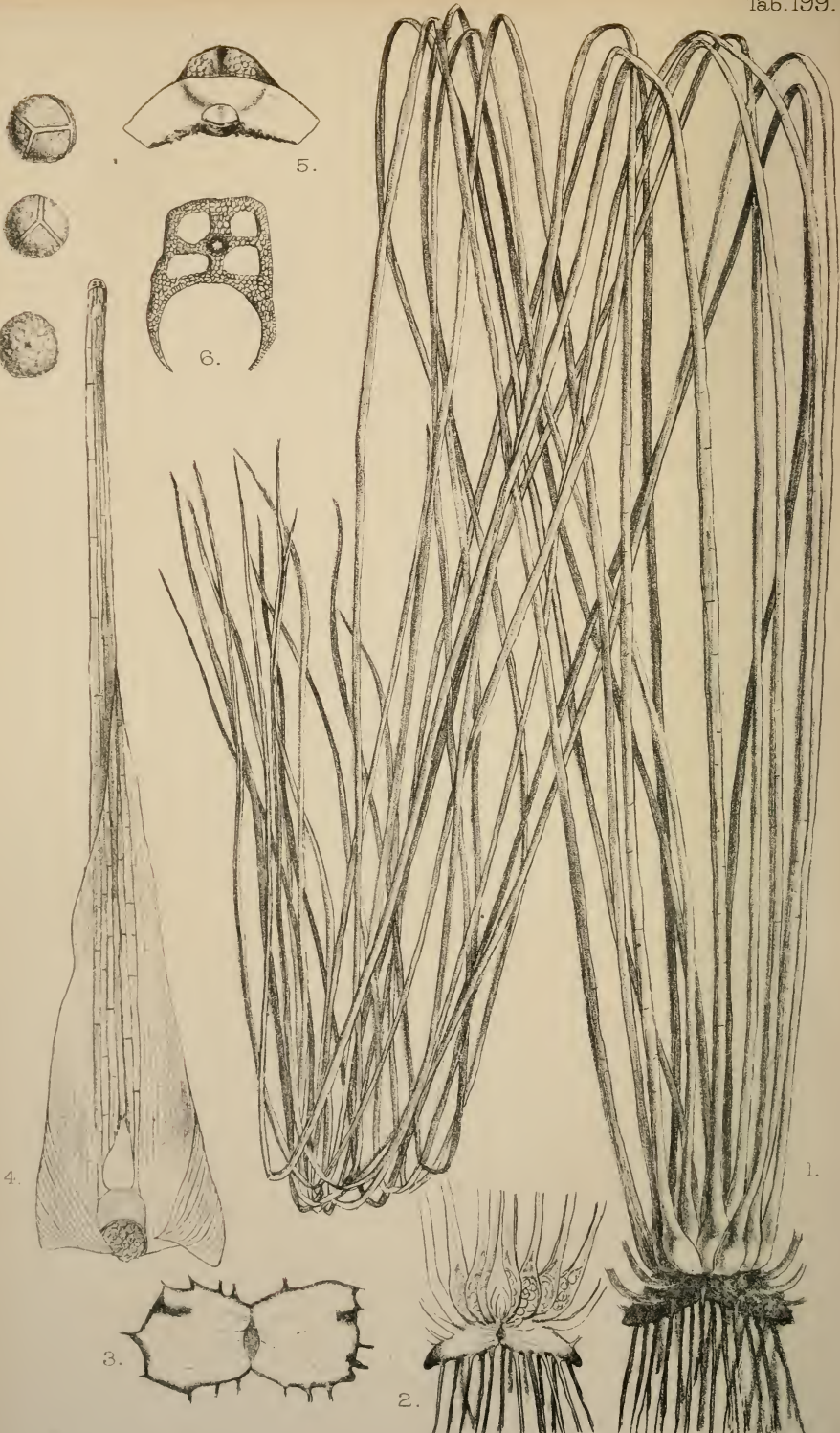
submerged; second, in the corm being bilobed; third, in the leaves being without stomata; fourth, in having the veil developed.

In general outward appearance our Irish plant bears more resemblance to *I. setacea*, Bosc., and *I. Malinverniana*, DeNotaris, than it does to *I. lacustris*. When laid side by side with strong plants of *I. setacea*, collected by Gay near Montpellier, and now in the Kew herbarium, as well as strong plants in the herbarium of the British Museum from several collectors, no difference is observable, and even very little when the plants are examined under the microscope. Out of five plants lately received from Professor Martins of the Montpellier University, which had been grown in rather deep water, one had the corm *bilobed*, another with a very slight third lobe, and the leaves were *destitute* of stomata. The only difference I could perceive between them and our Irish plant was in the lingula and glossopode, the former being longer, more transparent, with stronger margins, the glands on the glossopode much clearer and better developed, besides the absence of the veil.

Isoetes lacustris has been long known at Lake Bray, but only the normal type, which grows abundantly in the same lake along with our present plant. Leaves of the latter have been picked up by many collectors, but no definite opinion as to their belonging to a distinct form seems to have been expressed until 1871, when A. G. More, Esq., principal Assistant in the Natural History Museum, Dublin, called attention to it in a paper read before the Royal Irish Academy, which was reprinted, by permission of the Academy, as a 'Supplement to Cybele Hibernica,' in 1872. In his observations on *I. lacustris* Mr. More states, "A long slender form, some of whose fronds measured twenty-six inches in length, is in autumn washed ashore from deep water at Upper Lough Bray." On seeing the leaves collected by Mr. More, it occurred to me that the plant which produced them must be distinct from the ordinary state of *I. lacustris*. It was not, however, until November, 1876, that I obtained a supply of plants which were growing *in situ*. These I brought to the Botanic Garden, and had them planted along with plants of *I. lacustris*, where both preserved their respective forms; *I. Morei* producing long slender setaceous leaves, floating on the surface of water, as they frequently do at Lake Bray; *I. lacustris* short stiff subfalcate leaves, remaining under water.

Although our plant differs in so many particulars from the normal state of *I. lacustris*, it may be only a remarkable abnormal form of it. It is certainly much more distinct from it than *I. echinospora* is, which differs in no essential particulars, farther than the echinate macrospores and generally smaller more slender setaceous leaves.

It may be the fact that in Northern Europe we have only one true species, *I. lacustris*; *I. echinospora* and the present plant, *I. Morei*, being the extremes of forms of that species? However, the parts which afford specific characters in this genus being so few, and some of them, as we have seen, not very constant, it may be taken for granted that the limits of true species of *Isoetes* are not yet fully settled. But, either as a species or variety, I trust this



H. Olson lith.

Isoetes Morei, D. Moore.

Mintern Bros imp.

remarkable plant will bear the name of my colleague, A. G. More, Esq., who first called attention to it, and who has contributed in so many instances to the furtherance of British botany.

DESCRIPTION OF TAB. 199. — *Isoetes Morei*, D. Moore, from specimens collected at Lough Bray, Ireland. 1. A complete plant. 2. Vertical section of the corm. 3. Transverse section of the same. 4. Lower portion of a leaf, showing macrosporangium, veil and lingula. 5. Transverse section of microsporangium. 6. Transverse section of leaf. 7. Macrospores.

[N.B.—In section No. 4 the lingula is shewn *too narrow* at base, with margins more entire than they usually are.]

THE "PRO-EMBRYO" OF CHARA: AN ESSAY IN MORPHOLOGY.

By SYDNEY H. VINES, B.A., B.Sc., F.L.S., Fellow and Lecturer of Christ's College, Cambridge.

IT is to the researches of Pringsheim* that we are indebted for our knowledge of the fact that the fertilised oosphere of *Chara* does not immediately give rise, as had been stated by previous observers, to the sexual plant, but that a comparatively inconspicuous "pro-embryo" (Vorkeim) is developed from it, which presents no differentiation of stem and leaf, from one of the cells of which the axis of the sexual differentiated plant is formed as a lateral outgrowth. The details of the development of the "pro-embryo" have been recently described by De Bary.† From his description and figures it appears that the first stage in its development consists in the disappearance of the granules of starch and fatty matter from the protoplasm occupying the apex (free end) of the cell, and in the formation of a wall at right angles to its long axis as to divide it into two unequal cells—a small apical cell filled with hyaline protoplasm, and a much larger basal cell, the protoplasm of which is full of granules. The basal cell appears to act merely as a depository for nutrient materials to be used in the growth of the "pro-embryo," which is formed from the small apical cell in the following manner:—It is divided into two equal parts by the formation of a wall perpendicular to the first, lying therefore in the plane of the long axis of the oospore.‡ Each of the two cells thus formed grows out into a multicellular filament, the one being the "pro-embryo," the other the "primary root."

It is not necessary to follow the succession of cell-divisions which lead to the formation of these structures, nor is it essential to reproduce here Pringsheim's account of the development of the axis of the sexual plant from one of the cells of the "pro-embryo." What has been said above will be found sufficient to render intelligible the following discussion, which has for its object the elucidation of the morphological significance of the "pro-embryo."

* 'Jahrb. für wiss. Bot.' Bd. iii. 1864, p. 294.

† 'Bot. Zeitg.' 1875, p. 377 (trans. in Journ. Bot., 1875, p. 298); also 'Nordstedt, and Wahlstedt, Flora,' 1875.

‡ Oospore = fertilised oosphere (central cell, gynosphere, ovum).

The interpretation given by Pringsheim* of the facts discovered by him is to this effect:—He considers that the structure which springs from the oospore of *Chara*, and to which he gives the name of "pro-embryo" (Vorkeim), is the exact morphological equivalent of the protonema which is developed from the spore of a Moss, and he infers from the existence in these plants of leafless structures intervening between the spore and the leafy plant, that the *Characeæ* and the *Muscineæ* are closely allied. This close relationship is, he believes, placed beyond doubt by the fact that Mosses alone of all plants possess organs which are analogous to the "pro-embryonic branches" (Zweigvorkeime) of *Chara*. The researches of Schimper † shew that "rhizoid prothallia" occur on the stem and leaves of many Mosses.

In proceeding to inquire into the adequacy of this interpretation, it may be at once admitted that the *Characeæ* resemble the *Muscineæ* in many points. Pringsheim does not fail to note in his above-mentioned work the similarity in structure and development existing between the nucule of *Chara* and the archegonium of a Moss. It is usual at the present time ‡ to place the *Characeæ* in the class *Carposporeæ*, and to speak of the nucule as a carpogonium. The soundness of such a classification becomes questionable when it is remembered that both in structure and development, as well as in the changes which it undergoes in consequence of fertilisation, the nucule of *Chara* differs absolutely from a typical carpogonium. The central cell (oosphere) of the nucule is surrounded from the first by a multicellular investment, and consequently that formation of a cystocarp around the oosphere after its fertilisation, which is so characteristic of the *Carposporeæ*, does not take place in the *Characeæ*. It is probably more correct to speak of the nucule of the *Characeæ* as being an archegonium.

In a recent paper upon the alternation of generations among the Thallophytes, § Pringsheim groups the *Characeæ* with the *Fucaceæ* and the *Conjugatæ*, as being plants which do not present that dimorphism of the organs of fructification which is essential to the occurrence of alternation of generations. In making this statement he becomes unconsciously illogical. If, as he insists in his first paper, the "pro-embryo" of *Chara* be homologous with the protonema of a Moss, and if, as he asserts in his second paper, there be no stage in the life-history of *Chara* which corresponds to the asexual generation (sporophore ||) of the Moss, it must be admitted that the product of a fertilised oosphere is morphologically equivalent to the product of a germinating spore; that, for instance, the sporogonium of a Moss is equivalent to its pro-

* *Loc. cit.* p. 318, quoting from 'Monatsber. d. Berl. Akad.', 1862.

† 'Recherches anat. et morphol. sur les Mousses.' Strasbourg, 1848, pp. 13, 15, 19.

‡ 'Sachs, Lehrbuch,' 4te Auflage, 1874.

§ 'Jahrb. für wiss. Bot.', Bd. xi. 1877, p. 32.

|| Thiselton Dyer has suggested the word "oophore" as a general expression for the sexual and "sporophore" for the asexual generation of plants. These terms are used in this sense throughout this paper.

tonema—a result which is obviously incorrect. An attempt might be made to escape from this dilemma by surrendering the supposed homology of the "pro-embryo" with a protonema, maintaining, however, the assertion that no alternation of generations presents itself in the life-history of *Chara*; but this would only lead to further difficulties. Such a view would at once isolate *Chara* from all other living organisms as being an individual the fertilised "ovum" of which produces an embryo quite unlike its parent, from which the sexual individual is subsequently formed by a process of budding. The life-history of *Chara* can be satisfactorily accounted for only on the assumption that an alternation of generations occurs in it.

It is admitted by those who agree in placing the *Characeæ* among the *Carposporeæ* that an alternation of generations does exist in the life-history of *Chara*, and the following is a brief account of the supposed mode of its occurrences. To make it quite clear a comparison may be instituted between *Chara* and a typically carposporous plant such as *Coleochæte*. As the result of fertilisation, the oosphere of *Coleochæte* undergoes successive divisions, which give rise to a number of similar cells. This mass of cells, invested by the walls of the mother-cell, is the sporophore of *Coleochæte*, for, at a later period, these cells become isolated; each of them is in fact a spore (carpospore), and from each of them a zoospore is emitted, from which the oophore is developed. In *Chara* the fertilised oosphere does not give rise even to so simple a spore-producing apparatus as that of *Coleochæte*. It remains unicellular; it is, in fact, converted directly into a single carpospore, and this is all that represents the sporophore in the life-history of *Chara*. It is only when this spore is about to germinate that it becomes multicellular by the formation of cell-walls within it in the manner described by De Bary. This comparison may be conveniently expressed in the following tabular form:—

	<i>Oophore.</i>			<i>Sporophore.</i>
Coleochæte ...	————	————	Plant.	Oospore.
Chara	Proembryo.	————	Plant.	Carpospore.
Moss	Protonema.	————	Plant.	Sporogonium.

This view certainly harmonises with Pringsheim's theory of the homology of the "pro-embryo" with a protonema, but it presents obvious difficulties. It is not easy to realise that the so-called carpospore of *Chara* is the morphological equivalent of the whole oospore of *Coleochæte*, and therefore also of so complex a structure as the sporogonium of a Moss, and these difficulties are very much increased by Pringsheim's recent paper above referred to. In it he satisfactorily demonstrates that the spore of a Moss or of a Fern, for instance, is not the final stage of the sporophore, but that it is the first stage of the oophore. This being the case, the table given above is incomplete, all mention of the spore (except in the case of *Chara*) being omitted. In its complete form it is as follows:—

	<i>Oophore.</i>			<i>Sporophore.</i>
Coleochæte ...	Carpospore.	————	Plant.	Oospore.
Chara	Carpospore.	Proembryo.	Plant.	Carpospore.
Moss	Spore.	Protonema.	Plant.	Sporogonium.

This statement of the case makes it evident at a glance that the hypothesis of the direct conversion of the oosphere of *Chara* by fertilisation into a single carpospore results in a paradox. It compels us to regard the carpospore of *Chara* as being not only the sporophore but also the first stage of the oophore of the plant; or, in other words, to consider the carpospore of *Chara* as being the morphological equivalent of the oospore of *Coleochæte* and of the sporogonium of a Moss, and, at the same time, of a single spore of either of these plants, a view which is quite untenable. Moreover, such a direct conversion of an oosphere into a single spore is quite unparalleled among plants which exhibit an alternation of generations. In all such plants the result of the development of the fertilised oosphere is the production of numerous spores. Further, the mode of "germination" of this "carpospore" of *Chara* is quite different from that of the spores of other plants. When a spore germinates it usually protrudes a germinal filament (Keimschlauch) from any portion of its surface, but in *Chara* the protrusion of the filament is confined to a definite spot, and its formation is preceded by certain well-defined and apparently constant cell-divisions. It appears, therefore, that this view of the alternation of generations in *Chara* is unsatisfactory, for it is based upon an unwarrantable assumption, and it fails to explain all the phenomena of the life-history of the plant.

An attempt may now be made to give an interpretation of these phenomena which shall have a more secure foundation, and which shall interpret them in a more satisfactory manner. The first cell-divisions which take place in the fertilised oosphere of *Chara* are not unlike those which take place in that of *Coleochæte*, but the final result is different in the two cases; in *Coleochæte* the cells formed fall apart, but in *Chara* they remain connected and certain of them give rise to the "pro-embryo" and to the "primary root." The processes of growth exhibited by the "germinating carpospore" of *Chara* correspond much more nearly to those which accompany the development of an embryo from a fertilised oosphere than to those which occur in a germinating spore. It is interesting to compare, from this point of view, the embryology of *Chara* with that of the *Hepaticæ*. In *Chara*, the first division of the oosphere takes place, as we have seen, in a plane at right angles to the long axis of the archegonium, and this is the case also among the higher *Hepaticæ* (Jungermanniæ); but this difference exists, that in *Chara* two unequal cells are formed, whereas the two cells of the *Hepaticæ* are equal in size. The more superficial of the two cells in the *Hepaticæ*—the one, that is, which immediately underlines the neck of the archegonium—undergoes numerous divisions, by means

of which the tissue of the future sporogonium is formed, and the more deeply-placed cell gives rise to the tissue of the seta and foot (embryophore). In *Riccia*, however, the whole oosphere is devoted to the formation of the sporogonium. In *Chara*, the more superficial of the two cells gives rise to the "pro-embryo" by repeated divisions, whereas it appears that the deeply-placed larger cell undergoes no change. Since their mode of origin is the same, it is reasonable to suggest that the "pro-embryo" of *Chara* is the homologue of the sporogonium of the *Hepaticæ*, and that the basal cell of the former is the homologue of the seta and foot of the latter,—that the "pro-embryo" and the basal cell together are equivalent to the sporogonium with its seta and foot. It must not be forgotten, however, that in *Chara* the "primary root" is derived from the apical cell as well as the "pro-embryo." From the researches of Nordstedt and Wahlstedt* it appears that this development of a "primary-root" is not absolutely constant, and that when it does not take place the whole of the apical cell gives origin to the "pro-embryo." This fact affords some ground for regarding this root not as a "primary" root, in the strict sense of the term, but rather as an adventitious root. As I have endeavoured to establish elsewhere,† a "primary root" is an organ developed from that segment of the oosphere which is diagonally opposite to that one in which the apex of the stem is formed. Of this the Ferns and *Equisetaceæ* and also the *Phanerogams* offer good examples. When, as in *Chara*, the first root is formed from that half of the oosphere which gives rise also to the stem, it must be regarded as being adventitious. Of this *Selaginella* and the *Coniferae* afford examples. It may be objected that the inequality of the two cells in *Chara* destroys the homology which is here suggested, but this objection has not much weight. It is not denied that the sporogonium of *Riccia* is homologous with the sporogonium, seta, and foot of one of the other *Hepaticæ*, because in *Riccia* the sporogonium is formed from the whole instead of from half of the oosphere, and therefore the homology of the "pro-embryo" of *Chara* with the sporogonium of one of the *Hepaticæ* cannot be denied on the ground that it is formed from a small part of an oosphere the greater part of which is devoted to the formation of a foot.

On this view the "pro-embryo," or rather the true "embryo" of *Chara* must be regarded as the sporophore of the plant. The following table will illustrate this view in all its consequences:—

	<i>Oophore.</i>			<i>Sporophore.</i>
Coleochæte ...	Carpospore.	————	Plant.	Oospore.
Chara	————	————	Plant.	Embryo.
Moss... ..	Spore.	Protonema.	Plant.	Sporogonium.

* *Loc. cit.*

† On the Homologies of the Suspensor, 'Quart. Journ. Micr. Sci.', January, 1878.

A very obvious objection is at once suggested by this table, viz., that if it be correct the sporophore of *Chara* is represented by an organ which has never been known to produce spores. It must not be forgotten, however, that the transition from the sporophore to the oophore in plants which present a well-marked alternation of generations is not necessarily effected by means of spores. The recent researches of Pringsheim* and of Stahl† have shewn that the seta and the sporogonium (*i. e.* the sporophore) of a Moss may, under certain conditions, give rise to a protonema upon which the moss-plant (oophore) is subsequently developed as a lateral outgrowth. From the observations of Müller‡ we know that the protonema of a Moss is merely the simplest possible form of its leaf-bearing stem. These facts warrant the assertion that a direct transition from the sporophore to the oophore can be effected in Mosses without the intervention of spores. It is not so paradoxical, therefore, as it appears to be at first sight, to apply the term "sporophore" to an organ which does not actually produce spores. It may be inferred that the condition which is accidental in Mosses is permanent in *Chara*, in which plant the sporophore remains rudimentary, producing no spores, but giving rise to the oophore by lateral budding from one of its cells.

The vegetative reproduction by means of the "pro-embryonic branches"—or, as should now be said, "embryonic branches"—which has been described in detail by Pringsheim, and which is of common occurrence in *Chara*, affords some indirect but valuable support to the views here advanced. These embryonic branches spring from the nodes of the stem, and closely resemble the embryo in their structure. Like the embryo, an embryonic branch gives origin to a sexual plant by a process of budding from one of its cells which lies behind its apical cell. Expressing these facts in general terms this process may be described as the development of numerous sporophores (embryonic branches) by budding from the oophore (*Chara*-plant), as an instance, that is, of a transition from an oophore to a sporophore without the intervention of sexual reproductive organs (Apogamy, *De Bary*). Other instances of this occur among Ferns. It has been found§ that the prothallus (oophore) of certain Ferns (*Aspidium filix-mas cristatum*, *Aspidium falcatum*, *Pteris cretica*) gives rise to the fern-plant (sporophore) by a process of budding without the development of any sexual reproductive organs, and that this is the only means by which these Ferns are reproduced.

It appears from the foregoing facts and deductions (1) that a well-marked alternation of generations occurs in the life-history of *Chara*, and (2) that the *Chara*-plant with its reproductive organs is

* 'Jahrb. für wiss. Bot.' Bd. xi. 1877, p. 1.

† 'Bot. Zeitg.' 1876.

‡ 'Die Sporenvorkeime etc., der Laubmoose.' 'Arb. d. bot. Inst. in Würzburg,' Bd. I., Heft. iv., 1874.

§ Farlow, on asexual growth from the prothallus of *Pteris cretica*. 'Quart. Journ. Mic. Sci.', vol. xiv., 1874.

De Bary; Ueber apogame Farne, &c. 'Bot. Zeitg.', 1878.

the oophore, the sporophore being represented by the embryo, *i. e.*, the product of the development of the central-cell of the archegonium. In order to indicate the fact that no spores are ever produced, so far as is at present known, by the sporophore of *Chara*, we may speak of this plant as being "aposporous," using a word which is symmetrical with the term "apogamous," applied by De Bary to those Ferns in whose life-history no process of sexual reproduction occurs.

If this interpretation of the facts in the life-history of *Chara* be in any measure a correct one, it will necessarily have an important bearing upon the question of the systematic position of the *Characeæ*. This question has been recently discussed in these pages by Bennett* and by Caruel.† The former, accepting the prevailing account of the life-history of *Chara*, and perceiving the many features which the *Characeæ* and the *Muscineæ* possess in common, suggests that the *Characeæ* may be Mosses, rendered abnormal by their aquatic habit, in which the formation of the non-sexual generation (sporophore) is altogether suppressed. There is nothing in the views advanced in this paper to contradict the existence of a relationship between the *Characeæ* and the *Muscineæ*; on the contrary, there is much to establish it. It is true that the "pro-embryo" of *Chara* cannot any longer be regarded as the homologue of the protonema of a Moss, but, on the other hand, it is here contended that the embryo is the homologue of the sporogonium of a Moss; so that although these views destroy one link in the chain of analogies and homologies which connects the *Characeæ* and the *Muscineæ*, they replace it by a stronger one. I quite agree with Bennett's conclusion, on account of the facts detailed in the earlier part of this paper, that it is incorrect to place the *Characeæ* among the *Carposporeæ*, for they have stronger affinities with the Mosses.

Still it must not be overlooked that the *Characeæ* do possess certain features in common with some of the *Carposporeæ*. such as a very simple histological composition and their peculiar cortication. And further, although, as Bennett states and as I have already pointed out, the "nucule" of *Chara* is essentially different from a carpegonium,—is, in fact, an archegonium,—yet it presents a peculiarity in which it resembles the carpegonium of certain *Carposporeæ*, and in which it differs from the archegonium of a Moss. This peculiarity consists in the existence of one or more cells (Wendungszellen, *A. Braun*) at the base of the central-cell, which have been divided from it. These cells are usually regarded as being the representatives of those forming the trichopore of the *Florideæ*, that is, as the rudiments of an organ which exists fully developed in allied plants, the antherozoids of which are not endowed with the power of movement, but which is unnecessary in the *Characeæ*, because in them the antherozoids are actively motile.

* 'Journ. of Botany.' New Series. Vol. vii., July, 1878, p. 202.

† *Idem.* New Series, Vol. vii., September, 1878, p. 258. Also 'La Morfologia Vegetale.' Pisa. 1878.

I cannot proceed, therefore, as Bennett does, to unite the *Characeæ* with the *Muscineæ*.* I regard them as forming an independent group intermediate between the *Carposporæ* and the *Muscineæ*. This is really to say that they link the Thallophytes to the Cormophytes, and this I believe to be actually the case. In the structure of their vegetative and reproductive organs they resemble the cormoid Thallophytes on the one hand and the thalloid Cormophytes on the other.

Caruel proposes to place the *Characeæ* (his Schistogams) between the Vascular Cryptogams (his Prothalloperms) and the Phanerogams. He rejects, as I do, the supposed homology of the "pro-embryo" of *Chara* with the protonema of a Moss, and partly on this ground and partly on the ground that in Mosses the "neutral form" (sporophore?) is definite in its evolution, whereas in *Chara* it is indefinite, he separates widely the *Characeæ* from the *Muscineæ* in spite of many obvious resemblances. Of these reasons the former is quite insufficient, as a consideration of the foregoing paragraphs of this paper will shew. As to the latter, the observations of Pringsheim and of Stahl, to which reference has been made above, shew that the "neutral form" of a Moss is not necessarily definite in its evolution. I am unable to ascertain exactly from his paper or from his book what Prof. Caruel considers to be the "neutral form" of *Chara*, but if it is either the oospore or the "pro-embryo," these surely are definite in their evolution. He goes on to separate the *Characeæ* from the Prothalloperms on account of the absence from the former of "anything like the sexual prothallus so peculiar to the Prothalloperms," and also on account of "the complex organisation of the antherocyst (globule) compared to the simpler antheridium, and of the oogemma (nucule) compared to the archegonium, and of the different origin of both, which in *Characeæ* proceed directly from the neutral form and not from spores produced by it." Are we then to cease to regard the sexual *Chara*-plant as corresponding to the prothallus of a Fern, and are we to consider the sexual organs which it bears as a separate sexual generation? Surely this is a view which has no foundation in true morphology. Can there be any reason for regarding the archegonia and antheridia of *Chara* as constituting a generation distinct from the plant which bears them, whilst no such distinction is made in the case of the prothallus of a Fern? The feature of the *Characeæ* to which importance is attached as indicating a relationship with the Phanerogams is the "marked resemblance of structure, coupled with the same origin, between the oogemma of the one and the gemmule (misnamed ovule) of the other," and further, "the similarity of origin in the male forms of both the groups, equally proceeding from bodies which are modifications of leaves." Even if we admit, as Caruel does, that Celakovsky † has satisfactorily proved that the central-

* This has been done also by Trevisan. (Conspectus ordinum Prothallophytorum, in 'Bull. Soc. Bot. Belg.', 1877.) He unites the *Bryophyta* and *Phycophyta* (*Characeæ*) into one group which he calls *Anthogameæ*.

† 'Flora,' 1878, p. 49.

cell of the archegonium of *Chara* (oogonium, Celakovsky) and the ovule of a Phanerogam are both phyllomes, and that the investment of the former is comparable to that of the latter (ovary), still this fact does not necessarily establish the existence of a close relationship between these plants. Do we not find among Mosses archegonia which are morphologically phyllomes, and are not these organs usually invested by leaves forming either a perichætium or a perigynium? It is scarcely necessary to go so far as to the Phanerogams to find female organs which resemble those of the *Characeæ* in their morphological nature when they occur close at hand in the *Muscineæ*. The same remarks may be applied also to the male organs. It cannot be doubted that the antheridium of *Chara* much more closely resembles that of a Moss (which may be also a phyllome) than the stamen of a flowering plant. Caruel himself admits that great differences exist between the structure of the male organ of *Chara* and that of a stamen. This, together with the differences in the embryology of the two groups, suffices to keep them distinct.

The permissibility of such a comparison of the reproductive organs of *Chara* and those of a Phanerogam is very questionable. It is admitted on all hands that these organs in *Chara* belong to the oophore, whereas the ovules and stamens of a Phanerogam belong to the sporophore. It is difficult to imagine from what morphological stand-point it is that Caruel proceeds to institute it.

The ground upon which it is sought to establish the existence of a close relationship between the *Characeæ* and the *Phanerogamæ* cannot be considered to be satisfactory, and if the interpretation of the facts of the life-history of *Chara* which is given in this paper be the correct one, they lose even the appearance of plausibility.

NOTES ON NEW ZEALAND FERNS.

BY H. C. FIELD, ESQ.

[THE following notes, made from long observation of the Ferns of New Zealand in their native localities, were sent by Mr. Field in a letter merely intended for my own private instruction; but they contain so much that is interesting and valuable that I have asked and obtained his permission to publish them.—J. G. BAKER.]

I think *Gleichenia circinnata* and *G. dicarpa* are merely forms of the same plant. Here the lobes of both fold tightly back, so as to cover the sori, the only apparent difference being that, while those of the former are reflexed symmetrically, so as to cover all up closely, those of the latter fold back lopsidedly, so as to leave a sort of deep cup-shaped cavity on the upper side of each lobe, or perhaps I should rather say on the side of it farthest removed from the stipes of the frond. I hardly fancy this distinction sufficient to justify their being separately classed; and moreover, they

constantly grow together (that is, *dicarpa* seems only to grow along with *circinnata*, though the latter is often found alone), and are so mixed that I often think they must spring from the same rhizomes, though I have never been able to extract a rhizome with both kinds of frond upon it from the mud and moss of the swamps in which they occur. I find, too, that some masses of the swamp-soil containing these ferns, which I was at some pains to bring down from the mountains, and plant in a favourably wet place in my garden, have for the last three years only produced *circinnata* fronds, though they contained quite an equal number of *dicarpa* ones when I procured them.

I may next note the characteristics of the caudices of our arborescent ferns. *Cyathea medullaris* grows to an ultimate height of from forty to a hundred feet or more, and the fronds, on withering, break short off from the caudex, leaving a rhomboidal scar on the latter, to show where each one grew. Thus the whole outer surface of the caudex consists of these scars, except just at the bottom, where there is often a small cone of fibrous matter, which occasionally attains the dimensions of eighteen inches in diameter at its base, and two feet or more in height. It consists of apparent root-fibres growing longitudinally downwards from the caudex, but adhering firmly together. It is called "Weki" by the Maoris, who split it into slabs, and use it to line their potato-pits and storehouses, partly because it is almost imperishable and impervious to moisture, and partly because rats and mice do not gnaw through it as they will through wood. *C. Cunninghamsi* seems never to exceed fifteen or twenty feet in height, and its withered fronds, or their rachises, remain hanging around the caudex for many years, often in fact nearly concealing it. When they drop the separation seems effected by a sort of healing process, which has gradually diminished the diameter of the actual base of the stipe, so that only a small scar remains on the otherwise smooth surface of the caudex. There is also occasionally a small cone of weki at the base of the caudex. *C. dealbata* attains a height of from thirty to fifty feet, and its caudex is quite different. The withered fronds are separated by their stipes breaking off at a distance of about eight inches from the caudex, which is roughened with them, and actually concealed by them (as they closely overlap each other) for the greater portion of its length. Ultimately they disappear, partly through perishing under atmospheric influence, but mostly through being buried in weki, which on these ferns not only forms cones often five to six feet high, by three feet in diameter at the ground, but covers the whole caudex, so as to make it often a foot or more in diameter. *Hemitelia Smithii* only grows to a height of from fifteen to twenty feet, rarely exceeding the former. Its withered fronds hang in a collar round the head of the caudex, just below the crown, for several years, and then either drop short off or leave so small a portion of stipe behind them that it is immediately covered up in weki, which in these ferns forms the whole outer surface of a caudex as thick as that of *C. dealbata*, but seldom, if ever, a basal cone. *Alsophila Colensoi*

and *Dicksonia lanata* have creeping caudices, which anchor themselves to the ground with rootlets as they run. As both these ferns grow high up the mountains, so that they are buried in snow all the winter, one has few opportunities of observing them. I therefore got a number of plants of each last autumn, and planted them in a cool shady part of my garden, where they are all growing well. From watching their growth I am satisfied not only that they can never have a true erect caudex, but that even Mr. Henry and myself were deceived as to the soft portion of its termination standing erect. The whole caudex to its very end is prostrate, but the stipes of the crown rise at right angles (or rather at obtuse angles, as the plants grow on deeply inclined places) to it, and so closely together as to give the idea of the end of the caudex being pointed vertically. The continued horizontal growth of the caudex is, however, conclusively shown by the fact that, each spring, the new crown of fronds rises from beneath the side of the old one, and not from out of its centre, proving that during the year the apex of the caudex has extended beyond the circle of the old stipes. The caudex, as I mentioned in a previous letter, often creeps to a distance of thirty or forty feet from its original root, and I can only account for the circumstance of its habit in this respect remaining so long unnoted from its small diameter and its being buried under the rotted fronds and other decaying vegetation, and from the fact that the plants grow in places which are seldom visited by persons likely to notice the peculiarity, except very occasionally towards the end of summer or early autumn, when the snow has melted from off the mountains and the old crowns have withered and fallen. I think, however, that I know how the mistake of supposing that these ferns have occasionally a true erect caudex has arisen. When, in creeping along, the caudex comes in contact with a fallen tree, it rises over it, and descends to the ground again on the other side; and in the same way, on reaching the face of a precipitous bank, or face of rock, it climbs it, and resumes its horizontal course on the top. In either case, the caudex would be, for a time, actually erect, and a person ignorant of the creeping habit might easily fail to notice the fact that it was actually clinging by rootlets to the log or face; and the more so as, in this case, the natural growth of the crown, at an angle to the caudex, would appear to have arisen from its being forced out of the perpendicular by the obstruction, and would to a great extent cause the fronds to hide the caudex. The caudex of *Lomaria procera* constantly grows in the same manner, and on steep faces often (I think more often than not) actually descends. So usual indeed is the creeping habit, particularly in large plants, that many people fancy this fern has a creeping rhizome. In the description of *Alsophila Colensoi* I notice a misprint in the 'Synopsis' of inches for feet in respect of the length of the frond. *Dicksonia squarrosa* grows fully twenty-five feet high, and the caudex, which is very slender and hard, is covered by the bases of old stipes broken off at a distance of from eight to twelve inches from it. No weki grows on this fern. With us the stipes, rachis, &c., and the

scales on them, vary from medium brown to almost jet-black in different plants, and the shape of the fronds is broadly lanceolate, about two or three pairs of pinnæ only inclining downwards, rather than oblong-deltoid. The general colour of the frond, too, is yellowish green, while that of *D. fibrosa* is bluish green. In both the under surface has a greyer tinge than the upper one. *D. fibrosa* is said occasionally to reach twenty feet in height, though I have never seen one even fifteen feet high. In this fern the actual caudex is thin, not more than one inch and a half to two inches in diameter, yet it appears to be often fifteen or eighteen inches in diameter, owing to its being covered with a thick coating of long, nearly black, scales, interlaced and matted together, as if felted, so as to form a substance varying in harshness from sheep's-wool to cocoa-nut fibre. There is none of the true fibrous weki on this fern, but its sides are often adzed off by the Maoris, so that its caudex is reduced to a slab about two and a half or three inches thick, which is used in the same way as weki. The scales on the stipes and rachises are purplish black, the fronds lanceolate, the broadest part being above the centre, and the stipes and rachises yellowish brown, but lighter below than above. Fully half the pinnæ incline downwards. *D. lanata* has the second pair of pinnæ the longest, though the first (which alone incline downwards) are very little shorter, and the breadth of the frond is fully two-thirds of its length. The stipes is densely clothed with soft bright brown hairy scales, and the rachis, though smoother and of a brownish green below, has an upper surface like dark brown velvet. The colour of the frond generally is bright yellowish green.

As regards the *Hymenophylla*, I note that *H. Cheesemannii* occurs throughout at any rate the north island of New Zealand, and not merely at Titirangi. In *H. subtilissimum* the hairs are bristly rather than silky, and grow in clusters. *H. javanicum* has often a straight flat wing along the stipes and rachis, the crisping being confined to the other parts of the frond. *H. demissum* passes into *H. flabellatum*, so that no one can tell where one ends and the other begins, though their extreme forms differ so widely. *H. scabrum* often has its surface velvety rather than glabrous. *H. dilatatum* produces fronds sometimes three feet long, and those of *H. pulcherrimum* often measure two and a half feet. The ordinary form of the latter fern creeps so slightly that it is generally regarded as a tufted plant, though I am told that at Taranaki a more widely creeping type is occasionally met with. *H. bivalve* can always be identified at once by its weeping habit of growth, a result probably of the terminal position of its sori, and of their large size.

Trichomanes Lyallii grows at the Thames gold-fields and Wellington, as well as on the south-west coast of the middle island, and is, therefore, probably distributed throughout the colony. *T. venosum* varies greatly in its lobing, sometimes having beautifully regular palmate or flabelliform pinnæ, and at others having some lobes five or six times as long as the rest. *T. humile* again grows very irregularly. As a rule it has no regular rachis or pinnæ, but

divides several times dichotomously, so as to produce a sort of zigzag rachis along one side of the frond, which thus becomes lopsidedly triangular, and widest near the upper end, or perhaps I should rather say lower one, as the plant always grows on steep faces, with its fronds hanging downwards. *T. Colensoi* grows in a similar pendulous manner, but truly pinnated.

As regards *Davallia*, we have two common forms here, though I cannot clearly make out from the description if either of them is *D. Forsteri*. One has a widely creeping habit, from its very first appearance as a seedling, and sends up solitary fronds at distant intervals from the rhizome. The stipes is short, and the frond ovate-lanceolate, the lowest pinnæ being nearly or quite as long as any, and all curving upwards. The whole texture of the frond is very wiry, and the stipes and rachis are glossy reddish brown. The sori are very adiantoid in appearance, but I could not say that any of them were terminal, unless just at the apices of the pinnæ, where the point of the segment projects scarcely if at all beyond them. This plant seldom if ever exceeds eighteen inches high. The other is a larger plant, sometimes two and a half feet high, and with broader thinner foliage. It is not truly tufted, and yet creeps so slightly as to look almost so. Plants which I have had growing for the last four years, and which must have been several years old when I got them, have not yet spread to the sides of a six-inch flower-pot, and have in that space as many as from thirty to forty fronds, growing to a length of from twelve to fifteen inches. The stipes are yellowish green, and longer than those of the creeping sort, and the fronds are rhomboidal, the length one and a half times the breadth, and the lowest pair of pinnæ often incline downwards, while the rest grow out at right angles, or nearly so, with the rachis. A plant thus forms a most beautiful mass of foliage. We have an arborescent *Davallia*, if not a tufted one also, towards the head of our river, but I have only a solitary dried specimen of the former, and cannot get more at present, owing to the Maoris having shut up the country where it grows to prevent people prospecting for gold. It has harsher and more wiry foliage than the creeping plant, with a coppery tinge, and very adiantoid involucre. In all our *Davallias* the sorus grows rather on the larger side of a segment, which curls partially around it, and then sticks out like a claw, the whole presenting an appearance very similar to that of a dog's toe. *Lindsaya linearis* has distinct barren and fertile fronds, the former having far larger thinner pinnæ, and growing earlier in the spring than the others, as appears to be invariably the case where ferns have both sorts of fronds. On steep faces and hill sides *L. trichomanoides* produces pendent fronds often eighteen inches long by not more than two and a half or three inches broad.

All our *Adianta* have short, thick, creeping rhizomes, except *A. diaphanum*, which has fibrous roots furnished with little bulb-shaped tubers. *A. affine* is often two feet high or more, and the pinnules, which are bluish green, are very large, particularly in young plants. *A. fulvum* grows fully two and a half feet high,

and its pinnules are olive-green, and in young plants are of medium size and rather narrowly triangular, though in large fronds they become rounder and very small. The stipes is often black, or nearly so, and rough or prickly, though the rachises are smooth and rusty coloured above. *A. diaphanum* has blackish green foliage, and *A. athiopicum* light delicate green: the latter sometimes approximates closely to *A. cuneatum*. *A. formosum* abounds all along the western bases of the Tararua, Ruahine, and Kaweka ranges; in fact the country for a distance of seventy miles long, by nearly twenty miles broad, is full of it: and along the banks of the Waikanae, Otaki, Ohau, Waikawa, Manawatu, Orona, and Pohangia rivers, it forms dense thickets, like the bracken at home. It often grows five feet or more in height, and no fronds less than from two and a half to three feet high are soriferous. Its colour is bluish green, with prickly or hairy black stipes and rachises. *Hypolepis distans* is very scarce in its true type, which, by the way, differs from *Athyrium filix-femina* in having a widely creeping rhizome; but it appears to pass into *Polypodium rugulosum*, so that it is almost impossible to discriminate between them, and one actually sees more fronds of the latter than of the former labelled as "*H. distans*" in collections, and even persons who make a business of collecting ferns, for sale as plants or specimens, appear to supply the wrong one in this case more often than not. The true plant is very hard to transplant.

Of *Cheilanthes* we have three types in the colony, but I believe they are only forms of the same plant. First, there is the form known here as "*Sieberi*" (though it and the next differ from the descriptions of them) which has a long stipes, and from five to fifteen pairs of nearly equal-sized broad foliaged pinnæ (when soriferous the foliage of course looks narrower from the lobes curling over), the whole forming an oblong frond suddenly narrowed at the apex. The stipes and rachis are reddish brown. Secondly, there is what we call *C. tenuifolia*, which has a long deltoid frond and much more minute foliage, with black stipes and rachis; and, thirdly, there is the large sort which grows north of Auckland, and is described by Colenso, and which appears to be between the two, though larger than either. The first grows fully two feet high; the second seldom, if ever, exceeds a foot; while the third, by Colenso's description, is over four feet high, and I have seen specimens more than three feet myself. The difference between them is, however, no greater than occurs in many of our ferns in different localities, without any one for a moment dreaming of classing the ferns separately. *Lomaria procera*, *Asplenium bulbiferum*, and *A. jlucidum* would in fact yield each a dozen more widely different types in this colony alone.

Pellaea rotundifolia and *P. falcata*, again, are gradually being admitted to be merely forms of the same plant. *Pteris tremula* is a tufted plant, and has a strong aromatic odour (particularly the *Kingiana* type) when bruised or broken. In fact in some of our deep gulleys the scent is often quite unpleasantly strong on a hot day, even when the plants are uninjured. *P. scaberula* varies much

in its foliage, sometimes having its ultimate segments long and coarse, and at others quite laxy from the minuteness of the subdivisions. Though *P. comans* and *P. macilentā* differ so widely in their extreme forms, the intermediate links make it quite impossible to tell where one ends and the other begins, and it is not unusual to find fronds with the undulated edge which are mentioned as the characteristic of *P. undulata*. Both are tufted ferns. Our *P. incisa* has the barren lobes round or oval, and the fertile ones triangular. Possibly the partial folding over of the edge of the fertile lobes gives the altered appearance, though the rounded lobes seem never to produce sori.

Our *Lomaria Patersoni* or *L. elongata* produces both simple and pinnatifid fronds on the same plant, and the latter are often from three to four feet long. The fronds rise singly from widely creeping rhizomes. Our *L. discolor* has long creeping underground rhizomes, from which tufts rise at intervals. These tufts ultimately develop caudices two feet or more in height. The fertile fronds always rise in the centre of the crown, from within the circle of barren ones: they are always longer than the latter, and always have large leafy bases to their pinnæ. The pinnæ, too, of both fronds are always alternate. *L. vulcanica* has very small leafy bases to its fertile pinnæ. Our *L. lanceolata* is merely a tufted plant never developing any caudex. The barren fronds have scarcely any stipes, and are nearly always curved, but the fertile ones, which stand erect within them and are shorter, have longer stipes and are straight. The veins of the barren fronds are very conspicuous, being usually far darker-coloured than the rest of the frond, and often copper-coloured or crimson, and contrasting beautifully with the rest of the foliage. The young fertile fronds are often of the same colours, though they change to dark green afterwards. *L. alpina* throws up its fronds in tufts or clusters from creeping rhizomes. Most of the pinnæ in both barren and fertile fronds are deflexed. *L. procera* varies wonderfully in texture, colour, and form of pinnæ. Sometimes it has the harsh texture and dark bluish green colour of *L. Patersoni*, and at others is thin almost to filminess, and of a pale yellowish green. In form the pinnæ vary from circular to long oblong-lanceolate with tails at the ends almost as long as the pinnæ, while their edges are sometimes entire and sometimes quite deeply serrated or crenated. *L. filiformis* has only small fronds, with round or oval pinnæ, so long as it creeps on the ground. As it ascends trees it develops its large long-pinnad barren fronds; and the fertile ones are produced at a later period still. *L. nigra*, *L. fluviatilis*, and *L. membranacea* are only tufted plants, and the last has its fertile fronds on short stipes not more than one inch long. In all the fertile fronds stand erect inside the circle of prostrate barren ones. *L. pumila* seems a doubtful fern. I can find no one who has ever seen it, and some (Mr. Kirk among them) seem certain there is no such plant in the colony. I fancy that the specimens in your herbarium must be from a form of either *L. alpina* or *L. membranacea*. I thought I had got hold of *L. pumila* lately, but on watching the plant I feel satisfied it is merely *L.*

alpina with unusually tender foliage, owing to its growing in a dry soil, and among high scrub into which no wind can penetrate, instead of in its usual habitat of sphagnum swamp exposed to light and air.

Doodia caudata is, I believe, quite distinct from *D. media*, unless they are divergent forms of some plant not found in the colony. They grow in quite different situations, the former being an alpine and the latter a littoral plant; and *D. caudata* is very rare, being confined to two or three localities. Indeed what the Maoris (who held it sacred) regard as the true "Mokemoke" is confined to one part of the Wairarapa, where it grows on a spur of the Rimutaka range, and where it has a rather strong aromatic odour between those of thyme and tobacco. There is a difference, too, in the habits of the plants, *D. media* producing only a single caudex, while that of *D. caudata* parts into a number of lateral ones, and so produces a much thicker mass of foliage. The foliage, too, is widely different, the barren fronds of *D. caudata*, when true to type, being shaped like shamrock leaves, and the fertile ones having the two small round lateral lobes and a very long central one (sometimes one inch and a half long) with slightly serrated edges.

Asplenium obtusatum and *A. falcatum* often strongly resemble each other, but they can be readily distinguished by noting that, in all forms of the former, the sori are set obliquely to the costa, but parallel to each other, while in the latter they form lines radiating from the stalk of the pinnæ. *A. Hookerianum* varies from simply pinnate to tri- or quadri-pinnate, and from coriaceous to almost filmy in texture, in different soils and localities. *A. bulbiferum* has occasionally quite lanceolate fronds. It assumes all sorts of types, from nearly simply pinnate to tripinnate, and seems to pass into other kinds. I have specimens scarcely distinguishable from *A. Hookerianum* and *A. Colensoi*, except by their colour, and, of course, the bulbs; and I think that *A. Richardi* is only a form connecting *A. bulbiferum* and *A. flaccidum*, as I have plants of what was supposed to be it which actually produce occasional bulbs, and the colour is the same. *A. umbrosum* varies greatly in type. Besides the form described, and which, by the way, has the lobes distinctly stalked towards the bases of the pinnæ, as have also the others, there is a kind only growing about two and a half feet high with falcate or scythe-shaped lobes, and another about two feet high with much more abundant foliage, and the lobes rounded, but with crenated edges. It occurs at Taranaki. Both these last have the short sori mentioned as characteristic of *A. hians*, and the fructification never covers the pinnules as it does in the large plant. All throw off runners which produce fresh tufts.

Aspidium aculeatum varies more than many ferns distinctly classed. Var. *vestitum* develops a caudex, and becomes almost arborescent. There is one old plant a few miles from here, the caudex of which, at about a foot above the ground, parts into three branches, which all rise to the height of nearly six feet, and have dense crowns of fronds two and a half feet long, the whole forming a noble fern. I have several times thought of transplanting it

into my garden, but as it grows among large timber I have been afraid of injuring its roots and killing it in moving. If the bush were being cleared I should certainly try it, as the plant could but die in either case. *A. vestitum* has usually a short stout stipes and stout rachis, and the pinnæ are of equal length for the greater part of the length of the frond, giving it an oblong-lanceolate form. The fronds are very numerous and densely foliaged. What we regard as the *sylvaticum* form is simply a tufted plant with very long thin stipes, thin rachis, and pinnæ and pinnules farther asunder. The last are also more distinctly stalked, so that the whole frond is as it were loosely put together. There are very few fronds, not more than half a dozen or so on a plant, and they are almost deltoid in shape. We have other forms which approximate to *A. Richardi*, and a very beautiful one with short stipes, almost deltoid frond, and very numerous and closely-placed pinnæ and pinnules, the last being far more lanceolate in form than the other kinds, and more deeply and finely serrated in the edges. *A. oculatum* I do not know with certainty. Your description seems to agree with that of a plant which grows here, and is marked as "*oculatum*" in the herbarium at the Colonial Museum; yet Mr. Kirk maintains that it is merely a form of *A. Richardi* (in which he is certainly right), and he has a totally different soft-foliaged fern as "*oculatum*," which agrees with a description in the Transactions of our New Zealand Institute. I have not been able to get a specimen of Kirk's fern, which grows only in Wairarapa and some parts of the Canterbury. The involucre has a large black disc and narrow reddish margin, while ours have a small black disc and broad white margin. *A. capense* is here almost always non-indusiate, and the indusium, when it occurs, can scarcely be seen without a magnifying glass. *A. cystostegia* only grows where it is covered with snow for several months each year.

Nephrodium decompositum and *N. velutinum* are wrongly classed among plants with wide-spreading rhizomes. The latter is a tufted plant, never producing more than about half a dozen fronds at a time; and of the other we have at least two forms. The one has scattered scales on the stipes, long white silky hairs on the rachis, and a soft velvety frond of a light green colour. It has creeping rhizomes, but they seldom spread more than a few inches, say a foot, from the original root. The other is a tufted plant with much narrower, harsher-textured, finely-divided foliage of a dark green colour, and stipes and rachis sometimes greyish green and perfectly smooth and glossy, and sometimes coated with dark brown velvety down. The former, which is very scarce, while the other abounds, is generally called var. *glabellum*, but I fancy wrongly. Of *N. hispidum* we have also two forms. The one which most nearly meets your description has stout rhizomes which spread over spaces many yards square, and from which the fronds spring generally in clusters. It has very stout and very hairy stipes and rachis, and seldom exceeds fifteen inches in height. The stipes is short. The other is a far larger plant, occasionally growing four feet high, and is usually tufted, though in very large plants I have

found instances of the outer fronds springing from runners an inch or so in length. It however never runs farther. The stipes is longer and slighter in proportion than that of the other kind, and far less hairy—indeed, sometimes scarcely at all so; but the foliage of both plants is precisely the same, even to being similarly shaded with a sort of striped pattern of alternate light and dark green.

In our *Nephrolepis* the fronds are very frequently narrowed about two-thirds of the way up, and the sori are produced all over the under-surface, instead of only on the upper portion as in the Australian plant. Ours, too, has the white dots on the upper surface far more strongly developed than I have ever seen them in the other.

Of *Polypodium punctatum* we have again two forms at least. One has a yellow viscous stipes and rachis and a broad frond, and is often mistaken for *Hypolepis tenuifolia*. The other has dark brown velvety stipes and rachis, which I have never found viscous. Its frond is long and narrow, and it is constantly confounded with *H. distans*. It is so hard to distinguish between both the above and the corresponding *Hypolepis*, that I should not be at all surprised to find them classed as merely non-indusiate forms of these ferns, as *P. sylvaticum* has been of *A. aculeatum*. I fancy both the above would be included in var. *rugulosum*; and some persons say that there is no true *P. punctatum* in the colony. I have, however, a frond which was sent me from Auckland which I think is it, for though in other respects greatly resembling the first form I have described, its sori are much farther from the margin, and no larger than those of *P. pennigerum*. Our *P. australe*, the old *Grammitis australis*, is a tufted plant, not a creeping one; and *P. pennigerum* has a strong caudex often four feet high. *P. tenellum* has the edges of its pinnae entire till the sori are developed, when a lobe forms round each, or perhaps it would be more correct to say that the interval between them becomes indented, as the width over all does not increase. *P. Cunninghamsi* is certainly usually tufted, though I am not sure whether the tufts may not grow from creeping rhizomes, as the fern covers the whole surface of the tree trunks. The *Polypodium*, which you propose to call by the name of *novæ-zelandiæ*, has been found lately by Mr. Cheeseman, of Auckland, in two other places about fifty miles north of where my son first saw it.

Our *Gymnogramme leptophylla*, though a small form of the plant, has a bulbous or tuberous root, and is bi- or triennial, dying down towards the end of summer and coming up again in the winter or early spring.

Schizaa bifida has barren as well as fertile fronds. The barren ones are from three to five inches long by two to three inches wide, and several times dichotomously divided. The fertile ones are once or twice divided only and from eight to fifteen inches long. In the barren fronds the branches spread widely asunder, but in the fertile ones they grow almost parallel.

I fancy that the first eight *Ophioglossa* in your list are all forms

of one fern, as I could get plants which would answer all their descriptions out of my own paddock; yet I regard all as "*vulgatum*." There are often two and sometimes three leaves to one fertile spike.

I think that *Botrychium cicutarium* and *B. dissectum* might fairly be separately classed. They never grow together, the former occurring only among fern, grass, or manuka-scrub; and the latter, though so much smaller and more delicate, only on the richest bush soil. *B. dissectum* often has quite mossy foliage, like that of *Todea superba*.

It is possible that there may be similar apparent inaccuracies of description as regards other New Zealand ferns, but I have only noted those in respect of plants growing hereabouts, and with which I am thoroughly familiar.

THE CRYPTOGAMIC FLORA OF KENT.

BY E. M. HOLMES, F.L.S.

(Concluded from p. 345.)

LECIDEA MILLIARIA, Fr.

On the earth and decaying wood.

On heathy ground, Toy's Hill.

Known by its almost globular crowded apothecia and obtuse spores from *L. sabuletorum*.

L. SABULETORUM, Flk.

On decayed mosses, &c.

Fant Woods, near Maidstone.

L. ROSELLA (Pers.)

On trees; rare. E. B. 1651.

On the root of an ash tree in a hedge near Chelsfield.

L. RUBELLA (Ehrh.)

On elm trees, &c.; common.

Chelsfield; Selling; Lullingstone Park; Chilstone Park; Maidstone.

[*L. endoleuca*, with black apothecia, white internally, and acicular multiseptate spores, should be looked for on trees in Kent.]

L. EFFUSA (Sm.)

On trees, rocks, &c.

Var. *funella*, Fr. On trees near Maidstone; Sibertswold.

Var. *casio-pruinosa*, Mudd. On elder trees; frequent. Beechborough; Sibertswold; Waldershare; Newington.

L. PELIDNA, Ach.

On rocks and stones. Mudd, Manual (spores only) t. 3, f. 69. Sundridge, near Sevenoaks.

L. PETRÆA (Wulf.)

On rocks, pebbles, &c.

Lydd Beach; common on the pebbles in company with *Lecanora gibbosa*.

L. CONCENTRICA, *Dav.*

On calcareous rocks. E. B. 246.

Brastead.

Graphidiei.

GRAPHIS ELEGANS (*Sm.*) *Opegrapha* (E. B.)

On holly and other trees; rather rare. E. B. 1812.

Tunbridge Wells; Mr. Thompson; *Leight. Lich. Fl.* Witley Scrubs, near Sevenoaks; Toy's Hill, in very fine condition.

Known by its longitudinally-furrowed lirellæ.

G. SCRIPTA, *Ach.*

On coppice oaks, &c.; frequent.

Wye; Ide Hill, and Brastead Chart, near Sevenoaks.

Var. *serpentina*, *Ach.* *Leight. Br. Graph.*, t. 6., f. 21.

Dunton Green.

The variety *serpentina* may be known by its obtuse lirellæ from *G. inusta*, which it somewhat resembles.

[*Lithographa dendrographa* and *Graphis dendritica* should be looked for in Kent, the former on old elms or oaks, the latter on holly and other trees in damp woods in hilly districts.]

OPEGRAPHA HERPETICA, *Ach.*

On trees, often near the roots, usually in shady places.

E. B. 1789.

Brastead Chart; Wye.

May usually be recognised by the small lirellæ and the reddish tint of the thallus, which becomes of a deeper red when touched with solution of potash.

O. ATRA, *Pers.*

On trees; frequent. *Leight. Br. Graph.*, t. 5, f. 11.

Edenbridge.

Occurs in white small patches with the lirellæ crowded towards the centre. May be mistaken for *Opegrapha viridis*, which has a minutely-cracked thallus, with rounded apothecia mixed with the linear ones, and spores 13-septate.

O. SAXICOLA, *Ach.*

Var. *gyrocarpa* (*Zw.*) On greensand rocks; not common. Fant Woods, near Maidstone.

Var. *Persoonii*, *Ach.* On the rocks on Tunbridge Wells, and Rusthall Common; *Forster Fl. Tunbr.*

[*O. confluens* should be looked for on the rocks near the sea at Sandgate.]

O. VARIA, *Pers.*

Var. *notha*. On old trees. E. B. 1890. In the wood behind the Sussex Tavern, Tunbridge Wells; *Forster Fl. Tunbr.*

Trees near Eynsford Viaduct; Lullingsstone Park, near Shoreham.

O. LYNCEA (*Sm.*)

On old oaks, not common; rare in Kent.

On the Bear's Oak at Penshurst, Kent; Mr. Thompson.
Leight. L. Fl. On old oaks in Cobham Park; very fine
and abundant.

Easily recognised by its chalky white thallus, unbranched,
pruinose lirellæ, and 7-septate spores.

O. VIRIDIS, *Pers.*

On old trees (rare; *Leight. L. Fl.*) Common in Kent. *Leight.*
Br. Graph., t. 6, f. 14.

Trees near Crofton Park Farm, Orpington; Eynsford; Otford;
Brasted; Barming; near Cossington Spring, Maidstone.

Frequent on the thin, easily-separating bark of yew trees.

The var. *saxicola*, *Leight.*, I have not observed in Kent.

This species is easily known by its acicular 13-septate spores.

[*O. prosodea*, *Ach.*, should be looked for on very old oaks, since
it has been found in Surrey. *O. vulgata* is probably not
uncommon, but has been overlooked.]

STIGMATIDIUM CRASSUM, *Dub.* *Petusaria crassa* (*Jenner Fl. Tunbr.*)

On old trees; common, but rarely well-developed in Kent.
E. B. 1752.

Wrotham; Chislehurst; Ightham; Thornden Wood; Moldash;
Sevenoaks. On trees on Tunbridge Wells Common;
Hungershall Rocks; *Jenner Fl. Tunbr.*

ARTHONIA ASTROIDEA, *Ach.* *Opegrapha* (*Forster Fl. Tunbr.*)

On trees. E. B. 1847.

Remarkably fine on some young birch trees in the wood behind
the Sussex Tavern; *Forster Fl. Tunbr.* On ash trees,
Ightham; *Ohkubo!*

A. CINNABARINA (*Wallr.*) *Spiloma tumidulum* (*Forster Fl. Tunbr.*)

On old trees, &c. E. B. 2151.

In the little wood behind the Sussex Tavern at Tunbridge
Wells; *Forster Fl. Tunbr.*

Var. *anerythraea*, *Nyl.* Thornden Wood, near Canterbury.

A. PRUINOSA, *Ach.*

On old trees; not common. E. B. Suppl. 2692, f. 1.

Lullingstone Park; Cobham Park.

Known by its immersed pruinose apothecia, and cracked, rough,
or wrinkled thallus.

A. PROXIMELLA, *Nyl.*

On oak trees. *Grevillea*, vol. i., pl. iv., f. 3.

Woolwich Wood, near Sibertswold.

NORMANDINA LETEVIRENS, *Turn. & Borr.*

On damp sandstone rocks; very rare in Kent.

Hungershall Rocks.

[*N. pulchella* (*Borr.*) should be looked for on *Jungermannia*
dilatata in woods near Dover and Hythe, and *Endocarpon*
hepaticum, *Ach.*, on calcareous walls, and *E. miniatum* on
greensand rocks.]

VERRUCARIA NIGRESCENS (*Pers.*)

On walls and rocks; frequent. Leight. Ang. Lich. t. 2761.

On roots of trees in chalky soil, Otford; Toy's Hill. Fant
Wood, Maidstone, on greensand rocks.

V. FUSCELLA, *Turn.*

On walls; rare. E. B. t. 1500.

Hythe.

V. GLAUCINA (*Ach.*)

On calcareous walls; frequent.

Abbey Wood; Sevenoaks; Hythe.

V. RUPESTRIS, *Schrad.*

Var. *muralis*, *Ach.* Leight. Ang. Lich., t. 26, f. 1. On sand-
stone rocks, Hythe.

V. GEMMATA, *Ach.*

On trees; frequent. E. B. Suppl. 2617, f. 2.

Trees near Otford; Halstead; Dover.

V. NITIDA (*Weig.*)

Var. *nitidella*, *Flk.* On trees; not very common. Hothfield Park.

Easily recognised by its pale brown waxy thallus and small
numerous apothecia.

V. OLIVACEA, *Borr.*

On trees; rather rare. E. B. Suppl. t. 2597, f. 1.

Near Ashurst Wood, Penshurst.

This lichen closely resembles *V. Taylora* in appearance, but is
easily distinguished by its 7-septate spores, those of *V. Taylora*
being 1-septate.

From the small number of species above recorded of the
Lecideinei, *Graphidiei*, and *Pyrenocarpei*, it will be seen that there is
yet much to be done in these groups in Kent, and many species
might probably be added by careful observers. I may here remark
that I shall be glad to examine and record any specimens of
Kentish lichens sent for that purpose to my address, 30, Arthur
Road, Holloway.

Insert under SPHEROPHORON CORALLOIDES, *Pers.* (p. 210). *Muscus*
coralloides Tunbridgensis bracteolis nigerrimis, *Petiv.*, *Musc. Cent.*
ii. et iii. 1698, no. 437.

Found by Mr. Petiver on the rocks near Tunbridge.

This locality is given because the plant still grows, although I
have not observed it in fruit, on rocks on the Kentish side of
Tunbridge Wells.

SHORT NOTES.

REMARKS ON SOME CASUAL PLANTS OF NORTHAMPTONSHIRE.—Northamptonshire is certainly not poor in introduced plants. Perhaps the richest habitat for these is in the neighbourhood of the sewage works, the sides of the depositing tanks being covered with a rich and peculiar flora. *Lepidium Draba*, L., is one of its chief constituents, seeding freely: this plant also occurs in several parts of the country, and promises in time to be a perfect weed. *Erysimum cheiranthoides*, L., occurs rarely, although very frequent on the rail-banks about Blisworth and Kingsthorpe. *Sisymbrium Sophia*, L., rivals *L. Draba* in abundance, covering not only the sides of the tanks, but growing out of the brickwork and on the rubbish heaps all about the works. This plant occurs generally in the Nene Valley, although not very persistent in its localities. This year, on some ground frequently flooded, among undoubted indigenous plants, such as *Ranunculus sceleratus*, *Polygonum Hydropiper*, &c., occurred a single specimen of a *Lythrum*, which, except for the unusually large flowers, I took to be *L. Hyssopifolia*, but having sent Mr. Baker a portion of it he named it *L. flexuosum*, Lag. Specimens of *Tragopogon porrifolius*, L., occurred last year. *Solanum nigrum*, L., a very local plant in Northants, occurs in garden ground near the works: and *Datura Stramonium* is very frequent; this plant has occurred in cultivated ground on this side of the town for many years, in some places being a perfect pest. *Hyoscyamus niger*, L., formerly an abundant plant round Northampton, has now disappeared. *Verbascum virgatum* was frequent last year, but is absent now. As might be expected, the Chenopods form an important constituent of this sewage flora. *Chenopodium olidum*, Curt., is frequent. *C. album* is abundant, its three varieties, *candicans*, *viride* and *paganum*, being readily separable, *viride* being the most frequent. *C. hybridum*, L., very abundant, and is a common plant about Northampton. *C. rubrum*, L., most abundant and exceedingly variable as to height; fertile specimens may be gathered from one and a half inch to four feet high. *Setaria viridis*, Beauv., is generally to be found. *Panicum miliaceum*, an occasional plant. *Polygonum monspeliensis*, Desf., plentiful this year. *Symphytum asperrimum*, Bieb., noticed this year, by the Nene banks above Mr. Perry's mill, possibly introduced from the skin washing higher up the river. This year have occurred *Medicago denticulata*, Willd., and *M. maculata*, Sibth., in great plenty, and some few specimens of *Trifolium resupinatum*, L., also were found.—G. C. DRUCE.

EUPHORBIA PILOSA AND PALUSTRIS.—These two plants are probably forms of one species, which is found near Bath. It is admitted in the 'Student's Flora,' ed. 1, and excluded from ed. 2 without remark. But it has been known in the place where it now grows for 300

years, as it was seen there by L'Obel before 1576 (See his 'Stirpium Historia,' 194). It was also seen there by Thom. Johnson and his friends in 1634, as stated in his 'Mercurius Botanicus,' which I have before me. I believe that I was the first to call attention to it in my 'Fl. Bathoniensis' in 1833, and the late Edw. Forster wrote about it in 'Linn. Trans.,' xvii. 523. The old authors say that it is found "by a wood-side some miles south of Bathe." And L'Obel adds that it was "in sylva de Joannis Coltes prope Bathoniam" that he found it. I have seen it in what is in all probability the same wood, as well as in the lane where it is usually looked for. I may also refer to my 'Fl. Bath. Suppl.' 90, for the statement of the same facts. I venture to think that we ought not to exclude a plant of 300 years' standing without showing some reason, and that a valid one, which is not done in the 'Student's Flora.'—C. C. BABINGTON.

A NEW LOCALITY FOR TEUCRIUM BOTRYS.—We are indebted to Mr. H. Peirson for specimens of this very rare British species, collected by him in August last, in a locality a little distance to the south of Addington, in Surrey, near the Kentish boundary. This is at a considerable distance from the Boxhill station, to which it is quite similar in character, namely, a very dry barren field on the slope of a valley on the chalk. Perhaps some of our Surrey or London botanists may already know of this locality, but it has not, we believe, been previously recorded in print.

CHÆTOCEROS ARMATUM, *T. West.*—This filamentous Diatom was found by me on the Norfolk coast at Scratley, near Yarmouth, in 1851, and was the subject of a paper by Tuffen West, which appeared in the 'Trans. Microsc. Soc.,' with a figure, vol. viii. pl. 7. There was some doubt expressed as to the nature of this Diatom, as some naturalists considered it to be the case of an Annelid, but the paper referred to has, I think, settled the question. It has been found on various parts of the coast since. Last July I met with it in great abundance at Hunstanton, Norfolk.—HAMPDEN G. GLASSPOOLE.

URTICA PILULIFERA, L., used to be found growing pretty freely at Lowestoft, Suffolk, some years ago. This season only three or four small plants were to be seen in the old locality by the side of a wall on the lower road between the sea and the town.—HAMPDEN G. GLASSPOOLE.

Notices of Books and Memoirs.

Memoirs of the Botanic Garden at Chelsea, belonging to the Society of Apothecaries of London. By the late HENRY FIELD, Esq. Revised, corrected, and continued to the present time, by R. H. SEMPLE, M.D. London: printed by Gilbert and Rivington. 1878.

THE editor of this interesting history of the old Chelsea Garden may be congratulated on the happy manner in which he has executed his work, and carried on its memorials to the present day. Mr. Field's original book was printed in 1820, and though fifty-eight years is but a short time in the history of a city company, yet this period has seen such an extension of London westward that the Apothecaries' Physic Garden is now completely within its bounds, and subject to all the baneful influences of its smoke-laden atmosphere. The formation a few years back of the Chelsea embankment has still further altered the physical characters of the garden, and destroyed completely the picturesque river front. In spite of all changes, however, the Society has steadfastly held on to their tenure, and continued, at a large cost, to keep up the scientific character of their garden. It must be allowed that the Society deserves well of botanists, and has contributed largely in the past, often in the face of difficulties and discouragements, to foster and facilitate the study of plants. That it is still animated by the same spirit is evidenced by the present state of the garden and by the examination for women founded in this year.

The book is much fuller than Field's, and contains a portrait of Sir Hans Sloane, the donor of the land, a charming view of the garden from the river, several plans, and a complete list of the plants cultivated at the present time, drawn up by the well-known curator, Mr. Thomas Moore. The only want is an index of names of persons mentioned in the book. There are several interesting biographical sketches of botanists who have been connected with the garden, the last being that of Mr. N. B. Ward, who took a prominent part in restoring and maintaining it in a state of scientific efficiency. The memoir of Mr. Thomas Wheeler, for forty-two years Demonstrator of Botany to the Society, is written with much freshness, evidently from personal remembrance. Dr. Semple has indeed clearly been animated throughout by a love of his work, and has given us a little book which cannot fail to be read with interest and pleasure.

H. T.

Anthophyta quæ in Japonia legit beat. Emanuel Weiss, Med. Dr. et quæ museo nationali hungarico procuravit Joannes Xanthus, mus. nat. conserv., enumerat AUGUSTUS KANITZ. Buda-Pesth. 1878.

THIS is a simple enumeration, with localities, of the plants gathered by the Austro-Hungarian Expedition in Japan. Scarcely

any of the species seem rare ones, but we may mention *Lophatherum japonicum*, Steud., *Paulownia tomentosa*, Thbg., *Phtheirospermum japonicum*, Thbg., *Leonurus macranthus*, Max., *Gentiana Buergeri*, Miq., *Pertya scandens*, Schz. Bip., var. *ovata*, *Impatiens Textori*, Miq., *Selinum Japonicum*, Fr. & Sav., and *Desmodium Oldhami*, Oliv. The author promises a further memoir on Japanese plants, leaving us to suppose that he has merely printed here the names of species which he was able to determine. S. M.

HENRICI G. REICHENBACH *fil.*, *Otia botanica Hamburgensia*. Fasciculus primus, Hamburg, 1878.

FIVE papers are brought together in this fasciculus, namely, an account of the orchids gathered by F. C. Lehmann in Eguador, by Godefroy-Lebeuf in Cambodia, by the United States exploring expedition of 1838-42, and by Schweinfurth in Ethiopia, as well as an account, supplementary to the well-known one in the 'Linnean Transactions,' of the treasures secured by Parish at Moulmein. The first contains descriptions of several new species of *Masdevallia*, *Stelis*, *Epidendrum*, *Odontoglossum*, &c. In the second we notice the names of *Gymnadenia Galeandra*, Rehb. f., a species known from China, Hong-Kong, Assam, and Khasia, *Habenaria Rumphii*, Ldl., *Peristylis goodyeroides*, Ldl., *Cymbidium pendulum*, Sw., and *Dendrobium crumenatum*, Sw. The memoir on Schweinfurth's plants also includes stray notes on and descriptions of other orchids from Africa, with a diagnosis of a new genus *Pteroglossaspis* (near *Cyrtopera*); Schweinfurth has found *Habenaria cirrhata*, Rehb., f. hitherto known only from Madagascar, and this discovery is compared with that of *Angræcum eburneum*, Thouars, a species recently gathered by Wakefield in Nyika country. S. M.

An interesting lecture delivered at the Geographical Society by Mr. Thiselton Dyer, on "Plant-distribution as a field for geographical research," is printed in the Society's 'Proceedings' for 1878 (vol. xxii., No. 6).

Dr. D. Moore, of Glasnevin, has described in the Scientific Proceedings of the Royal Dublin Society a supposed new *Ceratozamia*, *C. fusca-viridis*. The specimen is in the collection at Glasnevin, came from Havana, and is said to be native of Cuba. It is nearly allied to *C. longifolium*, Regel, but differs from the description of that species in its globose stem and very long recurved leaves with the leaflets fuscous-brown beneath.

From Mr. Roper's notes on the additions to the Fauna and Flora of the Cuckmere district (Sussex) during 1878, it is gratifying to see that no less than 135 fresh species of plants have been found, thirty-one being *Phanerogams*.

The great 'Flora Brasiliensis' has made very rapid progress this year. Another part is to hand, Fasc. 97, dated 1st September, and containing the second portion of the *Gramineæ* worked out by

Doell. *Gymnopogon fastigiatus*, Nees, is made a new genus, *Monochate*, allied to *Leptochloa*, but differing in its fewer flowers. There are forty-three plates.

OTHER NEW BOOKS.—F. HEGELMAIER, 'Vergleichende Untersuchungen über Entwicklung dicotyledoner Keime.' Stuttgart, Schweizerbart, 1878 (8 *mk.*)—H. NÖRDLINGER, 'Querschnitte von Hundert Holzarten,' Bd. viii. Stuttgart, Cotta, 1878 (5 *mk.*)—TODARO, 'Relazione sulla cultura dei Cottoni in Italia, sequita da una Monografia del genere *Gossypium*.' Rome and Palermo, 1877-8 (with 12 folio plates).—MRS. LANKESTER 'Talks about Plants, or early lessons in Botany.' Griffith and Farrar, 1879.

ARTICLES IN JOURNALS.—OCTOBER, 1878.

Botanische Zeitung.—B. Frank, 'On some parasitic Fungi causing leaf-staining diseases.'—Scharlok, 'On the flowers of *Collomia*.'—K. Goebel, 'On root-shoots of *Anthurium longifolium*.'—M. Traube, 'On the mechanical theory of cell-growth and the history of the theory.'

Flora.—A. de Krempelhuber, 'Lichenes coll. in republ. Argentina a Lorentz et Hieronymus.'—F. de Thuemen, 'Symbolæ ad floram mycologicam Australiæ,' ii.—M. Gandoger, 'Rosæ novæ Galliæ' (continued).—W. Nylander, 'Circa Lichenes Corsicanos adnotationes.'—W. J. Behrens, 'Anatomico-physiological investigations on the nectaries of flowers.'—A. Borzi, 'Supplement to morphology and biology of *Nostochaceæ*.'

Oesterr. Bot. Zeitschr.—W. O. Focke, 'A case of inefficiency of certain pollen.'—J. Hinterhuber, '*Typha minima*, Hoppe.'—Schulze, 'Mycological notes.'—F. Hauck, 'Note on *Rhizophyidium Dicksonii*.'—J. Dedeczek, 'Short excursion to Jeschken and Mileschauen in N. Bohemia.'—R. F. Solla, 'Flora of neighbourhood of Görz' (continued).—S. Schunk, 'Flora of Val d'Agordo and Val di Fassa.'

Nuovo Giorn. Bot. Ital.—G. Archangeli, 'On *Fistulina hepatica*' (tab. 11).—G. Bertoloni, 'Further observations on the disease "falchetto" of the mulberry' (tab. 12).

American Naturalist.—W. J. Beal, 'How thistles spin.'—E. Palmer, 'Plants used by the Indians of the United States' (continued).

Bull. Soc. Bot. France (xxiv., 3).—Boulay, 'A new eradicator for collecting aquatics' (tab. 7).—M. Cornu, 'Development of *Agaricus cirrhatns* from a sclerotium.'—Lefèvre, 'Reproductions of *Rubus* by implantation of extremity of leafy shoot.'—P. Petit, 'Can desiccation kill Diatoms?'—Viaud-Grandmarais and Menier, 'Botany of Ile d'Yeu, Vendée.'—Beauregard, 'Structure and development of fruit of *Daphne*' (tab. 10).—P. Duchartre, 'Observations on double flowers of Lilies, especially of *L. tigrinum*.'

Botanical News.

WE are sorry to record the death of JAMES McNAB, the well-known curator of the Edinburgh Botanical Gardens, which occurred on November 20th in his 69th year. He succeeded his father in the care of the gardens in 1848. As a practical gardener of the highest order, Mr. McNab was probably almost without a rival: his botanical acquirements were also extensive and earned him the distinction in 1872 of being elected President of the Edinburgh Botanical Society, of which he was one of the original members. In 1834 he paid a visit to Canada and the United States, making considerable collections, some of the results of which he published in the 'Transactions of the Botanical Society,' the 'Edinburgh Philosophical Magazine,' &c. He was the author of numerous papers on botany, gardening, and arboriculture, and paid especial attention to climatology. His son, Dr. W. R. McNab is Professor of Botany in the Royal College of Science at Dublin.

THE REV. GEORGE HENSLOW contemplates printing a Catalogue of British Plants, arranged accordibg to Hooker's 'Students' Flora.' Any person wishing for copies is requested to communicate with him at 6, Titchfield Terrace, Regent's Park, S.W.

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Page	11, line	17,	for "Sia,"	read	Saio.
	12	13	from bottom,	for "wa,"	read wu.
	13	20	"	for "uri,"	read wu.
	14	21	"	for "E,"	read ε.
	14	14	"	for "Machuria,"	read Manchuria.
	31	11	"	for "Corinthia,"	read Carinthia.
	129	7,	for "acceduntur,"	read	accedunt.
	150	20,	for "RODRIGUESIANA,"	read	RODRIGUESIANA.
	215, 216	(in the July number)	are cancelled;	the leaf to be substituted is	inserted at the end of August number.
	223	23,	for "temniscata,"	read	lemniscata.
	224	12,	for "Niesse,"	read	Niessl.
	224	15,	for "Holnby,"	read	Holuby.
	224	12	from bottom,	for "New,"	read near.
	243	7,	for "longiores,"	read	breviares.
	287	15	from bottom,	for "S."	read F.
	318	25	"	after "Iosetes,"	insert lacustris.
	318	2	"	after "Rubiaceæ,"	insert by C. B. Clarke.
	320	2	"	for "3,"	read 2
	320	18	"	after "Scirpus,"	add and in a genus of Leguminosæ.

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