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THE
JOURNAL OF BOTANY,
BRITISH AND FOREIGN.

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NEW SERIES. VOLUME I. 
(VOL. X. OF THE ENTIRE WORK.)

Illustrated with Plates and Woodcuts.

MISSOURI
BOTANICAL
GARDEN.

LONDON:
TAYLOR AND CO., 10, LITTLE QUEEN STREET,
LINCOLN'S INN FIELDS.

ANDREW ELLIOT, 15, *Princes Street, Edinburgh*; J. ROTHSCHILD, *Paris*;
ASHER AND CO., *Berlin*; WESTERMANN, *New York*.

1872.

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THE
JOURNAL OF BOTANY,
BRITISH AND FOREIGN.

BERTHOLD SEEMANN.

A KEEN observation, a retentive memory, great energy and perseverance, with an extensive acquaintance with many countries, combined to produce in Dr. Seemann a naturalist of a high order, and his extensive scientific knowledge had the advantage of being mainly founded on actual observation. The thoroughly practical character of his mind led him always to try to turn his acquirements to some useful result to mankind, and in the pursuit of such objects he not unfrequently seemed to leave the strict paths of science; in botany, however, though the study of plants was but one among other subjects of interest in his many-sided mind, the scientific aspect was in reality always first. It was his hope and expectation to have soon settled down to steady work at science in England, but he has dared the climate of the tropics once too often, and at the comparatively early age of forty-seven his busy and useful life has ended.

Berthold Seemann was born on February 28th, 1825, at Hanover, being one of a family of whom several, as well as his mother, are still living. He was educated at the Lyceum of his native town, where the head-master at that time was the celebrated Grotefend, one of the earliest decipherers of cuneiform writing. It was from the son of this gentleman that young Seemann received his first lessons in Botany, and this soon became his chief study. He early acquired some aptitude in writing, his first article having been written at the age of seventeen. Two years after this, in 1844, full of a desire to travel in foreign countries, he came to Kew with the object of fitting himself for the work of a botanical collector, and worked in the garden under the then curator, Mr. John Smith. Here he was so fortunate as to gain the good opinion of Sir W. J. Hooker, on whose recommendation he was in 1846 appointed, by the Admiralty, naturalist to H.M.S. Herald, Captain H. Kellett, C.B., which had been employed since June, 1845, on a surveying expedition in the Pacific. This post had become vacant by the untimely death, of Mr. Thomas Edmonston,* by the accidental discharge of a rifle, at Sua, on

* See 'Narrative of the Voyage of H.M.S. Herald,' i. p. 67, where is a sketch of the life of this promising botanist. Dr. Seemann named after him (*Edmonstonia*) a plant of tropical South America, which is figured in Bot. Herald, t. 18. It is the *Tetrathylacium* of Poeppig and Endlicher.

the coast of Ecuador, on January 24th, 1846. Leaving England in August, Mr. Seemann went by way of Madeira and the West Indies, and disembarked at Chagres to cross the Isthmus of Panama, at that time a journey of some days. When he reached the city of Panama, in September, he found that the 'Herald' and her consort the 'Pandora' had not returned from Vancouver's Island. Seemann profited by the delay to explore the greater part of the Isthmus, and collected materials which enabled him to produce the most complete general description of that country ever published. He discovered not only a number of new plants and animals, but also some curious hieroglyphics in Veraguas, on which he afterwards read a paper before the Archæological Institute of Great Britain; it has since been shown that there is a remarkable correspondence between these New World antiquities and the ancient rock inscriptions of Northumberland and other parts of Great Britain. When, in the beginning of 1847, H.M.S. Herald returned from the North, Mr. Seemann joined her on January 17th, and remained with her until the completion of her voyage round the world, during which three cruises to the Arctic regions, *viâ* Behring's Strait, were made. Seemann thus had the opportunity of exploring nearly the whole west coast of America, frequently making long journeys inland. His explorations in Peru and Ecuador, when he was accompanied by Mr. (now Captain) Bedford Pim, R.N., led him from Payta through the Peruvian deserts, and across the Cordillera of the Andes to Loja, Cuenca, and Guayaquil, and familiarized him with the magnificent scenery, vegetation, and population of a large section of the former empire of the Incas. Subsequently, he traversed several of the western states of Mexico, starting from Mazatlan, crossing the Sierra Madre, and pushing on to Durango and the borders of Chihuahua. At that time, the Comanche and Alpache Indians were very troublesome, and Seemann narrowly escaped with his life. In 1848, the fate of Sir John Franklin began to excite apprehension in England, and the 'Herald,' accompanied by the 'Plover,' was directed to proceed to the Arctic regions, by way of Behring's Strait, to search for the missing voyagers. This gave an entirely new character to the expedition, which, up to this time, had been used simply for making hydrographical studies of the west coast of America. Three times did the 'Herald' proceed to the Arctic regions, the second year, joined by the 'Enterprise' and 'Investigator,' making valuable discoveries at each visit; a new island was discovered between Asia and America, and the vessel attained a higher latitude than any other had previously accomplished on that side of America. Mr. Seemann availed himself of these opportunities to collect materials for a Flora of the extreme north-west of Arctic America, and for the anthropology of the Esquimaux. In her various voyages, the 'Herald' visited repeatedly Kamtchatka and the Sandwich or Hawaiian Islands; and in 1850 she began her homeward course, touching and remaining for some time at Hongkong, Singapore, Cape of Good Hope, St. Helena, and Ascension, reaching

England on June 6th, 1851. On Sir W. J. Hooker's recommendation, the Admiralty requested Mr. Seemann to publish the results of this voyage, and he accordingly produced, early in 1853, the 'Narrative of the Voyage of H.M.S. Herald, being a Circumnavigation of the Globe and Three Cruises to the Arctic Regions in Search of Sir John Franklin.' This book was in two volumes, and was translated into German, partly by Edward Vogel, the African traveller, and passed through two editions on the Continent. The animals collected during the voyage were described by the late Sir John Richardson in a quarto volume, and in the years 1852-1857 the botanical results appeared in Seemann's 'Botany of the Voyage of H.M.S. Herald.' This contains accounts of the floras of Western Esquimaux-land, the Isthmus of Panama, North-western Mexico, and the island of Hongkong, with 100 plates by Fitch. In the preparation of this book the author had the advantage of the assistance of Sir William and Dr. J. D. Hooker (the latter furnishing the analyses of the plates), which is cordially acknowledged in the preface.

About this time the degree of Ph.D. was conferred on Seemann by the University of Göttingen, and the Imperial German "Academia Naturæ Curiosorum" made him a member under the name of "Bonpland,"—in accordance with the usual practice of the academy. A few years later he was elected Adjunct or Vice-President for life.

In 1853 Dr. Seemann started, in conjunction with his brother W. E. G. Seemann,* a quarto botanical journal, in German, under the title 'Bonplandia.' This was published in Hanover, though edited in London, and was well supported by botanists of various countries. Its publication was closed on the completion of the tenth volume at the end of 1862. The year 1857 took Dr. Seemann to Canada as official representative of the Linnean Society at the meeting of the American Association for the Advancement of Science at Montreal; on that occasion he read a paper on "Parthenogenesis in Plants and Animals," and took the opportunity of becoming acquainted with British North America and the United States.

In 1859, the Viti or Fiji Islands in the South Pacific Ocean were formally ceded by their king and chiefs to Great Britain; but before accepting the proffered cession, Colonel Smythe, R.A., was commissioned, by our Government, to draw up an official report on the state and condition of these islands, and through the influence of Sir W. J. Hooker Dr. Seemann was asked to join the expedition. Leaving England in February, 1860, Dr. Seemann went, by way of Egypt and Mauritius, to Sydney, touching at King George's Sound and Melbourne, and thence proceeding, in the 'John Wesley' missionary vessel, to Viti, where he arrived some months before Colonel Smythe, and at once commenced exploring this little-known group of islands, collecting information on all points of interest,

* Died March 3rd, 1868.

and accumulating large collections of plants and other objects of natural history. During his stay of eight months, he became familiar with the whole of the islands, and addressed a series of letters to the 'Athenæum' and 'Gardeners' Chronicle' regarding them. These letters were reprinted in many home and colonial newspapers, and translated into French and German; they gave a vivid picture of Dr. Seemann's dealings and intercourse with the natives; his success in conjunction with Mr. W. T. Pritchard, in saving the lives of five hundred people, who had been doomed to death, to commemorate the coming of age of the son of the Chief Kuruduadua; his ascent of Vorua and Buku Levu, two peaks never before climbed by any white man; of the scenery and vegetation; and of the customs and manners of the cannibal tribes amongst whom he found himself. The substance of the letters, together with much additional matter and Dr. Seemann's official report "On the Resources and Vegetable Products of Fiji," which had been presented to both Houses of Parliament, was incorporated in a separate book published in 1862, under the title of 'Viti: an Account of a Government Mission to the Vitian or Fijian Islands.' A catalogue of all known plants of the group was printed in an appendix to this work, and some new species were described by Seemann in his 'Bonplandia,' but he determined to produce a complete systematic book on the Fijian flora, and, in 1865, commenced the publication of the 'Flora Vitiensis.' This is a quarto, and intended to be completed in ten parts, with a hundred coloured plates by Fitch. Dr. Seemann has not lived to see it as a whole, though he has finished his share in it; nine parts are before the botanical public, and the tenth and concluding number, which includes the Cryptogams by various botanists, and an introduction and appendix, is expected to appear immediately. The 'Flora Vitiensis' contains the results not only of Dr. Seemann's own explorations, but those of all the other expeditions to the South Seas from Captain Cook's first voyage till the present time. It is the first time that the synonymy and characters of these have been properly and faithfully worked up, and Dr. Seemann's book must be the foundation of any future general Flora of the Tropical Pacific islands.

The 'Journal of Botany, British and Foreign' was commenced at the beginning of 1863, on the relinquishment of the 'Bonplandia,' of which it was in some sort a continuation, adapted to the country in which it was published. The first five volumes were published by Mr. Hardwicke, of Piccadilly, and volumes six and seven by Lovell Reeve and Co. As is well known to most of our readers, Dr. Seemann conducted this Journal at a considerable loss, and, at the end of 1869, this loss and his many other engagements determined him to give it up. A strong effort was, however, made by some of the leading English botanists to keep the Journal alive, and Dr. Seemann availed himself of the proffered assistance of Mr. Baker, of Kew, and Dr. Trimen, of the British Museum, in his editorial duties. The last two volumes (eight and nine) have been published by Messrs. Taylor and Co.

From this period the force of circumstances took Seemann more and more away from botanical and scientific work. In 1864 some French and Dutch capitalists availed themselves of his practical experience and intimate knowledge of tropical countries, to report on the resources and capabilities of a portion of the territory of Venezuela. He left Southampton on the 2nd of February, and reached Caracas towards the end of the same month; thence proceeded to Porto Cabello, Chichirividei and Tocuyo, and returned to Europe *viâ* Curaçao and St. Thomas. During this expedition he had the good fortune to discover, on the banks of the Tocuyo, extensive beds of anthracite, closely resembling Welsh steam coal in appearance, and valued in London at thirty shillings per ton.

Dr. Seemann was, however, elected in 1865 Honorary Secretary to the International Botanical Congress, which was held next year in London under the presidency of A. De Candolle; but after devoting himself for some months to the duties of his office, he was reluctantly obliged to tender his resignation, and again to leave England to explore with his former fellow-traveller, Captain Bedford Pim, New Segovia, and other parts of Nicaragua for the Central American Association. He left England in March, 1866, and returned in August with several new plants, which were considerably increased in number during his second visit in the following year. Several interesting letters of Dr. Seemann's from Nicaragua appeared at this time in the 'Athenæum;' these were republished in 1869 with great additions and new material (some of which had, however, appeared in the 'Panama Star and Herald'), and some chapters by Captain Pim, in 'Dottings on the Roadside in Panama, Nicaragua and Mosquito.' One result of these explorations was the purchase by some English capitalists of the Javali gold mine, in the district of Chontales, Nicaragua, and the company were so fortunate as to secure Dr. Seemann's services as managing director. This was most beneficial to the mine, but the result has been disastrous to science. For the last three years of his life, the necessary long and frequent absences from England and attention to business matters isolated Dr. Seemann, and, to his often-expressed regret, greatly interfered with botanical work. Besides the Javali mine, Dr. Seemann had the management of a large sugar estate near Panama. Still his friends, and he himself, hoped that all this was but temporary, and that when the mine had got into thoroughly good order, leisure and opportunity would be found for his return to scientific research.

Dr. Seemann started last summer for Nicaragua with some misgivings, having suffered severely from fever on his last previous visit. He, however, reached Javali at the end of July, after a rough journey through the swamps, in good health, but in the middle of September was seized with fever. From this he never rallied; his death, which happened after three weeks' illness, on October 10th, was somewhat sudden, and under circumstances which pointed towards some cardiac complication. The

next day his body was buried close by his house at the mine, in the little patch of industry and civilization his energy had called into existence in the primeval forest, and surrounded by the tropical vegetation he knew so well.

Besides the books already mentioned, Dr. Seemann was the author of many others. In 1858 he was asked to write the descriptions in English and German to the 'Paradisus Vindobonensis,' a series of eighty-four magnificent plates printed in colours. In 1852, he wrote an enumeration in German of the Acacias cultivated in Europe, with two plates. His 'Popular History of Palms' (1856) is well known, and, translated into German by Dr. Bolle, has passed through two editions in that language. His 'British Ferns at one View' (1860) has been a useful work to amateurs. Among his smaller botanical books may be mentioned 'Hanoverian Customs and Manners in their Relation to the Vegetable Kingdom' (1862) in German, an English translation of Von Kittlitz's 'Twenty-Four Views of the Vegetation of the Coasts and Islands of the Pacific' (1861), and the introduction to Lindley and Moore's excellent 'Treasury of Botany' (1865), besides the 'Popular Nomenclature of the American Flora' (1851), an attempt to collect all the native names of American plants, and the prefaces to several books of travels which he edited. Of detached papers in science, the Royal Society's Catalogue (to 1863) enumerates fifty-eight under Dr. Seemann's name; the first there given is one on descriptive botany in the Regensburg "Flora" for 1844.

But beyond his scientific writings, Dr. Seemann was a very prolific author of articles on subjects of general literature and politics. These are said to amount altogether to several thousands, in English, German and several other languages, which he wrote well. He was also the author of several short dramas, two or three of which have some popularity in Hanover, and of some pieces of music, of which art he possessed a good knowledge. Besides the Academy Nat. Curios., Dr. Seemann was a Fellow of the Linnean, Geographical and other societies in England and abroad; he took particular interest in the Anthropological Society, of which he was vice-president. In botany the groups which more especially engaged his attention were the genera *Camellia* and *Thea* (of which he published a synopsis in Trans. Linn. Soc. vol. xxii.) and other *Ternströmiaceæ*, the *Crescentiaceæ* (which he also monographed in the Trans. Linn. Soc. vol. xxiii.); the *Hederaceæ*, a revision of which Order, reprinted from this Journal, he published as a separate work in 1868; and the *Bignoniaceæ*, with which he intended to have pursued a similar plan. Regel (Gartenflora, iv. p. 183 and t. 126) dedicated to him a beautiful Gesneraceous plant from the Andes, now *Seemannia sylvatica*, Hanst.

Dr. Seemann married an English lady; but had the misfortune to lose his wife a few years ago, during one of his absences in Central America. He leaves an only daughter. A good portrait was published in No. 36

of 'Photographic Portraits of Men of Eminence,' by E. Edwards, B.A., and from the memoir accompanying this, we have largely drawn in the above sketch, as we believe that the facts were communicated by Dr. Seemann himself. The portrait here given is from a photograph taken in Paris in 1863.

Original Articles.

THE GENUS ALBIZZIA: ITS ORIGIN AND SYSTEMATIC LIMITS CONSIDERED.

BY BARON FERD. VON MUELLER, C.M.G., M.D., F.R.S.,

Director of the Botanic Garden of Melbourne.

It is nearly thirty years ago when Mr. Bentham, on the occasion of writing his celebrated essays on the *Mimoseæ*, rescued the genus *Albizzia* from oblivion.* The documentary evidence, however, indicating under what circumstances this genus was framed, has remained involved in much obscurity; nor has this uncertainty been cleared away by any of the most recent phytographic writings. Having for several years entertained the view that *Albizzia* and *Pithecolobium* ought to be merged into one genus,† distinct from the legitimate *Acaciæ* only in the concrescence of the stamens, it became necessary to ascertain to which of the two above generic appellations real priority was due. This question could not be solved here, where the comparatively scanty material of our young libraries and museums, however creditable it may be, affords, as yet, for researches of this kind, but very imperfect aid; and I was thus induced to ask my illustrious friend Dr. Giglioli, of Florence, the well-known naturalist of the 'Magenta,' to trace out in the Florentine libraries the precise origin of the genus *Albizzia* and its first record. Although surrounded with multifarious literary work, emanating from his travels, he entered, aided by Dr. Beccari, most obligingly on this task, and the information afforded me is so complete and important, that I offer it at length in his own words:—

"The founder of the genus in question, Dottor Antonio Durazzini, was a Florentine, who lived and wrote in the latter half of the last century. His description of the genus *Albizzia*, which, by the way, is dedicated to an old and noble family, the Albizzi, was read before the still existing Society of the Georgofili, and his communication bears the following title:—'Memoria sull' albero detto volgarmente Julibrissin, letta il dì 5 Agosto 1772, nella Società de' Georgofili dal Sig. Dott. Antonio Durazzini, Socio onorario di tale Accademia.' It is published in the *Magazzino Toscano*, tomo iii., parte iv., o sia volume duodecimo, in Firenze, appresso Pietro Gaetano Viviani, MDCCLXXII. The *Magazzino* was a scientific and literary journal, very little known, and, I suppose, rare to get at now out of Florence. The author begins (at p. 1) with a very

* Hook. Lond. Journ. of Bot. iii. 84.

† Documents relating to the Intercolonial Exhibition of 1866–1867 at Melbourne, in which, at p. 28, I retained *Pithecolobium* for the united two genera.

prolix introduction, and gives a long, but superficial account of the Julibrissin plant, states how it was introduced into Tuscany from Constantinople in 1749, by the Knights of Santo Stephano, and relates how it became successfully cultivated, citing also a notice given of the same plant by Leonard Plukenet in his 'Phytographia.' He then goes on to say, what exact place his plant ought to occupy in the Linnæan system, and proposes to make it the type of a new genus, *Albizzia*, as a member of that illustrious family was one of the first who introduced it into Tuscany. At p. 11, he gives the following specific diagnosis:—'*Julibrissin Albizia* inermis, foliis bipinnatis, floribus spicatis, centrali ceteris longiore. Acacia non spinosæ Wagæ Malabaricæ similis e Madaraspatan,' Pluk. Phyt. t. i. f. 4.* At p. 13 the author gives the following generic diagnosis:—'*Albizzia*. Acacia Plukenetii Julibrissin. Flos aggregatus; floscula non ultra 20. Calix: perianthium monophyllum, quinque-partitum, læve, citrinum, breve. Corolla monopetala, infundibuliformis, quinquefida, citrina; tubus cylindræus, longus, rectus, calici adhærens; limbus non multum patens, quinque-partitus, acutus. Stamina: filamenta plus minus viginti, receptaculo adnata, capillaria, intra tubum monadelphæ, cylindrum efformantia, corolla triplo longiora, versus apicem purpurascens colore. Antheræ incumbentes, rotundæ, colore viridi. Pistillum: germen oblongum, planum, acutum; stylus filiformis, staminibus longior, concolor; stigma acutissimum. Pericarpium: siliqua longissima, plana, marginibus undulatis, apice rostrato, seminibus juxta medium longitudinaliter dispositis. Semina pauca, plana, utrimque acuminata, novem circiter. Folia duplicato-pinnata, 15-jugia, paria. Foliola plana, sessilia, altero margine curvo, altero recto, apice acuto; paria non ultra triginta.'"

Dr. Giglioli sends with this extract from the memoir, also a tracing of the plate which accompanied Durazzini's description; and this illustration must be considered a good one for the time, more particularly so as some analytic details are given, and among them, at D the tubular concrescence of the stamens, the author having well recognized the cardinal importance of this generic character and acknowledged it both in the description and the drawing. It must also be allowed that the generic definition is such as to entitle thereby *Albizzia* (or as I should prefer with modern phytographers more correctly to write it, *Albizzia*) to be considered as fairly established fully a century ago. Willdenow, writing in 1805 (Spec. Plant. iv. 1065), was evidently not aware, when recording *Acacia Julibrissin*, that Durazzini had given a lengthened account of the tree, the quotations being only,—Forskål, Flora Ægyptiaco-Arabica, p. 177 (1775); † Scopoli, Deliciæ Floræ et Faunæ Insubricæ, i. 18. t. 8 (1786); Aiton, Hort. Kew. iii. 440 (1789). Much later De Candolle (Prodr. ii. 469), in 1825, only adds as quotation, Lamarck, Dict. i. 13 (1783), where Forskål's name is adopted. In the second edition of Aiton's 'Hortus Kewensis,' iii. 466 (1813), we find Gmelin's 'Reise

* It seems open to grave doubts whether Plukenet's figure really belongs to *Albizzia Julibrissin*, because the drawing shows the leaflets absolutely blunt, without any trace of apiculus; their nerve is remote from the anterior margin; the leaflets, moreover, are not quite sessile nor truncate at the base, while flowers and fruits are wanting to support the identity of the plant.

† Forskål gives the following note:—*Mimosa arborea*, rachibus partialibus 7-8-jugis, foliis 24-27-jugis, floribus monadelphis. Hanc Constantinopoli vidi, Turcis Djulibrzim, i.e. flos sericeus, propter stamina filiformia, longissima.

durch Russland' quoted, vol. iii. p. 372. t. 40 (1774),—Gmelin, also, adopting the same name as given by Forskål. Desfontaines, 'Histoire des Arbres et Arbrisseaux,' ii. 236, has still merely *Mimosa Julibrissin* as late as 1809. Miquel (Annal. Mus. Bot. Lugdun. Bat. iii. 55) adds to the synonyms *Mimosa arborea*, Thunb. Flora Japon. 229 (1784). Fournier, writing his excellent memoir on *Albizzia* in 1860 (Annales des Scienc. Nat. quatrième série, xiv. 368), states :—" Il ne m'a pas été possible, non plus qu'à Mr. Bentham, de découvrir où Durazzini aurait fait cette publication."

But the literature of the *Julibrissin* concerns us on this occasion but very little, beyond the desirability of fixing the date of the genus, and showing that it was Durazzini, and not Boivin, who named the species. It would also appear that this Florentine writer was the first, or at all events among the first, who adopted the present wording of *Julibrissin*. In larger libraries than my own this may be further traced.

I have now, however, an apt opportunity to point out how the Australian species of the genus *Albizzia* arrange themselves, and to offer on them a few notes :—

Albizzia lophantha (Benth. in Hook. Lond. Journ. iii. 86; Fournier in Annal. des Scienc. Nat. 1861, 17, 5). This is restricted to extratropic West Australia, but the precise geographic limits of the species are as yet unknown. Mr. Aug. Oldfield found it, besides in the localities already recorded, also at S. W. Bay, where it grew among sandstone rocks. It is our best plant for temporary shelter plantations in the most arid soil or exposed localities, and it produces seeds at a very early age most copiously. The latter will endure immersion in boiling water, which process indeed accelerates their germination. This bush is of remarkably rapid growth. The roots exhale a garlic odour.

A. Sutherlandi (F. Mueller, Fragm. Phytogr. Austr. vi. 23) only as yet known from the Flinders river. This species demonstrates how easy a transit exists between the genera *Albizzia* and *Acacia*; and my original view, that the former merely constitutes a section of the latter, may still finally be adopted.

A. basaltica (Benth. Flor. Austr. ii. 422). This species has been sent lately from the Barcoo by Mr. E. Schneider, and from Springsure by Dr. E. Wuth. The leaflets attain occasionally a length of $\frac{1}{2}$ inch. The pod is sometimes $\frac{3}{4}$ inch wide. The ripe seeds are more or less oval or orbicular, brown, smooth, 4–5''' long, remarkably flat, somewhat shining, and bordered by a narrow acute margin. There is no distinct lateral areol, nor is the funicle enlarged into any distinct arillus.

A. Thozetiana (F. M. in Benth. Flor. Austr. ii. 422). Restricted to eastern subtropic Australia.

A. procera (Benth. in Hook. Lond. Journ. iii. 88). Gloucester Island.

A. canescens (Benth. Flor. Austr. ii. 423). Now also known from Nerkool Creek, where it was found by Mr. E. Bowman, who observes that the foliage is almost deciduous.

A. pruinosa (*Pithecolobium pruinatum*, Benth. in Hook. Lond. Journ. Bot. iii. 211). This species is traced by Mr. J. Dallachy as far north as Rockingham Bay and Dunk Island. Its precise relation to the Java *Albizzia Junghuhniana*, well figured by Miquel, has to be further ascertained. This tree grows to a height of 60 feet or more. The flowers

are at first almost white, according to Mr. Carron, but change into yellow.

A. monilifera (*Pithecolobium moniliferum*, Benth. in Hook. Lond. Journ. iii. 211). Found on the Liverpool river during Captain Cadell's expedition.

A. Tozeri (*Pithecolobium grandiflorum*, Benth. Flora Austr. ii. 424). Newly-discovered localities for this brilliant plant are:—the Tweed (Guilfoyle); Camden Haven (Carron); Rockhampton (Thozet); Rockingham Bay (Dallachy); I found it on one of the islands of Barrier Straits. The tree seeks the vicinity of the sea. Its bark is smooth and whitish, the wood hard and pale. Sometimes three pairs of pinnæ occur. The leaflets attain occasionally the length of 4 inches. The calyx is often over 4 lines long. The pod is pulpless, a few inches long, more or less circularly twisted, hard, one inch or less broad, orange-coloured inside. Seeds black, shining, egg-shaped, turgid, placed transversely. No conspicuous arillus. The plant was originally intended for dedication to the late Horatio Tozer, who, while in search of fruits of this magnificent tree, met with a serious accident, involving ultimately his death.

A. Hendersonii (*Pithecolobium Hendersonii*, F. M. Fragm. v. 191; vi. 202) is now also known from the Tweed (C. Moore). The pod is, according to Mr. Carron, of a rich red inside. It is about 2 inches long, $\frac{2}{3}$ inch wide, arcuate, lignescent, crustaceous, somewhat septate, at the outer margin crenate, and there opening longitudinally. The seeds are placed transversely, turgid, egg-shaped, black, about $\frac{1}{3}$ inch long, without any marked lateral impressions. No evident arillus exists.

Two other species of Australian Albizzias are contained in our collections, but in a state too imperfect to admit of examination; one is from the Glenelg river, the other from Rockingham Bay.

The species of *Pithecolobium* now transferable to *Albizzia* were fully recorded by Bentham in 1844 (Hook. Lond. Journ. iii. 195–223), as far as known up to that time. Among those which have since been added we find:—*Pithecolobium Guadalupense* (Chapman, 'Flora of the Southern United States,' p. 116); *P. subcoriaceum* (Thwaites, Enum. Plant. Zeyl. 100); *P. fagifolium* (Blume in Miquel's 'Flora van Nederlandsch Indie, i. 35); *P. Junghuhnianum* (Benth. Pl. Jungh. i. 269); *P. acutangulum* (Miq. Prodr. Flor. Sumatr. 282); *P. oppositum* (Miq. l. c. 283); *P. Brongniarti* (Duchass. et Walp. in Annal. Bot. Syst. iv. 636); *P. brevifolium* (Benth. in Smithson, Contrib. iii. 67); *P. Panamense* (Duchass. et Walp. in Linnæa, xxiii. 746); *P. Splitgerberianum* (Miq. Stirp. Surinam, 5); *P. Kegellii* (Meissner in Linnæa, xxi. 249); *P. Miquelianum* (Meissner, l. c. 250); *P. Petersianum* (C. Muell. Annal. Bot. Syst. 1871, 844).

In conclusion, I may remark, that *Archidendron* can be generically separated from *Albizzia* only by its plurality of carpels; further, that even *Calliandra*, *Enterolobium*, and, perhaps, *Serianthes*, might well be incorporated in the genus *Albizzia*, just as the great monographer of these plants already included in it his formerly acknowledged *Zygia*. The latter genus would take precedence by priority over even *Albizzia*, had it become early supported by properly defined specific descriptions. It seems to me, that if we extend *Albizzia* in the manner just indicated, we should obtain a large and well-circumscribed genus, collateral with *Acacia*, agreeing with the latter also in the extreme modifications of the pod, and

solely differing in far more evidently monadelphous stamens. Be it not forgotten, that in *Acacia* we have not only a remarkable diversity of form and dehiscence of the fruit, but we find also in the section *Vachellia* a legume "filled with pulp," to use the expressions of the founders of that now abolished genus (Wight and Arnott, Prodr. Flor. Penins. Ind. Or. 272). To me, at least, it appears that within the same family, and more particularly in closely-related genera, an equitable value must be attached to their characteristics, and that notes, which are not regarded of generic importance in one case, cannot receive a higher value in the definition of allied genera. If the presence of a pulpy covering of the seeds in reality can separate *Pithecolobium* as a genus from *Albizzia*, then all the Australian, and many Indian, species of the former must be relegated to the latter.

THE ERYSSIPHEI OF THE UNITED STATES.

BY M. C. COOKE, M.A., AND C. H. PECK.

The following enumeration of the species of North American *Erysiphei* is published with the view of stimulating transatlantic mycologists to a more complete investigation of the forms recorded by Schweinitz, some of which have not as yet come under our notice. This must, therefore, be accepted rather as a contribution towards a synopsis of the species than an exhaustive catalogue. Further information is still required, even for some of Schweinitz's species provisionally included here.

1. *Podosphæra Kunzei*, Lev.; Cooke, Handbook Brit. Fungi, n. 1916.—On leaves of *Prunus Cerasus* and *Spiræa salicifolia*. New York (C. H. P. n. 162).

2. *P. biuncinata*, C. and P. Epiphyllous. Conceptacles globose, minute, scattered. Appendages 6–10, from three to five times as long as the diameter of the conceptacles, furcate at the tips and uncinata; extremities obtuse, ultimate ramuli rarely subdivided.—On leaves of Witch Hazel, *Hamamelis virginica*. Sandlake, N. Y. (C. H. P. n. 144).

3. *Sphærotheca Castagnei*, Lev.; Cooke, Handbook, n. 1911.—*Erysiphe fuliginea*, Schwz. Fung. Am. Bor. n. 2469: var. *C*, on *Sanguisorba canadensis*, Carolina (Schwz.); on *Agrimonia Eupatoria*, New Baltimore, N. Y. (C. H. P.); on *Geum album*, New York (C. H. P.); on *Spiræa opulifolia*, New Baltimore, N. Y. (C. H. P.): var. *G*, on *Bidens connata*, Tyre, N. Y. (C. H. P.): var. *I*, on *Brunella vulgaris*, Buffalo, N. Y. (C. H. P.).

4. *Sphærotheca pruinosa*, C. and P. Amphigenous. Mycelium effused, arachnoid, subpersistent. Conceptacles minute, globose, scattered. Appendages few, interwoven, colourless.—On both surfaces of leaves of *Rhus glabra*, Albany, N. Y. (C. H. P. n. 150), New York (W. W. D. n. 47).—Habit and character of mycelium very distinct from *S. pannosa*. The colourless appendages will not permit of its being confounded with *S. Castagnei*. Sporidia .0007–.0008 in. × .0004 in.

5. *Phyllactinia guttata*, Lev.; Cooke, Handbook, n. 1912.—*Erysiphe guttata*, Schwz. Fung. Am. Bor. n. 2476.—On leaves of *Corylus*, Carolina (M. A. C.); on leaves of *Alnus serrulata*, *Celastrus scandens*, *Carpinus americana*, etc., Albany, N. Y. (C. H. P. n. 163).

6. *Uncinula Bivonæ*, Lev. Mycelium arachnoid, evanescent. Conceptacles generally scattered, minute. Sporangia 4, subglobose, with 2

sporidia. Appendages 10–20, a little longer than the diameter of the conceptacles, simple, uncinata.—On both sides of leaves of Elm, Watkins, N. Y. (C. H. P. n. 159).

7. *U. adunca*, Lev.; Cooke, Handbook, n. 1913.—On leaves, Carolina (M. A. C.); on Willow leaves, Albany, N. Y. (C. H. P. n. 160).

8. *U. circinata*, C. and P. Amphigenous. Mycelium effused, evanescent or subpersistent. Conceptacles large, subglobose, scattered or crowded. Sporangia 8–16, narrowly ovate, 8-spored. Appendages numerous, simple, as long as the diameter of the conceptacles, circinate at the apex.—On leaves of *Acer*, Carolina (Rav. n. 1884); on leaves of *A. spicatum*, Watkins, N. Y. (C. H. P. n. 158).—The appendages are longer, more slender, and more numerous than in *U. bicornis*, always simple, and more like those of *U. adunca*. It cannot be regarded as a variety of either of these.

9. *U. polychæta*, B. and C. Amphigenous. Mycelium effused, arachnoid, evanescent or subpersistent. Conceptacles scattered, globose. Sporangia —? with —? spores. Appendages very numerous, not longer than the diameter of the conceptacles, simple, uncinata. On leaves of *Celtis*, Carolina (M. A. C.).

10. *Microsphaera divaricata*, Lev. Hypophyllous. Mycelium arachnoid, evanescent. Conceptacles scattered, globose, minute. Sporangia 4, ovate, rostrate, tetrasporous. Appendages few, five times and upwards the length of the diameter of the sporangia.—*Erysiphe divaricata*, Schwz. Fung. Am. Bor. n. 2473.—On *Alnus undulata*, Carolina (Schwz.).—This species rests on the authority of Schweinitz, and requires confirmation.

11. *M. extensa*, C. and P. Epiphyllous. Mycelium arachnoid, subpersistent. Conceptacles minute, globose, scattered. Sporangia 4, ovate, with 4–8 sporidia. Appendages 8–12, four times as long as the diameter of the conceptacles, 4–5 times dichotomously branched above; tips of the ultimate ramuli swollen.—*Erysiphe quercinum*, Schwz. Am. Fung. n. 2492.—On upper surface of leaves of *Quercus rubra*, Greenbush, N. Y. (C. H. P. n. 157).

12. *M. Hedwigii*, Lev.; Cooke, Handbook, n. 1918.—*Erysiphe viburni*, Schwz. Fung. Am. Bor. n. 2483?—On leaves of *Quercus aquatica*, Carolina (M. A. C.); on leaves of *Viburnum Lentago*, New York (C. H. P. n. 154).

13. *M. penicillata*, Lev.; Cooke, Handbook, n. 1919.—On leaves, Carolina (M. A. C.).

14. *M. pulchra*, C. and P. Amphigenous. Mycelium effused, arachnoid, evanescent, or subpersistent. Conceptacles globose, crowded, or scattered. Sporangia 4–6, with 4–6 sporidia. Appendages 10–20, near twice as long as the diameter of the conceptacles, four times dichotomously branched above; apices swollen.—On both sides of leaves of *Cornus alternifolia*, Greenbush, N. Y. (C. H. P. n. 155).—Allied to *M. Friesii*, but rather larger and more beautiful; the appendages are more numerous, and the ramuli more extended and elaborate.

15. *M. Friesii*, Lev. Amphigenous. Mycelium arachnoid, fugacious or persistent. Conceptacles minute, globose, scattered or crowded. Sporangia 4–6, ovate, with 6 sporidia. Appendages few (4–8), not exceeding the diameter of the conceptacles.—Var. C, SYRINGÆ, *Erysiphe Syringæ*, Schwz. Fung. Am. Bor. n. 2488? on *Syringa vulgaris*, Carolina (M. A. C.), Albany, N. Y. (C. H. P. n. 151): var. D, VACCINII,

Erysiphe Vaccinii, Schwz. Fung. Am. Bor. n. 2491 (partly); on both n. 153): leaves of *Vaccinium corymbosum*, Greenbush, N. Y. (C. H. P.) sides of var. *E. CASTANÆ*, on leaves of *Castanea vesca*, Sandlake, N. Y. (C. H. P. n. 156).

16. *M. Vaccinii*, C. and P. Amphigenous. Mycelium arachnoid, evanescent. Conceptacles globose, scattered. Sporangia 6–8, with 6–8 sporidia. Appendages rather numerous (12–20), 4–6 times as long as the diameter of the conceptacles, 3–4 times dichotomously branched above; tips swollen.—*Erysiphe Vaccinii*, Schwz. Fung. Amer. Bor. n. 2491 (partly). On leaves of *Vaccinium vacillans*.—West Albany, N. Y. (C. H. P. 153 a).

17. *M. diffusa*, C. and P. Amphigenous. Mycelium arachnoid, evanescent. Conceptacles minute, globose, scattered. Sporangia 4–6, ovate, with 4–6 sporidia. Appendages rather numerous (18–25), twice the length of the diameter of the conceptacles, about four times dichotomously branched above; ramuli lax, tips obtuse, not swollen.—On both surfaces of leaves of *Desmodium canadense*, Albany, N. Y. (C. H. P. n. 152).—Allied to *M. Dubyi*, but manifestly distinct.

18. *M. semitosta*, B. and C. Conceptacles globose. Sporangia pyriform, tetrasporous. Appendages few (about 6), not exceeding the diameter of the conceptacles, 3–4 times dichotomously branched above. Curtis, Catalogue, Plants of Carolina, p. 152; Berk. Introd. p. 278. f. 64. c.—On leaves of *Cephalanthus*, Carolina (M. A. C.).—This name is quoted in Curtis's Catalogue, but without description, and we have seen no specimen. The above characters are indicated by the figure cited.

19. *M. Ravenalii*, B. and C.; Rav. Exs. iv. n. 67; Curtis, Catalogue, p. 152.—On leaves of *Gleditschia*, Carolina (M. A. C.).—Our specimen in Ravenal's Fungi Car. consists only of mycelium without a single conceptacle, and no description has been published.

20. *M. Dubyi*, Lev. Amphigenous. Mycelium effused, interwoven, evanescent or subpersistent. Conceptacles scattered or gregarious, globose, minute. Sporangia 4, ovate, tetrasporous. Appendages few (7–10), scarcely longer than the diameter of the conceptacles; ramuli bicornute.—On Honeysuckle.—Portland, Maine (E. C. B.).

21. *Erysiphe lamprocarpa*, Link; Cooke, Handbook, n. 1925.—*Erysiphe Asterum*, Schwz. Fung. Am. Bor. n. 2489? 2493.—On Mints, Carolina (Schwz.); on leaves of *Aster* and *Solidago*, Albany, N. Y. (C. H. P. 161).

22. *E. graminis*, De Cand.; Cooke, Handbook, n. 1926; Schwz. Fung. Am. Bor. n. 2474.—On Grasses, Carolina (Schwz.).

23. *E. Martii*, Link; Cooke, Handbook, n. 1927.—On *Eupatorium ageratoides*, Carolina (M. A. C.); on stems and leaves of Peas, Albany, N. Y. (C. H. P. n. 171).

24. *E. tortilis*, Link; Cooke, Handbook, n. 1929; Schwz. Fung. Am. Bor. n. 2472.—On leaves of *Cornus*, Carolina (Schwz.).—This species rests on the authority of Schweinitz, and requires confirmation. *Microsphaera pulchra* is so very similar to the naked eye, that this species may have been confounded with it.

25. *E. horridula*, Lev.; Cooke, Handbook, n. 1931.—On *Xanthium*, Carolina (Schwz.).—This also requires confirmation.

26. *E. communis*, Schl.; Cooke, Handbook, n. 1930.—On *Ranunculus*, Maine (E. C. B.).

Species inquirendæ.

- Urcinula spiralis*, B. and C.; Berk. Introd. p. 278. f. 64 a.
Erysiphe densa, B. and C.; Berk. Introd. p. 278. f. 64 b.
E. phlogis, Schwz. Fung. Am. n. 2487.
E. densissima, Schwz. Fung. Am. n. 2479.
E. Liriodendri, Schwz. Fung. Am. n. 2480.
E. Gerardiæ, Schwz. Fung. Am. n. 2481.
E. Ceanothi, Schwz. Fung. Am. n. 2482.
E. Ambrosiæ, Schwz. Fung. Am. n. 2484.
E. Verbenciæ, Schwz. Fung. Am. n. 2485.
E. Quisquiliarum, Schwz. Fung. Am. n. 2486.
E. Chelones, Schwz. Fung. Am. n. 2490.
E. Mors-uræ, Schwz. Fung. Am. n. 2494.
E. necator, Schwz. Fung. Am. n. 2495.

ON THE BOTANY OF THE LIZARD PENINSULA.

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

(Continued from Vol. IX. p. 358.)

- Sarothamnus scoparius*. Comparatively scarce. Kynance Cove, etc.
Ulex europæus. Common.
U. Gallii. Common both over the inland downs and seabanks.
Genista tinctoria. Scattered along the seabank from the Lizard Point westward to Mullion.
G. pilosa. In similar places to the last on the seabank at Caerthilian and by the stream-side at Kynance Cove, and seen inland on Goonhilly Down.
G. anglica. Pradannack and Goonhilly Downs.
Ononis arvensis. Common. *O. spinosa* not seen.
Anthyllis Vulneraria. Frequent on the seabanks of the Serpentine tract, passing into *A. Dillenii*.
Medicago sativa. Once seen in a forage-field.
M. lupulina. Frequent.
M. maculata. Frequent.
Melilotus arvensis. One plant on shore of the harbour at Falmouth.
Trigonella ornithopodioides. Cadgwith and Lizard town in dry sandy soil.
Trifolium repens. Common.
T. hybridum. Common in forage-fields.
T. subterraneum. Sandy ground at Trethevas.
T. pratense. Common, both wild and cultivated.
T. medium. Rare.
T. arvense. Frequent, especially on the sandy seabanks.
T. scabrum. Like the last.
T. fragiferum. Roadsides, both inland and in inundated sandy places near the sea at Gunwallo, Durgan, etc.
T. procumbens. Frequent.
T. agrarium. Once seen in a forage-field at Mullion.
T. minus. Frequent.

Lotus corniculatus. Common; well-marked *tenuis* in a forage-field near Lizard Point.

L. major. Frequent.

Vicia Cracca. Frequent.

V. sativa. The cultivated form only seen.

V. sepium. Not frequent.

V. hirsuta. Frequent as a cornfield weed.

V. tetrasperma. Seen several times.

Lathyrus pratensis. Frequent.

Orobus tuberosus. Rare and not noted at all in the Serpentine tract.

Prunus communis. *P. spinosa*, frequent in hedges and truly wild on the seabank of the Serpentine between Cadgwith and Llandewednack.

P. insititia, apparently wild on the north shore of Helford Creek at Durgan. *P. domestica*, in hedges near houses, seen in one or two places.

P. Cerasus. Hedges at Poltesco, and in two or three other places.

P. Avium. Pengerrick woods; very likely planted.

Spiræa Ulmaria. Frequent.

S. Filipendula. Frequent on the Serpentine downs, both inland and on the seabank from Mullion round to Poltesco.

Geum urbanum. Quite rare on the Serpentine, and not frequent in the other tracts.

Potentilla anserina. Common by roadsides.

P. reptans. Hedgebanks occasionally.

P. Tormentilla. Frequent on the heaths; var. *procumbens* once seen on the Granite, west of Penryn.

P. Fragariastrum. Hedgebanks, rare; not seen on the Serpentine.

Comarum palustre. Never seen, although there are abundance of likely places.

Rubus rhamnifolius. This and *discolor* the most frequent forms through the area.

R. discolor. The typical English form (*rusticanus*, Mercier) everywhere common. A round-leaved plant between this and *thyrsoides* noted once in a hedge near Lizard town.

R. villicaulis. Not unfrequent.

R. umbrosus. Hedges in the Granite tract at Penryn and Falmouth.

R. Radula. Not unfrequent.

R. pallidus. Woods at Mawgan and Falmouth. Nowhere noted on the Serpentine.

R. fusco-ater. A somewhat doubtful form, seen once in the Granite tract west of Penryn.

R. corylifolius. Spread over the district, principally trailing over the seabanks. Forms with adpressed sepals several times noted, and a plant that may perhaps go under *dumetorum* once seen at Ruan Minor.

R. cæsius. Widely spread, but not so common as the last.

Rosa spinosissima. Sandy banks, in several places, especially near the sea at Mullion.

R. tomentosa. Hedges in the Devonian tract about Manaccan.

R. micrantha. Hedges at Falmouth and Manaccan, and sometimes grown for Sweetbriar in the cottage gardens.

R. canina. Frequent; the forms noted were *lutetiana*, *dumalis*, *urbica*, and *collina*.

R. arvensis. Frequent throughout the area.

Agrimonia Eupatoria. Frequent; var. *odorata* seen at Falmouth and Manaccan.

Sanguisorba officinalis. Frequent throughout the Serpentine tract, passing into a much reduced form on the exposed downs.

Poterium Sanguisorba. On the Serpentine down at Mullion, etc.

Alchemilla arvensis. Rare.

Cratægus monogyna. Frequent.

Pyrus Malus. Several times seen in hedges, but all the tomentose form, and perhaps not a native.

Epilobium hirsutum. Not seen.

E. parviflorum and *montanum*. Both frequent.

E. roseum. Walls at Greenbank, Falmouth.

E. tetragonum. The typical plant by roadsides at Falmouth and Penryn; *E. obscurum* spread through the area.

Circæa lutetiana. Rare.

Myriophyllum alterniflorum. Pools on downs; the only species seen.

Callitriche verna and *platycarpa*. Both frequent.

Lythrum Salicaria. Frequent.

Peplis Portula. Peaty pools of the Serpentine downs.

Tamarix anglica. The favourite shrub for planting round gardens and on the seabank.

Bryonia dioica. Never seen.

Montia fontana. Rare.

Corrigiola littoralis. South shore of Carminow Creek, amongst stones, not abundant.

Herniaria glabra. This and *Erica vagans* are the two most abundant characteristic plants of the Serpentine. It begins at Mullion and continues all round the coast to Poltesco, where we saw a tuft upon a wall more than a yard long. We noted it nowhere in the area except upon the walls and dry earthy banks of the southern Serpentine tract.

Polycarpon tetraphyllum. Earth-bank, by the roadside going out of Cadgwith to Poltesco, sparingly.

Scleranthus annuus. Sandy soil, in the Granite tract, near Penryn.

Sedum anglicum. Everywhere frequent on walls and dry earthy banks.

S. acre. On Serpentine rocks at Mullion, with *Arenaria verna*.

Cotyledon Umbilicus. Everywhere frequent on walls and rocks. No *Saxifraga* or *Chrysosplenium* anywhere seen.

Hedera Helix. Common.

Hydrocotyle vulgaris. Peaty pools of the downs.

Sanicula europæa. Only once seen in the Devonian tract in Pen-gerrick woods.

Eryngium maritimum. Sandy beach at Gunwallo.

Conium maculatum. Frequent.

Smyrnum Olusatrum. Trethevas, Lizard town, etc., always near houses.

Apium graveolens. Frequent in the streamlets near the sea, as at Gunwallo, Caervarrock and Poltesco.

Petroselinum sativum. Walls at Cadgwith, etc.; of course alien.

P. segetum. Noted two or three times as a cornfield weed.

Helosciadium nodiflorum. Common in ditches and the var. *pseudo-repens* in damp grassy places.

(To be continued.)

LICHENOGRAPHICAL NOTES.

BY JOSEPH A. MARTINDALE.

The publication of Leighton's 'Lichen Flora of Great Britain' has afforded Dr. Lindsay an opportunity to restate his opposition to what he terms "the modern school of lichenography;" but the numerous charges which he brings against it, in his review of the above-named work, at pp. 341-348 of the last volume, are either exaggerations or founded on misconception, while the greater part of the instances he adduces to support his opinions seem to me singularly unfortunate, proving often the reverse of that for which he advances them, and, even where they show a blemish, the cause of it is not unfrequently quite different from that he alleges.

Dr. Lindsay's chief dread in botanical matters is "extreme differentiation;" and, in his efforts to escape from it, he runs into the opposite error of too great generalization. In the term, "the modern school of lichenographers," this error is as evident and as great as in the charges which he brings against modern opinions and methods of examination. In truth, the systems of arrangement and the views respecting generic and specific characters advocated since the appearance of Leighton's 'Angiocarpous Lichens,' are extremely various; and, if we place the views and opinions of such as Massolongo and Körber at one end of the scale with those of Dr. Lindsay at the other, it is not too much to say that Dr. Nylander and Mr. Leighton will be found midway between them. To write, then, of a "modern school," is as fallacious as it can possibly be.

It is by no means my intention to enter into the whole matter which Dr. Lindsay raises, which would require more time than I can spare, and, in the majority of instances, a much more intimate acquaintance with the plants in question than I possess; there are, however, certain points on which a few remarks seem desirable. Dr. Lindsay's chief accusation against modern lichenographers is that their tendency is "towards extreme differentiation," and that, "having differentiated species and genera to a mischievously elaborate extent, according to the various character of the sporidia, they are being further subdivided" on characters derived from chemical tests.

My reply in general terms is, that the number of recently distinguished Lichens, at all events belonging to the British flora, is not nearly so great as might be supposed from Dr. Lindsay's account, and that by far the greater part of them occur in those genera in which the naked-eye characters are most minute, changeable, and unsatisfactory, and where chemical tests have been least used and relied upon for the purposes of distinction and arrangement.

In support of his assertion that the tendency of recent authors is to great division, he gives the number of species belonging to the British flora, as recorded from time to time in 'English Botany' (1844), Mudd's 'Manual' (1861), Crombie's 'Lichenes Britannici' (1870), and Leighton's 'Lichen Flora' (1871), from which it appears that the number of species has increased from 439 to 781, or 79½ per cent. on the earliest of these computations. But as a test of simplicity of arrangement, or of a tendency to multiply distinctions and names, such a mode of comparison

is simply misleading. The opinions of different botanists, and even of the same botanist at different times, as to what amount of difference from other plants is necessary in order that any given plant should take rank as a species, is so extremely great that the terms species and variety have ceased to have any very exact meaning; and the case may be, that of two botanists who allow and describe exactly the same number of *forms* or *plants*, the one may have nearly double the number of *species* which the other allows. The mere reckoning, therefore, of the number of species enumerated by any two authors, without a close scrutiny of synonymy and characters, and without reference to the number of varietal forms, serves hardly any purpose at all as a means of comparison.

Let us take the genus *Cladonia* as an example. Mudd's 'Manual' distinguishes by name either as species, varieties, or forms, 75 plants; while the later work of Leighton, with more material, enumerates only 53. Yet the larger number in the earlier work are classed as 10 species, while the smaller number in the later one are arranged under 25 species. Is, therefore, Mudd more simple and intelligible, and is Leighton a greater multiplier of distinctions? Is it more simple to regard a plant as *Cladonia gracilis*, var. *hybrida*, forma *chordalis*, than as *C. gracilis*, var. *chordalis*? Or again, where is the great simplicity in naming the plant figured in Eng. Bot. 2051 (and called by Leighton *Cladonia cornucopioides*), *C. coccifera*, var. *cornucopioides*, forma *pleurota*?

A second consideration vitiates any such comparisons in the gross between the floras of a limited tract of country, which is, that many plants which appear only in the later flora were not included in the former, not because they had not been distinguished and named at the date of its publication, but because, though found in other places, they had not been detected in the district to which the flora pertained.

If we wish to find the increase of "new species," truly to be called such, with any degree of accuracy, we must adopt a different plan, and see when the plants enumerated as belonging to our flora were first distinguished.

Considered in this way, we find that of the 781 species enumerated in the 'Lichen Flora,' 540 had been named by premicroscopic authors, or at all events before 1851. An increase, therefore, is apparent of 241 species, or about 44½ per cent., to be laid to the charge of modern splitters or species-makers.

It may, however, be urged against this plan that many plants which take rank as *species* in Leighton's work (as for instance, *Cladonia pungens*) were considered *varieties* by some previous authors. But when we recollect what book-species and book-varieties really are, and that the varieties of one author are the species of a second, or, if regarded as varieties, are assigned to quite a different type,—this objection loses very much of its force. *C. pungens*, for instance, was considered a distinct species by Acharius in his 'Methodus,' by Delise, Körber, Floerke, in Eng. Bot., and by Hooker; it was assigned to *C. rangiferina* by Acharius in the 'Synopsis,' and by Wahlenberg; and to *furcata* by Acharius in his Lich. Univ., by Fries, Schærer, and Nylander.

And, besides, the number thus raised to specific rank is probably compensated in great measure by the number degraded to varietal standing.

In any case, however, in comparisons made for the purpose this is, it

will be better to consider the number of distinct forms. These, in Leighton, number 1146 (species, varieties, and forms), of which 811 were named before 1851. This makes the increase of new distinctions $41\frac{1}{4}$ per cent. Set either of these two computations beside Dr. Lindsay's, bearing in mind the purpose for which his was made, and the unfairness of his comparison becomes evident.

But if Dr. Lindsay has exaggerated the increase and the tendency of botanists of the present day to multiply distinctions and names, his account of the causes of such increase is still more at fault. The causes in his opinion are chiefly two: first, the supersession of primary external characters by secondary internal ones; and, secondly, the adoption of chemical tests as a means of distinction. In order to examine the truth of these statements, I append a summary of the number of plants in each of the larger divisions of Leighton's work, showing how many received their name prior to, and how many since 1851:—

| | Species Named before 1851. | Varieties Named before 1851. | Species Named since 1851. | Varieties Named since 1851. | Plants Named before 1851. | Plants Named since 1851. | Increase per cent. |
|-------------------------------|----------------------------|------------------------------|---------------------------|-----------------------------|---------------------------|--------------------------|--------------------|
| Collemacei | 40 | 4 | 19 | ... | 44 | 19 | 43.2 |
| Myriangiacei | 1 | ... | ... | ... | 1 | | |
| Epiconodei | 20 | 5 | 8 | 1 | 25 | 9 | 36.0 |
| Cladodei | 36 | 29 | 1 | 3 | 65 | 4 | 6.1 |
| Ramalodei | 26 | 24 | 2 | 2 | 50 | 4 | 8.0 |
| Phyllodei | 70 | 45 | 1 | 8 | 115 | 9 | 7.8 |
| Placodei (upper genera) . . . | 109 | 75 | 20 | 13 | 184 | 33 | 17.9 |
| Placodei (lower genera) . . . | 179 | 71 | 124 | 56 | 250 | 180 | 72.0 |
| Pyrenodei | 59 | 18 | 66 | 11 | 77 | 77 | 100.0 |
| | 540 | 271 | 241 | 94 | 811 | 335 | |

An examination of the summary here given shows what could not be gathered from Dr. Lindsay's sweeping and general criticism, that the increase in the number of species and varieties, instead of being evenly distributed among the different tribes and families, as it should be were the cause some general principle in the mind of species-makers, preponderates remarkably in the lower genera of the Placodei and in the Pyrenodei, where the Lichen class unites with the Fungi; and in the Collemacei, where they approach the Algæ.

Now, it cannot be denied that the *whole class* has been subjected to minute examination and revision by the microscope. How does it come to pass, then, that the increase of new species and forms is found to preponderate so largely in the lower tribes? Did the same rage for multiplication not exist in lichenographers when they examined the higher Lichens? Were they not as prone in the classification of the *Stictici* and *Imbricariei* to adopt internal instead of external characters?

Surely, in view of the great contrast presented, we must acknowledge

that there is an essential difference between the higher and lower Lichens in the characters which can be relied on for specific distinction.

And, as for chemical criteria, it is precisely in the tribes in which the least increase has taken place that chemical tests have been most freely used, and are supposed to be of the greatest service. In the genera *Cladonia*, *Parmelia*, *Lecanora*, and *Pertusaria*, these tests have been most largely employed, and the result in no way tends to bear out Dr. Lindsay's statement.

In *Cladonia*, out of 53 forms, 50 date their first distinction from the premicroscopic era; while of the modern additions, only 1 seems fairly attributable to chemical tests.

In *Parmelia*, out of 44 forms, 37 were named by the older writers; while 6 of the 7 additions are varieties distinguished not by chemical or microscopic, but by external naked-eye characters.

In *Lecanora*, out of 149 forms, only 24 have been recently named; while 19 of the 23 forms of *Pertusaria* received their names before 1851.

The instances of plants separated by chemical tests which Dr. Lindsay adduces, together with his remarks, on pp. 346, 347 of the last volume of this Journal, respecting *Verrucaria polysticta* and *fuscella*, *V. æthiobola* and *margacea*, seem conclusively to prove that the old arrangements and distinctions of Acharius, Fries, and Schärer require as much modifying and reducing as the new of Nylander and Leighton; but it is eminently unfair to charge the microscope and chemical tests with making new distinctions, where they only keep distinct, or more accurately define, what had been dubiously distinguished before. *Pertusaria faginea*, for instance, is a Linnean species, and was kept distinct by Hofmann, Acharius, Turner, Borrer, and other premicroscopic botanists.

In *Lecidea*, *Verrucaria*, and other of the lower genera, where the increase in the number of forms distinguished by name is so very large, chemical tests, though used, have not played nearly so great a part, and it is very plain that the increase cannot be accounted for by any single circumstance. Many circumstances have contributed to it; the chief of which is, that these tribes were very ill understood by the earlier botanists, nor, from their minuteness and their imperfect and rudimentary thallus—so liable to fluctuation in form, consistence, and colour—was anything else to be expected from the means of examination at that time at the disposal of botanists. Of them in particular, the remark of Nylander is true:—“Facile enim jam diu patuit determinationes anteriores, sæpe nec species veras nec formas rite definitas respicere, sed notiones solum vagas indicare et incertas.”

Of the errors into which even Acharius fell, a striking instance may be found in Nylander's account of *Lecidea parasema* (Lich. Scand. 217, 218), where we see that he confounded it and its varieties, more or less, with about a dozen distinct species, as *disciformis*, *bacillifera*, *lapicida*, *anomala*, etc., while the names *tersa*, *lignaria*, *stigmatea*, *microspis*, and *synothea* seem to be mere synonyms for forms he had already distinguished.

Then, too, there are a great number of plants which the earlier lichenologists either entirely overlooked or regarded as Fungi. These Lindsay himself describes as “an increasingly large and important group,—for the most part of athalline forms,—whose apothecia (with or without spermogonia or pycnidia) alone represent the plant; minute in size, frequently obscure and difficult of observation, requiring for the determination of

their structure and place in classification, the patient use of the microscope." (Quarterly Journ. of Micro. Sc. Jan. 1869, pp. 49, 50.) Of these plants, Lindsay enumerates 119 species, belonging to various parts of the world; 16 of which were named by early authors, and the remaining 103 by the moderns.

In the paper I am quoting, Dr. Lindsay repeatedly complains of the useless number of names and distinctions, and yet 19 of the 103 recent species are named by himself; indeed, he has named more than any other author he quotes, Nylander alone excepted.

Of several of those he names, he seems only to have had imperfect specimens, for we are told, "spores not seen," or that he had found "pycnidia only." (Compare Lindsay's remark on *Pertusaria sublactea* and *P. fuginea* in Journ. Bot. IX. 347.) It is remarkable, too, that one of the forms which he has named is a plant which Mudd, who examined and described it, thought better to leave unnamed. (Mudd, Man. 165.)

Such being the state of the case, it is hardly to be wondered at that the number of species should increase, and one can very well see that Dr. Lindsay's practice is more nearly in agreement with that of other botanists than his theory.

I have had no intention in the previous remarks to justify the large increase in names and species which has taken place of late years; the character and experience of the writers who describe and distinguish them must be their passport. I simply wish to point out that the increase is not so large as Dr. Lindsay represents, and that it has not arisen from the use of chemical tests or a rage for multiplication. At the same time it is well to remember that Dr. Nylander pursues in this, as in most licheno-logical matters, a middle course; and while Dr. Lindsay protests against "mischievous differentiation," those of the Massolongo-Körberian school complain that he only finds "*alia nomina*" in many of their best-grounded species.

SHORT NOTES AND QUERIES.

AMMOPHILA BALTICA IN NORTHUMBERLAND.—I send an *Arundo*, which I got on Ross Links, Northumberland. I had been to Holy Island, and on coming home, as the sand was very wet, I took to the links and found the grass in small patches. . . . It is my opinion that it is truly wild; it grows close to the sea at a part where no ballast could be discharged. Holy Island is five miles distant. I have no idea over what space the plant is spread; I met with it for the length of between three and four hundred yards as I walked close by the side of the sandbank.—W. RICHARDSON. [Mr. Richardson's specimen is *Ammophila baltica*, Link (*Psamma*, Beauv.), a species found not only on the shores of the Baltic (as its name indicates), but on this side of Denmark, near Bremen. It is easily distinguishable from our common *A. arenaria* by its laxer, more lanceolate and less cylindrical panicle, and long, very acute glumes, besides other characters: There is no *à priori* impossibility of the plant being native at Ross Links, a promontory, about two miles across, south of Holy Island and north-east of Belford; further examination of the station will, however, be desirable before we publish a figure and full description of *A. baltica* as a British plant.—ED. JOURN. BOT.]

QUEENSLAND PLANTS.—A correspondent, at p. 273 of the last volume of the Journal, notices the receipt of *Sisyrinchium Bermudiana*, from Australia, “probably Queensland.” Some months since, I sent the plant to Mr. Bentham from the neighbourhood of Brisbane, where it is naturalized and exceedingly common, within a radius of a mile or two, but not further; fruiting very freely it is rapidly disseminated. Examples of another naturalized plant, *Paspalum annulare?* Trin., accompanied the *Sisyrinchium*; it is not easy to account for the occurrence of either, but both are now completely established: the *Paspalum* is quite as limited in its range as the *Sisyrinchium*. *Asclepias Curassavica*, from Brazil, is also thoroughly naturalized, its winged seeds giving it great advantage; so is *Ricinus communis*: but more than any other plant, *Lantana crocea* has asserted citizenship; it defies the competition of native shrubs, especially in damp ground, and it has been remarked that if all traces of human civilization were swept from Queensland, this would remain in evidence of the white man’s occupation, by whom alone it could have been introduced. A yellow-flowered *Opuntia* is also naturalized abundantly; its pyriform fruits are full of a richly coloured pulp of a deep mauve colour, but the flavour is insipid. *Senecio vulgaris* will not naturalize itself, though the attempt has been seriously made as a convenient green food for cage-birds. I have seen an example of *Anagallis cærulea*, not in cultivated ground, nor in a locality where it seemed at all likely to be introduced. Such plants as *Sonchus* and *Stellaria media* and the white Clover, are well known to be now quite at home in all cultivated parts of Australia.—CHARLES PRENTICE.

A GRASS FATAL TO SHEEP.—One remarkable fact connected with Queensland botany is, that a Grass, which grows locally abundant in the more northern portions of the colony, *Aristida hygrometrica*, R. Br., is fatal to sheep, by reason of its long sharp tripartite awns getting entangled in the wool and ultimately piercing the skin and penetrating to the viscera of the thorax and abdomen, causing death after prolonged wasting and suffering; the heart, liver, kidneys, etc., are sometimes, on dissection, found pierced by these mischievous awns in all directions.—CHARLES PRENTICE.

NOTE ON A BRITISH POLYPORUS.—Early last year I came into possession of a species of *Polyporus* obtained in this district, in the neighbourhood of Polegate, which exhibits a colorific property not noticed hitherto in Fungi. The plant may be described as follows:—Pileus semi-orbicular, corky, thin, dry, smooth, stemless, projecting from the wood on which it grows. Colour ochraceous, clothed on the upper surface with a fine down. Cuticle, none. Pores minute, angular, toothed, cinnamon-coloured. Mycelium of the same colour as the pileus. Odour agreeable. Size, 3 inches by 2. Thickness, three-eighths of an inch in the thickest part. Spores ovate, almost immeasurably minute. Growing on a dead log of wood, and slightly resupinate. The specimen has since been submitted to the Rev. M. J. Berkeley, who considers it a form of *P. rutilans*. On the application of liquor potassæ to a section of the pores, there is immediately developed a beautiful magenta colour, and in a very short space of time is produced an abundant crop of thin rhomboidal crystals, which, under polarized light, are extremely beautiful

and brilliant. When a fragment containing the pores is exposed to gentle heat over a spirit lamp, there rises at a certain degree of temperature, a glittering cloud of extremely thin tubular crystals, nearly square, and which reflect light of all colours like the finest gems. In the polariscope they are quite gorgeous. The addition of a solution of potash to these crystals develops at once the magenta colour obtained by the application of the alkali to the pores with the same result of the formation of rhomboidal crystals. It may be inferred from these phenomena, that the hymeneal membrane of the fungus contains a volatile acid, like the acid principle in certain lichens, the decomposition of which by means of alkalies, develops red colouring matter. The addition of a strong solution of silicate of soda to the sublimed crystals occasions the formation of hair-like crystals of great length, straight and curved, radiating from centres, and unlike any crystalline formation I have ever seen. The behaviour of this fungus under the action of alkalies and heat has recently been made more interesting to me by the discovery that *Parmelia parietina* submitted to gentle prolonged heat produces on the surface, particularly about the apothecia, a crop of very beautiful crystals of chrysophanic acid, which, on the application of a solution of potash, develop the usual bright red colouring matter. The shape and appearance of these crystals are, however, totally different to those obtained from the *Polyporus*, though they are probably analogous in their nature. The colour produced by the alkali is quite different to that obtained from the fungus. What the special acid in the fungus may be remains to be determined; and, unfortunately, I have not as yet succeeded in obtaining another specimen.—C. J. MULLER.

[A small portion of the plant has been submitted to Dr. Flight, of the British Museum, for examination, and he confirms Mr. Muller's observations. From the small quantity of the crystals obtainable it was found impossible to make an analysis; but from a measurement of their angles made by Professor Maskelyne, it was certainly determined that they were not ammonium chloride, which had been at first supposed. In connection with the production of crystals by species of *Polyporus*, reference may be made to an account by Dr. R. Scott, in the Transactions of the Linn. Soc. viii. 268, of a deposit of crystals of oxalic acid on the surface of a dried specimen of *P. sulphureus*.—ED. JOURN. BOT.]

A NEW (?) ENDOPHYLLOUS PARASITE.—Last August I gathered leaves from various plants of *Coleus* growing in my garden. Having removed the cuticle by boiling in potash, I noticed very curious growths in all of them. I send you some mounted for the microscope for your inspection. They have the appearance of unicellular fungi, and are composed of a central mass of reddish protoplasm, divided into four parts, and surrounded by a circular hyaline capsule. As they are of the same colour as the darker portions of the leaves, it occurs to me that they may have something to do with the variegation of them. I should be very glad to have your opinion on the subject.—T. HOWSE.

[The specimens were forwarded to Rev. M. J. Berkeley for his opinion, and he has kindly furnished the following information:—"There is, I think, no doubt that the bodies in the *Coleus* are some endophyllous Fungus, but I do not know of any in which the endochrome is so neatly divided into four portions; a matter which ought not, however, to sur-

prise, as there are examples in other branches of Fungi . . . Of course, we have not seen the whole development of the parasite, but it appears to be a distinct form of *Synchytrium* . . . Every stage [of division] was visible in the specimens, but it was not to be expected that we should see the zoospores . . . The resemblance to *Hæmatococcus* is singular, some of which are known to be mere conditions of Lichens. Mr. Broome has found *S. Mercurialis* and *S. Taraxaci*. I had only a dry specimen of the latter to examine, and did not see the endochrome divided, as in your species, though the colour was the same." The genus *Synchytrium* was founded in 1863 by De Bary and Woronin, on a parasite in the leaves of Dandelion, *S. Taraxaci* (Bericht der Naturfor. Gesells. in Freiburg, iii. 2), and has since been carefully studied by Dr. Schroeter, who has described eleven species in a monograph printed in 1870, in the first part of Cohn's 'Beitrage z. Biologie der Pflanzen.' Very different views are held by cryptogamists as to the affinities of these obscure parasites. Schroeter thinks them nearly related to *Hydrocytium*, *Codiolum*, etc., and places the genus among those *Palmellaceæ* which possess zoospores. Mr. Berkeley considers the genus allied to *Protomyces*, Unger, if that is distinct; and refers it rather to the *Ustilagineæ* than the *Saprolegniæ*, next to which (in *Chytridiæ*) it is localized by Rabenhorst. Mr. Howse's plant is a very distinct, and, probably, an undescribed form. As to the causation of variegation in the *Coleus* leaves by the parasite, it would be premature to express a decided opinion until the coexistence of the *Synchytrium* and the coloration has been noticed in more instances; but the indication is well worthy of being followed up.—FD. JOURN. BOT.]

HYMENOPHYLLUM TUNBRIDGENSE.—I have had during the past two years many opportunities of searching the cwms and valleys of North Wales for this fern, but have hitherto not succeeded in finding it. In 1870 my attention was turned to the upper portions of the south side of Llanberris Pass, especially Cwm Glas and the slopes of Crib Goch, where *H. Wilsoni* is very abundant, but I was unable to find *H. tunbridgense*. The same result attended my search of Cader Iris. Last year I had the pleasure of twice visiting the Glyders in company with a botanical friend, and on each occasion spending a week in searching the numerous cwms on the north side of those mountains with a like result,—*H. Wilsoni* in any quantity, but *H. tunbridgense* not to be found. Will any of your readers say whether they have met with this Fern in the northern part of the principality? For obvious reasons they had better not specify the exact locality.—W. PHILLIPS.

OVALS.—Dr. Trimen's desire to employ the term 'oval' as different from 'elliptic,' is both natural and reasonable. In mathematics the two terms are not identical; why then should not botany, which also aims at precision and completeness, obtain the fullest possible benefit from a geometrical vocabulary? An ellipse is that kind of oval which arises from a plane section of a circular cone, and botanists select for their conventional ellipse one whose eccentricity is expressed by about the fraction $\frac{4}{5}$, that is, whose minor axis is about three-fifths of its major. An oval in geometry is any curved loop; it is therefore open for botanists to select any special kind of curved loop that may be convenient for their conventional

oval; accordingly, some botanists make it synonymous with elliptic, others with ovate, and others, again, make it mean what in geometry is called elliptic, and use elliptic either as having another defined eccentricity, or in a sense inconsistent with its geometrical one. It certainly is best and safest for botanists to use these terms, so as to approach and not unnecessarily clash with geometricians; and the practical question remains,—what special meaning, if any, different from those of elliptic and ovate, is it desirable to assign to the term ‘oval’? Dr. Trimen’s suggestion at p. 370 of the last volume of the Journal will answer every purpose, provided only botanists in general will agree to accept and act upon it.—W. P. HIERN.

ERICA STRICTA, *Andr.*, IN IRELAND.—The distribution of this species, as given in De Cand. Prod. vii. 606, is “in montibus Corsicæ, Sardinia, et Hispaniæ australis (Boiss.!), etiam in Hibernia boreali (Lloyd in Herb. Hooker!).” This notice seems to have escaped the attention of Irish botanists, and is not taken up in any book upon British botany. It seems therefore worth drawing attention to, although some error has doubtless occurred. I have seen the specimen in the Kew herbarium, and there is no doubt about its identity with *E. stricta*. It is labelled in Sir W. J. Hooker’s hand, “North of Ireland! Dr. Lloyd, 1834.”—JAMES BRITTEN.

WINTER FERTILIZATION.—While out walking on a frosty morning in the end of November, my attention was attracted by a patch of *Geranium Robertianum* growing on a sunny bank, its brown and shrivelled leaves scarcely serving to break up the luxuriant mass of pink blossoms. On examination these were found to present a phenomenon which might be described in words almost the same as those used by Mr. Bennett, on p. 374 of last volume, with respect to *Stellaria aquatica*. The mature stigmas were twisted among and covered with pollen from the ripe anthers, which in this family have ordinarily disappeared long before the stigmas are developed. I regret that I neglected to ascertain the relative condition of these parts in the buds. I had previously observed the same thing in the flowers of *Geraniums* and *Pelargoniums* kept in the house during summer, the same species being protandrous in the open air; and I would now offer the explanation which suggested itself to me. When insects have free access to a protandrous flower, the pollen is removed as soon as it becomes ripe, the stamens wither away, and in due time the pistil is developed, expanding its stigmas in the place previously occupied by the anthers. If from any cause, however, the flower be not visited by insects, the pollen will not be removed, and the stamens will preserve their original position until, in the natural course of development, the stigmas make their appearance among them. Hildebrand has shown (‘Geschlechtervertheilung,’ p. 66) that sometimes, where at first sight self-pollination (a better word, I think, for “*Bestäubung*,” than “*pollenization*,” suggested by Mr. Bennett) seems to be the intention of Nature, this is not followed by fertilization; it would therefore be well in all such cases to determine experimentally whether this be the usual result. It would, however, be a mistake to assume that the crossing of flowers by the agency of insects is impossible during the winter months.

Many moths assume the imago state at this season alone; and entomologists find it worth their while to visit, in pursuit of them, the plants which are then in bloom, many of which are of unisexual species.—W. E. HART.

DIMORPHISM IN HYPERICINÆ.—In examining the Indian and Malayan species of this family, I have met with a marked case of dimorphism in *Cratoxylon formosum* (Benth. and Hook. f. Gen. Pl. i. 166). This is figured as *Tridesmis formosa* by Korthals (Vech. Nat. Gesch. Bot. t. 37), with long styles exceeding the stamens. Amongst the specimens in the Kew herbarium, besides long-styled forms, there are others in which the styles are much shorter than the stamens. As the species is said to become a large tree, it would be interesting to know whether different branches of the same individual produced the two kinds of flowers. Otherwise if the dimorphism were complete, it would be a serious obstacle to the production of seed.—W. T. THISELTON DYER.

FERTILIZATION OF CEREALS (Vol. IX. p. 373).—The following account of the process is given by Bidard in a paper printed in abstract in the 'Comptes Rendus' for 1869 (t. 68, p. 1486):—"The anthers open laterally; they are affected by a twisting movement, and let fall a cloud of pollen upon the expanded stigmas. At this instant the filaments elongate rapidly, and by means of this elongation and the twisting they separate the valves, make a passage for themselves, and appear outside the flower. It is at this moment the cultivator remarks, 'The wheat is in flower.' It is an error; the fertilization has terminated." The suggestion has been made to me, and quite truly, that for the complete proof of Bidard's last assertion, it requires to be shown that cereals are not protandrous. It is, however, a general belief that the fertilization is effected in the manner described by Bidard and Dr. Boswell Syme. A method of artificial fertilization, by drawing a rope over the heads of the corn, was proposed by Hooibrenk some years ago, and he is said to have been substantially rewarded for the invention. It is now, however, owing to the belief above mentioned, looked upon as futile. Information upon the subject will, I believe, be found in the volumes of the Royal Agricultural Society's Journal, which I have not at hand to give references to.—W. T. THISELTON DYER.

Extracts and Abstracts.

ON RUBUS LEESII.

BY DR. O. W. FOCKE, OF BREMEN.

In the year 1846 Professor Babington described a variety of *Rubus Idæus*, which he named *R. Leesii*, and soon after he published it as a species. As such he adopts it in his new Synopsis, whilst expressing some doubt as to its tenableness. From ordinary *R. Idæus* it differs in the shape of the leaf, the simple leaves and the leaflets of its ternate

leaves being roundish. As a striking point about it, Professor Babington mentioned that it seldom produces fruit. This and its rarity, for even in England only three stations are published, afford good grounds for the doubt as to its distinctness which he expresses. On the Continent, also, forms much resembling *R. Leesii* are known; for instance, the *R. Idæus* var. *anomalus* of Arrhenius, and a plant found some years ago in the neighbourhood of Bromberg by Herr Köhler, which agrees very well with the description. The specimens which I saw of this last seemed to me very remarkable. I did not doubt that I had before me a form of *Idæus*; but the question arose, whether out of this so very different form a new race, and finally a new species, might not be developed. I was not then aware of the constant unfruitfulness of the plant; and in the 'Jena Zeitschrift' I wrote about it, pointing out that whilst in *Idæus* the leaf lengthens itself out in three directions, in *Leesii* the lengthening out in a forward direction is arrested. Herr Köhler supplied me with living specimens, which flowered last summer. I found that the restraining process, by which the form of the foliage leaves was so curiously modified, extended also to the carpellary leaves, and that the axes of these was shortened, so that they did not close and completely envelop the ovules. Of the two ovules in each carpel, one uniformly pined away at a very early stage; the other developed itself during the blooming time in the normal way, but only few carpels were produced. In most cases, however, they dried up whilst the flowering was in progress; and, though some appeared to be fertilized, yet seed entirely failed to ripen. The infertility of the plant I saw, was correlative to the character of its foliage; and we must look upon it as only a curious form of *R. Idæus*, which deviates from the type, so far as the form of the leaf is concerned, in the same manner that *Fragaria monophylla* deviates from typical *Fragaria vesca*.—(From the 'Oesterreichische Botanische Zeitschrift,' 1870, p. 98.)

New Publications.

Thesaurus Literaturæ Botanicæ, omnium gentium inde a rerum botanicarum initiis ad nostra usque tempora, quindecim millia operum recensens. Editionem novam reformatam curavit G. A. PRITZEL. Fasciculus I. (Pp. 80.) Leipzig. 1872.

Working botanists in every country will welcome with satisfaction the commencement of a new edition of the indispensable 'Pritzel,' perhaps the most useful botanical book ever printed. This first part only gets to about half through the letter D (Desjardins), though it contains 2183 titles of books; six such parts will be required to complete the 'Thesaurus.'

The original edition appeared at the end of 1851, so that full twenty years have since elapsed, during which time there has been an immense accession to botanical literature, rendering a new edition of the 'Thesaurus' an urgent desideratum. To judge from this first part, the author has done his work most thoroughly, and brought the catalogue well up to date. Besides this, the whole text has evidently undergone a very careful revision, and considerable changes have resulted. Merely horticultural

or gardening books have been omitted from the general catalogue, where they certainly seemed out of place, and space has thus been gained for more relevant matter, in the shape of biographical notes and references. When ascertained, the birth and death of each botanical writer is given, and references to places where further information on his life can be obtained. The names of many botanists who have not published also come in their place with the rest, and with similar references, so that the book will be of great service to all interested in the biographical or historical aspect of botanical science. The only criticism that seems called for is, that there appears to be some uncertainty on the part of the author as to his limits; there is no information in the short preface on this point, and one does not know whether it was his intention to include the names of *all* known botanists or not. Some very obscure ones are mentioned, and a few far better known, *e. g.* Adam Buddle, are omitted. So also with regard to papers other than separate works; a few of these are enumerated, without any indication of the reason for their selection. The valuable 'Catalogue of Scientific Papers' published by the Royal Society, now approaching completion, is, however, uniformly quoted.

In so vast a collection there are, of course, omissions. In English botanical literature these are apparent chiefly in the class of local Floras, the names of Bastian, C. B. Clarke, and W. H. Coleman, for instance, authors of such works, are omitted. A little more care might also be shown in the quotation of the genera named after botanists. *Balfouria*, R. Br., is referred to both Andrew Balfour and the present Professor of Botany at Edinburgh. It was bestowed in honour of Sir Andrew. *Brownea*, Jacq., has nothing to do with Robert Brown, to which name, as well as to Patrick Browne to which it really refers, it is appended; *Brunonia* of Sir J. E. Smith commemorates the name of the great English botanist.

In taking leave of this admirable and useful book, we cannot forbear to add a wish that its author were able to investigate the great library of the British Museum and the MSS. and unedited works in the Botanical Department, which would enable him to fill up several gaps in the present part, and probably in those which are to come.

H. T.

Domestic Botany; an Exposition of the Structure and Classification of Plants, and of their Uses for Food, Clothing, Medicine, and Manufacturing Purposes. By JOHN SMITH, A.L.S., Ex-Curator of the Royal Botanic Gardens, Kew. London: Lovell Reeve and Co. 1871.

The selection of a title for a book is not always so easy a matter as may be generally supposed. To the question, "What's in a title?" we may answer, there is often a great deal, more especially in popular literature, but whether those titles impart the least gleam of light to the real nature of the book is another matter to which we cannot reply affirmatively. Indeed, in the popular literature of the present day we seldom expect to obtain any notion of the book from the title-page alone, but in scientific works, in which we look for sound and reasonable matter, we do look for a title in accordance.

If we had formed an opinion of the nature of the work before us from its title alone, we should have been grievously disappointed,—as much dis-

appointed, indeed, as we were after reading the preface, and then plunging into the following ninety-one pages. The author says in the preface (p. vi.), that "with a view of assisting to remove some of the fancied difficulties, and to render the knowledge of botany familiar and interesting to those who wish to become acquainted with its principles without requiring to be taught professionally, I have drawn up an introductory treatise, forming the first part of this work." This "introductory treatise" is, we think, not by any means calculated to assist in removing any difficulties, but rather to add to a student's embarrassments. The use of new terms is always objectionable, unless there is good reason to suppose those terms will be generally adopted, and even then much confusion is caused; for a student does not confine himself to one book, and he necessarily has to make himself acquainted with two sets of terms. That our readers may better understand the nature of the work under consideration, we will give a few examples of the terms used, and the reasons of the author for using them. At p. 16, under "Root-stock Stems" we read as follows:—" *Gemmæcorms* (bud-corms) include the greater number of plants known as herbaceous, biennial, and perennial. Their axis of growth, in its simplest state, consists of a bud furnished with roots, which multiplies itself by side buds (offsets), forming what is generally called the crown or root-stock. The increase is slow and compact, as in the Peony, Oriental Poppy, Marsh-mallow, Sea-kale, and Rhubarb, or it produces short or long, slender runners, called running-roots, furnished with leaf-buds, which become perfect plants, for which reason they may more properly be considered underground stems (*sarmenta*), this term being applicable to all plants that increase their domain by running roots, such as Goutweed, Mint, Dogsbane, Nettle, Michaelmas Daisy, Sarsaparilla, Brake-fern, and all such-like usurpers. The Strawberry and window Saxifrage are examples of above-ground *sarmenta*. The runner of the Potato is also of the same nature, but instead of the buds growing into leafy stems they become swollen, round, or oblong, fleshy, tuberous bodies, which ultimately lose their attachment to the stem, and become independent tubers, furnished with buds (eyes), which develop into leafy flower-stems, each becoming a separate plant, the tuber ultimately decaying. From this it may be considered a metamorphosed stem, and all such are known by the name of tubers. The Jerusalem Artichoke and Ulluco of Peru are of the same nature, as also some other knot-rooted plants of the Pea, Mint, and umbel families." *Tubercorm* is used for the fleshy roots of the Beet, Yam, Bryony, Turnip, Cyclamen, etc., and *rhizocorm* for those of the Iris, Sweet Flag, etc.; but we will pass on to the consideration of the stems, and these are divided in (1) "*Palmids*, plants with stems varying from 1 to 150 or more feet in height, with parallel-veined leaves,—Palms, Cycads, Tree-ferns, Screw-pines, and such-like, are included under this head. (2) *Arbors*, trees generally so called. (3) *Frutices*, shrubs like the common Laurel, Barberry, etc. (4) *Fruticals*, small shrubs with soft-wooded stems, such as the greater part of *Acanthus*, many of the *Gloxiniæ*, shrubby Begonias, Geraniums, and Crassulas. (5) *Ampelids*, climbers. (6) *Twiners*, Hop, Bindweed, and similar plants. (7) *Clingers*, plants of the character of the Ivy. (8) *Sarcocauls*, fleshy stemmed plants, like the *Cacti* and *Euphorbiacæ*." Besides these the author says, "There is a set of low plants that grow in tufts, remaining green all the year, of which the Pink, Carnation, Sea-thrift, Saxifrage, Sedum, Blue and Yellow Alys-

sum, and dwarf Fig Marigold are examples. In gardens they are always ranked with herbaceous plants, but their permanent stems give them more the character of shrubs. I therefore apply to them the term *frutlets*."

From these extracts our readers will be able to judge for themselves whether such matter is in harmony with the title of Domestic Botany. The second part of the book is devoted to "The families of plants, systematically arranged, with a description of their characters, properties, uses," etc., and here we find that the author is more in his element. From his long connection with the Royal Gardens of Kew, and from the fact of his son, the first curator of the museums, having, so to speak, grown up with the collections, and having left behind him, at the period of his early death, a mass of matter on the subject,—the author's knowledge of economic botany is not only great but very varied. This part of the book is really useful, and as complete as it was possible to have made it in its present compass; and we can only express a regret that the author should have thought it necessary to occupy any part of the volume with an introduction to botany when so many good ones already exist, and when he was able to give us really valuable matter on the uses of plants, and to throw in numberless interesting facts known only to himself, and gathered during a life's experience at Kew.

The name of Mr. W. H. Fitch is a sufficient guarantee for the excellence of the sixteen coloured plates, illustrating the habits of the principal plants.

K. E. M.

Botanical News.

The first part of a new volume (28th) of the 'Transactions of the Linnean Society' has lately been published. It consists of a complete systematic memoir, by Dr. Triana, of the extensive tropical Order *Melastomaceæ*. The author first gave to botanists his views on the relationships of the genera of this difficult family in 1865, at the Botanical Congress in Amsterdam, and his arrangement having been adopted by the authors of the 'Genera Plantarum' has become well known. In the present paper the whole of the species are enumerated, with their references and synonyms, and the new ones—a large number, many from the author's own country of New Grenada—are described in Latin. The whole are placed in 134 genera, grouped under 13 tribes. *Mouriria* and *Memecylon* are included in the Order. In the introduction, which, with the remarks on the species, is written in French, are observations on the peculiar difficulties presented by the Order in any attempt to form a lineal series of genera or species. The characters employed for the genera are the placentation, the character of the fruit and seeds, and especially the structure of the stamens. For technical characters reference is made to the 'Genera Plantarum' of Bentham and Hooker, but their recognition will be much facilitated by Dr. Triana's figures, which occupy seven plates. These represent the stamens, and occasionally other structures of 94 genera, arranged in their tribes. They are enlarged three or four times, and drawn to scale apparently with great faithfulness. The singular and varied appendices to the anthers of this Order, long considered to be one of its most characteristic traits, are shown not to be universal. In nearly all the tribes there are genera in

which the anthers have the ordinary structure. A full index is added, and completes a memoir, which surely well deserves the quinquennial prize of the Geneva Society which it gained for its author.

We are glad to hear that Mr. H. C. Watson's health is sufficiently re-established to enable him to proceed with the compilation of a summary of the distribution of British plants through the counties and vice-counties. This will really complete the valuable 'Compendium,' and put a finishing stroke to the author's labours in the field of British geographical botany.

The 'Nuovo Giornale Botanico' has now reached the end of the third volume. It will be in future edited by Professor T. Caruel, who has succeeded the late Professor P. Savi at Pisa.

In the Acta Soc. Scient. Fennicæ (vol. x. p. 118), Dr. S. O. Lindberg has published a critical revision of the figures of Mosses contained in the "Flora Danica."

The recently published parts of Baillon's 'Monographies' contain the Orders *Cruciferae*, *Papaveraceae*, and *Capparideae*.

A fifth century of M. C. Cooke's 'Fungi Britannici' has been recently issued, and contains a useful selection.

The first number of the 'Gardeners' Chronicle,' for 1872, contains a figure and description, by W. G. Smith, of a new *Peziza*, found by Mr. J. J. Chater, some two years back, at the Gonville Nurseries, Cambridge; it is named *P. (Humaria) Chateri*.

Professor Grisebach's great work on the Vegetation of the Globe is published at Leipzig. We hope to give an extended notice shortly.

It is stated that the Rev. W. A. Leighton intends to publish a *Conspectus*, with diagrams, of all Lichens hitherto discovered, and also that he is preparing a second edition of his 'Lichen Flora of Great Britain,' which will contain an introduction, glossary, and index.

M. Paillot has collected, in abundance, near Verdun, in Burgundy, *Lythrum Salzmanni*, Jord., a species allied to *L. thymifolium* and *L. hysopifolium*, and not hitherto noticed, we believe, out of the Mediterranean region. It will be included in the forthcoming centuries of Billot's 'Exsiccata,' n. 2834 *bis*.

In the January part of the 'Popular Science Review' (a very good one) there is a paper, by Mr. A. W. Bennett, on so-called "Mimicry" in plants, which will be found a useful *résumé* of what has been published on the subject. It is illustrated by figures of homomorphic winged fruits from genera of the widely separated Orders *Polygalaceae*, *Phytolaccaceae*, and *Malpighiaceae*, and other examples of outward resemblance among plants.

In the number of January for the 'Scottish Naturalist,' which now seems well established, and certainly deserves all encouragement, the editor, Dr. Buchanan White, in allusion to Professor Thiselton Dyer's note on *Exobasidium Vaccinii* (Journ. Bot. 1871, p. 329), mentions that he has seen it in Ross-shire (Achilty) and Inverness (Strathglass), as well as Perth and Aberdeen. He adds, that "there seems to be a real gall, not very dissimilar in appearance to the Fungus." We should like to see a larger proportion of Scotch botany in the pages of the 'Scottish Naturalist.'

At a recent meeting of the Manchester Literary and Philosophical Society, Mr. C. Bailey suggested that British botanists should record on the labels of plants for distribution the province and vice-county of Mr. Watson's 'Compendium of the Cybele Britannica,' as well as the locality.

This recommendation we cordially second, as likely to lead to a more thorough study of the geographical distribution of British plants.

In a paper "On some Abnormal Cones of *Pinus Pinaster*," printed in the 'Transactions of the Royal Society of Edinburgh,' vol. xxvi., Professor Alexander Dickson gives some elaborate details relating to the phyllotaxis of the scales in five cones of this species, which exhibit what is known as "convergence" of secondary spirals. The author considers this diminution in the number of secondary spirals, which results in a general disturbance of the arrangement, to be caused by "the coalescence or fusion of two consecutive scales in one of the secondary spirals," and, indeed, the double character of the "scale of convergence" is well seen in some of the cones figured. With reference to the question as to whether the various spirals can be derived from one fundamental arrangement, Dr. Dickson is inclined to think that, even with the aid of "convergence," and even occasional "divergence," it is necessary to recognize both the ordinary simple spiral and the ordinary bijugate as fundamental forms. Two admirable photo-lithographic plates accompany the paper, which is also illustrated by diagrams.

M. J. Paillot writes to say that it is his intention to resume forthwith the publication of Billot's 'Fxsiccata' and the 'Flora Sequaniæ,' temporarily interrupted by the war, and that he has the material for one or two fascicles of these publications. His address is now Besançon (Chaprais). Mr. Baker will be glad to receive contributions for M. Paillot. Very few English plants have as yet appeared in the series.

The post of Second Assistant in the Herbarium of the Royal Gardens of Kew is advertised as vacant, and has been thrown open to general competition. The examination, which takes place on the 16th instant, comprehends the elements of English education and of systematic and structural botany, as well as "the naming of plants by the British Flora." The limits as to age are 18 to 30, and the salary is £60 per annum, rising £5 to £100. The Government considers it proper to charge each of the young botanists who are tempted to compete for this lucrative situation, the sum of ten shillings for the privilege. Certainly those who intend to devote themselves to botany in England are not likely to be spoilt by a too indulgent Government.

At a special meeting of the Malvern Naturalists' Field Club, under the presidency of Mr. E. Lees, held on Dec. 12th, a testimonial, consisting of a silver epergne of the value of 80 guineas, was presented to the Rev. W. S. Symonds, F.G.S., rector of Pendock, on his retirement from the presidency of the Club, which he has held for eighteen years.

The herbarium of the late Professor P. Wirtgen, so well known for his critical researches in the Rhineland flora, has been purchased by Herr von Dechen, for the Natural History Society of Bonn.

The library of the late Mr. Baxter, Curator of the University Botanic Gardens, was disposed of at Oxford by auction last December.

The valuable collection of fossil plants formed by the late Abbé E. Coemans (see Vol. IX. p. 96) has been purchased by the Belgian Government for the Museum of Natural History at Brussels.

The death at Cannes of Mr. Bellenden Ker, at one time Editor of the 'Botanical Register,' has been recently announced. He had an excellent knowledge of garden plants, especially of the *Liliaceæ*, but for some years had taken no active part in horticulture or botany.

Original Articles.

HISTOLOGICAL NOTES.

BY W. R. M'NAB, M.D.

(Read before the Botanical Society of Edinburgh, Jan. 11th, 1872.)

On a Modification of Schultz's Process.

In order to separate the cells of plants, Schultz recommended that portions of the tissue should be placed in chlorate of potash and nitric acid. No quantities are stated, and the strength of the acid is also omitted in all accounts of Schultz's process that I have read. I tried taking a little chlorate of potash and a little nitric acid, as advised in Naegeli and Schwendener's book on the microscope, and, on placing the portions of tissue to be operated on into the test-tube, had the satisfaction of seeing them instantly dissolved, abundance of nitrous fumes being at the same time given off. Prof. Church kindly came to my assistance, and, by placing the tissue in a test-tube with two drachms of nitric acid, of sp. gr. 1.10, with three grains of chlorate of potash, a mixture was obtained which gave good results. The action was slow, and after keeping the portions of tissue in the solution for a fortnight the cells could be separated. No nitrous fumes are given off, and as the action is slow, it is quite under control. Specimens of scalariform vessels, prepared in this way, are exhibited; they are from *Pteris aquilina*, and show that each cell forming the vessel can be separated. It is also to be noticed that the ends are not hexagonal pyramids, but the cells are cut obliquely across, the vessel being continuous. In some specimens I have observed that no cell-wall exists at the junctions, merely the bars of thickening matter, giving a sort of gridiron appearance, while a free channel must exist between the component parts of the scalariform vessel.

On the Fibre in the Stem of Muntingia.

In August last J. Anderson Henry, Esq., of Hay Lodge, directed my attention to an Australian plant, *Muntingia*, which he informed me yielded a useful fibre. Having just concluded the investigation of New Zealand Flax, I thought it might be interesting to compare the *Muntingia* fibre with that of Flax-hemp, Manilla Hemp, and New Zealand Flax, all of which I had just examined. On making sections of the stem of *Muntingia*, abundance of bast-cells were observed between the cambium and the epidermis. The epidermis of the stem produces numerous hairs; underneath it are a few layers of subepidermal cells, then the bast-cells in bundles, alternating with soft bast, and divided by the expanded ends of the medullary rays. The wood-cylinder is well developed, and has a well-marked pit in the centre. The walls of the bast-cells are thin, and of comparatively little strength, and from the close way in which they are united into bundles, it would be quite impossible to separate the ultimate bast-cells so as to render it available for the manufacture of fine fabrics. The quantity of fibre in the stem is very considerable, but I do not think it could be used except for the manufacture of ropes.

On the Adventitious Roots of the Cherry-laurel.

In a paper on the adventitious roots of the Cherry-laurel, published in the Bot. Soc. Trans. x. p. 314, I stated that there seemed to exist a peculiar matrix between the loose cells of the pileorhiza, which could be brightly coloured by the long action of carmine. This was considered to be owing to the gelatinous degeneration of the walls of the cells at the growing-point. This view turns out to be quite correct, as it has also been observed by authors. Hofmeister (Hand. der Phys. Bot. i. 425) mentions that the walls of neighbouring cells become gelatinous in the pileorhiza of many plants, such as *Secale*, *Allium Cepa*, and *Angiopteris evecta*. In some plants the cells of the pileorhiza do not separate, but always remain attached, as in *Lemna*, *Pistia*, and *Cuscuta*.

On the Stem of Cynara Scolymus.

Prof. Dyer recently directed my attention to the stem of the *Cynara Scolymus*. At first sight the stem exactly resembles that of a monocotyledon; the bundles being all isolated and scattered up and down in the cellular tissue (primitive tissue) of the stem. In the ordinary dicotyledonous stem the fibro-vascular bundles are all united to form a solid cylinder, and no distinction is to be noticed between the fibro-vascular bundles proper to the stem and those running to the leaves. In other dicotyledonous stems, however, these bundles are often separate, and if instead of forming a cylinder with a ring of cambium, the individual bundles remain separate, the stem will resemble very much the stem of a monocotyledon. In dicotyledons, according to Sachs (Lehrbuch, p. 542), we have the secondary fibro-vascular bundles of the stem forming either outside the leaf-bundles (exogenous) or internally to them (endogenous); each of these presents two varieties. In *Mirabilis*, *Amaranthus*, *Atriplex*, etc., the secondary fibro-vascular bundles of the stem form outside the leaf-bundles. The leaf-bundles are, therefore, near the centre of the stem, and they remain separate, while the stem-bundles unite and form a closed cambium ring. In other stems the leaf-bundles unite and leave a closed cambium ring; this ring of cambium soon ceases to grow, and a new one forms outside, which in turn disappears. In this way numerous circles of fibro-vascular bundles are formed. Many *Bauhinias*, *Phytocrenes*, etc., have stems of this kind. In *Cynara* the secondary stem-bundles form after the leaf-bundles and more internally; all the bundles remain separate and do not form a cambium ring. These bundles anastomose with each other, and when the stem is examined in transverse section, its apparently monocotyledonous nature is very evident. The same kind of stem is found in *Cucurbita* and *Nymphaeaceæ*. In *Piperaceæ*, *Begoniaceæ*, and *Arabia*, the internal secondary bundles remain isolated, while the leaf-bundles form a cylinder leaving a closed cambium ring, a very interesting modification of the form found in *Cynara*. Such stems would be very puzzling to the palæontological botanist, and might lead to their being placed in a wrong division of flowering plants.

On the Periderm of Acer campestre.

The young stems of *Acer campestre* give a very good demonstration of periderm. In the autumn the shoots of the first year become more or less invested with a covering of cork—the periderm. On examining the

stem in transverse section, the pith, wood-cells, and cambium layer are distinctly visible. Outside the cambium, layers of soft bast and thickened bast-cells are observed, then the cork-cambium and numerous cork-cells, forming a thick external layer. The epidermis with its appendages is thrown off. The periderm is in general cracked longitudinally, because the cells remain of uniform diameter; hence, as the cells at the periphery are of the same size as those next the cork-cambium, splitting must take place. The formation of the periderm is very well seen in the young shoots of the Black-currant. If a section be made in the autumn, a layer of cork-cells can be observed below the epidermis. On transverse section the Black-currant shows pith, wood cells, and cambium layer. Outside the cambium comes a quantity of soft bast; no thickened bast-cells being visible. Externally, the epidermis is to be seen covered with hairs, then several rows of subepidermal cells, and then the cork-cells. After the formation of the cork-cells the epidermis, with all its appendages, is thrown off in the same way as in *Acer campestre*.

The Thickened Cells in the Leaves of Pines.

Under the epidermis of the leaves of Pines peculiar elongated thickened cells are to be met with, which resemble bast-fibre in their general characters. On a careful examination of a transverse section of the leaf the fibro-vascular bundles can be observed, but no bast-cells are visible; the bundles being surrounded by soft cellular tissue; while underneath the epidermis, and, therefore, widely separated from the fibro-vascular bundles, these peculiar thickened cells are to be seen. As the true bast-cells always form a portion of the tissues of the fibro-vascular bundles, it is evident that from their position these thickened cells are not to be considered as bast, but rather as subepidermal cells. Dr. Hooker describes and figures numerous bast-cells in the scales of the cones of *Welwitschia*. In that plant, however, the fibro-vascular bundles in the scales are only very slightly developed, and do not form any of the true bast-cells, while the thickened cells occurring so abundantly under the epidermis seem to be only thickened subepidermal cells. These thickened subepidermal cells occur in Lycopods, and I have no doubt that what Professor Williamson and others call liber in *Lepidodendron*, must be considered as only a series of greatly developed thickened subepidermal cells.

ON THE BOTANY OF THE LIZARD PENINSULA.

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

(Concluded from p. 16.)

Helosciadium inundatum. Pools on Pradannack and Goonhilly Downs.

Bunium flexuosum. Not noted, but doubtless overlooked.

Pimpinella Saxifraga. Frequent. *P. magna* never seen.

Ænanthe Lachenalii. Once seen in a rivulet near Mullion.

Æ. crocata. Frequent about the low part of the streams.

Æthusa Cynapium. Frequent.

Foeniculum vulgare. Banks near the sea at Cadgwith and Helford, doubtfully native.

Crithmum maritimum. Everywhere abundant on the rocky seabanks.

- Angelica sylvestris.* Frequent.
Heracleum Sphondylium. Common.
Daucus Carota. Common, passing into fine *maritimus* on the sea-banks.
Torilis Anthriscus. Frequent.
T. nodosa. Sandy ground, rare.
Scandix Pecten-Veneris. Frequent.
Anthriscus sylvestris. Common. *A. vulgaris* not seen.
Sambucus nigra. Frequent where there are hedges, but perhaps always planted.
Lonicera Periclymenum. Frequent.
Viburnum. Neither species noted.
Rubia peregrina. Hedges near Helston and Durgan; not seen in the Serpentine tract.
Galium cruciatum. Not seen.
G. verum. Frequent.
G. palustre. Frequent.
G. saxatile. Quite uncommon.
G. Mollugo. Frequent where there are hedges.
G. Aparine. Frequent.
Sherardia arvensis. Frequent in cultivated fields.
Valeriana. Neither species noted.
Centranthus ruber. Walls at Cadgwith, Penryn, etc., alien.
Valerianella dentata. Rare. *V. olitoria* not seen.
Dipsacus sylvestris. Roadsides in the Devonian tract in several places.
Scabiosa succisa. Common.
Knautia arvensis. Common.
Tragopogon pratensis. Neither variety noticed.
Helminthia echioides. Roadsides at Gunwallo and Durgan.
Leontodon hirtus. Common on the seabanks.
L. autumnalis. Common.
Hypochæris radicata. Common.
Sonchus arvensis. Common.
S. asper and *oleraceus.* Frequent.
Crepis virens. Frequent.
Hieracium Pilosella. Frequent.
H. umbellatum. Everywhere frequent on hedgebanks; this and *Pilosella* the only species noted. The relative abundance of *umbellatum* and *boreale* is quite reversed in Devon and Cornwall, as compared with the east side of England.
Taraxacum officinale. Common.
Lapsana communis. Frequent.
Cichorium Intybus. Frequent throughout the area.
Arctium minus; var. *intermedium*, Lange, is much the most frequent form. We saw good typical *minus* by the shore of the Helford Creek at Durgan. *A. majus* was nowhere noted.
Serratula tinctoria. Frequent, passing into a very dwarf monocephalous form on the Serpentine downs.
Carduus nutans. Frequent. *C. crispus*, which is rare about Plymouth, nowhere noted.
C. tenuiflorus. Sandy ground near the sea at Mullion, etc.
C. lanceolatus. Frequent.

- C. palustris* and *arvensis*. Both common.
- Carlina vulgaris*. Frequent on the drier seabanks.
- Centaurea nigra*. Common, often radiate. Good characteristic radiate *decipiens* on the dry hillside north of Carminow Creek.
- C. Scabiosa*. Not unfrequent.
- Bidens tripartita*. Stream near Caergerrack and shores of Carminow Creek.
- Eupatorium cannabinum*. Common.
- Artemisia vulgaris*. Frequent. *A. Absinthium* nowhere seen.
- Gnaphalium uliginosum*. Frequent. *G. sylvaticum* is already very rare about Plymouth, and was nowhere noted.
- Filago germanica*. Frequent. *F. minima* not seen.
- Petasites fragrans*. Established by roadsides near houses at Falmouth, Pengerrick, and Llandewednack. *P. vulgaris* never seen.
- Tussilago Farfara*. Frequent.
- Aster Tripolium*. Frequent amongst the sea cliffs.
- Solidago Virgaurea*. Frequent on hedgebanks, etc.
- Senecio vulgaris*. Common. *S. sylvaticus* never seen.
- S. erucifolius*. Roadsides in two or three places near Gunwallo.
- S. Jacobæa*. Common.
- S. aquaticus*. Frequent.
- Inula Conyza*. Hedgebanks in the Devonian tract at Helford and Durgan.
- I. dysenterica*. Common.
- Bellis perennis*. Common.
- Chrysanthemum segetum*. Abundant in a potato-field west of Penryn.
- C. Leucanthemum*. Common.
- C. Parthenium*. Roadsides near cottages at Cadgwith, etc.
- C. inodorum*. Common.
- Anthemis nobilis*. Everywhere frequent, both over the inland downs and in sandy hollows near the sea.
- A. Cotula*. Seen in two or three places only, and *arvensis* not at all.
- Achillea Ptarmica*. Frequent.
- A. Millefolium*. Common.
- Campanula rotundifolia*. The only species, except *hederacea*, and seen only once at Kynance Cove. It is quite a rarity in Devon and Cornwall.
- C. hederacea*. In the Granite tract west of Penryn. Not seen on the Serpentine.
- Jasione montana*. Frequent through the district.
- Erica Tetralix* and *cinerea*. Both common, but less so on the Serpentine than the next.
- E. vagans*. Plentiful on the Serpentine; the commonest plant over several square miles. There is an isolated station in the midst of the Devonian tract in the wood on the south side of Looe Pool, near Helston.
- Calluna vulgaris*. Common.
- Vaccinium Myrtillus*. The only species, and only seen two or three times.
- Ilex Aquifolium*. Frequent where there are hedges.
- Ligustrum vulgare*. Looks indigenous in a few places, as for instance, amongst rocks by the two streamlets that run down to Kynance Cove.
- Fraxinus excelsior*. Frequent.
- Gentiana campestris*. Scattered over the Serpentine downs of Goonhilly and Pradannack.

- Cicendia filiformis*. Like the last.
- Erythræa Centaurium*. Frequent, passing into var. *littoralis* on the seabanks.
- E. pulchella*. Frequent.
- Menyanthes trifoliata*. In a reed-swamp at Gunwallo with *Ranunculus Lingua*.
- Convolvulus arvensis*. Common.
- C. sepium*. Frequent; a beautiful form with corolla suffused with pink, at Llandewednack.
- C. Soldanella*. Sandhills at Gunwallo.
- Cuscuta Epithymum*. Frequent on heath and furze.
- Hyoscyamus niger*. Waste ground at Mullion, Helford, etc.
- Solanum nigrum*. Roadsides at Poltesco.
- S. Dulcamara*. Frequent.
- Verbascum Thapsus* and *nigrum*. Roadsides at Falmouth.
- Veronica arvensis*, *serpyllifolia*, and *Beccabunga*. Frequent.
- V. montana*. Pengerrick Woods.
- V. Chamædrys*, *agrestis*, and *Buxbaumii*. Common.
- Bartsia viscosa*. Frequent by roadsides and inundated places.
- B. Odontites*. Common.
- Euphrasia officinalis*. Common.
- Rhinanthus Crista-galli*. Unfrequent.
- Pedicularis sylvatica*. Damp heaths, rare. *P. palustris* not seen.
- Scrophularia nodosa*. Roadside at Falmouth.
- S. aquatica*. Everywhere common.
- Digitalis purpurea*. Common.
- Antirrhinum Orontium*. Frequent in cultivated fields.
- Linaria Cymbalaria*. Well established on walls at Helston, etc.
- L. Elatine*, *spuria*, and *vulgaris*. All three frequent throughout the area.
- L. purpurea*. Old walls at Penryn.
- Sibthorpia europæa*. In the Granite tract west of Penryn. No *Orobanche* seen, but Mr. Briggs gathered *rubra* on a previous visit on the Serpentine seabank between Cadgwith and Poltesco.
- Verbena officinalis*. More abundant than I have seen it anywhere else, principally by roadsides near houses.
- Salvia verbenaca*. On the Serpentine seabank at Cadgwith.
- Lycopus europæus*. Frequent.
- Mentha rotundifolia*. Roadsides at Mawgan, Llandewednack, etc., always near houses.
- M. sylvestris*. Fine in the western streamlet at Caerthilian.
- M. viridis*. Roadside at Llandewednack near a house.
- M. piperita*. Roadside at Caerterrack.
- M. hirsuta*. Common; passing into *paludosa* and *sativa*.
- M. arvensis*. Frequent.
- M. Pulegium*. Inundated roadsides at Trethevas.
- Thymus Serpyllum*. Common on the Serpentine downs and elsewhere.
- Origanum vulgare*. Nowhere seen.
- Calamintha menthifolia*. Frequent, principally in the lanes of the Devonian tract.
- Teucrium Scorodonia*. Frequent.

- Ajuga reptans*. Appears rather unfrequent.
- Ballota nigra*. Frequent.
- Lamium album* and *purpureum*. Both frequent.
- L. incisum*. Cultivated ground near Lizard Point.
- Galeopsis Tetrahit*. Frequent. This the only species noted.
- Stachys Betonica*. Frequent.
- S. palustris*. Frequent. Var. *ambigua*, Smith, characteristic, by the roadsides at Falmouth and Llandewednack.
- S. sylvatica* and *arvensis*. Both frequent.
- Nepeta Glechoma*. Frequent.
- Prunella vulgaris*. Frequent.
- Scutellaria minor*. Seen in two or three places sparingly.
- Myosotis palustris* and *arvensis*. Both frequent.
- Lithospermum officinale*. Seabank at Gunwallo, and roadsides at Helford and Falmouth. *L. arvense* not noted.
- Borago officinalis*. Cadgwith, near gardens.
- Anchusa sempervirens*. Hedgebank at Helford, near gardens.
- Echium vulgare*. Waste ground at Falmouth and Mullion.
- Pinguicula lusitanica*. Swamps at Mullion, CaerVERRACK, etc. *P. vulgaris* not seen.
- Primula vulgaris*. Frequent. *P. veris* nowhere seen.
- Lysimachia vulgaris*. Swamp at Cadgwith and by the shore of Carminon Creek.
- L. nemorum*. Rare. Not seen in the Serpentine tract.
- Anagallis arvensis*. Common in cultivated, and looking as if indigenous on the Serpentine seabanks. Var. *carnea* once seen near Cadgwith.
- A. tenella*. Frequent.
- Samolus Valerandi*. Frequent both near the sea and in damp ground inland.
- Glaux maritima*. Abundant by both the streamlets at Caerthilian.
- Armeria maritima*. Everywhere plentiful on the seabanks.
- Plantago major* and *lanceolata*. Both common. *P. media* not seen.
- P. maritima* and *Coronopus*. Plentiful near the sea, and both scattered over the inland Serpentine downs.
- Littorella lacustris*. Shore of Carminon Creek and pools of the Serpentine downs.
- Chenopodium urbicum*. Farm-yard at Cadgwith.
- C. rubrum*. Shores of Falmouth Harbour and Carminow Creek.
- C. album*. A common weed.
- Atriplex hastata* and *patula*. Both frequent.
- A. Babingtonii*. Shores of the Helford Creek, etc.
- Beta maritima*. One of the commonest plants of the seabanks.
- Salsola Kali*. Sandy shore at Gunwallo, etc.
- Polygonum amphibium*. Carminow Creek, etc.
- P. lapathifolium*, *Persicaria*, *Hydropiper*, and *aviculare*. Common.
- P. Raii*. Sandy shore at Gunwallo.
- P. Convolvulus*. Frequent.
- Rumex Hydrolapathum*. In the reed swamp near the mouth of the Gunwallo stream.
- R. crispus*, *obtusifolius*, *nemorosus*, and *conglomeratus*. All frequent.
- R. pulcher*. Roadsides at Mullion, CaerVERRACK, etc.
- R. Acetosa* and *Acetosella*. Both frequent.

Euphorbia Helioscopia and *Peplus*. Both common.

E. exigua. Seen two or three times.

E. amygdaloides. By the stream above Kynance Cove.

Mercurialis perennis. Roadside at Poltesco. *M. annua* not seen.

Urtica urens. Frequent.

U. dioica. Common.

Parietaria diffusa. Frequent on walls.

Humulus Lupulus. Among bushes at Llandewednack; doubtless introduced.

Ulmus suberosa. All the four varieties, *campestris*, *major*, *glabra*, and *stricta*, noted; the latter, the habit of which is well-marked, the most frequent form. *U. montana* not seen.

Quercus Robur. Scarcely, if at all, in the Serpentine tract. All the three varieties noted in the Devonian tract; var. *intermedia* by the south shore of Helford, near the point from which the ferry starts.

Corylus Avellana. Never seen on the Serpentine, but frequent northward.

Alnus glutinosa. Like the last.

Populus alba and *nigra*. Both noted, but most likely planted.

Salix alba. Roadside near Penryn.

S. triandra. Streamside at Treveddan.

S. viminalis. Seen in several places.

S. Smithiana. Roadside near Penryn.

S. cinerea. Common.

S. aurita. Shore of Carminow Creek.

S. repens. Common all over the Serpentine downs.

Spiranthes autumnalis. Scattered in grassy places all over the Serpentine.

Orchis maculata. Goonhilly Downs, etc.

Iris foetidissima. Rare.

I. Pseudacorus. Frequent.

Allium vineale. Fine, on hedgebanks between Falmouth and Penryn.

A. Schcenoprasum. Plentiful, mixed with *Arenaria verna* and *Scilla autumnalis*, on the Serpentine down at Mullion.

Scilla verna and *autumnalis*. Frequent in dry grassy places near the sea, all round the Serpentine.

Ruscus aculeatus. Amongst rocks on the Serpentine seabank, north of Cadgwith, and by the Kynance streamlets.

Tamus communis. Hedges at Falmouth and Durgan. Not seen on the Serpentine.

Alisma Plantago. Frequent. Var. *lanceolatum* in Carminow Creek.

A. ranunculoides. Frequent in damp places all round the Serpentine.

Triglochin palustre. Frequent. *T. maritimum* not seen.

Potamogeton pusillus. Carminow Creek, etc.

P. natans. Ditch at Gunwallo.

P. polygonifolius. Swamps in several places.

Zannichellia palustris. Pond at Trethevas, etc.

Zostera marina. Helford Creek, the typical form.

Lemna minor. Frequent. No other species noted.

Arum maculatum. Hedgebanks. Not seen in the Serpentine tract.

Sparganium simplex. Looe Pool, near Helston.

S. ramosum. Low part of the streams in several places.

- Juncus effusus*. Common.
J. glaucus. Roadsides at Newton, etc.
J. maritimus. Banks of the two Kynance streamlets, extending up to the plateau of Goonhilly Downs.
J. acutiflorus. Swamps at Treveddan.
J. lamprocarpus, *bufonius*, and *supinus*. All three frequent.
Luzula campestris. Frequent. No other species seen.
Cyperus longus. About the streamlet below Llandewednack.
Cladium Mariscus. Plentiful about the streamlets above the village at Kynance Cove.
Schoenus nigricans. Frequent over the Serpentine, especially where the streamlets break through the seabanks.
Scirpus setaceus. Seen in two or three places.
S. Savii. Frequent along with *Schoenus*, or in similar places.
S. palustris. Frequent.
S. multicaulis. Pools of the Serpentine downs.
S. fluitans. Plentiful in the pools of the Serpentine downs.
Eriophorum angustifolium. Swamps; rare.
Carex remota. Pengerrick woods.
C. muricata. Once seen.
C. flava. Frequent.
C. Oederi. By the Caerthilian streamlet and in a swamp at Trethevas.
C. distans. Near the shore at Mullion.
C. glauca. Common. Many other species no doubt overlooked, but the time of year was too late both for Carices and Grasses.
Phalaris arundinacea. Frequent.
Phleum pratense. Frequent.
Alopecurus geniculatus. Frequent.
Agrostis canina, *vulgaris*, and *alba*. All three noted.
Ammophila arundinacea. Sandhills at Gunwallo, etc.
Aira cæspitosa, *caryophyllea*, and *præcox*. All three frequent.
Avena fatua. Cadgwith, etc.
A. strigosa. Potato-field at Penryn.
Arrhenatherum avenaceum. Common.
Holcus mollis and *lanatus*. Frequent.
Triodia decumbens. Frequent.
Molinia cærulea. Frequent.
Glyceria fluitans. Frequent.
Sclerochloa rigida. Walls at Helford and Cadgwith.
S. loliacea. Seabanks near Lizard Point, etc.
Poa annua, *trivialis*, and *pratensis*. Common.
Briza minor. A frequent weed in cornfields. *B. media* not seen, but probably overlooked.
Cynosurus cristatus. Frequent.
Dactylis glomerata. Frequent.
Festuca sciuroides. Rare.
F. ovina, *duriuscula*, and *rubra*. All frequent.
F. elatior. Streamsides at Kynance Cove and Poltesco.
F. pratensis. Rare.
Bromus sterilis and *mollis*. Both frequent.
Brachypodium sylvaticum. Common, principally in the Devonian lanes.
Triticum repens. Common.

- T. acutum*. Seabanks at Mullion.
Lolium perenne. Common.
L. italicum. Commonly mixed with *Trifolium hybridum* in forage-fields.
Polypodium vulgare. Frequent.
Polystichum angulare. Frequent, principally in the lanes of the Devonian tract.
Lastrea Filix-mas. Frequent.
L. dilatata. Lanes of the Devonian tract.
L. æmula. Lanes of the Devonian tract at Manaccan and Pengerrick.
Athyrium Filix-fœmina. Frequent.
Asplenium marinum. Seacliffs, near Lizard Point.
A. Adiantum-nigrum. Common on walls without *Ruta-muraria*.
Scolopendrium vulgare. Frequent, principally in the lanes of the Devonian tract.
Blechnum and *Pteris*. Both frequent.
Osmunda regalis. By streamlets at Gunwallo, Mullion, and Pengerrick.
Equisetum maximum. Wood at Trethevas, and by a stream down the seabank, north of Llandewednack.
E. arvense. Common.
E. palustre. Not unfrequent.

A CASE OF POISONING BY THE SEEDS OF *MACROZAMIA SPIRALIS*.

BY GEORGE BENNETT, M.D., F.L.S., ETC.

I lately received a letter from Mr. W. C. Brown, dated September 5th, 1871, from Singleton, in which he says, "I enclose a nut in this letter for your inspection and report. I think it contains a narcotic poison. Several of these nuts were brought in from the bush on Friday last, and by negligence, or want of knowledge of their poisonous properties, got into the hands of some children, one of whom ate a kernel, and has been in a dangerous state ever since, violent vomiting, stupor, and yellowish appearance of the eyes being among the most prominent symptoms. The nut comes from the Pineapple-shaped fruit growing on a plant resembling the Fern." The nut sent was unquestionably that of *Macrozamia spiralis*, called by the aborigines "Burrawang," by the juvenile Australians "Blackfellows' Potatoes," and more commonly about Sydney the "Native Palm." The cone of *M. spiralis* is of large size, the male long and slender, the female measuring about ten inches in height by about eight inches in breadth, and when the drupes, which are about the size of a Chestnut, are ripe, they become of a brilliant scarlet colour. Some years since I sent cones and drupes of *M. spiralis* to Sir William Hooker, who deposited them in the Economic Museum of Botany at Kew, which having been placed in strong brine, preserved their freshness of colour very well. The fossil remains of Cycads attest their having formed a very considerable portion of the vegetation of Great Britain.

M. spiralis, or "Burrawang," of the aborigines is abundant about Sydney, and in certain areas in New South Wales; the leaves from their resemblance in foliage to Palms, are used in the Roman Catholic churches

in New South Wales on Palm Sunday; they are also used for decorative purposes. The plants are generally found growing in rocky and sandy soils. The nuts are eaten by the aborigines, but are principally consumed in seasons when food is scarce, and produce poisonous effects, unless they are previously steeped, for several days, in water, and then roasted on the fire. The nuts contain a nutritious starch, some samples of which were sent to the Paris Exhibition of 1867, and Mr. Charles Moore (of the Sydney Botanic Gardens, and, at that time, one of the Commissioners for Sydney) informs me it was highly spoken of by some interested in the food department, who tasted it. The *Macrozamia* yields also a clear amber-coloured gum, and I have often seen the cones covered with it.

On the Manning River, New South Wales, there grows a very noble arborescent species of *Macrozamia*, discovered by Mr. C. Moore, and named by Dr. Mueller, of Melbourne, after the late Sir William Denison, *Macrozamia Denisonii*. I had before mentioned, in my 'Gatherings of a Naturalist,' that it attains the height of from eight to ten feet, and those sent down to Sydney which I had an opportunity of examining, were of that size; but Mr. C. Moore informs me that he has seen them thirty feet high. It is stated that the fruit is edible and highly prized by the aborigines in that district. To render it innocuous it must first be steeped for three days in water, and roasted.

To ascertain the source of the active poisonous principle in these Cycadean nuts, Mr. J. L. Norrie, an analytical chemist at Sydney, has examined them, and writes me as follows:—

“I now send you some account of my examination of the nuts of *M. spiralis*. In the first place, the seeds examined were perfectly dry. On removing the shell and epidermis, and pulping the seed, I obtained a large quantity of starch and some gluten; testing the soluble portion it is found to have a decided acid reaction, lime water throws down oxalic acid in the form of oxalate of lime; continuing our investigations further we find the potash salt, and isolate *binoxalate of potash*, which is the poisonous substance contained in these nuts. There is also every appearance of an alkaloid crystallizing in prisms, but the quantity operated upon was so small that I could only obtain a microscopic specimen; it therefore requires further examination upon a larger quantity of material to test its particular properties. These seeds contain also vegetable albumen, gum, and sugar, and consequently as an article of food, as used by the blacks, they are of no mean value; for it must be remembered that in the roasting of these nuts the binoxalate of potash would be converted, at a low red heat, into carbonate, modifying, or completely destroying the poisonous properties. The starch granules are also worthy of notice. They differ somewhat in appearance among themselves in size of grain, but generally they are composed of large and small granules, with few of intermediate size. The smaller grains are chiefly round, rarely oval, and not provided with the dark central spot or aperture, designated the hilum, as in wheat. The large grains, instead of being rounded and flattened, are perfect ovoids, in fact, resembling so many small birds' eggs, forming an exceedingly pretty microscopic specimen, and quite distinct from other starch grains. When examined with a power of 450 diameters, they are seen to great advantage. Time has not permitted me to examine them further, which I hope to do at a future opportunity.”

It has been found that when the seed, in a fresh state, had been cut up and given to fowls, it has been generally fatal to them.

SHORT NOTES AND QUERIES.

FERTILIZATION OF GRASSES.—The reference in the last number of the 'Journal of Botany' (p. 26) to M. Bidard by Prof. Thiselton Dyer appears to imply that that gentleman is not aware of any doubt having been thrown on the accuracy of M. Bidard's observations on the fertilization of Grasses. About the time of the publication of his paper in the 'Comptes Rendus' I was in correspondence on the subject with Mr. Darwin, who told me that Prof. Delpino, of Florence, had also made a series of observations, the results being directly opposed to those of the French botanist. Whether these observations have been published I do not know. The well-known and extremely accurate observer, Mr. Spruce, has, however, forwarded to the Royal Horticultural Society a paper, which was read at its Scientific Committee, December 21st, 1869, from which the following extracts, bearing on this interesting and practically important subject, are made. After describing the arrangements of the male and female flowers in various Grasses of Tropical S. America (*Luziola*, *Pharus*, *Olyra*, and some *Bambuseæ*), and the abundance of pollen scattered by some, he proceeds:—"To come home to our own country: is all the pollen wasted that a touch or a breath sets free from the flowers of Grasses in such abundance? Watch a field of Wheat in bloom, the heads swayed by the wind, lovingly kissing each other, and doubtless stealing and giving pollen. Consider, too, that throughout Nature, heat or moisture, or both, are essential to the emanation of the impregnating influence. In all our *Festuceæ*, as well as in *Cynodon*, *Leersia*, and some other genera, the stigmas are protruded from the side or from the base of the flower at an early stage, often before the stamens of the same flower are mature, thus, as it were, inviting cross-fertilization from the more precocious stamens of other plants which are already shedding their pollen. All who have gathered Grasses will have remarked that some have yellow anthers, others pink or violet anthers; and that anthers of both types of colour may coexist on distinct individuals of the same species. The same peculiarity is just as noticeable in tropical Grasses, and (without professing to give a complete physiological explanation of it) this is what I have observed respecting it. The walls of the anther-cells are usually of some shade of purple, but are so very thin and pellucid, that when distended with mature pollen the yellow colour of the latter is alone visible. When the pollen is discharged the anthers resume their original purple colour, shortly, however, to take on the pallor or dinginess of decay. Where the anthers emerge of a purple hue, and change from that to brown, it will probably be found that they have discharged their pollen while still included in the flower. These observations, made without any reference to the question now in hand, require to be renewed and tested; and in them, as in all that precedes, I am open to correction. Of Grasses with bisexual flowers, there are two ways in which the ovary may be fertilized, viz. either by the pollen of its own flower (closed or open), or by that of other flowers, after the manner of the diclinous species. In the latter case, the pollen may be transported by the wind, or in the fur of animals (as I have observed the seeds of *Selaginellas* in South America), or in the plumage of birds. The agency of insects has not been traced in the fertilization of Grasses, but may

exist. The little flies I have seen on the flowers of Grasses seemed bent on depositing their eggs in the nascent ovaries, but may also have aided in cross-fertilization. In the Amazon Valley, Grasses are often infested by ants, who, indeed, leave nothing organic unvisited throughout that vast region; and they also, I think, cannot help occasionally transferring grains of pollen from one flower to another. The flowers of Palms and Grasses agree in being usually small and obscurely coloured, but contrast greatly in the former being in many cases exquisitely and strongly scented, whereas in the latter they are usually quite scentless. The odour of Palm flowers often resembles that of Mignonette; but I think a whole acre of that "darling" weed would not emit more perfume than a single plant of the Fan Palm of the Rio Negro (*Mauritia Carará*, Wallace). In approaching one of these plants through the thick forest, the sense of hearing would perhaps give the first notice of its proximity, from the merry hum of winged insects which its scented flowers had drawn together, to feast on the honey, and to transport the pollen of the male to the female plants; for it is chiefly dioicous species of Palms that have such sweet flowers. The absence of odoriferous flowers from the Grasses seems to show that insect aid is not needed for effecting their fecundation, but does not render its accidental concurrence a whit less unlikely. If the flowers of Grasses be sometimes fertilized in the bud, it is probably exceptional, like the similar cases recorded of Orchids and many other families."—A. W. BENNETT.

GERMINATION OF DELPHINIUM.—In the 'Journal of Botany' for December last (Vol. IX. p. 375), observations by Dr. Asa Gray, in 'Silliman's Journal,' are quoted, regarding a presumed hypocotyledonary gemmation occurring in *D. nudicaule*. Dr. Gray believes that here the plumule becomes abortive, and that its place is taken by a hypocotyledonary bud. I would draw the attention of your readers to two very interesting papers, one by Bernhardt ("Ueber die merkwürdigsten Verschiedenheiten des entwickelten Pflanzenembryo," Linnæa, vii. 1832, p. 561), the other by Irmisch ("Ueber einige Ranunculaceen," 'Botanische Zeitung,' Jan. 4, 1856), from which it appears that the phenomenon to which Dr. Gray refers, and which occurs in different species of *Delphinium* and *Anemone*, in several *Umbelliferae*, etc. etc., is due to the fact, that in the plants in question the bases of the cotyledons are connate into a narrow tube, which, to quote from Irmisch, "may easily, by superficial examination, be mistaken for the hypocotyledonary axis;" that the growing plumule, instead of going up this tube, which is too narrow for its passage, bursts through it at the side. In this way a "hypocotyledonary gemmation" is simulated. A very curious case is described in Bernhardt's Memoir, as occurring in *Prangos ferulacea*, Lindl., where the first leaf of the plumule makes its way up through the cotyledonary tube, while the succeeding ones and remainder of the bud force themselves out through a rupture at the base of the tube (l. c. pp. 574, 575, t. 14. f. 4).—ALEXANDER DICKSON.

SCIRPUS TRIQUETER.—With reference to a note in Mr. Keys' 'Flora of Devon and Cornwall' (p. 280), I have to say, that I found *Scirpus triquetus*, L., in July, 1857, growing most copiously on a mud-bank

about a mile, or rather less, on the Calstock side of the Tamar, beyond Calstock, just opposite to the rocks of Morwellham, on the opposite side of the river. It grew there finer than I have seen it elsewhere, either about St. Ouen's, in Jersey, or on the banks of the Thames. I communicated examples of the plant to Professor Babington two or three years later, when an edition of his 'Manual' had come out without the locality in question, which I conceived could scarcely have been overlooked, for at the time I was gathering my specimens a small steamer passed, and any botanist could have recognized the *Scirpus* from her deck; and the locality, or its neighbourhood, had been visited by Messrs. Watson, Babington, W. S. Hore, Johns, etc. It is possible, however, that this mud-bank has been swept away by a subsequent flood.—CHARLES PRENTICE.

HYMENOPHYLLUM TUNBRIDGENSE (p. 24).—In reply to Mr. Phillips, I beg to say that I know a locality for this Fern not far from Llanberis. It grows, in company with *H. Wilsoni*, in a somewhat dangerous place, but was procured for me by a native eighteen months ago.—R. MORTON MIDDLETON, jun.

DIMORPHISM IN ERANTHEMUM.—I enclose a sketch, taken from dried specimens of dimorphous flowers, of an apparently new species of *Eranthemum* with large long-peduncled panicles, which I called provisionally *E. elatum*. It is a large herb, 2 to 3½ feet high, quite glabrous, and not essentially differing from *E. crenulata*, except in the inflorescence, and leaves 3–4 times larger. The manner in which I came to notice these very different-looking flowers on the same plant is shortly this:—In crossing the Pegu Yomah in 1868–69 I first came across the plant, but saw only fruits. Dr. T. Anderson, to whom I showed my *Acanthaceæ*, would not assent to calling it an *Eranthemum*, but thought it something else. I could not see the difference from *Eranthemum*, but I put it aside when working up the Burmese *Acanthaceæ*. On my last trip in Burmah, I again had to cross the Yomah, and found the plant this time very frequent along almost every hill stream, in shady situations. Again I saw nothing but fruits, although the very long styles and the young fruits necessarily led me to search vigorously after corollas, which I presumed to be very large, for, with the exception of the *Hygrophilææ* and *Andrographideææ*, the corolla is larger than, or at least as long as the capsule. Finally, I alighted upon a group of plants which had something like flowers, but so very small (only a line long) that I was not surprised to have missed them for so long a time. The following characters were jotted down, and the plant referred to *Andrographis*:—Corolla rubescens, subringens; limbus 5-lobus, lobis oblongis concavis, 2 superioribus convergentibus, 3 inferioribus approximatis; tubus lineam fere longus, basi inflatus. Stamina 2, fauci inserta; antheræ 2-loculares, locellæ parallelæ; filamenta brevissima v. subnulla. Stylus tubi longitudinis; stigma bilabiato-infundibuliforme. Calyx regularis, 5-partitus. Capsula *Eranthemum*. On a latter occasion I found a large-flowered true *Eranthemum*, otherwise so similar to my plant, that I took it away for a better comparison. Not very long ago I examined my Burmese *Acanthaceæ*, amongst which I found not less than 15 new species. When my supposed new genus turned up along with the specimen of the large true *Eranthemum*,

I found that they were the same, and both really identical with my *E. elatum*. The large-flowered form had the same little flowers interspersed among the large flowers, whilst the small-flowered form showed calyces with styles upwards of an inch in length. It now became quite clear to me that these minute flowers were the true fertile flowers of *Eranthemum*, for the large showy flowers were all sterile! I cannot, on examining the material before me, find a single young fruit with a long style; all have them very short and curved, and this, I may add, is not the case alone in this new species, but apparently in all *Eranthemums*, of which, however, I have unfortunately only a very scanty supply. The long-styled ovaries all remain abortive, and dry up after some time. You will observe, from the above, that I only once met with the fully-developed large flowers; but this may possibly be attributed to these large flowers only opening at certain hours, so that they were overlooked by me. The species of *Eranthemum* are frequently cultivated in the gardens of India and Europe; and, therefore, it will be easy enough to find out whether the fertile flowers are all, as I believe to be the case, minute and differently-shaped from the sterile ones. Besides the above, I observe in my dry specimens another form, which, however, may be probably the produce of some insect. There are calyces, which have a longer tube than usual; and these I find destitute of a corolla, but bearing young, broad, quite different-looking capsules, all which were partially eaten by some insect inside. These showed also no vestige of a style. *Eranthemum Ecbolium*, T. And., which I adopted on another occasion as a type of a separate genus (*Ecbolium Linnæanum*), does not show these several differences, but has only long and well-developed flowers, which all bear fruit.—S. KURZ.

HAMPSHIRE PLANTS.—In September last I found *Tillæa muscosa* growing abundantly on the roadside at Shidfield, between Botley station and the village of Wickham, Hants. I am not aware that this locality has ever been recorded, though this seems singular, as the venerable Dean of Winchester, an industrious botanist, was rector of Wickham during the first few years of this century, and the locality for *Tillæa* is within a mile of the village of Wickham, on the high-road between that place and Southampton. It is hardly likely that he should have overlooked it, if it was growing there then. I may also mention that I found *Briza minor* growing at Botley, in two separate spots, distant from each other at least a mile and a half.—G. S. STREATFIELD.

ANANDROUS STATE OF ERICA CINEREA.—While arranging the *Ericaceæ* of the British Museum herbarium, my attention was arrested by some abnormal specimens of *Erica cinerea*, sent from Wiltshire by the Marchioness of Bath, to which the following note was attached:—"Three years ago a plant of Heath was found similar to the enclosed specimen, and was taken up and planted in a peat border in the garden, where it has continued to produce similar blossoms every year. The present specimen was taken from a plant (where there are several more) about a mile distant from the spot where the former grew." Similar specimens are in Sowerby's herbarium, labelled "Marquis of Bath," no doubt from the same locality. Their remarkable appearance is due to the fact that both

corolla and stamens are wanting. I find no reference to this form, which is interesting on account of its apparent permanence, as well as on structural grounds, in the European Floras which I have consulted, nor does Dr. Masters mention it in his 'Vegetable Teratology.' A nearly similar state of *E. Tetralix* (var. *anandra*, Rich.) has, however, long been known to occur in France. Cornuti, in his 'Enchiridion' (1635), enumerates among the plants found "in pago Sainet Prix," *Erica scoparia flosculis herbaceis*, which is cited by Germain ('Guide du Botaniste,' 1851) as "*Erica Tetralix*, var. *anandra*?" Chevallier ('Flore des Environs de Paris,' ii. 517, 1836) describes it thus:—" *E. Tetralix*, var. *α*; *E. parviflora*, N.; floribus profundius lobatis albis omnibus femineis, stylo valde exserto;" he adds that the flowers are only half the size of those of normal *Tetralix*, and that both grow together at Montmorency. From this locality, which is cited by Cosson and Germain as identical with that of Cornuti, there are specimens answering to the above description in Herb. Mus. Brit., collected in 1868 by M. Edmond Mouillefarine. Dr. Masters (op. cit. p. 405) states that "in 1860 M. Parquet discovered it in peaty woods near Nangis (Seine-et-Marne);" but he has seen no examples.—JAMES BRITTEN.

WINTER FERTILIZATION BY AGENCY OF INSECTS.—Mr. W. E. Hart, in his interesting note (p. 25) on the winter-flowering of *Geranium Robertianum*, remarks:—"it would, however, be a mistake to assume that the crossing of flowers by the agency of insects is impossible during the winter months. Many moths assume the imago state at this season alone; and entomologists find it worth their while to visit, in pursuit of them, the plants which are then in bloom, many of which are of unisexual species." Allowing that pollen is collected from one flower to another, even in winter, by insect-agency, I think that Mr. Hart is scarcely correct in saying that many moths assume the imago state at this season alone. No doubt a few do so, but they are species that probably seldom visit flowers. Some few (under a dozen) other species emerge in autumn and hibernate, and probably do visit, in mild weather, such flowers as appear and bear nectar in winter. I am not aware that any flowers are visited by entomologists in pursuit of moths during the *winter months proper*. In autumn and spring the Ivy and Sallow blooms are much frequented both by moths and moth-hunters, but these plants are scarcely winter flowerers. It is, perhaps, worthy of notice, that it is chiefly the male Sallows that are attractive,—for one insect on the female plant you will find ten on the male, and then probably only a small proportion of pollen is conveyed by insect-agency from the male to the female Sallow. In Perthshire the Ivy does not bear flowers in anything like proportion to the number of flower-buds, nor fruit in proportion to the number of flowers. Many a plant may be seen covered with flower-buds that fail to be matured.—F. BUCHANAN WHITE.

Reports.

NEW SPECIES OF PHANEROGAMOUS PLANTS IN PERIODICALS PUBLISHED IN GREAT BRITAIN DURING THE YEAR 1871.

The following alphabetical list includes the new genera and species which have been published during 1871 in the following periodicals:—‘Ann. and Mag. of Nat. History,’ ‘Botanical Magazine,’ ‘Floral Magazine,’ ‘Gardener’s Chronicle,’ Hooker’s ‘Icones Plantarum,’ ‘Journal of Botany,’ ‘Journal of the Linnean Society,’ and ‘Refugium Botanicum.’ The names of the Natural Order and the native country are appended to each species, as well as the reference to the place where it is described or figured. Three important memoirs have appeared during the year in the ‘Transactions of the Linnean Society,’—Mr. Bentham’s monograph of the genus *Cassia*, Dr. Masters’s account of the *Passifloræ*, and Dr. Triana’s enumeration of the *Melastomaceæ*. The numerous new species contained in these monographs have not been included in the following list.

ABELIA ADENOTRICHA, *Hance* (*Caprifoliaceæ*).—Jehol. (Journ. Bot. IX. 132.)

ABRUS MOLLIS, *Hance* (*Leguminosæ*).—Canton, Pakwan Hills. (Journ. Bot. IX. 130.)

ABUTILON DARWINII, *Hook. f.* (*Malvaceæ*).—South Brazil; Dr. Fritz Mueller. (Bot. Mag. t. 5917.)

ALPINIA OFFICINARUM, *Hance* (*Zingiberaceæ*).—Island of Haenan, China. (Journ. Linn. Soc. xiii. 6.)

AMARANTHUS (?) *SALICIFOLIUS*, *Hortorum* (*Amaranthaceæ*).—Philippine Islands. (See Gard. Chron. 1550, f. 331, and Fl. Mag. 557.)

ANGELICA CITRIODORA, *Hance* (*Umbelliferæ*).—Canton. (Journ. Bot. IX. 131.)

ANTHURIUM EMARGINATUM, *Baker* (*Aroideæ*).—S. America. (Ref. Bot. t. 274.)

A. MARGARITACEUM, *Baker*.—S. America. (Ref. Bot. t. 280.)

ASPLENIUM SCHIZODON, *T. Moore* (*Filices*).—New Caledonia. (Gard. Chron. p. 1004. f. 223.)

BEGONIA CRINITA, *Oliver* (*Begoniaceæ*).—Andes of Bolivia probably, discovered by Pearce. Sent by Veitch to Hort. Kew. (Bot. Mag. t. 5897.)

B. RICHARDSIANA, *T. Moore*.—Natal. (Gard. Chron. p. 1065, and f. 243.)

BOLBOPHYLLUM CHLOROGLOSSUM, *Reichb. f., et Warm., Orchid. Lag. Sant. ined.* (*Orchideæ*).—Lagoa Santa. (Gard. Chron. p. 1195.)

B. NASUTUM, *Reichb. f.* Hort. Saunders. (Gard. Chron. p. 1482.)

BOMAREA CHONTALENSIS, *Seem. in Herb. Mus. Brit.* (*Amaryllidaceæ*).—Nicaragua. (Gard. Chron. p. 479.)

BRACHYTOME, *Hook. f.* (*Rubiaceæ, § Gardenieæ*).—*B. Wallichii*, *Hook. f.*—East Bengal, Wall. Cat. 8464 and 8466; East Himalaya, Griffith, Kew Distr. 2787. (Hook. Ic. Plant. t. 1088.)

BRACKENRIDGEA ZANGUEBARICA, *Oliv.* (*Ochnaceæ*).—Zanzibar. (Hook. Ic. Plant. t. 1096.)

- BREDIA OLDHAMI, *Hook. f.* (*Melastomaceæ*).—Formosa. (*Hook. Ic. Plant. t. 1085.*)
- BUTTONIA, *M'Ken.* (*Scrophularineæ, § Gerardieæ*).—*B. natalensis*, *M'Ken.*—Natal. (*Hook. Ic. Plant. t. 1088.*)
- BYRSANTHUS EPIGYNUS, *Mast.* (*Homalineæ*).—Gambia, Congo. (*Journ. Linn. Soc. xiii. 17.*)
- CALANTHE PLEIOCHROMA, *Reichb. f.* (*Orchideæ*).—Japan. (*Gard. Chron. p. 938.*)
- CAMPANULA (EUCODON) VERONICIFOLIA, *Hance* (*Campanulaceæ*).—Canton. (*Journ. Bot. IX. 133.*)
- CHALEPOA, *Hook. f.* (*Pittosporæ?*).—*C. magellanica*, *Hook. f.*—Tierra del Fuego, South Chili. (*Hook. Ic. Plant. t. 1082.*)
- CHLOROCODON, *Hook. f.* (*Asclepiadeæ*).—*C. Whitei*, *Hook. f.*, *Mr. White.* *Hort. Kew.* (*Bot. Mag. t. 5898.*)
- COMBRETUM (EUCOMBRETUM) ALFREDI, *Hance* (*Combretaceæ*).—Canton. (*Journ. Bot. IX. 131.*)
- COPTOSAPelta GRIFFITHII, *Hook. f.* (*Rubiaceæ*).—Malacca, Griffith, *Kew Distr. 2789*; Singapore. (*Hook. Ic. Plant. t. 1089.*)
- CYRTANTHERA CHRYSOSTEPHANA, *Hook. f.* (*Acanthaceæ*).—Mexico, imported by Bull. (*Bot. Mag. t. 5887.*)
- DENDROBIUM ACROBATICUM, *Reichb. f.* (*Orchideæ*).—Moulmein. (*Gard. Chron. p. 802.*)
- D. ANNULIGERUM, *Reichb. f.*—Marisa. (*Gard. Chron. p. 675.*)
- D. CÆLOGYNE, *Reichb. f.*—Moulmein. (*Gard. Chron. p. 136.*)
- D. FUGAX, *Reichb. f.*—India. (*Gard. Chron. p. 1257.*)
- DIASCIA BARBERÆ, *Hook. f.* (*Scrophulariaceæ*).—Cape Colony, *Mrs. Barber.* *Hort. Kew.* (*Bot. Mag. t. 5933.*)
- DORSTENIA MANNII, *Hook. f.* (*Moreæ*).—Old Calabar, *Mann.* *Hort. Kew.* (*Bot. Mag. t. 5908.*)
- ECHIDNOPSIS, *Hook. f.* (*Asclepiadeæ*).—*E. cereiformis*, *Hook. f.*—Patria ignota. *Hort. Kew.* (*Bot. Mag. t. 5930.*)
- EMPOGONA, *Hook. f.* (*Rubiaceæ, § Gardenieæ*).—*E. Kirkii*, *Hook. f.*—East Tropical Africa. (*Hook. Ic. Plant. t. 1091.*)
- EPIDENDRUM CRINIFERUM, *Reichb. f.* (*Orchideæ*).—Costa Rica. (*Gard. Chron. p. 1291.*)
- E. (AMPHIGLOTTIUM) ERECTUM, *Hook. f.*—New Granada? *Hort. Kew.* (*Bot. Mag. t. 5902.*)
- E. TRIVALVE, *Reichb. f.*—*Epidendrum* (n. sp.?), *Reichb. f.* *Beitr. Cent. Am. p. 85.*—Costa Rica. (*Gard. Chron. p. 1678.*)
- EUGENIA (EU-EUGENIA) GRIJSII, *Hance* (*Myrtaceæ*).—Fokien. (*Journ. Bot. IX. 5.*)
- E. (SYZYGIIUM) MINUTIFLORA, *Hance.*—Canton. (*Journ. Bot. IX. 5.*)
- E. (EU-EUGENIA) PYXOPHYLLA, *Hance.*—Kwangsi. (*Journ. Bot. IX. 6.*)
- FUCHSIA KIRKII, *Hook. f.* (*Onagrariæ*).—New Zealand. (*Hook. Ic. Plant. t. 1083.*)
- GLADIOLUS DRACOCEPHALUS, *Hook. f.* (*Iridaceæ*).—Natal, *Cooper.* *Hort. Saunders.* (*Bot. Mag. t. 5884.*)
- GOMPHOCARPUS PADIFOLIUS, *Baker* (*Asclepiadeæ*).—Natal, *Cooper.* (*Ref. Bot. t. 254.*)
- HAWORTHIA VITTATA, *Baker* (*Liliaceæ*).—Cape of Good Hope, *Cooper.* (*Ref. Bot. t. 263.*)

- HOHENBERGIA LEGRELLIANA, *Baker* (*Bromeliaceæ*).—S. America. (Ref. Bot. t. 285.)
- HUMATA TYERMANII, *T. Moore* (*Filices*).—W. Africa. (Gard. Chron. p. 870. f. 178.)
- IPOMÆA HABELIANA, *Oliv.* (*Convolvulaceæ*).—Galapagos. (Hook. Ic. Plant. t. 1099.)
- KÖHLERIA RUPESTRIS, *Seem.* (*Gesneraceæ*).—Nicaragua. (Gard. Chron. p. 611.)
- LATHYRUS (OROBUS) DAVIDII, *Hance* (*Leguminosæ*).—Pekin. (Journ. Bot. IX. 130.)
- LEPTACTINA, *Hook. f.* (*Rubiaceæ*).—*L. Mannii*, *Hook. f.* (Hook. Ic. Plant. t. 1092); *L. involucrata*, *Hook. f.* (l. c. p. 74); *L. densiflora*, *Hook. f.* (l. c. p. 74.)—West Tropical Africa. *L. senegambica*, *Hook. f.* (l. c. p. 74); Senegambia, Heudelot, 893.
- LILIUM HOOKERI, *Baker* (*Liliaceæ*).—Sikkim Himalaya. (Gard. Chron. p. 202.)
- LINARIA (LINARIASTRUM) QUADRIFOLIA, *Hance* (*Scrophulariaceæ*). (Journ. Bot. IX. 133.)
- LORANTHUS SAMPSONI, *Hance* (*Loranthaceæ*).—Canton. (Journ. Bot. IX. 133.)
- LYCASTE LINGUELLA, *Reichb. f.* (*Orchideæ*).—Peru? (Gard. Chron. p. 738.)
- MACARANGA SAMPSONI, *Hance* (*Euphorbiaceæ*).—Canton. (Journ. Bot. IX. 134.)
- MAJIDEA, *Kirk* (*Sapindaceæ*, § *Sapindeæ*).—*M. Zanguebarica*, *Kirk.*—Zanzibar. (Hook. Ic. Plant. t. 1097.)
- MASDEVALLIA ATTENUATA, *Reichb. f.* (*Orchideæ*).—Costa Rica. (Gard. Chron. p. 834.)
- M. HARRYANA*, *Reichb. f.*—Hort. Veitch. (Gard. Chron. p. 1421, and Floral Magazine, t. 555.)
- M. IGNEA*, *Reichb. f.*—New Granada. (Gard. Chron. p. 1482.)
- MASSONIA ODORATA, *Hook. f.* (*Liliaceæ*).—Colesberg, S. Africa. *Dr. Arnott*, Hort. Kew. (Bot. Mag. t. 5891.)
- MAXILLARIA REICHENHEIMIANA, *Endr.*; *Reichb. f.* (*Orchideæ*).—Costa Rica. (Gard. Chron. p. 1678.)
- NERINE PUDICA, *Hook. f.* (*Amaryllidaceæ*).—Cape. Hort. Kew. (Bot. Mag. t. 5901.)
- NOTHOSCORDUM AUREUM, *Hook. f.* (*Liliaceæ*).—California. *Bolander*, Hort. Kew. (Bot. Mag. t. 5896.)
- ODONTOGLOSSUM PLATYODON, *Reichb. f.* (*Orchideæ*).—New Granada. (Gard. Chron. p. 1163.)
- O. CROCIDIPTERUM*, *Reichb. f.*—New Granada. (Gard. Chron. p. 1129.)
- ONCIDIUM BRYOLOPHOTUM, *Reichb. f.* (*Orchideæ*).—Central America. (Gard. Chron. p. 738.)
- O. EXASPERATUM*, *Lind.*; *Reichb. f.*—Ecuador? (Gard. Chron. p. 1129.)
- O. OCHTHODES*, *Reichb. f.*—Ecuador. (Gard. Chron. p. 1483.)
- PASPALUM BURCHELLII, *Munro* (*Gramineæ*).—Brazil. *Herb. Burch. Bras.* 6844. (Hook. Ic. Plant. t. 1100.)
- PHILODENDRON WILLIAMSII, *Hook. f.* (*Aroideæ*).—Bahia. *Williams*, Hort. Kew. (Bot. Mag. t. 5899.)

PHITOPIS, *Hook. f. (Rubiaceæ)*.—*P. multiflora*, Hook. f.—Peru, *Mathews*, 1639. Var. *angustifolia*, Hook. f.—Peru, *Spruce*, 4834. (Hook. *Ic. Plant. t. 1093.*)

PHYLLACANTHUS, *Hook. f. (Rubiaceæ)*.—*P. Grisebachianus*, Hook. f.—Cuba, *Wright*, 2655. *Catesbæa phyllacantha*, *Griseb. Cat. Pl. Cub. 122.* (Hook. *Ic. Plant. t. 1095.*)

PHALÆNOPSIS MANNII, *Reichb. f. (Orchideæ)*.—"Discovered by *Gustav Mann*." (*Gard. Chron. p. 902.*)

PLEUROTHALLIS AURICULIGERA, *Reichb. f. (Orchideæ)*.—Brazil. (*Gard. Chron. p. 1579.*)

P. AVICEPS, *Reichb. f.*—Brazil. (*Gard. Chron. 1579.*)

P. POLYLIRIA, *Endr. ; Reichb. f.*—Costa Rica. (*Gard. Chron. p. 1483.*)

POLYCYCNIS GRATIOSA, *Endr. ; Reichb. f. (Orchideæ)*.—Costa Rica. (*Gard. Chron. p. 1483.*)

QUERCUS ECHINOIDES, *R. Br. Campst (Cupuliferæ)*.—Oregon. (*Ann. and Mag. Nat. Hist. 4. vii. 250.*)

Q. JACOBI, *R. Br. Campst.*—Vancouver's Island. (*Ann. and Mag. Nat. Hist. 4. vii. 250.*)

Q. ERSTEDIANA, *R. Br. Campst.*—S. Oregon. (*Ann. and Mag. Nat. Hist. 4. vii. 250.*)

Q. SADLERIANA, *R. Br. Campst.*—Oregon. (*Ann. and Mag. Nat. Hist. 4. vii. 249.*)

RANUNCULUS LIMOSELLOIDES, *F. M. (Ranunculaceæ)*.—New Zealand. (*Hook. Ic. Plant. t. 1081.*)

RAPHANOCARPUS, *Hook. f. gen. nov. (Cucurbitaceæ)*.—*R. Kirkii*, *Hk. f.*—Mozambique. (*Hook. Ic. Plant. t. 1084.*)

RODRIGUEZIA LEOCHILINA, *Reichb. f. (Orchideæ)*.—Costa Rica. (*Gard. Chron. p. 970.*)

ROTTBÖLLIA MOLLICOMA, *Hance (Gramineæ)*.—Whampoa. (*Journ. Bot. IX. 134.*)

RUBUS (§ RHAMNIFOLII) RAMOSUS, "*Bloxam ;*" *Briggs (Rosaceæ)*.—England. (*Journ. Bot. IX. 330.*)

SACCOLABIUM BUCCOSUM, *Reichb. f. (Orchideæ)*.—India. (*Gard. Chron. p. 938.*)

SAKERSIA AFRICANA, *Hook. f. (Melastomaceæ)*.—West Tropical Africa. (*Hook. Ic. Plant. t. 1086.*)

SAXIFRAGA (§ DACTYLOIDES) MAWEANA, *Baker (Saxifragaceæ)*.—Morocco. (*Gard. Chron. p. 1355, and fig. 300.*)

SELAGINELLA NITELLA, *T. Moore (Lycopodiaceæ)*.—Patria ignota. (*Gard. Chron. p. 902, and fig. 190.*)

SENECIO FARRISII, *Baker (Compositæ)*.—Peru, *Farris*. (*Ref. Bot. t. 250.*)

STROPHANTHUS KOMBE, *Oliv. (Apocynaceæ)*.—Zambesi-land. (*Hook. Ic. Plant. t. 1098.*)

SYMEA, *Baker (Liliaceæ)*.—*S. gillesioides*, *Baker*.—Chili, *Reed*. (*Ref. Bot. t. 260.*)

TAMATAVEA, *Hook. f. (Rubiaceæ)*.—*T. Melleri*, *Hook. f.*—Madagascar. (*Hook. Ic. Plant. t. 1090.*)

TORENIA AURICULÆFOLIA, *Fl. Mag. (Scrophulariaceæ)*.—Patria ignota. (*Fl. Mag. t. 534.*)

XIPHION AUCHERI, *Baker (Irideæ)*.—Palestine. *Aucher-Eloy*, 2137. (*Journ. Bot. IX. 110.*)

X. PALÆSTINUM, *Baker*.—Palestine. (*Journ. Bot. IX. 109.*)

Extracts and Abstracts.

BIO-GEOLOGY.

BY CANON KINGSLEY.

Bio-geology begins with asking every plant or animal you meet, large or small, not merely, What is your name? but, How did you get here? By what road did you come? What was your last place of abode? And now you are here, how do you get your living? Are you among the strong, the successful, the multiplying, the colonizing? Or are you among the weak, the failing, the dwindling, the doomed?

At the outset you will soon find yourself involved in chemical and meteorological questions, as, for instance, when you ask, How is it that I find one flora on the seashore, another on the sandstone, another on the chalk, and another on the peat-making, gravelly strata? The usual answer would be, I presume—if we could work it out by twenty years' experiments, such as Mr. Lawes, of Rothampstead, has been making on the growth of Grasses and *Leguminosæ* in different soils and under different manures—the usual answer, I say, would be, Because we plants want such-and-such mineral constituents in our woody fibre; again, because we want a certain amount of moisture at a certain period of the year; or, perhaps, simply because the mechanical arrangement of the particles of a certain soil happens to suit the shape of our roots and of their stomata. Sometimes you will get an answer quickly enough, sometimes not. If you ask, for instance, *Asplenium viride* how it contrives to grow plentifully in the Craven of Yorkshire down to 600 or 800 feet above the sea, while in Snowdon it dislikes growing lower than 2000 feet, and is not plentiful even there, it will reply, Because in the Craven I can get as much carbonic acid as I want from the decomposing limestone, while on the Snowdon Silurian I get very little. I have to make it up by clinging to the mountain-tops for the sake of the greater rainfall. But if you ask *Polypodium calcareum*, How is it you choose only to grow on limestone, while *Polypodium Dryopteris*, of which, I suspect, you are only a variety, is ready to grow anywhere?—*Polypodium calcareum* will refuse, as yet, to answer a word.

Again,—I can only give you the merest string of hints,—you will find in your questioning that many plants and animals have no reason at all to show why they should be in one place and not in another, save the very sound reason for the latter which was suggested to me once by a great naturalist. I was asking, Why don't I find such-and-such a species in my parish, while it is plentiful a few miles off in exactly the same soil? and he answered, For the same reason that you are not in America: because you have not got there,—which answer threw to me a flood of light on this whole science. Things are often where they are simply because they happen to have got there, and not elsewhere. But they must have got there by some means, and those means I want young naturalists to discover, at least to guess at.

Or, again, you will have to inquire whether the species has not been prevented from spreading by some natural barrier. Mr. Wallace has shown, in his 'Malay Archipelago,' that a strait of deep sea can act as

such a barrier between species. Moritz Wagner has shown that, in the case of insects, a moderately broad river may divide two species of beetles, or a very narrow snow-range two species of moths.

Again, another cause, and a most common one, is that the plants cannot spread because they find the ground beyond them already occupied by other plants, who will not tolerate a fresh mouth, having only just enough to feed themselves. Take the case of *Saxifraga hypnoides* and *S. umbrosa* (London-pride). They are two especially strong species. They show that, *S. hypnoides* especially, by their power of sporting, of diverging into varieties; they show it equally by their power of thriving anywhere, if they can only get there. They will both grow in any sandy garden, under a rainfall of only 23 inches, more luxuriantly than in their native mountains under a rainfall of 50 or 60 inches. Then how is it that *S. hypnoides* cannot get down off the mountains, and that *S. umbrosa*, though in Kerry it has got off the mountains and down to the sea-level, exterminating, I suspect, many species in its progress, yet cannot get across county Cork? The only answer is, I believe, that both species are continually trying to go ahead, but that the other plants already in front of them are too strong for them, and massacre their infants as soon as born.

And this brings us to another curious question,—the sudden and abundant appearance of plants, like the Foxglove and the *Epilobium angustifolium*, in spots where they have never been seen before. Are their seeds, as some think, dormant in the ground, or are the seeds which have germinated fresh ones wafted thither by wind or otherwise, and only able to germinate in that one spot because there the soil is clear? General Munro holds to the latter theory. He pointed out to me that the *Epilobium* seeds, being scattered, could travel with the wind; that the plant always made its appearance first on the new banks, landslips, clearings, where it had nothing to compete against; and that the Foxglove did the same. True, and most painfully true, in the case of Thistles and Groundsels; but Foxglove seeds, though minute, would hardly be carried by the wind, any more than those of the White Clover, which comes up so abundantly in drained fens. *Adhuc sub judice lis est*. And I wish some young naturalists would work carefully at the solution, by experiment, which is the most sure way to find out anything.

But in researches in this direction they will find puzzles enough. I will give them one which I shall be most thankful to hear they have solved within the next seven years: How is it that we find certain plants, viz. the Thrift and the Scurvy-grass, abundant on the seashore and common on certain mountain-tops, but nowhere between the two? Answer me that, for I have looked at the fact for years,—before, behind, sideways, upside down, and inside out,—and I cannot understand it.

But all these questions, and specially, I suspect, that last one, ought to lead the young student up to the great and complex question, How were these islands re-peopled with plants and animals, after the long and wholesale catastrophe of the glacial epoch?

I presume you all know, and will agree, that the whole of these islands, north of the Thames, save the ice-clad mountain-tops, were buried for long ages under an icy sea. From whence did vegetable and animal life crawl back to the land, as it rose again, and cover its mantle of glacial drift with fresh life and verdure?

Now let me give you a few prolegomena on this matter. You must study the plants of course, species by species. Take Watson's 'Cybele Britannica' and Moore's 'Cybele Hibernica,' and let (as Mr. Matthew Arnold would say) your thought play freely about them. Look carefully, too, in the case of each species, at the note on its distribution which you will find appended in Bentham's 'Handbook' and in Hooker's 'Student's Flora.' Get all the help you can, if you wish to work the subject out, from foreign botanists, both European and American; and I think that, on the whole, you will come to some such theory as this for a general starting platform—namely, that we do not owe our flora (I must keep to the flora just now) to so many different regions—or types, as Mr. Watson calls them—as Mr. Watson makes; but to three, namely, a European or Germanic flora, from the S.E.; an Atlantic flora, from the S.W.; a Northern flora, from the N.; and that these three invaded us after the glacial epoch, and our general flora is their result.

But this will cause you much trouble. Before you go a step further you will have to eliminate from all your calculations most of the plants which Watson calls glacial, *i. e.* found in cultivated ground about habitations. And what their limit may be I think we never shall know. But of this we may be sure, that just as invading armies always bring with them, in forage or otherwise, some plants from their own country; just as the Cossacks, in 1815, brought more than one Russian plant through Germany into France; just as you will inevitably have a crop of North German plants upon the battle-fields of France next summer,—so do conquering races bring new plants. The Romans, during their 300 or 400 years of occupation and civilization, must have brought more species, I believe, than I dare mention. I suspect them of having brought, not merely the common hedge Elm of the South, not merely the three species of Nettle, but all our red Poppies, and a great number of the weeds which are common in our cornfields; and when we add to them the plants which may have been brought by returning crusaders and pilgrims, by monks from every part of Europe, by Flemings or other dealers in foreign wool, we have to cut a huge cantle out of our indigenous flora; only, having no records, we hardly know where and what to cut out, and can only, we elder ones, recommend the subject to the notice of the younger botanists, that they may work it out after our work is done.

Of course these plants introduced by man, if they are cut out, must be cut out of only one of the floras, namely, the European; for they probably came from the south-east, by whatever means they came.

That European flora invaded us, I presume, immediately after the glacial epoch, at a time when France and England were united, and the German Ocean a mere network of rivers, which emptied into the deep sea between Scotland and Scandinavia. And here I must add, that endless questions of interest will arise to those who will study, not merely the invasion of that truly European flora, but the invasion of reptiles, insects, and birds, especially birds of passage, which must have followed it as soon as the land was sufficiently covered with vegetation to support life. Whole volumes remain to be written on this subject. I trust that some of your younger members may live to write one of them. The way to begin will be, to compare the flora and fauna of this part of England very carefully with that of the southern and eastern counties, and then to compare them again with the fauna and flora of France, Belgium, and Holland.

As for the Atlantic flora, you will have to decide for yourselves whether you accept or not the theory of a sunken Atlantic continent. I confess that all objections to that theory, however astounding it may seem, are outweighed in my mind by a host of facts which I can explain by no other theory. But you must judge for yourselves, and to do so you must study carefully the distribution of Heaths, both in Europe and at the Cape, and their non-appearance beyond the Ural Mountains in America, save in Labrador, where the common Ling, an older and less specialized form, exists. You must consider, too, the plants common to the Azores, Portugal, the West of England, Ireland, and the Western Hebrides. In so doing, the young naturalists will at least find proofs of a change in the distribution of land and water which will utterly astound them when they face it for the first time.

As for the Northern flora, the question where it came from is puzzling enough. It seems difficult to conceive how any plants could have survived when Scotland was an archipelago in the same ice-covered condition as Greenland is now; and we here have no proof that there existed after the glacial epoch any northern continent from which the plants and animals could have come back to us. The species of plants and animals common to Britain, Scandinavia, and North America must have spread in pre-glacial times, when a continent joining them did exist.

But some light has been thrown on this question by an article on "The Physics of the Arctic Ice," by Dr. Brown, of Campster, in the 'Quarterly Journal of the Geological Society' for February, 1870. He shows there that even in Greenland peaks and crags are left free enough from ice to support a vegetation of between 300 and 400 species of flowering plants, and therefore, he well says, we must be careful to avoid concluding that the plant and animal life on the dreary shores or mountain-tops of the old glacial Scotland was poor. The same would hold good of our mountains; and, if so, we may look with respect, even with awe, on the Alpine plants of Wales, Scotland, and the Lake mountains, as organisms, stunted it may be, and even degraded, by their long battle with the elements, but venerable from their age, historic from their endurance. Relics of an older temperate world, they have lived through thousands of centuries of frost and fog to sun themselves in a temperate climate once more.

Now there are questions which may puzzle the mind of a Hampshire naturalist. You have in this neighbourhood, as you well know, two, or rather three, soils, each carrying its peculiar vegetation. First, you have the clay lying on the chalk, and carrying vast woodlands, seemingly primeval. Next you have the chalk, with its peculiar, delicate, and often fragrant crop of lime-loving plants; and next you have the poor sand and clays of the New Forest and Bagshot basin, saturated with iron, and therefore carrying a moorland or peat-loving vegetation in many respects quite different from the other. And this moorland soil, and this vegetation, with a few singular exceptions, repeats itself, as I dare say you know, in the north of the county, in the Bagshot basin, as it is called, the moors of Aldershot, and Hertfordbridge.

Now what a variety of interesting questions are opened up by these simple facts! How did these three floras get each to its present place? Where did each come from? How did it get it past or through the other, till each set of plants, after long internecine competition, settled itself down in the sheet of land most congenial to it? And when did each

come hither? Which is the oldest? Will any one tell me whether the Heath flora of the moors or the Thymy flora of the chalk downs were the earlier inhabitants of these isles?—questions to which I cannot get any answer, and which cannot be answered without first a very careful study of the range of each species of plant on the continent of Europe, nor, again, without careful study of those stupendous changes in the shape of this island which have taken place at any late geological epoch. The composition of the flora of our moorlands is as yet to me an utter puzzle. We have Club-mosses, three species, enormously ancient forms which have survived the age of ice; but did they crawl downward hither from the northern mountains, or upward hither from the Pyrenees? You have the beautiful bog Asphodel again, an enormously ancient form; for it is, strange to say, common to North America and to Northern Europe, but does not enter Asia—almost an unique instance. It must, surely, have come from the north, and points (as do many species of plants and animals) to the time when North Europe and North America were joined. You have sparingly, in North Hampshire,—though, strangely, not on the Bagshot moor,—the Common or Northern Butterwort, *Pinguicula vulgaris*, and also in the south, the New Forest part of the county, the delicate little *Pinguicula lusitanica*, the only species now found in Devon and Cornwall, marking the New Forest as the extreme eastern limit of the Atlantic flora. You have again the Heaths, which, as I have just said, are found neither in America nor in Asia, and must, I believe, have come from some southwestern land long since destroyed by the sea. But more, you have in the New Forest two plants which are members of the South Europe, or properly the Atlantic flora, and which must have come from the south and south-east, and which are found in no other spots in these islands. I mean the lovely *Gladiolus*, which grows abundantly under the Ferns near Lyndhurst, certainly wild, but it does not approach us nearer than the Loire and the Rhine; and that delicate Orchid, the *Spiranthes æstivalis*, which is known only in a bog near Lyndhurst and in the Channel Islands, while on the Continent it extends from Southern Europe all through France. Now, what do these two plants mark? They give us a point in botany, though not in time, to determine when the south of England was parted from the opposite shores of France; and whenever that was, it was just after the *Gladiolus* and *Spiranthes* got hither. Two little colonies of these lovely flowers arrived just before their retreat was cut off. They found the country occupied with other plants, and, not being reinforced by fresh colonists from the south, have not been able to spread further north than Lyndhurst. There, in the New Forest, and, I may say, in the Bagshot moors, you find plants which you do not expect, and do not find plants which you do expect; and you are, or ought to be, puzzled, and I hope also interested, and stirred up to find out more.—(From an Address to the “Winchester and Hampshire Scientific and Literary Society,” delivered Dec. 28th, 1871.)

New Publications.

The Young Collector's Handy Book of Botany. By the Rev. H. P. DUNSTER, M.A. London: L. Reeve and Co. 1871. Svo. (Pp. 168.)

“*Embryo*.—The leaf in an immature state” (p. 6).

“*The Corolla*, which is the name given to the fold of the flower lying inside the calyx, is made up of the petals, which, when expanded, are the flower-leaves, and of the stamen and pistils” (p. 12).

“*Wild Violets*.—These need no description, nor do the Heartsease, for everybody knows them. They are the parents of the beautiful florists' flowers, so-called” (p. 20).

“*Common Flax*.—This beautiful blue flower is an annual, growing about 18 inches high. Its inflorescence forms a sort of panicle. Some writers say it is not one of our native field flowers, but was introduced from Egypt. It is, however, very common, and its uses numerous and most important” (*Id.*).

“*Spotted Persicaria*.—A most beautiful marsh plant” (p. 25).

“*Flowering Rush*.—Few things are more handsome than the Flowering Rushes which we meet with at the water's edge. The foliage is so rich and beautiful, the colouring of the flowers so various, that what is properly called the bog Asphodel, with its flowers of golden yellow, is more like an Iris than a Rush” (p. 27).

These extracts will give a better idea of the contents of this singular book than any words of ours could convey. It is the worst of its kind that we have ever had the misfortune to notice.

J. B.

British Local Floras.

The fifth and concluding part of Mr. Key's 'Flora of Devon and Cornwall' is published, containing the Orders from *Labiatae* to the end of the vascular Cryptogams. Each succeeding part of this Flora has been an improvement on its predecessor, and the part before us is well edited, and fully on a level with the majority of books of its class. There is little that calls for any special remark. *Callitriche autumnalis* is not a probable inhabitant of the western peninsula; one of the other commonly submerged species has been most likely mistaken for it. *Arum italicum* “has been reported as having been found near Kingsbridge, Devon,” and is by no means unlikely to occur in the county. The same may be said of *Asplenium viride*, recorded from Petertavy, Dartmoor, but it is desirable that both should be confirmed by other botanists. With reference to *Trichomanes radicans* in the north of Cornwall, the author adds something to what has been already stated in our pages (Vol. IX. p. 174). The plant was shown to Mr. Fox “by the owner of the place, who first found it there.” This may be considered to lessen the claims of the Fern to be considered a native in the locality. A note from Mr. C. Prentice giving more details of his discovery of *Scirpus triqueter* in Cornwall will be found at p. 45 of our present number.

Mr. Britten has published in the 'Transactions of the Newbury District

Field-Club' a summary of what he has been able to collect on the botany of Berkshire. As no catalogue of the plants of this county has been hitherto printed, the present will form a good groundwork for a more complete Flora, which must be the work of resident botanists. The list contains 844 species, including a good many more or less naturalized introductions. It is followed by detailed localities for the more interesting or rare species. It is likely that further research will considerably extend the number of Berkshire plants, as it will certainly trace with greater completeness their distribution through the county. The paper is illustrated by a map, showing the five districts into which the county is divided by the author, which are quite artificial ones. Mr. Britten has requested us to state that he will be glad to receive any additions or corrections to this forerunner (it is to be hoped) of a Berkshire Flora, and will send a copy to any botanist who desires it.

The excellent "Supplement to the 'Flora Vectensis,'" by Mr. A. G. More, published in our last volume, has been reprinted, with some additions, by the author. A list of 120 species is given which occur on the mainland of Hampshire, but are absent from the Isle of Wight, no less than twenty of these belonging to Watson's Germanic type, which is thus shown to be much more strongly marked on the mainland than in the island. Several of these are, however, "colonists" only. *Carex vesicaria*, mentioned as absent from Hampshire, was recorded in this Journal (Vol. II. p. 316), from the New Forest, by Messrs. Trimen and Dyer.

The Birmingham Natural History Society has issued a second volume of 'Proceedings,' the contents of which refer chiefly to the geology of the district. There are, however, lists of the additions made to the flora of the neighbourhood since the publication of the last volume (see Journ. Bot. VIII. 293). These include 67 Phanerogams, among which are many critical species, especially of *Rubi* and *Roses*, and 28 Mosses. A list of the "Scale Mosses and Liverworts," also by Mr. Bagnall, is given; and Mr. A. W. Wills contributes an enumeration of the "Confervoid *Algæ*."

The Eighth Annual Report of the Belfast Naturalists' Field-Club contains several localities for some of the more interesting plants of the district, e. g. *Carex strigosa*, *C. disticha*, *Arenaria trinervis*, *Saxifraga granulata*, *Stachys Betonica*, *Tortula recurvifolia* ("certainly new to our list of Irish Mosses"), and *Orthotrichum leiocarpum* ("extremely scarce, if before recorded").

Proceedings of Societies.

LITERARY AND PHILOSOPHICAL SOCIETY OF MANCHESTER.—
Oct. 9th, 1871.—Joseph Baxendell, F.R.A.S., in the chair.—"Notices of several recently-discovered and undescribed British Mosses." By G. E. Hunt, Esq. *Gymnostomum calcareum*, N. and H., var. *brevifolium*, B. and S. *Gymnostomum viridulum*, Bridel. Perennial?, dioicous; stems cæspitose, sparingly branched, very slender, a third of an inch in height, of a reddish-brown colour below, upper part pale green, slightly glaucous; leaves ovate or ovate-lanceolate, with erect bases, thence spreading, papillose, margin crenulated in the upper part; cells in the upper portion of the leaf opaque, quadrangular, in the lower portion elongated, subdiapha-

nous; nerve thick, papillose, extending almost to the apex. Male flowers gemmiform, on very short axillary branches which usually spring from an innovation; perigonal leaves ovate, suddenly acuminate, nerved to the apex. I have not seen female flowers or fruit. Habitat: rocks at Blackhall, near Banchory, where it was discovered by Mr. John Sim.—

Entosthodon minimum, Hunt, sp. nova. Annual, dioicous; stems gregarious, erect, an eighth to a quarter of an inch high; lower leaves obovate, margin reflexed, nerve thin, vanishing below the apex; upper leaves oblong, suberect, subcanaliculate, margin recurved, crenulate in the upper part, nerve rather strong, produced almost to the apex; areolæ large, those of the lower part of the leaf elongate-hexagonal, of the upper part shorter. Male plants with the flowers terminal, antheridia 6 to 8, sessile, without paraphyses, perigonal leaves usually like the upper stem-leaves, but occasionally (together with all the stem-leaves) obovate, when they contain clavate, slightly swollen paraphyses, without antheridia. Female plants with the flowers both terminal and in the axils of the upper stem-leaves, archegonia with a few rather long filiform paraphyses; no distinct perichæatial leaves; vaginula short, cylindrical; seta an eighth to a quarter of an inch long, erect; capsule with a distinct neck, smooth, when dry obconical, widest at the mouth, operculum conical-acute. Calyptra, when young, brown, very narrow-conical, cleft on one side for a third of its length, cells spirally arranged; peristome half immersed, teeth sixteen, very slender, linear-subulate, transverse articulations distant. Fruit matures in August. Discovered near Glasnevin, Dublin, on the top of a sandstone wall, by Mr. David Orr. It has no nearly-related European allies.—*Webera Breidleri*, Juratzka (*vide* Fergusson). Dioicous, growing in extended light green patches, procumbent in the lower part, which is of a reddish-brown colour; stems about an inch and a half long; leaves ovate, decurrent, erecto-patent, concave, serrated towards the apex, margin recurved; nerve thin, vanishing below the apex; areolæ rather large, upper ones narrow elongate, acute at both ends, lower ones narrow elongate-quadrangular. Male flower terminal, discoid; outer perigonal leaves spreading, elliptic-lanceolate, longer than the stem-leaves, saccate at the base, margin strongly recurved, apex cucullate, serrated; inner perigonal leaves obovate, suddenly acuminate, serrated at the diaphanous apex, areolæ large, elongate-quadrangular; antheridia subsessile, with short filiform paraphyses. Perichæatial leaves linear-lanceolate, recurved at the margin, strongly nerved, nerve vanishing below the apex; seta geniculate near the base, slender; capsule oval pendulous, glaucous-green when young, pale reddish-brown when mature. Fruit matures July to August. Habitat: abundant on wet débris of slaty rocks near springs, on the table-lands above the head of Glen Callater, also Loch-na-gar, and in Canlochan Glen. Its companions above Glen Callater are *Dicranum Starkii*, *D. falcatum*, *Oligotrichum hercynicum*, and *Polytrichum sexangulare*. In the springs themselves abound the following, viz. *Philonotis*, several species; *Splachnum vasculosum*, *Mnium cinclidioides*, and several allied species; *Hypnum exannulatum*, *H. falcatum*, *Thuidium decipiens*, *Webera albicans*, var. *glacialis*, and numerous other interesting plants.—*Philonotis adpressa*, Ferg. Plant widely cæspitose, erect, two or three inches high, either dull glaucous-green or with a fine red tinge; leaves papillose, when moist erect, with one wide plica on each side of the nerve, incurved towards the apex, when dry slightly twisted, widely ovate, from an amplexicaul base, not acumi-

nate, apex either obtuse and cucullate, with a very slight mucro, or in the more slender forms of the plant rather acute; margin denticulate, slightly reflexed; nerve very thick, continuous; cells in the upper part of the leaf small, ovoid, towards the base a little shorter and wider. I have seen neither flowers nor fruit. Habitat: Glen Prossen, Clova, and various other places in the Clova district (Rev. J. Fergusson). Glas Mheal, Perthshire, at an elevation of 2500 feet (G. E. Hunt). In the latter station it was accompanied by *Thuidium decipiens*, De Not., *Bryum Duvalii*, *Splachnum vasculosum*, and other rare species.—*Thuidium decipiens*, De Not.; *Hypnum rigidulum*, Ferg. mss. This species was lately described by the Rev. J. Fergusson in 'Science Gossip,' and noticed in 'Journal of Botany,' October, 1871. From every form of *Hypnum commutatum* it is at once separated by its papillose leaves with much dilated auriculate bases; by its larger alar cells; by the ovoid cells of the upper portion of the leaf, those of *H. commutatum* being linear; by its monoicous inflorescence; and by the time of the fruit, which is at maturity in autumn. Fruit has been found only in Italy and in South Prussia.—Mr. Charles Bailey distributed specimens of *Acidium Statices*, Desm. (see Journ. of Bot. IX. 244), which Mr. John Barrow and he had found in some abundance on a species of *Statice* (probably *S. Limonium*), on the 3rd of June last, on the eastern shore of Walney Island. The *Statice* occurs on ground covered each high tide, on Tummer Hill Marsh, near the Water Garth Nook. Mr. Bailey mentioned that the *Urocystis pompholygodes*, Sch., also occurred on Walney Island in great plenty near Bent Haw Scar, on *Thalictrum eu-minus*, a. *maritimum*, Eng. Bot.; also that *Acidium crassum*, Pers., was common on *Cornus Mas*, L., at Silverdale, Warton Crag, and other places in North Lancashire.

Botanical News.

Dr. Pfeiffer, whose very useful 'Synonymia Botanica' we briefly alluded to on its appearance, and which has been since finished, has published the first part of an equally useful index, under the title of 'Nomenclator Botanicus.' This laborious compilation contains, in alphabetical order, the names of all the grades superior to the specific published before the year 1859, with an elaborate system of references to authorities and dates, derivations and systematic position in various books. This first part of 80 pages carries us but a little way through the letter A, so that a large book may be expected. The thanks of all botanists are due to the author for the immense amount of industry which he has expended in lightening their labours in systematic botany.

In the 'Journal of the Quekett Microscopical Club' Mr. M. C. Cooke has some notes on *Podisoma*, the well-known parasite on the Juniper. After giving an account of the remarkable observations of Dr. Oersted, of Copenhagen, which go to prove that the *Podisoma* is a state of *Ræstelia* (parasites on species of *Pyrus*), or, rather, that there is a sort of alternation of generation between them, both being forms of one species,—Mr. Cooke points out some difficulties in accepting these conclusions as absolutely proved. Three species of *Podisoma* are described and their proto-

spores figured. *P. foliicolum* of Berkeley and Broome, found on the leaves of the Savin, is removed from the genus and placed among the *Melanconiei* close to *Coryneum* as the type of a new genus, *Sarcostroma*, under the name *S. Berkeleyi*; the *P. Bulliardii* of Bonorden is doubtfully referred to the same new genus.

A new edition, by the Rev. Robert Main, of the Admiralty 'Manual of Scientific Inquiry,' has appeared, some sixteen pages being devoted to botany. Half of this consists of instructions in the collection, preservation and forwarding of living and dry specimens, originally written by Sir W. J. Hooker and now revised by Dr. J. D. Hooker. The second division is taken up with inquiries relating to pharmacology and economic botany, drawn up by Mr. Hanbury and Professor Oliver. These are not simply queries, but contain much useful information, geographically arranged. The Umbelliferous fetid gum-resins, cardamoms, Lauraceous products and india-rubber and gutta percha come in for the largest share of queries.

Dr. Charles Martins' paper on botanical geography in the 'Revue des Deux Mondes' of February 1st, 1870, with the title of "Les Populations végétales, leur origine, leur composition, leurs migrations sous l'influence des causes naturelles et par celles de l'homme," has been reprinted in a separate form.

We notice the publication of the following new pamphlets:—L. T. Olney, '*Algæ Rhodeacæ*, a list of the Algæ of Rhode Island,' 1871 (pp. 13); A. Rivière, '*L'Amorphophallus Rivieri*, Durieu' (pp. 15); a description and figure of a new gigantic Aroid, with the habit of *Dracontium asperum*, from Cochin China, grown in the experimental garden at Kamma; A. Bunge, 'Weite und enge Verbreitungs-bezirke einiger Pflanzen' (pp. 10).

A third fasciculus (Nos. 54–79) of the Rev. J. E. Leefe's 'Salictum Exsiccatum' has appeared. The printed tickets contain much information on the species included, of which the following is a list:—54. *Salix Grahami*, Bor. ms. "near *S. retusa*." 55. *S. cordata*, Muhl.; Rees, Cyclop. n. 30. 56. *S. prinoides*, a modification of *S. cordata*, Muhl. 57. *S. lætevirens*, a form of *S. cordata*, Muhl. 58. *S. rufescens*, a modification of *S. cordata*, Muhl. 59. *S. pontederana*? Schl.; from Rothbury, Northumberland. 60. *S. phyllicifolia*, L.; *S. bicolor*, Ehrh. Salict. Brit. Exsicc. n. 43. 61. *S. ambigua*, Ehrh. var. γ .; *S. spathulata*, Willd. Borr. 62. *S. phyllicifolia*, L.; *S. bicolor*, Koch, Syn. 653. 63. *S. ferruginea*, E. B. S. t. 2665; Salict. Brit. Exsicc. n. 35. 64. *S. laxiflora*, Borr. F. Bot. t. 2749; "the smooth ovaria are in this climate becoming downy." 65. *S. aurita*, L. 66. *S. rubra*, Huds. 67. *S. cuspidata*, Borr. ?; *S. cuspidata*, Schultz, Koch. 68. *S. tenuifolia*, Sm. 69. *S. nigricans*, Fr.; Koch, Syn. p. 650. 70. *S. acutifolia*, W. Koch, Syn. p. 645; Salict. Wob. t. xxv. 71. *S. Ansoniana*, Forbes, Salict. Wob. t. cvii.; "a form of *S. nigricans*, Fr." 72. *S. petiolaris*, Sm. Salict. Wob. t. 23. 73. *S. Forsteriana*, Sm. Salict. Wob. t. cx. 74. *S. hirta*, Sm., cf. Bab. Man. p. 312; from Rothbury, Northumberland. 75. *S. ramulosa*, Borr.; *S. Helix*, Anderson, cf. Salict. Brit. Exsicc. 11, 12, 13. 76. *S. Woollgariana*, Borr.; Salict. Wob. t. 4. 77. *S. patula*, Ser.; and *S. oleifolia*, Ser. Monogr. p. 11; *S. salviæfolia*, Koch. 78. *S. lacustris*, Schl. ?; Salict. Wob. t. cxvi.; Monogr. p. 66. 79. *S. nigricans*, Sm.

The new volume (1871) of the 'Transactions of the Botanical Society

of Edinburgh' contains Sir Walter Elliot's list of field clubs. This is confined to societies in the provinces, and is arranged under the three heads of England and Wales, Scotland, and Ireland. Though the catalogue does not profess to be complete, no less than 121 clubs are enumerated, with particulars of their constitution, government and publications. Certainly there can be little doubt that, with so extensive a machinery, comparatively slight results are at present obtained, and centralization, on some such plan as that proposed by Sir Walter Elliot, needed, to direct their investigations, and to render the work done more available.

A reissue is in course of preparation (to be published by Mr. Quaritch in monthly parts) of Lindley and Hutton's 'Fossil Flora of Great Britain,' originally published in 1837. This standard book has of late years become very scarce, and the descriptions are now much behind the time, though the plates retain their great scientific value. A supplementary volume will be added, written by Mr. Carruthers, which will contain a critical revision of the species in the original book, and figures and descriptions of all the important additions to fossil botany made during the last thirty-five years.

At a recent meeting of the Scientific Committee of the Royal Horticultural Society, a report on the growth of twelve different species of plants, under five different conditions of manuring, as observed during 1870-71, was presented by Dr. Masters. This report forms the complement to a former one (noticed in this Journal, Vol. IX. p. 153), recording the results of the previous year's experiments, and embodying also the results of the elaborate chemical analyses and calculations made by Dr. Gilbert. Making due allowances for the different, and in some respects improved, conditions under which the experiments were carried on during the second season, the results obtained presented a very general agreement with those obtained during the first year, except in the case of the root development of the several plants, which presented some singular discrepancies not easily to be accounted for. This is the more satisfactory, as many circumstances concurred to throw a doubt over the trustworthiness of the first year's trials. But this uncertainty applied not so much to the physiological and structural questions involved, as to those connected with the chemical constitution of the plants acted on.

Professor Thiselton Dyer has a paper in the 'Quarterly Journal of Microscopical Science' on the structure of the stem of the Screw-pine (*Pandanus*). The fibro-vascular bundles contain two large angular scalariform vessels, surrounded by wood and liber cells, and with a few spiral vessels on the inner side; at regular intervals round the periphery of the bundles are strings of small parenchymatous cells, each containing a single oblong prismatic crystal. These do not occur elsewhere in the tissues, but true raphides are plentiful in the general parenchyma, especially near the rind.

Mr. A. Destruge writes from Ecuador ('Nature' for Jan. 25th), on the subject of the Condurango of that country, a plant which has lately been greatly vaunted (as so many drugs have been before) as a remedy for cancer, and already fetches a high price in the American market. It is an Asclepiadeous plant, and, according to Mr. Destruge, forms the type of a new genus of the division *Astephanæ*.

Our London readers are reminded that this evening (February 1st) at the Linnean Society's Meeting, the President, Mr. Bentham, will read a

paper on the classification and geographical distribution of the *Compositæ*, on which great Order he has been for some time at work for the second volume of the 'Genera Plantarum.' Mr. Bentham has also commenced another (the sixth) volume of the 'Flora Australiensis.'

Dr. F. Schultz is about to commence a new series of his 'Herbarium Normale' of the plants of France and Germany, and has found it necessary to associate with himself a younger botanist in the person of Dr. F. Winter. No change in the form of the publication will be made, and the subscription price of each fasciculus, containing two centuries, will be 50 francs (£2). A general catalogue of, and annotations on, the plants of the twelve published centuries of the first series of the 'Herbarium Normale' can be obtained from Dr. Schultz at the price of 3 francs (2s. 6d.). His address is Weissenburg, Elsass.

Professor Thiselton Dyer has resigned the chair of botany in the Royal College of Science at Dublin. We understand that there are several candidates for the appointment in the field.

Our American fellow-botanists are at present much annoyed at the abrupt dismissal of Dr. Parry, who for many years has held the post of botanist to the Department of Agriculture, soon after the entrance of a new commissioner. Professors Torrey, Gray, Eaton, and Brewer have joined in a protest against the action of the commissioner, and the correspondence which has passed upon the subject is given in the 'American Naturalist' for January, 1872, and is now reprinted in a separate pamphlet. For dismissing Dr. Parry without any previous notice, in a letter which may well stand as a model of epistolary curtness, the new commissioner justifies himself by maintaining that Dr. Parry has not gone beyond the scope of the "routine operations of a mere herbarium botanist," and that these are "practically unimportant" to farmers and gardeners. Reading this in the light of the rest of the commissioner's letters, and the extracts which are given in the pamphlet from his reports, all here will, we think, incline to hold the opinion that Dr. Parry has been hardly treated, and that the course followed, to use the words of Dr. Gray, "does not seem calculated to win the confidence of scientific men in the present administration" of a very important department of the public service of the United States.

M. Millardet, who, in consequence of recent events, had resigned his appointment at Strasburg, has been appointed professor of the Académie des Sciences at Nancy.

Space will not permit us to do more than put on record the death, at Berlin, of Dr. J. T. C. Ratzeburg, on Oct. 24th, 1871, at the age of 70; and of Siegfried Reissek, at Vienna, on Nov. 9th. Obituaries of both appear in the 'Botanische Zeitung.'



W.H. Eitch, del et. lith.

Wintern Bros imp.

Symea gillesioides, Baker

Original Articles.

ON *SYMEA*, A NEW GENUS OF TRIANDROUS *LILIACEÆ*
FROM CHILI.

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

(PLATE CXXI.)

SYMEA, Baker, Refugium Botanicum, sub t. 260. "Perianthium viride, basi breviter campanulato-gamophyllum; segmentis 6, ovato-lanceolatis, flore expanso patentibus, interioribus distincte latioribus et brevioribus. Stamina fertilia 3, ad faucem tubi inserta, filamentis brevibus filiformibus basi dilatatis, antheris parvis oblongo-rotundatis, cum staminodiis 3 minutis linearibus membranaceis alternantibus. Ovarium sessile, in tubo inclusum, ovulis in loculo binis; stylus brevis, rectus; stigma punctiforme. Capsulam nondum vidi. Herba chilensis, radice tuberosa, folio solitario lineari carnosio-herbaceo, floribus umbellatis. *S. gillesioides*, Baker, the only known species.

"We have named this very distinct new genus, which occupies a position intermediate between *Gilliesia* on the one hand and *Leucocoryne* and *Brodiaea* on the other, in honour of J. T. Boswell Syme, Esq., LL.D., of Balmuto House, Kirkcaldy, Fifeshire, as a tribute of acknowledgment of the pains he has taken, and the ability which he has displayed, in marshalling and describing the plants of Britain in the now nearly-completed third edition of Sowerby's 'English Botany;' and as desirous, too, to connect his name with an Order, the European members of which he has for many years studied carefully under cultivation."

From amongst the new plants described in Britain during 1871, enumerated at pp. 49-52, we have selected for illustration the genus *Symea*, as being likely to be of special interest to our readers. The foregoing note and technical description are taken from the account in the 'Refugium,' and we are indebted to Mr. Wilson Saunders for kindly allowing us to make use of the lithographic plate that was drawn and engraved for that work. The plant was discovered near Santiago, in Chili, by Mr. E. C. Reed, who has lately introduced into England, in a living state, many other interesting species from the same neighbourhood. As will be seen from the plate, it is very like a *Gagea* in general aspect, but the divisions of the perianth are green and foliaceous instead of coloured and corolline, and they are united towards the base in a distinct cup, from the throat of which arise the minute stamens, three of which are absent, and replaced by very small membranous processes. The two other known genera of gamophyllous *Liliaceæ*, in which half the anthers are suppressed, are both confined to the west side of the American continent. *Leucocoryne*, with four species, restricted to Peru and Chili, has a corolline perianth very like the corolla of *Vinca* in shape, with the three barren filaments standing up like small horns from the throat of the tube; *Brodiaea*, with five species, belongs to California and British Columbia, and has the staminodia in the shape of minute petaloid scales on a level at the top of the throat with the sessile fertile anthers. But the greatest interest connected with *Symea* is the light that it throws upon the homology of the two extremely curious genera *Gilliesia* and *Miersia*, of which,

especially the former, the structure is very abnormal and difficult to understand. The original *Gilliesia* was brought to England about the year 1827, and was figured both by Lindley in the 'Botanical Register' (992) and by Hooker in the 'Botanical Magazine' (t. 2716). The flower consists of no less than six different rows of parts, and the plant was regarded by Lindley as the type of a new Natural Order, of which a full account will be found in the 'Vegetable Kingdom,' with his ideas upon its structure and affinities. Viewing the plant now in the light thrown upon it by *Miersia*, *Solaria* and *Symea*, all since discovered, and all of which are identical in general habit and come from the same district, it seems impossible to doubt that the two outer rows, which were then regarded as an abnormal external "involucre," really represent the ordinary liliaceous perianth, and that *Gilliesia* may be fairly regarded as simply a liliaceous genus of abnormal structure.

That Dr. Boswell Syme has fairly earned his right to a nook in the gallery of the men who give names to plant-genera, none of those who have used his 'English Botany' are likely to doubt; and those who have experienced the benefit of his labours as Curator of the Botanical Society of London, and its present representative the Botanical Exchange Club, will be fully prepared to cordially endorse this view. I am glad to have this opportunity of dedicating to him a plant belonging to an Order, one of those which are his special favourites. It is interesting to note that three closely-allied genera, *Brodicæa*, *Gilliesia* and *Miersia*, have all been discovered by, and named after, our own countrymen.

RECENT RESEARCHES IN THE DIATOMACEÆ.

BY THE REV. EUGENE O'MEARA, M.A.

The second of a series of treatises in course of publication under the direction of Dr. Johannes Hanstein, under the title of 'Botanische Abhandlungen aus dem Gebiet der Morphologie und Physiologie,' is eminently calculated to interest such as are engaged in the study of the Diatoms, and promote their knowledge of these interesting and ornamental organisms. These benefits, however, must be confined to those students who are acquainted with German, unless some one undertake to remove the obstruction, and present the treatise in an English dress.

Dr. E. Pfitzer's 'Untersuchungen über Bau und Entwicklung der Bacillariaceen (Diatomaceen)' deserves more than a passing notice, and therefore, in justice to the author, as well as with a view to the benefit of my fellow-labourers in this field of research, I shall not content myself with directing attention to some of its most salient points, but shall, in a few papers, give a brief analysis of the entire treatise.

With great justice, the author remarks that since Nitzsch and Ehrenberg opened up the path to this interesting field of observation, very little has been added to our knowledge of the structure and development of the soft contents of the Diatomaceous frustule, notwithstanding that many distinguished men, in different countries, have devoted themselves to the study of the Diatoms. This failure is to be accounted for by the fact that most observers have come to the examination only after the organic parts have been destroyed by acid or burning. And I would invite the

special attention of my fellow-labourers to the observation of our author, that so partial an investigation cannot continue without injurious effect on the growth of our knowledge of this group. The task which Dr. Pfitzer has proposed to himself is by a series of careful observations to prove the accuracy of Meneghini's observation, "That anatomy has to effect the same beneficial revolution in the Natural Classification of *Diatomaceæ* as has been produced in the system and nomenclature of Conchyliæ." This arduous enterprise he entered on with full confidence of ultimate success, and aided by a very extensive acquaintance with the literature of the subject. I would take occasion to recommend my fellow-labourers to make themselves acquainted with Heiberg's book, 'De Danske Diatomeer.'* The labour of acquiring a knowledge of the Danish language will be well requited by the profit and pleasure they cannot fail to derive from its perusal.

A patient and careful examination of the several species of *Diatomaceæ* in the direction indicated by Dr. Pfitzer, even in the hands of men much less competent than he is, can scarcely fail to contribute most important additions to our knowledge on the subject. At the same time, there is reason to doubt that a more satisfactory system of classification than we have at present is likely to be established. A considerable number of the known species of *Diatomaceæ* are fossil, and for this reason are beyond the reach of such observations; but if these researches contribute to verify in any degree the correctness of the present system of classification, to make clear what remains doubtful, or to rectify mistakes that may have been made, the labours of Dr. Pfitzer will have proved eminently successful.

Deferring my remarks on the direct results of Dr. Pfitzer's observations to my next paper, I shall now refer to two matters of interest noticed in the introduction.

The name *Diatomaceæ* has been used by nearly all the more recent authors to designate the group. Rabenhorst, in his more recent work, has adopted the name *Diatomophyceæ*, but in his former treatise used that of *Diatomaceæ*, "die Süßwasser Diatomaceen;" and in this he has been followed by Grunow, Heiberg, Schuman, Cleve, and Suringar. Dr. Pfitzer, however, maintains that the name *Bacillariaceæ* should be substituted, the genus *Bacillaria* having been established by Gmelin in 1788, whereas the genus *Diatoma* was established by De Candolle in 1805; and some of the older writers on the subject have used this designation. It may be deemed inconvenient now to abandon the name of the group which has been so generally adopted by recent writers, but, on technical grounds, Dr. Pfitzer's view is undoubtedly correct.

The most interesting portion of the introduction is, perhaps, that in which the author sketches the gradual progress of knowledge regarding the true structure and development of the Diatomaceous frustule, from its first dawn to the present moment. The bivalve character of the frustule was known before adequate notice had been taken of the hoop, or connective membrane, which binds the two valves of the frustule together. And even after the importance of this part of the frustule had been to some extent recognized, its true structure and its relation to the development of the plant were overlooked.

Wallich in 1858 observed that in the case of *Amphitetras Triceratium*

* A critical review of this book will be found in Journ. Bot. 1864, pp. 321-323.

and *Biddulphia*, "the hoop consisted of two pieces, which at first entirely overlap each other, but as the process advances, recede from each other, and whilst so receding, appear like three distinct parallel annuli, the centre being less diaphanous, and its markings more confused, in consequence of its being in reality the overlapping and double portion referred to." Wallich still further contributed to establish a true conception of the mode of growth in the hoop, by proving that in the families above specified, "the growth of each plate of the connecting membrane takes place at the margin furthest off from the valve to which it is attached." Pfitzer endorses the accuracy of Wallich's views, and expresses an opinion that greater value attaches to this discovery than even to that of the bivalve character of the frustule.

Presuming the separate plates of the connecting membrane to be in all cases as Wallich describes them, "marginal extensions of the valves perpendicular to their general plane," and that the formation of the new valves takes place within it, the effect of these conditions on the growth of the future frustules must be obviously to effect a gradual diminution in the size of the valve equivalent to the thickness of the siliceous plate of the hoop.

In the year 1869, Dr. M'Donald, in his interesting paper "On the Structure of the Diatomaceous Frustule and its Genetic Cycle" (Ann. and Mag. of Nat. Hist. 4 ser. vol. iii. 1869, p. 1), adopts the theory of Wallich concerning the structure of the hoop, and traces out its effects on the development of the frustule. "As each perfect frustule consists of an older and a younger valve, never of two valves of the same age, Kützing's names—primary as applied to the former, and secondary to designate the latter, or the invaginated valve—can be open to no possible objection. But to these it is absolutely necessary to add two tertiary valves of the same age, resulting from the process of fission, viz. the first tertiary developed in connection with the primary valve, and the second tertiary forming a new frustule with the secondary valve."

The process of diminution in each successive frustule goes on until the minimum is reached, when the frustules conjugate, and from this operation arises a sporangial frustule, in all respects similar to its parents, but double the size.

Within a few months after the important discovery of Dr. M'Donald had been made known, and before the paper had come under the notice of Dr. Pfitzer, the latter had worked out the same conclusion, thus corroborating the views of Dr. M'Donald, without derogating in the slightest degree from the credit due to himself for his own independent observation.

It must be remarked that the theory just stated as to the nature of the hoop and its bearings on the development of the frustule, has been established only in regard to the genus *Biddulphia* and its kindred families. The supposition that the same character belongs to the hoop in the other numerous genera is but a presumption,—a very natural one, indeed, but still it needs confirmation.

This fact opens up a wide field for research, and it is hoped that the numerous students of the *Diatomaceæ* throughout the world will be prompted to follow out the track the discoveries of Wallich, M'Donald, and Pfitzer have indicated.

CASTANEA VULGARIS, Lam., GROWN IN SOUTHERN CHINA.

BY H. F. HANCE, PH.D.

During the autumn and winter seasons, the markets of Hongkong and Canton are well supplied with the common Chestnut, which is habitually seen on the dessert-tables of all foreigners. But I was always under the impression that the whole of the fruit eaten here was brought down from the north, large quantities being carried by the junks which arrive from Tien-tsing. Mr. Sampson informs me that he was aware that a quantity of an inferior quality comes from the north of Kwang-tung province, but no one seems to have known that the tree is cultivated in the immediate neighbourhood of Canton. Such is, however, the case, as proved by several living branches, laden with ripe fruit of full size and excellent quality, which were brought to me last September. The fact that so large a tree can be profitably grown for fruit in the very south of China makes it more than probable that its meridional extension in the empire as a true native is far greater than supposed: hitherto it is not known to occur except in the extreme north; where, according to Bunge,* it is abundant, and certainly wild.

The distribution of this tree is somewhat singular; for, though plentiful in Japan, it does not, on the Asiatic continent, apparently extend northwards into either Manchuria or Mongolia; and, though common in south-eastern Europe, it does not spread in that direction beyond the immediately conterminous districts of Asia. It is especially remarkable that it should be absent (at least I can find no record anywhere of its occurrence), from the whole of Hindostan and the Himalayan provinces, in some of which it might have been confidently looked for. In Japan the tree seems very variable in its foliage, and has been described by the late Professor Blume † as a distinct species, under the name of *C. japonica*, of which he admits no less than twelve varieties, to which should doubtless be added his *C. Bungeana* and *C. mollissima*. With the exception of the last, these have been referred to the European species by M. Alphonse De Candolle; ‡ and I may add that that accomplished botanist and accurate observer M. Maximowicz, who had ample opportunities of observing the living tree, wrote to me in 1863, while residing at Nagasaki, that he believed "there is only one *Castanea* which grows wild in Japan, and the seeds and the whole habit of the plant remind me so exactly of *C. vesca*, that I cannot but think it is the same plant."

The Chinese specimens before me are not unlike some given me by M. Teijsmann as the true *C. japonica*, Bl. They have short petioles (5-6 lines long), and a limb 5-7 inches in length, and $2\frac{1}{4}$ - $2\frac{1}{2}$ broad, for the most part only very obscurely toothed at the edge, and with the setiform apices of the primary veins very shortly produced. But they differ besides from the ordinary European and American varieties, and resemble rather *C.*

* Enum. Pl. Chin. Bor. 62. Blume describes this as a new species, under the name of *C. Bungeana*. It is omitted in Maximowicz's 'Index Floræ Pekinensis.'

† Ann. Mus. Bot. Lugd. Bat. i. 284.

‡ Prod. Syst. Nat. Reg. Veg. xvi. ii. 114.

pumila, Michx.,—the *Chinquapin* of the United States,—by the under surface of the leaves being clothed with very dense ochraceo-fulvous velvety tomentum, composed of stellate and simple hairs intermixed, extremely conspicuous, both to touch and sight, and which shows no signs of disappearing or becoming thinner in even the oldest leaves. The branchlets also have a similar indumentum. There is some approach to this in the variety *japonica*, but it wears off more or less entirely as the leaves mature. I have little doubt that Blume's *C. mollissima*, which he states to have been introduced into Java from China, is identical; his name is very appropriate to this apparently well-marked variety.

It is singular that though the authors of every European Flora in which the tree occurs to which I am here able to refer,* concur in stating that the leaves of the common Chestnut are quite smooth beneath at maturity, M. A. De Candolle should describe them as “*vulgo subtus dense incano-tomentosa.*”

NOTES ON THE BRITISH RAMALINAS IN THE HERBARIUM OF THE BRITISH MUSEUM.

BY THE REV. JAMES M. CROMBIE, M.A., F.L.S. AND G.S.

The species and varieties of the genus *Ramalina* which occur in Great Britain and Ireland have hitherto not been sufficiently understood, as, indeed, has been the case with those occurring in other regions. Dr. Wm. Nylander, however, has recently been engaged in making a complete revision of all the species and forms which have as yet been detected throughout the world, the results of which have been published in a very valuable monograph of the genus. A notice of this has been given by the Rev. W. A. Leighton, in the ‘Annals and Magazine of Natural History’ for February, and a revision and diagnosis of the British species in accordance therewith has also been added. To this latter, however, there are several additions and corrections to be made, which it may be useful for British lichenists to here record. These are founded upon a critical examination of the specimens in the herbarium of the British Museum, and may be regarded as supplementary to the above-mentioned paper of Mr. Leighton. We may premise that the results obtained by Nylander are derived from a microscopical examination of the internal structure of the thallus and the character of the spores and spermogones, as well as the observation of the thalline reactions with hydrate of potash (K). In Leighton's excellent and indispensable Brit. Lich. Fl., there are enumerated as British four species and five varieties of *Ramalina*, which is the number mentioned also in my Lich. Brit. Enum. A revision of the genus, however, according to Nylander's monograph, gives no less than nine species and several additional varieties and forms, nearly all of which occur in the herbaria of various collectors and authors from ante-Dillenian times till the present day now preserved in the British Museum.

* For Great Britain—Smith, Lindley, Hooker and Arnott, Babington; Spain—Wilkomm; France—Cosson and Germain, Grenier, Boreau, Philippe; Germany—Reichenbach, Bluff and Fingerhuth, Koch, Herbich; Russia—Ledebour; Italy—Gussone, Moris, Bertoloni, Parlato; Dalmatia—Visiani; Rumelia—Grisebach.

A. *Spermogones in pale or colourless conceptacles.*

I. Stirps *R. gracilis*. Thallus attenuated, fruticulose, subrounded, or somewhat angulose or narrowly compressed; cortical stratum composed of filamentose elements.—Of this division but a single species occurs, and that very sparingly, in Britain, belonging to its second subdivision, viz.,

†† *Medullary stratum not tinged with K.*

1. *R. thrausta* (Ach. L. U. p. 596, as *Alectoria*), Nyl. Syn. i. p. 296; Recog. Mon. Ram. p. 18; Leight. Br. Lich. Fl. p. 94, as var. of *R. calicaris*, but not Mudd, Man. p. 73.—Following the description of Mudd, this species has been nearly always confounded in this country with a var. of *R. scopulorum*, and all the localities given in Leighton's Lich. Fl., and in his paper in Ann. and Mag. Nat. Hist., are, with one exception, incorrect. A single specimen, the only one gathered, or at least preserved, occurs in Herb. Brit. Mus., "on sandy soil above Bay of Nigg, coast of Kincardineshire" (Crombie, 1860); but in all probability it will yet be detected on old Firs in our northern highland forests, its usual habitat in Scandinavia.

II. Stirps *R. fraxineæ*. Thallus compressed, more or less longitudinally striato-nervose or subcostato-unequal.

(a.) Cortical stratum composed of filamentose elements. Of this division, there occur the following species and varieties belonging to its second subdivision, viz.,

†† *Medullary stratum not tinged with K.*

2. *R. calicaris* (Hoffm. Fl. Germ. p. 139), Nyl. Syn. i. p. 292, pro p. Recog. Mon. Ram. p. 33.—*R. calicaris* var. *canaliculata* (Frs.), Mudd, Man. p. 73; Leight. Br. Lich. p. 92.—Of this common species, there are a goodly number of specimens in Herb. Mus. Brit. from various parts of the country, though in the older herbaria, as Buddle's and Pulteney's, it is not distinguished or localized. It appears to be generally distributed and plentifully fertile throughout the country, and is very abundant in the more open parts of the New Forest. From this locality a somewhat unusual state, with the laciniae much attenuated, appears in Herb. Crombie, sub nom. f. *attenuata*. A singularly caespitose condition, in which the laciniae are very short and crowded, "from Swanston Wood," near Edinburgh, in Herb. J. Sadler, is apparently either a very young or stunted state of this plant. Mudd's Exs. 44 (*canaliculata*), "from Airyholme Wood, Cleveland," is sufficiently typical.

Var. *subampliata*, Nyl. Recog. Mon. Ram. p. 34, "with broader laciniae and the appearance of *R. fraxinea*, but with the straight spores of *R. calicaris*." Of this there is a single specimen "from near Lyndhurst, New Forest," in Herb. Crombie; and Leighton, in Ann. and Mag. Nat. Hist., also mentions it as collected in Yorkshire by G. Dixon.

Var. *subfastigiata*, Nyl. l. c., "similar in general appearance to *R. fastigiata*, but distinguished by its straight spores," also mentioned as British by Leighton, does not appear to occur in Herb. Mus. Brit. so far as I have examined.

3. *R. farinacea* (Linn. Sp. Pl. ed. i. p. 36), Ach. L. U. p. 606; Nyl. Recog. Mon. Ram. p. 34. Dill. Musc. t. 23. f. 63: *Lichen farinaceus*,

E. B. t. 889. *R. calicaris*, var. *farinacea*, Mudd, Man. p. 73; Leight. Br. Lich. Fl. p. 93.—Numerous specimens occur alike in the older herbaria, as Buddle's, Hudson's, Pulteney's, and in the more recent, as E. Forster's, Mudd's Exs. 45, Leighton's Exs. 40, Crombie's, etc. It is very generally distributed over Great Britain and Ireland, though it is rarely met with in fruit. In fact, Leighton, l. c. *supra*, says that he has never seen it in this condition. The specimen, however, figured in E. B. t. 889, "gathered by Mr. Abbot, in Clapham Park Wood, Bedfordshire," bears numerous apothecia; and along with it, in Sowerby's Herb., is a fruited specimen from the New Forest, sent by Lyell, where I myself have gathered the apothecia. There is also a fruited specimen from Dunkerron by Taylor, and one sparingly so in Herb. E. Forster from Carmarthenshire. A state which apparently belongs to this species is var. *minutula*, Ach., and is not of unfrequent occurrence on old pales in wooded regions, as in New Forest and the Scotch Highlands, though there is no specimen in Herb. Brit. Mus. It is, however, scarcely if at all sorediiferous, and may belong to *calicaris*, of which, as Nylander observes, l. c. p. 35, *farinacea* itself may be only a variety.

4. *R. fraxinea* (Linn. Sp. Pl. ed. i. p. 1146), Ach. L. U. p. 602; Nyl. Recog. Mon. Ram. p. 36. Dill. Musc. t. 22. f. 59: *Lichen fraxineus*, Sm. E. B. t. 1781. *R. calicaris*, var. *fraxinea*, Mudd, Man. p. 73; Leight. Br. Lich. Fl. p. 94.—This well-known species, common throughout Britain, is well represented in the older and recent herbaria. The specimen figured in E. B. as above, "from Cambridgeshire" (Relhan), belonging (Herb. Sowerby) to the typical form *tæniiformis*, Ach., with "elongated laciniae, narrowed at the base and apex," a very common condition. Intermediate between this and var. *ampliata*, Ach. L. U. 603, with "laciniae much dilated and lobed, costato-rugose, and subreticulated," of which a very characteristic specimen occurs in Herb. Pulteney, are Leighton's Exs. 38, Mudd's Exs. 42, and specimens from Salwey, Crombie, etc., from various parts of England and Scotland.

R. fastigiata (Pers. Uster. Ann. i. p. 256), Ach. L. U. p. 603; Nyl. Recog. Mon. Ram. p. 39. Dill. Musc. t. 23. f. 62 c: *Lichen fastigiatus*, Sm. E. B. t. 890, lower fig. on left. *R. calicaris*, var. *fastigiata*, Mudd, Man. p. 73; Leight. Br. Lich. Fl. p. 94.—This does not appear to have been rightly distinguished by the older lichenists, since it appears along with *calicaris* in Herb. Pulteney sub nom. *Lichen prunastri*; but the fig. as above in E. B., from a specimen gathered in Bedfordshire by Mr. Abbot, is sufficiently typical. It is common in the more recent herbaria from various parts of Britain, and though varying somewhat in the length and breadth of the laciniae, is for the most part like Mudd's Exs. 43, Leighton's Exs. 39, and Larbalestier's Exs. 60, sufficiently characteristic.

5. *R. polymorpha*, Ach. L. U. p. 600; Nyl. Scand. p. 76; Recog. Mon. Ram. p. 50; Th. Fries, Scand. p. 40. Hook. Br. Fl. ii. p. 224; Leight. Br. Lich. Fl. p. 92 pro p. *R. scopulorum*, var., Mudd, Man. p. 74.—From *R. scopulorum*, with which it has been frequently confounded, it may readily be distinguished by the thallus being "granuloso-sorediate, more cartilaginous, sub-opaque, and the medulla giving no reaction with K." It is at the same time a very variable species, of which two very distinct varieties occur in Herb. Brit. Mus. One of these varieties, *depressa* mihi, with short, dwarfed, caespitose laciniae,

adnate to the rock, occurs in Herb. E. Forster, from maritime rock, Polperro and Tintagel, Cornwall, and between Brighthelmstone and Portsdown, sparingly fruited. To this also may probably be referred a specimen from Salwey, from Guernsey, and the same state occurs on the coast of Kincardineshire. The other variety, *ligulata*, Ach. Syn. p. 295, with "laciniæ longer, plane, subsimple, broader, thickly covered with large globose granules," occurs sparingly fruited from coast of Kincardineshire, where it is abundant, in Herb. Crombie. Intermediate between this and the preceding, and probably the typical form, is Mudd's Exs. 47, "top of Roseberry, Cleveland," and Leight. Exs. 73, "Near Thirsk, Yorkshire." Though frequently found inland, it nevertheless there, like many other plants, indicates on the old sea rocks its maritime origin.

6. *R. pollinaria*, Ach. L. U. p. 608; Nyl. Syn. i. p. 296; Recog. Mon. Ram. p. 52. Dill. Musc. t. 21. f. 57, A and B; Mudd, Man. p. 74; Leight. Lich. Fl. p. 95, not E. B. t. 1607.—But few specimens of the true plant occur in Herb. Brit. Mus., in consequence of *R. everniodes*, Nyl., having previously been confounded with this species. Those which occur are almost entirely referable to f. *humilis*, Ach., which is frequent on pales and barn doors in the south-east of England, as mentioned in E. B. 1607 (the description). In this state it appears in Herb. E. Forster, from Walthamstow, Essex, and its neighbourhood, and in Herb. Crombie, from near Tunbridge Wells. The form *elatior*, Ach., is represented only in Mudd's Exs. 46 (middle specimen excluded), though I have it fruited in my own herbarium from near Hastings, and probably it is not very uncommon in England.

(b.) Thallus usually transversely or subreticulately unequal. Cortical stratum amorphous or subamorphous.

†† *Medullary stratum not tinged with K.*

7. *R. everniodes*, Nyl. Prod. Gall. Alger. p. 47; Recog. Mon. Ram. p. 55. E. B. t. 1607, sub nom. *L. pollinarius*.—Of this very distinct species, which may readily be distinguished from the preceding by "the amorphous cortical stratum, the softness and reticulate rugosity of its thallus," there are several specimens in Herb. Brit. Mus. As a British species, it was only recently distinguished by myself from Nylander's description in his monograph, but it is the plant figured in E. B. as above, and referred to in the description as gathered by Lyell, in Testwood Park, New Forest. The specimen drawn, which is well fruited, appears in Herb. Sowerby, and I have also found the apothecia sparingly on an old Oak near Lyndhurst. Under the name of *R. pollinaria* it also occurs in Herb. Salwey, from Isle of Wight; Taylor, from near Belfast; Crombie, from New Forest; and is also the plant of Leighton's Exs. 41, from Gopsall, Leicestershire, and Mudd's Exs. 46, from Cleveland (the middle specimen). It is very variable in the character of the laciniæ, and I have a specimen from near Lyndhurst in which the thallus consists of a "single large rounded lobe" (f. *monophylla* mihi). This species is evidently the plant of Dill. Musc. t. 21. f. 57, C and D, and occurs in Herb. Buddle, from which it would appear that D was drawn.

IV. Stirps *R. scopulorum*. Thallus firm, solidly corticated, subroundly compressed, unequal on the surface; cortical stratum externally amorphous, internally filamentose.

† *Medullary stratum yellow and then rusty-red with K.*

8. *R. scopulorum* (Dicks. Crypt. iii. 18), Ach. L. U. p. 604; Nyl. Recog. Mon. Ram. p. 58. Hook. Br. Fl. ii. p. 225; Mudd, Man. p. 74.—This, like *R. polymorpha*, with which it has been frequently confounded, is a somewhat variable species. It may be readily distinguished in all its states by the character of the thallus, which is shining, and never *granuloso-sorediate*, and by the different reaction with K. The specimen figured in E. B. t. 688 (a larger form) does not occur in Herb. Sowerby, though a specimen entirely typical from the same locality, Lamorna Cove, Cornwall, gathered by Turner, is present. It also occurs typical in Larbalestier's Exs. 13, from Grosnez Common, Jersey, in Herb. E. Forster, from the south coast of England, and Aberystwith, in Wales; in Herb. Holl, from Leigh Tor, Devon (larger form); in Herb. Lyle, from the island of Arran, and from Ardglass, co. Down, Ireland; in Herb. Crombie, from the coast of Kincardineshire; and I have seen specimens from Orkney. On the east of Scotland, however, it is not so common as *R. polymorpha*.

Var. *subfarinacea*, Nyl. in lit.—This is *R. thrausta* of Mudd's Man. p. 73, and is there sufficiently well described. As *R. thrausta*, it appears in Herb. Brit. Mus. from several localities, viz. Laughbraugh, Cleveland (Mudd), top of Malvern (Holl), coast of Kincardineshire (Crombie), in which last it is very abundant on old walls near the sea, as about Portlethen. Mr. Leighton informs me that it is also his *R. thrausta*, from Longmynd, Salop; and probably my own from Movrone and Craig Tulloch, though, as the specimens have not been preserved, this is uncertain. The laciniae are short and shining, often *pulverulento-sorediiferous*, but it does not appear to occur in fruit.

†† *Medullary stratum not tinged with K.*

9. *R. cuspidata* (Ach. L. U. p. 605), Nyl. Recog. Mon. Ram. p. 60.—This species, if in reality distinct from the preceding,—and on this point Nylander, l. c., says, “*forsan non vere specie differat*,”—I have not been able as yet satisfactorily to determine in its typical state, as described by Leighton in Ann. and Mag. Nat. Hist. As described by Nylander, Lich. Scand. p. 76, and by Th. Fr. Lich. Scand. p. 40,—“a small form with the laciniae erect, subsimple, blackish at the subulate apices,”—it occurs in Herb. Forster, from near Aberystwith; in Herb. Holl, from Membury, south Devon; in Herb. Crombie, from coast of Kincardineshire. In this last locality, states approaching to var. *crassa* (Del.) are occasionally seen. Probably several of the specimens in the older herbaria are referable to the plant as described by Leighton, but an accurate examination of these is not altogether attainable, in consequence of the medulla, through old age, etc., often presenting itself in an abnormal state. To this, at all events, judging from the synonym *Lichen siliquosus*, and its description given by Withering, iv. p. 40, is to be referred Dill. Musc. t. 17. f. 38, for which he gives as localities “the Grey Wethers, Wilts, and rocks in the Cambrian Alps.” As *L. siliquosus* it occurs in Pulteney's herbarium, though there it is also mixed with *R. polymorpha*. Mr. Leighton also refers Dill. t. 17. f. 39 A to this species, and his own Exs. 2, which latter unfortunately does not occur in Herb. Brit. Mus. The figure of Dillenius, I suspect, must be assigned from his own description to

Rocella tinctoria, and I think that t. 17. f. 38 B, which is undoubtedly a *Ramalina*, may with greater propriety be held to represent the present plant.

Such, then, are the results presented by a revision of the British *Ramalinas*, according to Nylander's valuable monograph. There can be little doubt that a more extended research will add even to the present large number of species and varieties. For instance, *R. minuscula*, Nyl., can scarcely be absent from stunted Pines on our highland mountains, nor can vars. *emplecta*, Ach., and *capitata*, Ach., of *R. polymorpha* be wanting on some of our maritime rocks.

SHORT NOTES AND QUERIES.

ELEOCHARIS UNIGLUMIS, *Reichb.*—As far as the British Isles are concerned, this very indistinct species has been believed to be confined to the neighbourhood of the sea. Mr. A. G. More, however, agrees with me in certainly referring to it a plant collected in a marshy field on the north side of the Seven Bridge Road, near Botley, Berks. See also 'Flora of Middlesex,' p. 299.—W. T. THISELTON DYER.

HAMPSHIRE PLANTS.—The publication of Mr. More's 'Supplement to the Flora Vectensis,' reminds us that there are some errors in our list of Hampshire plants, published eight years ago (*Journ. Bot.* II. pp. 316–318), which it would be well to correct. '*Carex stricta*' is certainly a mistake for a state of *C. paludosa*, with the lowest leaf-sheaths destitute of laminæ, and with filamentous margins. '*Lastrea æmula*,' from Boscombe Chine, is not that species, but *L. spinulosa*, as was pointed out at a meeting of the Botanical Society of Edinburgh in 1865, by Mr. Neill Fraser.—W. T. THISELTON DYER; H. TRIMEN.

EAST GREENLAND.—Very little is known of the flora of the east coast of Greenland. Scoresby and Sabine's expedition collected, in 1822, only about sixty-two flowering plants between lat. 70° and 76° N., and it has been generally supposed to consist of very few species. We may expect considerable additions to our knowledge from the explorations of the second German Arctic expedition which has recently returned. 'Fraser's Magazine' for February contains the substance of an official lecture, delivered by Dr. Pansch, naturalist to the steamer 'Germania.' From this, we find that the expedition reached the Pendulum Islands in the autumn, and made excursions to as far north as lat. 77°; in lat. 73° 12' a stupendous fiord branching far into the interior was discovered. The country, contrary to what was expected, was found to be in the main completely free from snow for three whole months, disappearing as early as April. From this time the soil constantly absorbs, in a most surprising manner, the heat that incessantly streams from the now never-setting sun. The ground thaws to a depth of from twelve to eighteen inches. There is in the height of summer scarcely any nocturnal cooling, and dew is all but unknown. It is stated that a rich and vigorous vegetation results,

especially on tracts of wet mud formed by the water from melted snow-slopes which is unable to penetrate the frozen lower stratum of the ground. On the hills (1000–3000 ft.) the air is warmer at the summits than below, so that no highest limit of plants exists. Saxifrages, *Silene*, *Dryas*, and other plants occur on these summits, and on a peak 7000 ft. high Moss several inches long occurred in thick cushions. Slopes of uninterrupted green clothe the lower slopes up to 1000 ft., decked with yellow flowers of the Dandelion, etc. Ferns, Sorrel, a *Campanula*, an evergreen *Pyrola*, a large-flowered *Epilobium*, a *Polemonium*,* *Rhododendron*, and, more remarkable, great quantities of vigorous dwarf Birch were observed. The Bilberry and *Andromeda* cover large spaces. From this account it appears that the flora is much richer than has been supposed. It is probably very similar to that of Spitzbergen, though scarcely likely to contain so large a number of species as those islands, which, though in lat. 76° to 80° N., have a phanerogamic flora of ninety-five species, the result of an exceptional climate produced by the influence of the Gulf Stream. Reference to our second volume (pp. 168–174) will give our readers a description of the climate and appearance of Spitzbergen in lat. 78° N. during summer very like what Dr. Pansch has given of East Greenland.

THE DISTRIBUTION OF *ARMERIA MARITIMA*, ETC., IN BRITAIN.—In the very suggestive lecture of Canon Kingsley on Bio-Geology, which appeared at pp. 53–57, he expresses himself sadly puzzled about the supposed anomaly in the distribution of “the Thrift” and “the Scurvy Grass.” He asks, “How is it that we find these plants abundant on the seashore and common on mountain-tops, but nowhere between the two?” This, however, is scarcely a correct statement of the fact, for both *Armeria maritima* and *Cochlearia officinalis* are found in various intermediate habitats. Apart altogether from localities in which they may be regarded as escaped from cultivation, both plants in highland districts may often be seen here and there along the course of the streams and rivers from their sources on the mountains to their junction with the ocean, *e. g.* along the Dee and Don in Aberdeenshire. In these situations they have evidently been washed down from the mountains, as is the case with other alpine plants, such as *Arabis petræa* and *Alchemilla alpina*, which do not, however, quite reach the seashore. Mr. Kingsley’s statement must therefore evidently be qualified in this respect. Nor is this the only qualification which it requires, for it is to be observed further that in mountainous tracts they are by no means confined exclusively to the highest summits, but are sometimes found also on isolated hills of comparatively low elevation, as in Breadalbane, Braemar, and North Wales, where we have seen them at an altitude of some 1500 feet and even lower. Indeed, “the Thrift” is mentioned in Greville’s ‘Flora Edinensis’ as occurring on the top of Arthur’s Seat, Edinburgh, which is only 840 feet in height. These exceptions being made, Mr. Kingsley’s question resolves itself into the much simpler one, “How is it that these plants, abundant on the seashore, and common on mountains and by rivers in

* Probably an Arctic variety of *P. cæruleum*. “It is very remarkable that this plant inhabits no part of Greenland but the east coast only, and at a very high latitude.”—Hooker, “Arctic Plants,” Linn. Soc. Trans. xxiii. 334.

highland districts, are not found also in natural habitats in subalpine and lowland tracts?" On this point I do not think that it will be necessary to wait *seven years* for an answer, which, not to enter into minute details, or occupy too much space, may briefly be stated on bio-geological grounds as follows:—In all their *native* habitats, whether on the loftier or lower mountains, they are to be regarded as strictly maritime plants, still flourishing on the old insular sea-rocks, and not carried away by subsequent denudation. This, I think, sufficiently explains the supposed anomaly, and answers Canon Kingsley's question. A much more difficult question, and one closely connected with the present, is, whether the different characters presented by these plants in their montane and maritime habitats, depend entirely upon difference in temperature, elevation, etc., or upon difference in origin, the former having been introduced from a north, and the latter from a south direction. This, however, is a subject far too extensive and complicated to be here discussed. It is very much to be desired that botanists would turn their attention more particularly to the very interesting study of phyto-geology, and record the results of their investigations from time to time in this Journal.—JAMES M. CROMBIE.

FERTILIZATION OF THE HAZEL.—Three years ago I stated my belief that the Hazel is as nearly self-fertilized as it is possible for a unisexual plant to be; *i. e.* that the female flowers are fertilized from male flowers in close proximity to them. Other botanists had combated this idea on the ground that the male and female flowers are not matured on the same bough at the same time. I have this year repeated my observations, and with the same result as before. The enclosed twig, gathered in Oxfordshire on February 3rd, will, I hope, reach you in sufficiently good condition to show that the red stigmas of the female flowers are completely protruded and in a receptive condition, and are be-pollened (to use Mr. Hart's term) to all appearance from the anthers of the fully-developed catkins with which they are in actual contact. My observations, both on that day and on a subsequent date, February 10th, were uniform, that there were few female flowers developed on those dates which might not easily be fertilized from male catkins which were in close contiguity to them. My theory of the fertilization of winter-flowering plants is not that cross-fertilization is impossible with them, but that they are specially constructed with a view to self-fertilization as a rule, and that where a species, ordinarily flowering in the spring or summer, prolongs its period of flowering into the winter, the structure or arrangement of the male and female organs may even be specially modified for this purpose, as observed by myself in *Stellaria* and by Mr. Hart in *Geranium*. The Hazel I take to be a true winter-flowering plant, producing its male and female flowers in January and February, independently of the temperature or the forwardness or backwardness of the season. When its period of flowering is prolonged into March, I should not be surprised to find that the later female flowers depend for their impregnation on pollen brought from a distance. The Willows, as pointed out by Dr. Buchanan White, are spring, not winter-flowering, plants.—ALFRED W. BENNETT.

VARIATION OF LEAVES OF COLEUS (see p. 23).—I have examined leaves from plants of *Coleus* growing in a neighbour's garden at Sydenham, also others from the north of London, and find the same entophytes in all of them. In some the endochrome is coloured, in others partially or quite colourless; these last may in parting with their contents have coloured adjacent portions of the leaf. Though this is not sufficient proof that the variegation is produced by the fungus, the very irregular manner in which the *Coleus* leaves are coloured leads me to suspect that the cause may be a different one from that which produces the more regular variegation of *Geranium* and other well-known plants.—T. HOWSE.

DRABA RUPESTRIS.—I have lately had an opportunity of examining the specimen sent by the Rev. W. M. Hind to the Herbarium of Trinity College as *Draba rupestris* (see Vol. IX. p. 335), and which was supposed to have sprung up from a seed contained in soil brought from Ben Bulbin. Mr. Hind appears to have determined its name by the dangerous process of exclusion. It is certainly only a large form of *D. verna*.—W. T. THISELTON DYER.

CALLITRICHE OBTUSANGULA, *Legall.*—Mr. A. G. More records this plant from ditches near Brading harbour, Isle of Wight, in the 'Journal of Botany,' Vol. VIII. p. 342; and I now find that I gathered the same plant by Aldreth Bridge, in Cambridgeshire, in July, 1855, but have never been satisfied of its true name. It seems to be quite distinct from *C. vernalis* and *C. stagnalis* (*C. platycarpa*), with the latter of which I had confounded it. Its nearest ally is the *C. Asagræi* of Hegelmaier's Monograph, p. 54, tab. 3, f. 9, and 4, f. 1; but the leaves of that plant are very different in form from those of *C. obtusangula*, and it is a native of North America. If attention is paid to the *totally blunt* lobes of the fruit it cannot be mistaken for any of our other species, and will very likely prove to be not uncommon. Again we are indebted to the acute observation of Mr. A. G. More for a real addition to our flora.—C. C. BABINGTON.

BETULA.—I have three specimens of a *Betula* from Ben Aven, Braemar, and Ben Vachart, near Struy (J. Hall), which do not well accord with our recognized species, and I have long since labelled them *B. intermedia* or *B. humilis*. Colonel Brown, of Thun, in Switzerland, an excellent authority, named a plant of Dr. Balfour's, from Clova, *B. intermedia* (Mag. Nat. Hist. ser. 2, i. 447); and I have long expected that in some of the mountain excursions of the Edinburgh professor we should hear again of the plant. I am as unable as ever to name my specimens, which I have had since in 1839 and 1842, and wish to direct the especial attention of botanists who visit the Scottish Highlands to the small shrubby forms of *Betula* to be found there. Mr. H. C. Watson (Comp. Cyb. Brit. 560) speaks of the plants as "error," but does not give his reasons either there or in Cyb. ii. 382, or iii. 507. The plants have nothing to do with my attempted split of *B. nana* adverted to in the same place.—C. C. BABINGTON.

Reports.

REVIEW OF THE CONTRIBUTIONS TO FOSSIL BOTANY PUBLISHED IN BRITAIN IN 1871.

BY WILLIAM CARRUTHERS, F.R.S.

The following papers have been published:—

BAILY, W. H. Figures of Characteristic British Fossils. Part iii. pl. 28.

The author devotes this plate to representations of four plants from the Devonian measures of Ireland and Scotland, namely, *Palæopteris hibernica*, Schimp.; *Knorria Bailyana*, Schimp.; *Cyclostigma Kiltorkense*, Haught.; and *Lepidodendron nothum*, Ung.

BINNEY, E. W. Observations on the Structure of Fossil Plants found in the Carboniferous Strata. Part ii. *Lepidostrobus* and some allied cones. Palæont. Soc. pp. 33–62, pl. vii.–xii.

The author figures two cones, which, from the similarity in the structure of their axis respectively to *Lepidodendron Harcourtii*, With., and *L. vasculare*, Binney, he believes to be the fruits of these species. Nine cones, belonging to the same group as that to which the name *Flemingites* was given, are figured, and named as eight new species of *Lepidostrobus*. The most important observation in regard to these cones is the discovery, according to the author, of microspores in the sporangia of the upper portion of one of the cones, and the existence in all of them of sporangia enclosing the macrospores (Binney) or sporangia (Carruthers). (See further on, under EQUISETACEÆ, *Lepidostrobus ambiguus*.) Under the name *Bowmanites cambrensis* (gen. and sp. nov.), Mr. Binney figures a Calamitean cone, in which several sporangia are borne in a linear series on each scale. It is to be regretted that the author gives no diagnostic characters for the new genus and the many new species he proposes in this important memoir.

CARRUTHERS, W. On some supposed Vegetable Fossils. Quart. Journ. Geol. Soc. vol. xxvii. pp. 443–448, pl. xix.

The author describes some physical impressions and zoological structures, which have been erroneously supposed to belong to the vegetable kingdom.

On two Undescribed Coniferous Fruits from the Secondary Rocks of Britain. Geol. Mag. vol. viii. pp. 540–544, pl. xv.

The author describes the cone of a second species of Pine associated with a second species of *Sequoia* from the Gault, and shows that the type of Pine associated with the *Wellingtonias* of the Gault was the same as that now found with these trees in Western North America.

On the History and Affinities of the British *Coniferæ*. Abstract. Brit. Ass. Reports, 40th Meeting, p. 71.

The author traces the appearance, development, and affinities of the fossil and recent Conifers of Britain.

On the Sporangia of Ferns from the Coal Measures. Abstract. Brit. Ass. Reports, 40th Meeting, p. 71.

The sporangia are referred to hymenophyllaceous Ferns.

CARRUTHERS, W. Remarks on the Fossils from the Railway Section at Huyton. Abstract. Brit. Ass. Reports, 40th Meeting, p. 71.

The author described in general terms a series of carboniferous fossils collected at Huyton by the Rev. H. Higgins.

————— Note on an *Antholithes* discovered by C. W. Peach, Esq. Abstract. Brit. Ass. Reports, 40th Meeting, p. 72.

The specimens showed that *Antholithes* were the spikes of *Cardiocarpon*.

DAWSON, J. W. On Spore-cases in Coals. (Reprinted from 'Silliman's Journal,' April, 1871.) Ann. Mag. Nat. Hist. 1871, pp. 321-329.

The author figures some spore-cases from a brown bituminous shale of Upper Devonian age from Kettle Point, Lake Huron, which he names *Sporangites huronensis*, and he considers they belong to the species of *Lepidodendron* found in the bed. His *Sporangites glabra* are "almost without doubt the spore-cases of *L. corrugatum*." He has found spore-cases in many American coals, but he considers their presence as "accidental rather than essential to coal-formation."

————— The Fossil Plants of the Devonian and Upper Silurian Formations of Canada. Montreal and London, 1871, p. 100, pl. i.-xx.

The author gives the results of his researches in these strata prosecuted for several years, and here brought to a conclusion, so far as the accessible material will admit. He reports more than 120 species of land plants. The work is, with a few additions and some necessary changes, the same as the memoir read to the Royal Society in 1870, and now in its archives. Twenty-six new species are named, mostly founded on very imperfect materials, and imperfectly described. These new species are included in the systematic list.

————— On New Tree-ferns and other Fossils from the Devonian. Quart. Journ. Geol. Soc. vol. xxvii. pp. 269-275, pl. xii. Abstract. Geol. Mag. vol. viii. p. 231.

Three Fern stems and some other fossils are described in this paper from the Devonian rocks of North America.

————— On the Structure and Affinities of *Sigillaria*, *Calamites*, and *Calamodendron*. Quart. Journ. Geol. Soc. vol. xxvii. pp. 147-161, pl. vii.-x.

The author holds that *Calamites* and *Lepidodendron* are distinctly cryptogamous, and are related to, or included in *Equisetaceæ* and *Lycopodiaceæ*; but *Calamodendron* seems to form a connecting link between *Calamites* and the ribbed *Sigillariæ*, while *Lepidophloia* seems to connect *Lepidodendron* with *Sigillariæ* of the *Favularia* type. On the other hand, the ribbed *Sigillariæ* may be related through *Dadoxylon* to the modern Conifers, and the *Favulariæ* may be related to the Cycads.

HEER, OSWALD. On the Carboniferous Flora of Bear Island. Abstract. Quart. Journ. Geol. Soc. vol. xxvii. p. 1; Ann. Mag. Nat. Hist. vol. vii. p. 175.

The author compares the flora of this island with the plants found in the Yellow Sandstones of Ireland, and concludes that they are of Lower Carboniferous age, and form a special group, for which he proposes the name "Ursa-stagr."

HULL, EDWARD. On the Geological Age of the Ballycastle Coalfield, with Palæontological Notes by W. H. Baily. Journ. Roy. Geol. Soc. Ireland, vol. ii.

The author considers these beds the equivalents of the Upper beds of coal under the Lower Carboniferous series of Scotland. The report by Mr. Baily on the fossils confirms this opinion. The only fossils found belong to known species of the genera *Sigillaria* and *Lepidodendron*.

PHILLIPS, JOHN. Geology of Oxford and the Valley of the Thames. Oxford, 1871, pp. 523.

This volume contains lists, and sometimes descriptions and figures, of the plant-remains found in the different formations within the boundaries to which it refers. The new species are included in the systematic list.

THOMSON, J. On the Occurrence of *Stigmaria stellata*, Eichw., in the Lower Carboniferous rocks, Lanarkshire. Abstract. Geol. Mag. vol. viii. p. 236.

WILLIAMSON, W. C. On the Organization of *Volkmania Dawsoni*. Mem. Lit. Phil. Soc. Manch., 3rd series, vol. v. pp. 28-40, pl. i.-iii. Abstract. Proc. Lit. Phil. Soc. Manch. vol. x. pp. 105, 106.

The author describes the minute structure of a Calamitean cone of the same type as that to which Binney had given the name *Bowmanites cambrensis*. Each whorl of leaves in the cone supports several sporangia in a linear series.

————— On *Stigmaria*. Abstract. Proc. Lit. Phil. Soc. Manch. vol. x. pp. 116-118.

The author describes this fossil as having a true cellular pith and two kinds of medullary rays. It could not be the root of *Lepidodendron*, and it showed that we were still ignorant of the internal organization of *Sigillaria*.

————— On the Organization of the Stems of Calamites. Abstract. Brit. Ass. Reports, 40th Meeting, pp. 89, 90. Abstract. Proc. Roy. Soc. vol. xix. pp. 268-271. Ann. Mag. Nat. Hist. pp. 299-302.

The author describes the minute structure of the stems, which he places in two generic groups, the *Calamites* and *Calamopitus*, the former to comprehend those without infranodal canals, the latter those which possess them.

————— On the Organization of the Fossil Plants of the Coal Measures. Part. ii., *Lepidodendra* and *Sigillariæ*. Abstract. Proc. Roy. Soc. vol. xix. pp. 500-504. Ann. Mag. Nat. Hist. pp. 134-138.

The author describes the structure of *Lepidodendron*, *Sigillaria*, *Diploxyton*, *Ulodendron*, *Halongia*, and *Favularia*, and believes that all these forms are but modifications of the Lepidodendroid type.

YOUNG, J., and ARMSTRONG, JAS. On the Carboniferous Fossils of the West of Scotland. Trans. Geol. Soc. Glasgow, vol. iii., Suppl.

The authors give a systematically-arranged list of the known fossil plants, amounting in all to ninety species, with the localities where they have been found.

Synopsis of the Genera and Species Described or Figured in the Memoirs enumerated above.

FILICES.

Caulopteris Lockwoodi, Dawson, Quart. Journ. Geol. Soc. vol. xxvii. p. 270; pl. xii. f. 1-3. Devonian. Gilboa.

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- C. antiqua*, Newb. ; Daws. Quart. Journ. Geol. Soc. vol. xxvii. p. 271 ; pl. xii. f. 4. *Devonian*. Ohio.
- C. peregrina*, Newb. l. c. p. 272 ; pl. xii. f. 506. *Devonian*. Ohio.
- Glossopteris longifolius*, Phillips, Geol. Oxford, p. 168. *Oolite*. Eye-ford.
- Neuropteris retorquata*, Daws. Foss. Pl. Canada, p. 50 ; pl. xvii. f. 197. *Devonian*. Lepreau.
- N. Selwyni*, Daws. l. c. ; pl. xvii. f. 198. *Devonian*. St. Johns.
- Palæopteris hibernica*, Schimp. ; Baily, Characteristic British Foss. pl. 28. f. 1.
- Pecopteris approximata*, Phillips, Geol. Oxford, p. 168 ; diag. xxviii. f. 2. *Oolite*. Stonesfield.
- P. densifolia*, Daws. Foss. Pl. Canada, p. 56 ; pl. xvii. f. 195, 196. *Devonian*. St. Johns.
- P. diversa*, Phillips, l. c. ; diag. xxviii. f. 1. *Oolite*. Stonesfield.
- P. incisa*, Phillips, l. c. ; diag. xxviii. f. 5. *Oolite*. Stonesfield.
- Psaronius Erianus*, Daws. Foss. Pl. Canada, p. 58. *Devonian*. New York.
- P. textilis*, Daws. l. c. p. 59. *Devonian*. New York.
- Rhachiopteris gigantea*, Daws. Foss. Pl. Canada, p. 57. *Devonian*. New York.
- R. palmata*, Daws. l. c. *Devonian*. New York.
- Sphenopteris plumosa*, Phillips, Geol. Oxford, p. 168 ; diag. xxviii. f. 3. *Oolite*. Stonesfield.
- S. splendens*, Daws. Foss. Pl. Canada, p. 53 ; pl. xvi. f. 186. No locality.
- Tæniopteris angustata*, Phillips, Geol. Oxford, p. 168 ; diag. xxviii. f. 8-10. *Oolite*. Stonesfield.
- EQUISETACEÆ.**
- Annularia laxa*, Daws. Foss. Pl. Canada, p. 31 ; pl. vi. f. 64-69. *Devonian*. Gaspe.
- Asterophyllites lenta*, Daws. Foss. Pl. Canada, p. 29 ; pl. v. f. 60. *Devonian*. St. Johns.
- Bowmanites cambrensis*, Binney, Pal. Soc. ; Binney's Carb. Fl. p. 59 ; pl. xii.
- Calamites*, Williamson, Brit. Ass. Rep. 40th Meeting, p. 89 ; Proc. Roy. Soc. vol. xix. p. 268.
- Calamodendron antiquius*, Daws. Foss. Pl. Canada, p. 24 ; pl. iii. f. 39. *Devonian*. Lepreau.
- C. tenuistriatum*, Daws. l. c. p. 25 ; pl. iii. f. 40. *Devonian*. Lepreau.
- Calamopitrus*, Williamson, Brit. Ass. Rep. 40th Meeting, p. 90 ; Proc. Roy. Soc. vol. xix. p. 271.
- Lepidostrobus*? *ambiguus*, Binney, Palæont. Soc. ; Binney's Carb. Fl. p. 55 ; pl. xi. f. 1. This undoubtedly belongs to the genus *Bowmanites*, which Mr. Binney figures in his next plate. The elaborate drawings and descriptions of Professor Williamson show beyond doubt, what the analogy of allied plants made one expect, that the round bodies are sporangia, and not as Mr. Binney supposes macrospores ; and the introduction of a large sac enclosing the sporangia in this species makes it doubtful whether they exist in the specimens of cones of *Flemingites*, which he figures as seven species of *Lepidostrobus*. Besides, the preparations of Professor Huxley have conclu-

sively established my interpretation of the "macrospores," for he has detected around these bodies immense quantities of microspores, composed, as in R. Brown's *Triplosporites*, of three sporules, and in the interior of some of the "macrospores" themselves he had observed and has shown to me several microspores yet remaining.

Pinnularia elongata, Daws. Foss. Fl. Canada, p. 33; pl. vii. f. 77. Devonian. St. Johns.

P. nodosa, Daws. l. c.; pl. vii. f. 78. Devonian. St. Johns.

Sphenophyllum ovale, Phillips, Geol. Oxford, p. 86; f. 3. Carboniferous. Forest of Dean.

Volkmannia Dawsoni, Williamson, Mem. Lit. Phil. Soc. Manch. 3rd ser. vol. v. p. 28; pl. i.-iii. This obviously belongs to Binney's genus *Bowmanites*, and is perhaps the same species as that of which Binney figures the external form.

LYCOPODIACEÆ.

Arthrostigma gracile, Daws. Foss. Pl. Canada, p. 41; pl. xiii. Devonian. Gaspè. This is a species of that group of plants to which Houghton gave the name *Cyclostigma*. It has no points of correspondence with *Calamites*; the leaves are spirally arranged in all the specimens figured, and not in whorls as in Dr. Dawson's restoration.

Cyclostigma densifolium, Daws. Foss. Pl. Canada, p. 43; pl. viii. f. 92-96. Devonian. Gaspè.

C. Kiltorkense, Haught.; Baily, Characteristic Brit. Foss. pl. 28. f. 3.

Knorria Bailyana, Schimp.; Baily, Characteristic Brit. Foss. pl. 28. f. 2.

Lepidodendron, Williamson, Proc. Roy. Soc. vol. xix. p. 500.

L. Harcourtii, Williamson, Palæont. Soc.; Binney's Carb. Fl. p. 46; pl. vii.

L. nothum, Ung. Baily, Characteristic Brit. Foss. pl. 28. f. 4.

L. vasculare, Binney, Palæont. Soc. l. c. p. 49; pl. viii.

Lepidophloios antiquus. Daws. Foss. Pl. Canada, p. 36; pl. viii. f. 90. 91. Devonian. Gaspè.

L. dubius, Binney, l. c. p. 52; pl. ix. f. 3.

L. Hibbertianus, Binney, l. c. p. 55; pl. x. f. 2.

L. latus, Binney, l. c. p. 57; pl. xi. f. 3.

L. levidensis, Binney, l. c. p. 54; pl. x. f. i.

L. Russellianus, Binney, l. c. p. 51; pl. ix. f. 1, 2.

L. tenuis, Binney, l. c. p. 53; pl. ix. f. 4.

L. Wuenschianus, Binney, l. c. p. 56; pl. xi. f. 2.

Sigillaria, Williamson, Proc. Roy. Soc. vol. xix. p. 500.

Stigmara, Williamson in Proc. Lit. and Phil. Soc. vol. x. p. 116.

S. areolata, Daws. Foss. Pl. Canada, p. 23; pl. iii. f. 33. Devonian. Gaspè.

S. minutissima, Daws. l. c. p. 23; pl. iii. f. 34. Devonian. Gaspè.

S. perlata, Daws. l. c. p. 22; pl. iii. f. 32. Devonian. St. John.

S. stellata, Eichw.; Thomson, Geol. Mag. vol. viii. p. 236. Carboniferous. Lanarkshire.

CYCADEÆ.

Palæozamia megaphylla, Phillips, Geol. Oxford, p. 169; diag. xxx. f. 1. Oolite. Stonesfield.

Pterophyllum Buckmanni, Phillips, Geol. Oxford, p. 170. Oolite. Sevenhampton.

CONIFERÆ.

- Antholithes floridus*, Daws. Foss. Pl. Canada, p. 63; pl. xix. f. 236.
No locality.
- Araucarites sphaerocarpus*, Carr. Geol. Mag. vol. viii. p. 542.
- Brachyphyllum solitarium*, Phillips, Geol. Oxford, p. 120. *Lias*.
Bidford.
- Cardiocarpon ovale*, Daws. Foss. Pl. Canada, p. 60; pl. xx. f. 223,
224. *Devonian*. St. John.
- Carpolithes compactus*, Daws. Foss. Pl. Canada, p. 63; pl. xix. f. 229.
Devonian. St. John.
- Dadoxylon Newberryi*, Daws. Foss. Pl. Canada, p. 14; pl. i. f. 7-9.
Devonian. Ohio.
- Ormoxylon erianum*, Daws. Foss. Pl. Canada, p. 14; pl. i. f. 10-14.
Devonian. New York.
- Pinites dejectus*, Carr. Geol. Mag. vol. viii. p. 541.
- P. hexagonus*, Carr. Geol. Mag. vol. viii. p. 540; pl. xv. *Gault*.
Folkestone.
- Sequoiites ovalis*, Carr. Geol. Mag. vol. viii. p. 541.
- Trigonocarpum perantiquum*, Daws. Foss. Pl. Canada, p. 62; pl. xix.
f. 228. *Devonian*. St. John.

INCERTÆ SEDIS.

- Breea eulassioides*, Lloyd; Phillips, Geol. Oxford, p. 95. *Permian*.
Meriden.
- Carpolithes plenus*, Phillips, Geol. Oxford, p. 300; pl. xiii. f. 1, 2.
Coralline Oolite. Marcham.
- Næggerathia gilboensis*, Daws. Quart. Journ. Geol. Soc. vol. xxvii. p.
273; pl. xii. f. 8. *Devonian*. Gilboa. It is impossible to determine
what this fragment is, and it is to be regretted that it has received a
specific name.

EXCLUDED.

- Carpolithes permianus*, Gein. l. c. p. 446.
- C. umbonatus*, Sternb.; Carruthers, Quart. Journ. Geol. Soc. vol. xxvii.
p. 446; pl. xix. f. 12-17.

Extracts and Abstracts.

THE ARRANGEMENT AND MORPHOLOGY OF THE LEAVES OF *BAPTISIA PERFOLIATA*.

BY PROFESSOR ASA GRAY.

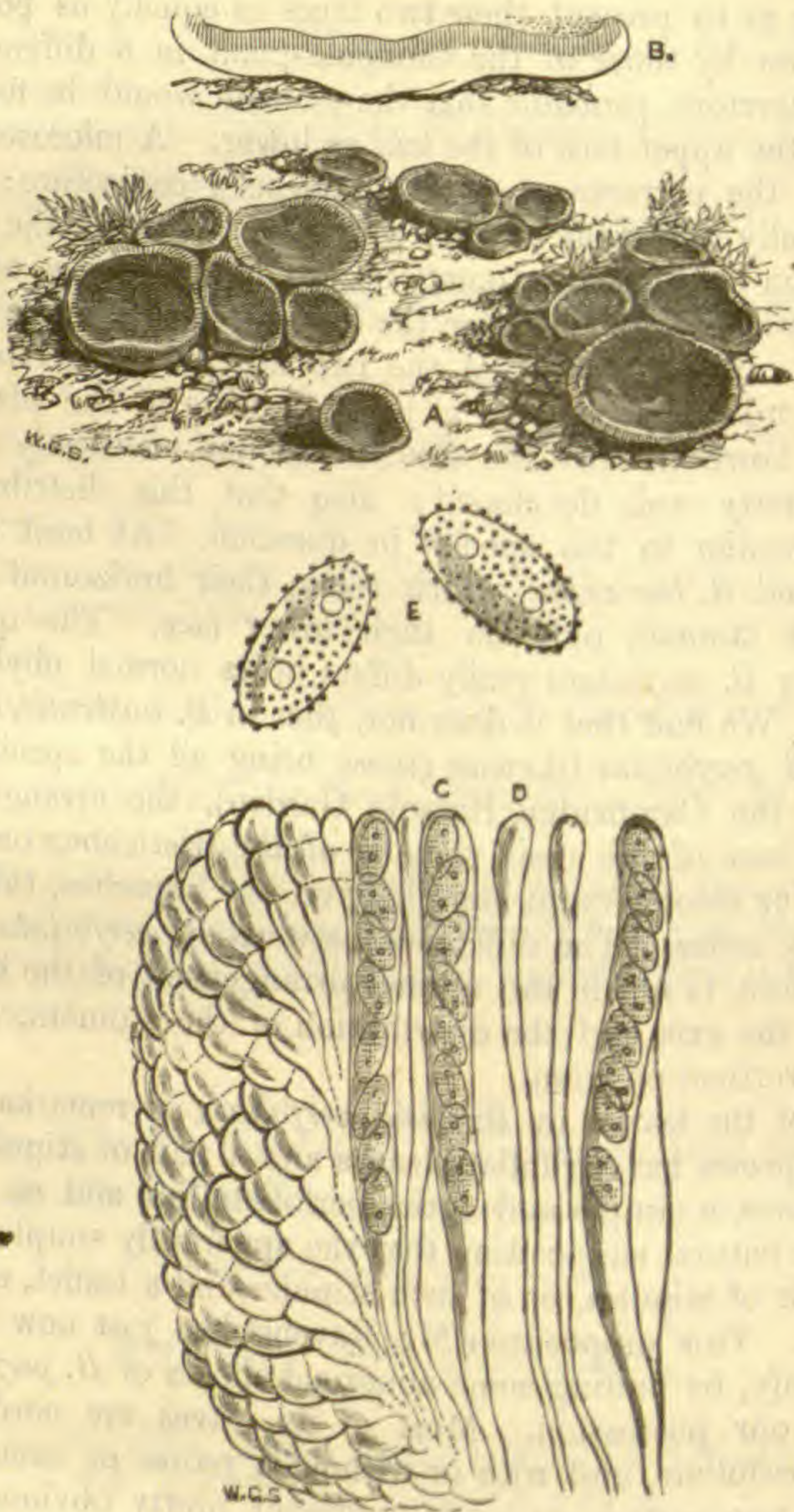
In a paper sent by Mr. Ravenel to Professor Gray, and read by him at the last meeting of the American Association for the Advancement of Science, the character of the torsion of the stem, by which the foliage on summer shoots becomes unilateral, is explained. It had been hastily supposed by the present writer that the leaves were five-ranked, and became one-ranked by a continuous torsion of the stem. Mr. Ravenel points out that the phyllotaxis of the plant in question is really of the two-ranked order, which inspection of the growing shoots makes abundantly clear, and that they become one-ranked by the alternate twisting of the successive internodes right and left, *i. e.* one twists to the right, the

next as much to the left, the next in the opposite direction, and so on, thus bringing the leaves into a vertical position all on one side of the horizontal branch. It occurred to Mr. Ravenel that this vertical position of the leaves was correlated with the remarkable alternate torsion of the axis, namely, that the leaves on the reclining branches were adjusting themselves, so as to present their two faces as equally as possible to the light, as is done by those of the Compass-plant in a different way; and that it was, therefore, probable that the stomata would be found to be as numerous on the upper face of the leaf as lower. A microscopical examination proves the correctness of Mr. Ravenel's conjecture: the stomata are about equally numerous on the two faces. Whether the leaves take a vertical position because the stomata occupy both surfaces, or whether the stomata are so distributed because the leaves stand edgewise to the zenith, is a question. The fact is, that the two are thus correlated, and such correlation is ordinarily essential to the well-being of the plant. It may be remarked, however, that the stomata do not manifestly appear until the leaf is pretty well developed; also that this distribution of the stomata is peculiar to the species in question. At least the leaves of *B. australis* and *B. leucantha*, which retain their horizontal position, are provided with stomata only on their lower face. The question next arises, whether *B. perfoliata* really differs in its normal phyllotaxis from its congener. We find that it does not, that in *B. australis*, *leucantha* and *alba*, and in *B. perfoliata* likewise (these being all the species at present cultivated in the Cambridge Botanic Garden), the arrangement of the leaves at the base of the main stem is of the tristichous order, but that after the first or second cycle, especially on the branches, this changes to the distichous order. The difference between *B. perfoliata* and its congeners, therefore, is not in the normal arrangement of the leaves, but in the fusion of the axis and the distribution of the stomata, adopting the foliage of its vertical position.

The form of the leaves in *Baptisia perfoliata* is remarkably peculiar. Most of the species have trifoliate leaves and a pair of stipules; this has, to all appearance, a simple and entire perfoliate leaf and no stipules. It is, however, a natural supposition that the apparently simple leaf consists either of a pair of stipules, or of such stipules and a leaflet, connate into a rounded disk. This supposition Mr. Ravenel has just now had the good fortune to verify, by finding some abnormal shoots of *B. perfoliata*, one of which is in our possession. Most of its leaves are cordate, clasping rather than perfoliate, and with or without a retuse or emarginate apex; some almost two-parted, so as to represent pretty obviously a pair of stipules; and one of like conformation, but with an obvious terminal leaflet in the sinus! Mr. Ravenel remarks, that this is a manifest step towards his own *B. stipulacea*. But it hardly invalidates that species, although the inflorescence and legume of the two are quite alike.— (From 'Silliman's Journal,' Dec. 1871, pp. 462, 463.)

PEZIZA CHATERI.

We noticed (p. 31) the publication of this species, and, by the kindness of Dr. Masters, are now able to give an illustration, with the description.



Peziza (Humaria) Chateri, W. G. Smith. Cups concave, at length expanded; margin curved inward, sessile, bright orange-red within, pale brown externally from the colour of the cells of the cup, from 2 to 6 lines across; asci cylindrical, containing 8 elliptic, rough spordia with 2 nuclei, $\cdot 0008$ inch long by $\cdot 0004$ inch wide, arranged in one row; paraphyses linear, with clavate tips. Cup composed of clavate, pale brown, septate cells, whose tips give a granulated appearance to the outer surface, which is without hairs. Its nearest affinities are with *P. melaloma* and *P. hirta*.

Discovered by Mr. J. J. Chater, of Gonville Nurseries, Cambridge, on the north and north-east sides of a heap of road-earth, gathered for use in the garden some two years back at the nurseries. (From the 'Gardener's Chronicle,' 1872, p. 9.)

ON FLAX AND ITS CULTURE IN OLDEN TIME.

BY PROFESSOR HEER.

In this paper Professor Heer traces out the history of the cultivation of the Flax plant from the earliest ages, drawing the conclusion that *Linum usitatissimum* has been evolved by gradual stages out of *L. angustifolium*. The following notes contain a general summary of what he advances.

1. Flax has been cultivated in Egypt for 5000 years as an important crop, and has played a similar part in Babylonia, Palestine, and the shores of the Black Sea. We find it in Greece in the time of Homer, and also very early in Italy, whither it was introduced from Greece. It was brought to Gaul and Spain by Phœnicians and Carthaginians.

2. It is found in the oldest Swiss pile-buildings at a time when we find no trace of hempen or woollen fabrics. Sheep were domesticated as far back as the Stone period, but the wool could not be obtained from the hide without metal. The construction of sheep-shears (which are as old as the time of David) must have caused a great revolution in clothing and domestic industry.

3. The Flax of the Swiss pile-buildings is the small-leaved plant (*L. angustifolium*), which still grows wild on the shores of the Mediterranean, but is now nowhere cultivated in Europe. It must have also been grown in the South of Europe at the same time, but I have not been able to ascertain where. This would be of great importance for the determination of the date of the pile-buildings. The high antiquity of these has been called in question; but that they belong to a date long before the Roman occupation of the country, the general state of their economy in regard to domesticated animals and plants is sufficient evidence. The Wheat is a form long lost (*Triticum vulgare antiquorum*, Heer), found also by Unger in a tile of the Dasher Pyramid, dating back to 3300 years before Christ. The Barley (*Hordeum hexastichum sanctum*) agrees with that of the oldest Sicilian coins. Rye, Oats, Hemp, the domestic hen, and metal were not known. We see then that already at a very early period there lived in the heart of Europe a people who, in cattle-rearing and agriculture, had reached a by no means low point of culture.

4. In Italy, in the time of the Emperors, a Summer Flax and a Winter Flax were cultivated, as at the present day. What form of Flax was grown in Old Egypt is not yet known, but most likely it was the *Linum angustifolium*, and afterwards followed the *L. hyemale romanum*, and the *L. usitatissimum*.

5. The common Flax has been evolved by cultivation from *L. angustifolium*, the intermediate stages being *L. ambiguum* and *L. hyemale*. The centre from which Flax-culture has spread is certainly the Mediterranean region.

The following is Dr. Heer's diagnosis of the forms of the species:—

L. usitatissimum; sepalis ovatis acuminatis eglandulosis capsulam subæquantibus, foliis glabris lanceolatis vel lineari-lanceolatis trinerviis, pedicellis fructiferis erectis.

Var. 1. Root annual; stem solitary, erect; capsule .28–.32 inch long; seeds beaked at the apex .16–.24 inch long.

- a. Capsule indehiscent, .28 inch long; carpels glabrous internally.
L. usitatissimum vulgare.
- b. Capsule splitting open with elasticity, .32 inch long; carpels ciliated internally.—*L. crepitans*, Bönning.; *L. humile*, Mill.
- Var. 2.* Root annual or biennial; stems numerous, diffuse at the base, arcuate; capsules indehiscent, .28 inch long; carpels internally ciliated; seeds .2 inch long, rostrate at the apex.—*L. hyemale romanum.* Winter Flax grown in South Europe.
- Var. 3.* Root annual or perennial; stems numerous; capsules .28 inch long; carpels slightly ciliated internally; seeds .16 inch long, shortly rostrate at the apex; leaves all acuminate at the apex.—*L. ambiguum*, Jordan in Cat. Semin. Herb. Dijon, 1848, p. 27; Walp. Ann. ii. 114.
- Var. 4.* Root annual or perennial; stems numerous, diffuse at the base arcuate; capsules .24 inch long; carpels ciliated internally; seeds .12 inch long, scarcely beaked at the apex; leaves all acuminate at the apex.—*L. angustifolium*, Huds.—(From 'Neujahrsblatt herausgegeben von der Naturforschenden Gesellschaft,' 1872.)

Proceedings of Societies.

BOTANICAL SOCIETY OF EDINBURGH.—*Jan. 11th, 1872.*—Professor Wyville Thompson, President, in the chair. The following communications were read:—"Obituary Notice of James Boyd Davies." By Professor Balfour.—"Velocity of Sap." By W. R. M'Nab, M.D. Edin. If the amount of fluid transpired by a plant in a given time be measured, and if the size of the stem through which the fluid has passed be known, it becomes possible to calculate the velocity with which the fluid moved. As all the tissues in the stem do not serve as canals for the passage of sap, it becomes necessary to deduct the area occupied by the non-conducting tissues from the total area of the stem. Hales observed that a Sunflower transpired in twelve hours thirty-four cubic inches of water. The transverse section of the stem having an area of one square inch, a column of water, thirty-four inches high, would have passed through the stem if it had been a simple tube. Hales allowed one-third of the stem to be non-conducting tissue, which would thus raise the column to $45\frac{1}{3}$ inches. Calculating the velocity of the fluid from these data, we find that the rate was .0011811 inch per second, or still further reducing the conducting tissue, as Hales' calculation was too large, we have a velocity of .0015748 inch per second. Sachs (Hofmeister, Hand. der Phys. Botan. iv. 234) gives an account of an experiment with a branch of the White Poplar, which transpired 480 cub. cent. of water in one hundred and ten hours. After making the necessary deductions for the non-conducting tissues in the stem, Sachs calculates the rate of movement to be .064 mm., or .0025196 inch per second. In experiments made by me to determine the velocity of the sap in the Cherry-laurel, by means of lithium and thallium citrate and the spectroscope, the following results were obtained:—

| | | | | | | |
|------|----------|-----------------|-------|---------|-------|-------------|
| 1. | ·0020232 | inch per second | . . . | 11 A.M. | . . . | cloudy. |
| 2. | ·0029436 | " " | . . . | 3 P.M. | . . . | cloudy. |
| 3. | ·0035277 | " " | . . . | 3 P.M. | . . . | cloudy. |
| 4. | ·0051108 | " " | . . . | 11 A.M. | . . . | bright sun. |
| 5. | ·0078324 | " " | . . . | 12 noon | . . . | bright sun. |
| Mean | ·0047292 | " " | | | | |

The mean of the five experiments giving a velocity of ·0047292 inch per second. The greatest velocity, experiment 5, was obtained in bright sunlight at noon; the lowest rates, experiments 1 and 2, were observed in the forenoon and afternoon, the sun being more or less obscured by passing clouds. As Sachs has calculated the velocity on the amount transpired in one hundred and ten hours, the mean is lower than that obtained by spectroscopic observation,—the short duration of the experiments, together with the time of day, increased temperature, and brighter light, easily accounting for the difference. I am indebted to the Rev. J. Constable, M.A., Principal of the Royal Agricultural College, Cirencester, for some of the calculations required in this paper.—“Tendrils of *Ampelopsis Veitchii*.” By W. R. M’Nab, M.D. Edin. While visiting J. Anderson Henry, Esq., of Hay Lodge, in August last, he directed my attention to the peculiar tendrils of *Ampelopsis Veitchii*. These tendrils are furnished with disk-like suckers, several of them occurring on one tendril and forming a very strong support. At first these appear as bodies resembling very much the head of a small pin, and afterwards they develop with flat disks. Sachs (*Lehrbuch der Botanik*, p. 672) mentions that in *Ampelopsis hederacea* the tendrils develop disks which secrete a sticky substance and thus adhere to walls, etc. Darwin found that the old dry disks would support a great weight; one tendril with five disks supporting no less than ten pounds. The tendrils of *Ampelopsis* are, like those of the Vine, modified portions of the stem. They branch, and, when examined in transverse sections, the ring of fibro-vascular bundles is seen to be complete. At the end of each of the branches of the tendril, a slight club-shaped swelling is observed. This rapidly grows into a disk, by the development of a large branching hair from every cell of the epidermis of part of the club-shaped end of the tendril which is next the body to be adhered to, and, therefore, that part which is most shaded from the light. As every cell produces a hair, the original epidermis is entirely lost. These hairs are glandular and secrete a sticky substance, which enables the disk to adhere to the wall or other support. The cells in the centre of the disk rapidly enlarge and become thickened, the dry walls having a well-marked pitted appearance. These tendrils have but little tendency to coil round any fixed object, but are markedly influenced by light. They turn away from the light, as does also the whole branch, and, therefore, afford a very well-marked example of negative Heliotropism. The interest in these tendrils is considerable—first, on account of their being negatively heliotropic; or turning away from the light, and, second, on account of their morphological nature. They are stem-organs, the apex of each branch developing a series of hairs, each epidermal cell on one side of the club-shaped extremity, developing a large branching glandular hair, and thus losing all the appearance of an epidermis. In the cells of the tendril both rounded and acicular crystals of calcium oxalate are to be met with. I am indebted to J. Anderson Henry, Esq., of Hay Lodge, for the specimens examined.—“Note on

the stem of *Isoetes*." Prof. Williamson and others have directed attention to the cambium layer of *Isoetes*. Having an opportunity of examining sections of fresh specimens of *Isoetes* kindly sent to me by my father, I am now able to show these sections to the Society, and I trust that I shall be able to convince most of you that no cambium layer, comparable to that in ordinary dicotyledonous plants, exists. At the Meeting of the British Association, held in Edinburgh, in August last, Prof. Williamson stated that cambium was a fluid in which free cells floated. I have not been able to find anything like that in *Isoetes* or in any other plant I have ever examined, and it is not likely that any indications of such a form of cambium could be met with in fossil plants. In the section of lime which I exhibit, you will be able to see the cambium layer stained with carmine, and giving you an almost diagrammatic view of it. In *Isoetes* we have a layer of cells in the periphery of the stem, which multiply by division, but they are really the meristem cells of Naegeli, developed in the primitive tissue, and not a portion of the fibro-vascular bundle. The bundles are only slightly developed and run through the cellular (primitive) tissue to the roots and leaves. Prof. Williamson has thus mistaken the meristem layer of the primitive tissue for the cambium layer of the united fibro-vascular bundles of dicotyledons.—“Histological Notes” (II.). By W. R. M'Nab, M.D. Edin. (see p. 33).—“On the Effects of Pruning on certain Coniferous Trees and Shrubs.” By Mr. M'Nab, Curator, Royal Botanic Gardens.—Prof. Alex. Dickson exhibited specimens of *Chenopodium Bonus-Henricus* and *Salsola Kali*, showing Protogynous Dichogamy. Dr. Dickson pointed out that in these, as in some other cases of protogyny, e.g. *Plantago lanceolata*, *Luzula campestris*, etc., this condition was made very apparent by the circumstances of the stigmas being distinctly withered by the time the stamens of the corresponding flowers are exerted. *Chenopodium Bonus-Henricus* is very well adapted for demonstration, as the stigmas are relatively large. In *Salsola* the parts require the aid of a lens for their distinct observation. In the latter plant these gland-like knobs alternate with the stamens, and, although Dr. Dickson has not detected any secretion, he thinks it possible that this plant may be fertilized by insect agency. Dr. Dickson called attention to the circumstance that, where dichogamy occurs, in more or less inconspicuous flowers, it is most frequently of the protogynous kind, for example, as in *Scrophularia*, *Plantago*, *Euphorbia*, *Parietaria*, *Aristolochia*, *Luzula*, *Anthoxanthum*, *Alopecurus*, *Nardus*, to which may be added the two plants exhibited, and probably *Triglochin*.—Mr. M'Nab laid before the meeting a hybrid Hellebore between *H. purpurascens* and *H. atrosanguinea*. It had been raised by Mr. Butler, nurseryman, Greenock, and is a free flowerer.—Prof. Balfour exhibited a growing specimen of the Ipecacuan plant, with ripe fruit. The plant has flowered freely for several years in the hothouses at the Botanic Gardens, but has not hitherto yielded perfect fruit. The pollen was applied to the stigma artificially.

February 8th.—Professor Alexander Dickson, V.P., in the chair. The following communications were read:—“Notes on some Microscopic Fungi.” By James Cumming, M.D., C.M. The author while making a series of experiments last winter, in connection with the “germ theory,” examined a number of different solutions which had been exposed for some time to the air, all at the same elevation and temperature, in order to ascertain if there were distinct species of Infusoria and microscopic

Fungi, proper to different solutions. After a period of exposure to the atmosphere of from ten days to a month, microscopic Fungi in the corpuscular and filamentous forms were observed in the following fluids:—Carbolic acid, phosphate of ammonia, sulphate of quinine, tartrated antimony, acetate of lead, tea, saturated solution of sugar, port wine, sherry, claret, milk, sulphate of magnesia, yeast, urine, coffee, hay, chloride of zinc, chlorine, and hyposulphate of soda. The following poisons also contained Fungi:—Tincture of aconite, tincture of Calabar bean, tincture of digitalis, and liquor strychniæ. The presence of Fungi, according to some authors, materially affects the therapeutic properties of certain alkaloids. The author had found, however, that notwithstanding the presence of Fungi in several poisons which he had tested, their active properties were unaffected. A quantity of tincture of aconite was exposed to the air for several weeks and then submitted to microscopic examination, when it was found crowded with torulæ, filamentous bodies, bacteria, and vibriones. A small quantity was injected (subcutaneously) into a rabbit, when it was almost immediately seized with slight startings, followed by violent spasms, and died in four minutes. Two drachms of tincture of Calabar bean were exposed at the same elevation and temperature, and after some time examined, when Fungi and Infusoria were detected. A small quantity was injected into a rabbit, when it produced the characteristic symptoms of poisoning. The rabbit was seized with peculiar quick trembling movements, gathering its limbs together and shivering as if from cold. Two drachms of tincture of digitalis were similarly exposed, and, on examination, large irregular yellow bodies, formed of rounded quadrilateral cells and groups of round yellow corpuscles, were observed scattered over the field. It also, when subcutaneously injected, produced the symptoms of poisoning. In a portion of liquor strychniæ torulæ were observed, and on it being injected into a rabbit, caused death in fifty-five seconds. The results of these experiments show that the presence of Fungi did not materially affect the therapeutic properties of these poisons. The author described the different species of microscopic Fungi which he had observed, and noticed their mode of development. In conclusion, he made some remarks on the connection of Fungi with disease.—“On the Flora of Craig Breidden, Montgomeryshire.” By Mr. James F. Robinson. The author noticed the principal plants he met with,—*Potentilla rupestris*, *P. argentea*, *Hypericum Androsæmum*, *Sedum Fosterianum*, *Cystopteris dentata*, *Veronica montana*, *V. spicata*, *Lychnis Viscaria*, *Inula Helenium*, etc.—“Report on the Open-air Vegetation at the Royal Botanic Garden.” By Mr. M’Nab.—“Notice of the Rapid Growth of a Twig of Poplar.” By the late Mr. A. M. Morrison; communicated by Mr. Thomas Stevenson, C. E.—Professor Dickson exhibited a cone of *Pinus Pinaster*, having its scales arranged in a quadrijugate spiral. He believed the specimen to be unique.—Mr. J. B. Webster presented sections of stumps of Spruce and Scots Fir, exhibiting the formation of wood after the trees had been cut down. Mr. Sadler stated that he had examined the new wood microscopically, and found it to differ in no way from the wood formed previous to the trees being felled.

LINNEAN SOCIETY.—*February 1st.*—Dr. J. D. Hooker, Vice-President, in the chair. The President, Mr. Bentham, read the first part of

a paper "On the Classification and Geographical Distribution of the *Compositæ*." The author has recently completed, in conjunction with Dr. Hooker, the revision of this great Order for the 'Genera Plantarum,' and has classed the species (some 10,000) under 750 genera in 13 tribes, a considerable reduction from Lindley's estimate of 1005 genera. There is in no case any doubt as to the admission or rejection of a plant, the Order being marked by absolute and well-defined boundaries. The various arrangements of the group proposed by different botanists were rapidly passed in review, commencing with Linnæus, who considered it as a "class," containing "orders" which were distinguished by characters founded on the sexual arrangements of the flowers in each capitulum. These groups have proved quite artificial. Cassini's papers, which were published in the years from 1816-1834, are of great value. The characters of his genera were taken from the styles and anthers; and though he multiplied genera to far too great an extent, his table showing the affinities of the tribes is very good. Robert Brown and David Don added considerably to the knowledge of the Order. Lessing greatly modified Cassini's grouping, but with the opposite result to improving it; his tribes and subtribes are certainly less natural. De Candolle in his 'Prodromus,' from following Lessing too closely, has been led into errors, and several identical species are repeated in different tribes. Unfortunately, too, De Candolle was interrupted by an illness of two years in working out the monograph. The late C. H. Schultz-Bipontinus devoted himself almost entirely to the *Compositæ*, but published no general arrangement of the Order. He founded his genera almost entirely on characters taken from the achenes, but seems to have often published hurriedly and has greatly multiplied species and made very numerous changes of name. His appellation of the Order *Cassiniaceæ*, if necessary, would have to give way to Lindley's prior one *Asteraceæ*. The numerous scattered papers of Professor Asa Gray constitute the most important of more recent contributions, from their great accuracy and trustworthiness. Mr. Bentham's own changes in the generally accepted arrangement of the group, were mostly made many years ago, and are very much a return to Cassini's, though worked out independently. After alluding to the investigations of Hildebrand and the speculations of Delpino, the author took up in order the various structures which have been employed as means of classification in this remarkably uniform Natural Order:—1. Sexual characters, of little value generally speaking, but vary in this respect in different groups. In the rayed tribes the hermaphrodite flowers are always in the disk and the female ones in the circumference; a supposed exceptional genus of Nuttall, of which authentic specimens are in his herbarium at the British Museum, appears to have the universal arrangement. 2. Di- and trimorphism are rare in *Compositæ*. 3. Pistil. The structure of the ovary and ovule is absolutely uniform throughout the Order and gives no characters. The style has been used greatly for systematic purposes by Cassini, Lessing, and De Candolle; it is invariably bifid, with the stigmas on the inside of the branches, but there are several modifications of its extremity. These, though of great importance, are by no means constant; in the *Asteroidæ* and *Senecioneæ*, for instance, several forms may be found. The forms figured by Lindley (Veg. Kingd. p. 703) by no means invariably characterize the group they profess to. 4. Fruit. Here also absolute identity of structure prevails in the achenes; the external form alone varies.

Carpological characters are therefore difficult to obtain; those chiefly available are shape, consistence, and the number of ribs, 5, 10, or 15, theoretically formed, as in *Umbelliferæ*, by a 5-sepalled adherent calyx, the free part of which is the pappus. This latter puts on infinite forms and varies considerably even in the same genus; its absence is not of great significance, no tribe being without an a-pappous genus. 5. Androecium. Great uniformity prevails here also; the filaments are either hairy or glabrous and with or without apical appendages. Very constant characters are, however, afforded by the form of the base. This is either truncate, or eared with the auricles obtuse or acute, or more or less tailed, ten varieties being distinguishable. Statistics were given showing how constantly in the different tribes one or more of these forms of anther-base obtained. *Calenduleæ* have the greatest variety in this respect. 6. Corolla. This is regular or irregular and occasionally tetramerous or trimerous. The ligulate flowers of *Cichoraceæ* are always 5-toothed at the extremity and are simply an ordinary tubular flower, split open down one side; the ligulate female ray-flowers, on the contrary, are always 3-toothed, the two inner lobes being deficient. 7. Inflorescence and bracts. Capitula are universal, and the bracts forming the involucre have an unusual value for such organs, and often give good generic characters. The so-called "paleolæ" on the receptacle of some genera are homologically precisely the same as the bracts of the involucre. Remarks were also made on the foliage, habit, etc., of the Order. The geographical distribution was postponed to a future meeting.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.—
February 14th.—J. J. Murphy, Esq., President, in the chair. The Rev. G. Macloskie read a paper "On the Silicified Wood of Lough Neagh, with Notes on the Structure of Coniferous Wood." The petrified wood is not confined to the shore of the lake, but is found far in the country. Lignites abound in the districts lying to the south and east of the lake. The silicified wood is found in the drift deposits at Sandy Bay, to the east of the lough, and inland, near Crumlin; but on the west of the lough it occurs only on the beach, to which it has been washed by the waves. The Miocene age may, with probability, be assigned as the time when the trees grew, whilst they have been subsequently imbedded in Post-pliocene clay fragments. Large silicified trunks have been found under the Crumlin river, near Crumlin, and one of these, now at Langford Lodge, is about ten feet high and as many in girth. The appearance of the silicified wood was described by the lecturer. The woody substance has entirely disappeared, 98 per cent. of silica being found in the fragments. A microscopic examination shows that they often retain the delicate structure of the original wood, and the rounded disks on the wood-cells prove that they belonged to the *Coniferæ* or Pine family of plants. These do not appear to have been the only plants living at the particular time and place to which they belonged, for leaves of Alder and Beech, and other ordinary exogenous trees, have been got at Sandy Bay; but it appears that coniferous wood will be preserved where the harder woods decay. The Miocene flora of this country was rich and varied, but it is only the one kind of wood that comes down to us in a silicified condition. The Lough Neagh silicified wood belongs to the cupressal type, and has been termed *Cupressoxylon Pritchardi*. This group is

characterized by having the disks in one series and distant, or in a double series and opposite, by having no spiral fibres, and by having very numerous resiniferous cells; in this last point, it differs from Pine-wood, which possesses resiniferous ducts; in all essential characters it agrees with the wood of Cypress. As to the nature of silicification, two different processes are popularly confounded under the term. (1.) The incrusting process, as the geysers of Iceland. Then there is simply a deposition of silica from surcharged water, especially on its evaporation. Complete evaporation of the water is, perhaps, necessary, and hot water is favourable to the process. (2.) Interstitial silicification, where the organic matter is removed particle by particle, the delicate internal structure of the original organism being usually preserved. The Lough Neagh wood has undergone the second kind, or interstitial silicification. This process must have been caused by water containing silica in solution, but it was not due to the water of Lough Neagh, as that water is singularly free from earthy constituents, and is not known even to have any tendency towards silicification, and the lough did not exist as such at the time when the process took place. Nor can the adjoining soil or clay have produced any such effect, as it is only when dissolved in water that the silica can penetrate the structure of wood. Nor can the agent have been hot water or steam, as has been supposed in some quarters, for it would, in this case, have reduced the ligneous matter to a pulp and destroyed it. The waters of most rivers and of the sea contain a very small percentage of silica, which is sufficient to supply material for the process. It is usually found that the change commences at the surface, so that the internal parts remain largest unsilicified and often decay, whilst the outer shell becomes hard and stony, and subsequently the internal parts may become filled up with a foreign matter, as sand. Thus, soft wood may be most easily preserved, as the silicifying process will here most rapidly penetrate to the heart of the trunk before it has time to rot. A rapidly-flowing river, containing silica in solution, and having logs of trees in its channels, would afford favourable conditions for the production of silicified wood, and we may thus guess at the origin of that for which the neighbourhood of Lough Neagh is celebrated. The Antrim system of trap-rocks forms part of a more extensive system, which includes the Hebrides, much of Scotland, and islands north of Scotland. All this district during the Miocene age constituted part of a continuous continent. Its northern parts were occupied by mountains covered with luxuriant forests, and watered by large rivers. Mr. Geikie has recently discovered the bed of one of these rivers under the Scur of Eigg, one of the Hebrides; and fragments of coniferous wood have been found there, which Lindley and Hutton call *Pinites*, but which agree closely with our specimens. This river probably flowed southwards, towards the Antrim district. In its course it would pass the island of Mull, where silicified wood has been found, agreeing substantially in character with that which we are describing; in fact, the elaborate description of it which Mr. Nicol gave forty years ago would apply in every word to the Lough Neagh specimens. In the water of this river, as of a similar river, we believe the explanation of the petrifying work is to be found, and the petrified logs grew in the Miocene age, as forest-trees in mountains of the north of Scotland. Lignite beds were formed by Mosses and other vegetation in the swamps adjoining the river, and were sometimes swept down by its floods. Subsequent outflows of basalt

buried these, so that we find them intercalated in the trap. Vast denudation succeeded, wearing away hills, and leaving only shreds and patches for subsequent times. Then the glacial action of its Post-pliocene age transported such silicified trunks as came in the way, wearing and rounding them, and at last leaving them buried up in its clay drift, where they are still preserved.

Botanical News.

ARTICLES IN BOTANICAL JOURNALS FOR JANUARY.

Botanische Zeitung.—T. Hildebrand, "On the Means of Distribution of the Fruits of the *Compositæ*." F. Buchenau, "On the 'Gemination' of the Flower-whorls in *Alismaceæ*." J. Hanstein, "Introductory Remarks on the Phenomena of the Movements of Cell-contents in their Relationship with Protoplasm." H. Leitgeb, "On Endogenous Bud-formation in Liver-Mosses." J. Reinke, "On a Gonidioid Formation in a Dicotyledonous Plant" (*Scytonema Gunneræ*, with some details of the stem of *Gunnera scabra*.)

Flora.—J. Müller, "Euphorbiacearum Species Novæ" (twenty-two species and *Pseudocroton* gen. nov. described). A. Kanitz, "On *Urtica oblongifolia*, Koch, with Notes on other Species of Nettles" (tab. 1). F. Arnold, "Lichenological Fragments." Obituary notice of Ratzeburg.

Hedwigia.—"Review of T. M. Fries' 'Lichenographia Scandinavica.'" German translation of M. C. Cooke's paper on Polymorphic Fungi in *Pop. Sc. Rev.* for Jan. 1871.

We notice the publication of a second fasciculus of Pfeiffer's elaborate 'Nomenclator Botanicus,' a second part of Van Heurck's descriptions of new plants in his herbarium, the third and concluding volume of Krompelhuber's 'Geschichte und Litteratur der Lichenologie,' which contains an account of the progress and literature of Lichenology from 1866 to 1871 inclusive, and a second fasciculus of Pritzel's 'Thesaurus Literaturæ Botanicae,' carrying on the catalogue of authors to Jussieu.

On the 14th February, at the meeting of the Society of Arts, Dr. Masters in the chair, Mr. J. Collins, of the Pharmaceutical Society, read a paper, "On the Study of Economic Botany, and its claims Educationally and Commercially considered." The author insisted on the practical utility of an acquaintance with the uses of plants, and recommended that two or three hours each week should be devoted in schools to elementary lessons on the most commonly used vegetable products, well illustrated by specimens. He alluded to the exertions of Sir William and Dr. Hooker in forming the Museum of Economic Botany at Kew, which he characterized as one of the finest and most complete in Europe, and suggested that if a society of economic botany were formed, an appropriate name for it would be the Hookerian Society. The commercial aspect of the subject was particularly referred to, and a more systematic effort to examine the vegetable products of the globe on the part of our merchants recommended, and an extension of the cultivation of useful species.

We mentioned last month that Prof. Thiselton Dyer had resigned the

chair of Botany at the Royal College of Science in Dublin, and we are now glad to say that the Royal Horticultural Society at South Kensington has secured his services as Professor of Botany. The duties of this new post are defined to be the general conduct of the scientific business of the Society, both horticultural and botanical, by attending the meetings and exhibitions and reporting on all objects of merit, answering scientific inquiries made by the Fellows, editing the publications of the Society, care of the library, reporting results of experiments at Chiswick, and naming of plants. We think the Society has made a very good choice.

The 'Academy' informs us that Dr. Schweinfurth, the botanist, has returned from Africa to Europe. After his great journey west of the Upper Nile, in the country of the Niam Niam and Monbutta, he made a short excursion from his headquarters, the Seriba Ghatta, westwards to Kurkur and Danga, and planned a much more extended journey. A fire which broke out in the Seriba Ghatta on December 2nd, 1870, however, destroyed the whole of his property. Fortunately a portion of his collection was already sent off and on its way to Berlin. From December, 1870, to February, 1871, the indefatigable traveller made a tour in a part of Fertit hitherto unvisited by Europeans.

The post of second assistant at the Royal Herbarium at Kew has been filled by the appointment of Mr. S. le Marchant Moore, of University College, London. Mr. Moore obtained the Gold Medal of the College in 1871 for botany. We hear that six candidates presented themselves at the open competition for the post.

From statistics relating to the examinations in science at the University of London, it appears that at the Preliminary Examination for the degree of M.B. in the year 1870, 98 candidates presented themselves; of the 64 rejected, 55 failed in botany, and 5 of them in botany alone, being the only candidates rejected for failure in a single subject. At the first examination for the degree of B.Sc., in the same year, out of 22 candidates 12 were rejected, 10 in botany, and 1 of these in botany alone. We commend these figures to the lecturers on botany in our medical schools: so long as the University requires a knowledge of this science in candidates for its medical degrees, students of medicine must make it a part of their studies; and until science is systematically included in school education, they must acquire their knowledge at the medical schools. It seems, however, that either the lecturers or the students are at fault, or else that elementary botany of a kind necessary to satisfy the examiners is a subject singularly difficult of acquirement.

At the late Annual Meeting of the Cheshire Farmers' Supply Association, held at Crewe, Mr. Robert Holland, of Mobberley, was appointed consulting botanist.

The death of Dr. A. Spring, in his fifty-ninth year, on January 17th, at Liège, is announced. He was Professor of Physiology in the University of Liège, and the author of a well-known monograph on *Lycopodium* and *Selaginella*, published in 1841.

Colonel Chesney, R.A., F.R.S., who died on January 30th, at the age of eighty-three, was known to botanists from the collection of plants made by him during his exploration of the Euphrates valley, nearly forty years ago. Bertoloni, in his 'Miscellanea Botanica' (1842-3), published a determination of these. The Leguminous genus *Chesneya* was founded by Lindley on one of the plants discovered by the late traveller.

Original Articles.

ON ANACHARIS.

BY C. C. BABINGTON, M.A., F.R.S.

There is far from being a concurrence of opinion concerning the proper generic name of the plant called *Anacharis Alsinastrum*. In our last-published Flora (Hook. Stud. Fl. p. 350) the name of *Anacharis* is used, as was done by Bab. and Planch. (Ann. Nat. Hist. ser. 2, vol. i. p. 83, and Ann. Sc. Nat. ser. 3, t. xi. p. 74); but in the next preceding British Flora (Benth. Handb. ed. 1, 499; ed. 2, 447) the generic name *Elodea* is adopted. Syme (Eng. Bot. ix. 80) follows Bentham, but in a note expresses the opinion that *Hydrilla* is the proper name. Asa Gray named the North American plant *Udora* in the first edition of his 'Botany of the Northern States' (p. 462), but in ed. 5 (p. 495) he has adopted *Anacharis* as the proper name.

Richard defined genera with each of the names *Elodea*, *Anacharis*, and *Hydrilla* in 1812 (Mem. Inst. 1811, pt. 2, p. 1), and had previously described the genus *Elodea* in 1803 (Mich. Fl. Bor.-Amer. i. 20). In the latter work he refers *E. guyanensis* to that genus, as well as *E. canadensis*, and places them as hermaphrodite plants in the Linnean Class and Order *Triandria Monogynia*. In both of these places he states expressly that *Elodea* has hermaphrodite flowers. In the Mem. Inst. he says that *Anacharis* and *Hydrilla* are dioecious; indeed, he did not know the female flowers of *Anacharis*. Humboldt and Boupland (Pl. Equinoct. ii. 150) place their *E. granatensis* in the same Class and Order, and state that it has the same structure as *E. guyanensis*, Rich. But Richard describes his *E. canadensis* as hermaphrodite, in which he is wrong, if his plant is that now so named from the United States and Canada; and his *E. guyanensis* and the *E. granatensis* of Humboldt as also hermaphrodite, and in that he is correct. It is remarkable that Richard, although referring to *E. guyanensis* in Michaux's work in 1803 (but by name only), does not seem to have published any description of it until the appearance of his paper (Mem. Inst.), which was issued in 1814, but communicated to the Institute in 1812. Pursh called the Canadian plant *Serpicula occidentalis* in 1814 (Fl. Amer. Septen. i. 33), and expressly states that the flowers are hermaphrodite. Nuttall called the same plant *Udora* (Gen. ii. 242) in 1818. He describes the *U. canadensis* as so decidedly unisexual, that the male flower is "migratory, breaking off connection usually with the parent plant; it instantly expands to the light, the anthers also burst with elasticity, and the granular pollen vaguely floats upon the surface of the water." Asa Gray gives a similar account of the male flowers of his *Anacharis*. He says, "The staminate flowers (which are rarely seen) commonly break off, as in *Vallisneria*, and float on the surface, where they expand and shed their pollen around the stigmas of the fertile flowers."

It appears from this that there are two series of plants closely resembling each other in appearance, of which one series has perfect triandrous flowers, and the other has incomplete dioecious flowers, of which the males are nearly or quite sessile, and have the curious habit of becoming de-

tached when the pollen is ripe, and floating freely about on the surface of the water, and shedding their pollen there. Such a difference of structure and mode of fertilization has seemed to many, if not most, botanists as quite sufficient to place the plants in different genera, for here the male are of quite a distinct structure from the female flowers, and the difficulty attending the propagation of the plant is met by the power which each node of the stem possesses of producing a new plant if detached from the rest.

But even if it be considered that the diœcious structure of *Anacharis* and *Hydrilla* is not sufficient to separate them from the hermaphrodite *Elodea* of South America (*Apalante*, Planch.), still the expediency of retaining *Elodea* as the genuine name is very doubtful, as the sec. *Elodea* of *Hypericum* has been separated as a genus by the name of *Elodea* by Pursh, Spach, Endlicher, and others, and as there was manifestly a mistake in Richard's original definition of his *Elodea* as applied to the species of *Anacharis* (if they were intended to be included in it), although that definition does suit the South American species described by him and by Humboldt. It appears, therefore, to me that we had better retain *Anacharis* as the name of the plant well known in North America, and unfortunately now too well known in England.

Doubtless Richard was led to suppose that the Canadian plant is hermaphrodite from its very close resemblance to his *E. guyanensis*, which he had seen alive and then ascertained its hermaphrodite structure. The barren filaments found in the female flowers of the Canadian plant would lead him to that conclusion in the absence of the proper male flowers. I have not seen the male flowers of my *Anacharis Alsinas-trum* (of which apparently only the female plant is in Europe), and A. Gray does not tell us if they are sessile, as those of *Hydrilla* are represented on Richard's plate, or shortly stalked, as in his figure of *Anacharis*, and no other author has, to my knowledge, given a plate of the male plants of either *Hydrilla* or *Anacharis*.

Hydrilla seems quite distinct by the subglobose spathe of its sessile male flowers; the spathe of the male flowers of *Anacharis* being figured and described by Richard as tubular and bifid, and described by A. Gray as sessile, tubular, and 2-cleft. Richard also says that the male flowers of *Anacharis* are stalked and so figures them, but A. Gray does not state anything on that point.

Mr. Syme gives as his opinion, that "there are no characters of sufficient importance to separate the genera *Hydrilla*, *Elodea*, and *Anacharis*," but in that opinion I cannot concur. Dr. Hooker states that the staminodes of the female flowers of *Anacharis* are sometimes antheriferous. I have examined very many flowers in the hope of finding anthers, but without success, and others have been equally unsuccessful. Hooker is apparently copying Syme, who derived (?) the statement from A. Gray, in whose book it seems to result from his considering *Elodea canadensis*, Michx., as certainly the same plant, and if the same plant as certainly correctly referred to the same genus as *E. guyanensis*, i.e. of hermaphrodite structure. It is much to be desired that American botanists should carefully investigate and determine if hermaphrodite flowers ever really do exist in the United States or Canada, for, apparently, it is of no use hunting for them in England, where all the plants seem to have sprung from the division of a single sprig originally introduced. Pro-

bably the plant found in Scotland, which is also female, originated in the same manner.

REVISION OF THE NOMENCLATURE AND ARRANGEMENT OF THE CAPE SPECIES OF ANTHERICUM.

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

Anthericum is a genus that is largely developed at the Cape of Good Hope, and is at present in a state of great confusion in books and herbaria. The history of the literature of the Cape species, not going back further than Linnæus, is in general outline as follows:—At the date of the ‘Species Plantarum’ only five species were known, four of which have been well-known garden “succulents” for several generations, and remain so still. A few years later came the explorations of Thunberg, extending from 1772 to 1775. The value of his researches in adding to our knowledge of the Cape flora may be judged of from the fact that to the five species he added twenty-two, a dozen of which were named and characterized by Linnæus in his ‘Supplement’ and ‘Systema Vegetabilium,’ and the rest by Thunberg himself in his ‘Prodromus’ of 1794 to 1800, and afterwards more fully in his detailed ‘Flora Capensis’ of 1807 to 1813. The type-specimens of these twenty-two species were preserved in Thunberg’s herbarium at Upsala, but his descriptions being somewhat brief, later writers have been greatly puzzled how to deal with them. In his magnificently-illustrated works, the ‘Icones’ and ‘Hortus Schœnbrunensis,’ especially in the former, which extended from 1781 to 1783, and consequently takes priority over Thunberg’s own publications, Jacquin named and figured about twenty species from specimens grown in the Austrian gardens, and, as is the case with all the plants he dealt with, illustrated them so fully and clearly that there is little room for doubt about their characters (fruit and seed characters alone excepted), and none about their identity. A few were named by Aiton in ‘Hortus Kewensis,’ and scraps of a few drawn in the early numbers of the ‘Botanical Magazine.’ Willdenow did not contribute any material addition, but he took up as a genus *Bulbine*, which Linnæus named in ‘Hortus Cliffortianus’ and afterwards abandoned. In the seventh volume of ‘Systema Vegetabilium’ the younger Schultes brought together all available information bearing on the subject, quoting carefully Thunberg’s and Jacquin’s descriptions, adding a few species, and extending the bounds of *Bulbine* so as to take in several species with glabrous filaments, which Willdenow had left in *Anthericum*. Lastly, in 1843, Kunth treated upon them in regular course in the fourth volume of his ‘Enumeratio.’ Besides relegating to *Ornithogalum* the Thunbergian species with truly bulbous rootstocks, he disposed the Cape species of *Anthericum*, understanding the name in the Linnean and Thunbergian sense, under six genera, *Anthericum*, *Bulbine*, *Bulbinella*, *Trachyandra*, *Cæsia*, and *Chlorophytum*, the two middle ones here constituted for the first time, and the two last Australian genera established by Robert Brown. I cannot think that this subdivision was a move in the right direction. *Chlorophytum* is a genus clearly marked from *Anthericum* by its discoid seeds and deeply-lobed capsule. One Cape species was placed there by Robert Brown himself, of which we gave a figure a short time ago in the *Refugium*

(*Chlorophytum elatum*, t. 216); but the other five species, placed there by Kunth with a mark of doubt, evidently do not properly belong there, and have no good character to take them out of *Anthericum*. The same applies to the four Cape species placed by Kunth under *Cæsia*. They have not the characteristic capsules of the Australian members of the genus, and otherwise do not differ materially from *Anthericum*. For specimens, Kunth appears to have relied mainly upon Drége's rich collections, and everything that he was able to examine himself he describes most carefully, and locates under its proper genus (in his sense) correctly; but he was compelled, from want of material, to leave the (generic) position of a large proportion of the species doubtful, and many of Drége's plants which he described as new prove, on comparison, to be Thunberg's over again. Since 1843 of course much additional material has accumulated, and Kunth had not the use even of what was existing at that time in this country. But the key to the nomenclature lies in a correct interpretation of the Thunbergian types. Having lately, through the courtesy of Professor Areschoug and Dr. Ahlberg, been favoured with the loan of these, and having compared them with Jacquin's figures and such of Drége's specimens as I have been able to consult, I propose now to report the result of my examination. I think the clearest way of dealing with the matter will be to enumerate all the known species, and I shall add a few undescribed ones in their place in the series, first giving a general key to the groups and minor subdivisions, and then the synonymy of the species as briefly as is consistent with clearness, not recapitulating in the way of notes on their characters what has been printed already, and give the mere names alone of those which have been anywhere figured or fully described. I have taken considerable pains to seize hold upon the best distinctive characters of Kunth's genera, a point which, from his detailed descriptions, it is not easy to understand. I believe that as divisions of the genus they are for the Cape the best that can be adopted, but that the line of separation between them is too slight, and their cross relationships too many, for them to be properly regarded as more than mere groups, on a par with those into which we separate *Scilla*, *Ornithogalum*, and *Allium*.

Key to the Species.

Group 1. *Bulbine*, L. Flowers yellow, with 1-nerved segments. Scapes naked. Racemes always simple. Pedicels solitary, articulated at the apex. Filaments all densely bearded. Ovules in each cell several, superposed. Seeds in each cell few.—Caulescent or acaulescent herbs, with decidedly fleshy leaves.

Leaves terete, about the thickness of a quill, nearly flat on the face.

Caulescent. 1. *frutescens*. 2. *rostratum*.

Acaulescent. 3. *annuum*. 4. *asphodeloides*. 5. *altissimum*. 6. *favosum*.

Leaves terete, the thickness of the finger, deeply channelled down the face. 7. *præmorsum*. 8. *pugioniforme*.

Leaves lanceolate, flat on the face. 9. *aloides*. 10. *latifolium*. 11. *nutans*.

Leaves nearly hemispherical, like those of a *Mesembryanthemum*. 12. *mesembryanthemoides*.

Group 2. *Bulbinella*, Kunth. Flowers minute, yellow or yellowish,

with 1-nerved segments. Scapes naked. Racemes always simple. Pedicels solitary, articulated at the apex. Filaments naked. Ovules in each cell twin collateral. Seeds in each cell solitary.—Acaulescent herbs, with leaves usually very narrow, fleshy or dry.

Leaves filiform, 1-3-nerved. 13. *triquetrum*.

Leaves a line or less broad, 5-7-nerved. 14. *peronatum*. 15. *ciliolatum*.
16. *gracile*.

Leaves 3-4 lines broad, many-nerved. 17. *Cauda-felis*. 18. *setosum*.

Leaves lanceolate. 19. *floribundum*.

Group 3. *Trachyantra*, Kunth. Flowers white, with obscurely 3-nerved segments with a purplish keel. Scapes naked. Racemes usually corymboso-paniculate, sometimes simple. Pedicels solitary, articulated at the apex. Filaments muricato-papillose. Ovules in each cell several, superposed. Seeds in each cell few.—Acaulescent herbs, with dry narrow-linear or subterete leaves, usually surrounded at the crown of the root with a whorl of membranous scales.

Leaves subterete, 1-1½ line broad, glabrous or hairy.

Rachis of inflorescence persistently pilose or setose. 20. *canaliculatum*.

21. *scabrum*. 22. *Gerrardi*. 23. *asperatum*.

Rachis of inflorescence glabrous or glabrescent. 24. *longepedunculatum*. 25. *elongatum*. 26. *affine*. 27. *flexifolium*. 28. *Jacquinianum*.

Leaves flat, glabrous, not distinctly ciliated. 29. *hispidum*. 30. *undulatum*. 31. *revolutum*. 32. *falcatum*.

Leaves flat, glabrous, distinctly ciliated. 33. *ciliatum*. 34. *longifolium*.
35. *Brehmeanum*.

Leaves flat, persistently clothed over the surface. 36. *thyrsoidium*. 37. *paradoxum*. 38. *muricatum*. 39. *hirsutum*.

Group 4. *Streptanthera* (*Cæsia*, Kunth, ex parte, non R. Br.). Flowers white, with 3-nerved segments with a purplish keel. Scapes naked or sparsely leafy. Racemes very lax, simple or corymboso-paniculate. Pedicels solitary or geminate, articulated at the apex. Filaments muricato-papillose. Ovules 2 in a cell, collateral. Seeds in each cell solitary. Leaves dry, very narrow.

Scapes leafy or bracteate. 40. *contortum*. 41. *Dregeanum*.

Scapes leafless.

Racemes simple. 42. *filiforme*. 43. *brevifolium*. 44. *flagelliforme*.

45. *Zeyheri*. 46. *scilliflorum*.

Racemes copiously corymboso-paniculate. 47. *Burkei*. 48. *intricatum*.

Group 5. *Dilanthes* (*Chlorophytum*, Kunth, ex parte, non R. Br.). Flowers white, the segments with a purplish keel with 3 nerves. Scapes naked or bracteate. Racemes simple or corymboso-paniculate. Pedicels usually geminate from the lower bracts, articulated at the middle. Filaments muricato-papillose. Ovules and seeds in a cell superposed. Herbs with narrow, flat or subterete leaves, surrounded by filiform fibres, not scales.

Racemes simple. 49. *triflorum*. 50. *Schultesii*.

Inflorescence compound. 51. *crispum*. 52. *pulchellum*. 53. *rigidum*.

54. *viscosum*.

(To be continued.)

ON THE SOURCE OF THE CHINA ROOT OF COMMERCE.

BY HENRY F. HANCE, PH.D., ETC.

Although China root has for a very long period formed a prominent article of export from Canton to India, and to a small extent to Europe,* and although large quantities of it, dug up on the neighbouring hills, may be seen in open places within the city, being dried by exposure to the sun,—the plant which furnishes the drug had never been precisely ascertained. By the majority of writers† it is said to be yielded by *Smilax China*, L., a plant apparently quite unknown to modern botanists, though there is, I believe, no reason to doubt its identity with the species distributed by Wallich under the name of *S. ferox*, which occurs throughout the whole of the mountainous districts of India and China, and, though absent from the Manchurian flora, where it is replaced by *S. excelsa*, L., extends into Japan. Mr. Porter Smith, on the other hand, has recently stated‡ that China root is “not far removed from the *Smilax lanceifolia* of Roxburgh, if it be not identical.” But, though it is extremely probable that more species than one are employed medicinally by the Chinese, as Dr. Royle remarks§ is the case by the natives of India, this must for the present be considered a matter rather of conjecture than of established fact. So far as regards the Canton drug, it was at least certain that it is the product of one or more of the six species of *Smilax* enumerated in Mr. Bentham’s ‘Flora Hongkongensis,’ because none other occur within the district; and, though I had long been anxious to ascertain which is the actual plant yielding the drug, I was obliged to content myself with this half-negative information. But, through the kindness of Mr. E. C. Bowra, Deputy Commissioner of Maritime Customs at Canton, whose position gives him great advantages in inquiries of this nature, I recently obtained a living plant, with the stem attached to the stout fibrous roots, thickened here and there into large tubers, the latter evidently identical with the China root sold in the shops. Although this specimen was not in flower, a comparison with the different species in my herbarium leaves no doubt that it is referable to *S. glabra*, Roxb.|| It is interesting to note that the accu-

* The total export during the last eighteen months is as follows:—

| | | |
|----------------------------------|-------|------------|
| Half-year ending 30th June, 1870 | . . . | 43,452 lb. |
| ” ” 31st December, 1870 | . . . | 21,320 ” |
| ” ” 30th June, 1871 | . . . | 35,136 ” |

Total 99,908 ”

† Pereira, Elem. Mat. Méd. 672; Griffith, Med. Bot. 658; Lindley, Med. and Econ. Bot. 64.

‡ Contrib. to Mat. Med., etc., of China, 198. Dr. Wells Williams (Chinese Com. Guide, ed. 5, 115) erroneously believes China root to be in no case the product of a *Smilax*, but to be merely the *Pachyma cocos*, Fries, which is not a true Fungus, nor even the scleroid mycelium of one, as still maintained by Lévillé (Le Maout and Decaisne, Traité Gén. de Bot. 707), but a peculiar degeneration of the roots of dicotyledonous trees, in which the tissues are all transformed into pectine. (Cf. Berkeley in Journ. Linn. Soc. iii. 102.)

§ Illustr. Himal. Bot. 383.

|| A most beautiful and accurate representation of this plant will be found at plate 100 of Dr. Seemann’s ‘Botany of the Voyage of the Herald.’ The ‘Chih Wuh Ming Shih T’u K’ao,’ or ‘Nomenclature and Description of Plants, illustrated with Plates,’ published in 1841, contains a very good outline figure of the root and stem, with leaves but without flowers.

rate and observant Roxburgh had remarked that the root of his plant was "not to be distinguished by the eye from the medicinal drug brought from China under the name of China root";* and he adds that a decoction of it is used by the natives of Silhet for the cure of sores and venereal complaints. Amongst other Chinese names for the plant is one signifying *simus aprugnus*. In this and other species, the numerous pedicels of the umbel are surrounded at their base by dark-coloured linear bracteolæ, much like the paleæ of Ferns.

The unanimous and strong belief entertained by the natives of every country, both of the Old and New World, where the genus *Smilax* occurs, in the "virtus mundificans, diuretica, diaphoretica"† of the different species, without the possibility of the opinion being the result of intercommunication, is surely inexplicable on any ground save that of their possessing really energetic alterative and depuratory properties; and appears to me an unanswerable refutation of the opinions of those physicians—according to Dr. Christison,‡ a majority of the profession—who distrust or disbelieve the therapeutic value of sarsaparilla, or "ascribe its supposed effects to the care bestowed on the comfort and diet of the patient."§

Dr. Seemann has recently|| separated certain species of *Smilax* as the types of two distinct genera, which really differ in no particular but in the stamens being fewer or more than six in number. In this view I am quite unable to concur, for he himself admits the stamens in his *Pleio-smilax* to vary from 12 to 18, and I besides think the genus as ordinarily admitted far more natural than if split into three, distinguished by a single character, and that only a numerical one. But the form and proportions of the perigone-segments and the stamina, and the number of the latter, differ a good deal; and a careful examination of the whole species known would indubitably lead to the establishing of several very distinct and natural sections, and will, it is to be hoped, be soon undertaken by some competent botanist, for Kunth's monograph is executed in a most perfunctory manner, nor do the two sections admitted by Grisebach seem thoroughly natural and satisfactory.

ON A SUBSTANCE KNOWN AS "AUSTRALIAN CAOUTCHOUC."

BY W. T. THISELTON DYER, B.A., B.Sc., F.L.S.

A peculiar india-rubber-like material has lately been sent to this country, the history and origin of which seem likely to become matters of as great controversy as the true nature of the Torbane Hill mineral. In appearance it consists of sheet-like masses, somewhat less than an inch in thickness, and with more or less scattered sand-grains adhering to their surface. It occurs at a place called Coorong, whence it is brought to Adelaide. The country in the neighbourhood is described as consisting of limestone ridges and scrub without grass. The Coorongite, as it has

* Fl. Ind. iii. 792.

† Loureiro, Fl. Cochinch. ii. 764.

‡ Dispensatory, 827.

§ Royle and Headland, Man. Mat. Med. ed. 4, 645.

|| Journ. Bot. VI. 193, 257.

been named, is confined to a depressed portion of the district, the bottom of which is sandy and grass-covered; it occurs on the banks forming the margins of the depression, and also on the sides of island-like elevations which are scattered about it.

The botanical interest of this curious substance begins with the opinion given with respect to it by the Rev. M. J. Berkeley. "I think," he states in a letter published in one of the Adelaide papers, "there is no doubt that Mineral Gamboge" (another name for the same thing) "is a collemal in an imperfect state. A thin slice shows necklaces of gonidia, but I see nothing like fructification. I have met with no collemal at all like it before." Mr. Whittell, in a letter in the 'Adelaide Observer' (Sept. 30, 1871), gives some further account of its microscopic appearances:—"If one of the thin layers be held up to a strong light, there will be seen in its substance a number of black-looking streaks. If a section be made so as to intersect one of these streaks, it will be found generally (though not in every case) that the black streak is in reality a hollow space lined with dark brown sporules (?), with a lighter coloured mycelium interspersed. The greater number of these sporules measure $\frac{1}{3500}$ th of an inch in diameter, but some are as large as the $\frac{1}{2500}$ th. The mycelium appeared to be formed by the union of small cells end to end." Several Diatoms, belonging to the genera *Cocconema*, and *Navicula* were also detected in the matrix of the substance by Mr. Whittell.

Another writer in the 'Register' (May 8th, 1866) describes thin sections as "exhibiting under the microscope, especially if moistened with a solution of caustic potash or benzole, a granular and cellular structure with entangled fibres resembling the fibres of decayed fungi." Mr. Berkeley has also, as he informs me, been struck with this pseudo-cellular structure. Mr. Archer, the Secretary of the Dublin Microscopical Club, to whom I submitted a fragment for examination, gives, I think, the true explanation of this appearance. He writes to me, in a recent letter, to the following effect:—"I think the substance in question is certainly organic,—some kind of gum with accidental things imbedded, such as bits of vegetable tissue, some confervoid or fungal threads, and the like. Once I saw a *Cymbella* in the material, but I never could find the same place again. The matrix appears to possess a certain amount of *quasi* cellular appearance by reason of streaks running here and there in a *quasi* reticulated manner. Of course, in the act of making the section, the knife leaves a number of superficial streaks which one must throw overboard." The structure of the matrix noticed above may doubtless be attributed to a physical fibrillation due to the mere shrinking and hardening of the substance. That it must have been in a soft, if not fluid state, is evident from the miscellaneous collection of cryptogamic *reliquiæ* which different microscopists have detected in it. Their miscellaneous character is a sufficient proof that their presence is adventitious.

As to the origin of the substance, opinions are the most discordant possible. The suggestion which occurred to Mr. Berkeley, that it is the residue of some cryptogamic plant, is, at first sight, very plausible. One can imagine such a residue being formed by *Bromicolla aleutica*, which forms in the Aleutian isles a layer, two feet thick of a Nostoc-like substance, covered with a gramineous vegetation.* One can imagine it also

* Rep. Ray Soc. 1845, p. 174.

to result from the drying up of a lake covered with *Homonema fluitans*, the "vegetable turtle fat," described by Dr. Seemann as a jelly-like mass several feet thick, with a tall species of Sedge growing in it.*

The following analysis, made by Dr. Bernays, discountenances, however, this theory entirely. He found :†—

| | |
|--|--------|
| Moisture | 4682 |
| Carbon | 647300 |
| Hydrogen | 116300 |
| Ash | 17900 |
| Oxygen and unestimated matters | 203768 |

Any residue left by a Cryptogam (assuming, of course, that no extensive change of composition had taken place in it, except the loss of water) would contain about 50 per cent. oxygen, or far more than the *whole* of the unestimated matter put down above; it would contain also much less hydrogen.

It may, therefore, be safely concluded that no cryptogamic growth could have produced a substance which is practically a hydrocarbon and not a carbo-hydrate.

The next suggestion, then, that occurs is, that it is an oozing or secretion from some plant. Calling to mind the actual existence in Australia of the Grass-tree (*Xanthorrhœa*), this suggestion deserves attention. Dr. Muecke, indeed, in the 'Adelaide Observer' (July 3, 1869), states that the plant which produces the caoutchouc *belongs* to the family of Grass-trees. After giving some account of it, he goes on to say, "the damp yellow juice exudes from the knot and the bottom stalks during the summer heat, and flows on the sand, where it becomes hard, as every caoutchouc does." Specimens of the plant intended by him have been sent to this country, and prove to belong to a *Cyperacea*, a species of *Lepidosperma*. This is quite out of the question as a "gum"-producing plant. It, however, occurs on the margins of the depression round which the deposit is found, and its wiry-roots are found permeating the specimens.‡

The facts, as far as they go, seem to point to the depression having been occupied by water, upon the surface of which an oily matter floated, which drifted towards the edges, and accumulated amongst the fringing sedges. The evidence, however, for and against this view in the Australian papers is most conflicting. It implies, of course, the mineral nature of the hydrocarbon, and evidence of the existence of petroleoid springs in the neighbourhood has consequently been sought for to confirm it. An observer already quoted, Dr. Muecke, remarks that "nobody would have thought of searching for petroleum or asphaltum in a region which consists of a shell limestone only, and belongs to the newest formation." There is, however, nothing to prevent older rocks, which might yield the petroleum, underlying the limestone.

On the other hand, a writer in the 'Express' (Sept. 1, 1871), speaks of "oily scum discovered by the Admiralty surveyors off the south coast.

* Viti, p. 28.

† There is, I think, some small printer's error in the decimals. The analysis, consequently, does not sum up to 100 parts. The figures are, however, no doubt substantially correct.

‡ They have been attributed, also, from mere inspection to some species of *Restio*.

This substance" (the Caoutchouc) "is found," he proceeds to say, "near the salt creek in a depressed basin, and coats sticks and plants not uniformly throughout, but in such a manner as to cover the upper and leave the under portions, again illustrating the action of oily matter floating on water. As a fact further bearing on this, blowers of gas are known to occur in the vicinity, and from the surface of the water-holes oil has been skimmed off, and brought to Adelaide."

All this is flatly contradicted by Mr. Francis in the 'Adelaide Observer' (April 17, 1871):—"The wells have good drinking-water in them, without any trace or even the odour of petroleum. The holes in the limestone are ordinary circular blow-holes found in this recent limestone."

But, on the other side, a letter addressed to Dr. Schomburgh by a shepherd has been sent to this country, asserting that the springs *are* tainted with petroleum. Dr. Bernays also states that the specimen of the caoutchouc he analysed looked exactly like the caoutchouc found at Castleton, Derbyshire.* That the substance is of mineral origin and not vegetable is, on the whole, I think, pretty certain; how it has got to be deposited in the position where it is found is another question which, perhaps, needs further elucidation. I am indebted to Mr. Jackson, the Curator of the Kew Museum, for allowing me to see the extracts from the Australian papers which I have quoted above. I have, I believe, brought together all that is positively known about this rather mysterious substance, and the result may probably be interesting to some readers of the Journal.

SHORT NOTES AND QUERIES.

HYMENOPHYLLUM TUNBRIDGENSE (pp. 24, 46).—Mr. Peter Inchbald, in his list of Llandudno plants, etc. (published anonymously at Llandudno in 1864), localizes this species "at the foot of Penmaen-mawr. *H. Wilsoni* is the commoner plant in North Wales."—JAMES BRITTEN.

SALIX PONTEDERANA.—In the last (3rd) fasciculus of the Rev. J. E. Leefe's 'Salictum Exsiccatum' (alluded to at p. 62), there occurs (No. 59) a remarkable Willow, "found very sparingly at Rothbury, Northumberland," in 1868 and 1870. It bears the name "*S. Pontederana?* Schl. Koch Syn. p. 646." Besides the foliage there are only male catkins. As far as these latter go, they almost perfectly agree, in form and size of scales, with those of *S. rubra*, Huds., with which also the stamens correspond, the filaments being combined usually nearly as far as the anthers, so as to present the appearance of a single forked organ. In other respects, however, the plant differs; it forms "a small shrub with declining branches," and the foliage is quite unlike that of *S. rubra*, the leaves being oval or oval-lanceolate, sparingly and coarsely dentate-serrate, and

* Since writing the above, however, I am informed by Mr. Andrew Murray that coorongite is *not* at all like the Castleton elaterite. He knows that substance well, and describes it as resembling *burnt india-rubber*. The average of five analyses of elaterite by Johnston given in Brooke and Miller's 'Mineralogy,' p. 631, gives for the composition of 100 parts—

| | |
|----------|-------|
| Carbon | 85.13 |
| Hydrogen | 12.63 |

conspicuously hairy beneath, suggesting affinity with the *Capree* group, especially with some forms of the polymorphic *S. cinerea*. A female plant has been previously distributed by Mr. Leefe (Sal. Exs. fasc. ii. no. 33) under the name of "*S. Pontederana*, Sch. Koch! received from the Rev. L. Darwall." This seems to differ very little, save in the downiness of its leaves, from *S. Forbyana* of Smith, included in English manuals as a variety of *S. rubra*. I have no opportunity of getting at Schleicher's original plant, but the male specimens above noticed, and probably the female ones also, seem properly included under the *S. Pontederana* of Andersson, who in his monograph in the 16th vol. of De Caudolle's Prodrromus (pt. 2, p. 311) uses the name to include what he believes to be numerous hybrids between *S. purpurea* and the members of the *Capreeæ* section. Dr. F. Wimmer holds a similar view, who carries the notion of hybridity to a greater length, and considers also *S. rubra* a hybrid form between *S. viminalis* and *S. purpurea* (see the notice of his views in Vol. IV. pp. 383-6).—HENRY TRIMEN.

WHAT IS CUNDURANGO?—My friend Dr. Aristides Rojas, of this city (Caracas) submitted lately to my inspection some fragments of a plant he had received from Guayaquil, and which were said to come from the famous "Cundurango." It was a single leaf, rather roughly preserved, and a considerable quantity of the tufts of silky hairs which constitute the coma of the *Asclepiadaceæ*. No seeds, however, were attached to these hairs. The leaf is petioled (petiole about $1\frac{1}{2}$ " long, and hispidulous), broadly cordate at the base with rounded lobes, obovate, entire and acuminate, 5" long, and about 8" broad; both sides are densely covered with hispid hairs. This last circumstance makes me believe that it belongs to a species of *Macroscepis*, as the broadly cordate base, in my opinion, would not well agree with *Fischeria*, another genus with frequently hispidulous leaves. Decaisne mentions two species of *Macroscepis* in his 'Monograph of Asclepiadaceæ' (DC. Prod. viii. 599); *M. obovata*, H. B. K. (Nova Gen. et Sp. Pl. iii. p. 201, t. 233), and *M. rotata*, Desne., *Cynanchum longiflorum*, Jacq. (Amer. p. 85, t. 59), was recognized by the same author as another species (DC. Prod. viii. 551), but omitted in the article dedicated to *Macroscepis*. Karsten describes a fourth species (calling it a third species, as he likewise was not aware of the existence of *M. longiflora*) *M. urceolata* ('Flora Columbiae,' ii. p. 115, t. 161). The material at hand renders it, of course, entirely impossible for me to determine to which of these species the "Cundurango" may belong, or if it will turn out to be a new species. Those who have access to Professor Jameson's (late of Quito) 'Synopsis Plantarum Æquatoriensium' (2 vols. 1865, 1867), will perhaps be able to give some further information.—A. ERNST. [See also p. 63.]

COTULA CORONOPIFOLIA, L. This plant was first met with in England about two years ago. (See Journ. Bot. 1870, p. 8.) As it is always interesting to trace the migrations of an introduced plant, it may be well to record in the same pages the date of its first appearance in Europe. There is a figure of it in the 'Flora Batava,' t. 658, and in the description attached to the plate it is stated that "towards the end of the seventeenth century this plant, believed by some to have been originally derived

from the Cape of Good Hope, was taken to the Leyden Botanic Gardens and cultivated with great care under glass. This attention, however, was shown to be by no means necessary, for in 1741 Moehring met with it at Emden, in E. Friesland, on ground inundated in the winter."—W. T. THISELTON DYER.

ON SOME PLANTS RECORDED FROM IRELAND.—*Lythrum Hyssopifolia*.—In Mackay's 'Flora Hibernica,' "Ballymadder, near Bannow, Co. Wexford, James Tardy, Esq.," is given as a locality for this. On 27th July, 1870, I examined about an acre of muddy soil, covered in some places with pools of semi-stagnated water, at the mouth of a small and almost dried-up stream, which made its way beneath the shingle into the sea at Ballymadder. This was the only likely place I could discover, either by search or inquiries, near Ballymadder. My search was unsuccessful, but I do not consider it complete, and this year I hope to give the place a thorough re-examination. *Erica vagans*.—Mackay makes no mention of this. Bentham says (1858), "ascending along the Atlantic to Cornwall and the south coast of Ireland." Dr. Boswell Syme, in 'English Botany,' says, "on an islet near the coast of Waterford, near Tramore." The authors of Cyb. Hib. are very doubtful as to its right to be included in the Irish list; they write, "In answer to an inquiry addressed to him, Dr. Burkitt, of Waterford, has kindly informed us that in 1836 he gathered a specimen on the cliffs in the townland called Islandicane, west of Tramore, Waterford; this specimen, which we have not been able to trace, was sent with other Heaths from the same locality to the late Dr. Ball, who is the authority for the name of the species. It is very desirable that the locality should be examined afresh, as Dr. E. Perceval Wright has searched the whole length of coast from Anne's-town to the 'Metal Man,' without discovering any trace of the Cornish Heath." In July 1870, I called on Dr. Burkitt, the original finder, and obtained precise information from him as to the *locus* of the plant. He described the place so accurately, that I could not have gone more than a quarter of a mile astray. My search was a very careful one, but unsuccessful as the last. The locality was not on an "islet," but a short way from the cliffs on the mainlands, and in the townland of Islandicane. I have frequently walked over the neighbouring cliffs since without finding any trace. *Erica cinerea* and *E. Tetralix* occur in many places. Dr. Burkitt afterwards told me that he himself had searched in vain. *Euphorbia Peplis*.—Little doubt seems to have been thrown on this species as Irish. In the Cyb. Hib. we read:—"Garraris Cove, near Tramore, Waterford (Miss Trench); Mackay Addit. (Nat. Hist. Rev. o. s., vi. 537); and spec. ! with label attached in Herb. Mackay. First found by Miss Trench, 1839." "Garraris Cove" should be Garryrisk Cove. It is of small extent, not more than half a mile long, and easily searched. In July, 1870, I examined this place very carefully, and on telling Mr. A. G. More that I thought the plant must be extinct there, he suggested that perhaps it might be found in some of the adjacent coves along the coast. Therefore, in 1871, I examined every cove from Annestown to Tramore, but without finding the least trace of *Euphorbia Peplis*. My search was long and careful in each case, and it is my opinion that *E. Peplis* no longer exists in or near its old locality. Taking the three plants mentioned as a

whole, I think their claims to be considered as Irish are slight indeed, not one of them having been found for thirty or forty years, if indeed two of them were ever found at all.—R. M. BARRINGTON.

PLANT DRYERS.—The best article I have ever used, better than any blotting-paper, is one of the kinds of sheathing paper made by Messrs. Roberts and Son, of Waltham. In any large quantity it can be had, cut to size, at the mill. I have just been distributing two tons of it among botanists, cut to size of twelve to eighteen inches. Each sheet is like a pad of blotting-paper. We stitch from three to five sheets together into a dryer, the specimens being placed between successive dryers, of course enclosed in a sheet of thin soft paper; nothing can be better nor so cheap.—PROFESSOR ASA GRAY in 'American Naturalist.'

DROSERA ROTUNDIFOLIA.—Mr. W. G. Smith, in a communication to the 'Gardeners' Chronicle,' gives as a reason why the flowers of *Drosera rotundifolia* are so rarely seen expanded, their "extreme sensitiveness to touch, the flowers being far more sensitive than the leaves in this respect." He found that a very light touch caused the instant closing of several expanded flowers. On the Cheshire moors I have frequently found this species with fully expanded blossoms between 12 and 12.30, even when the weather was cloudy. I have often kept *D. rotundifolia* and *D. intermedia* in water for many days without inducing their flowers to open. On one occasion, however, I noticed them fully expanded at 10.30 A.M., but they closed in half an hour, although they were not touched. Linné ('Flora Suecica') says of *D. rotundifolia*, "Flos mense Junio evigilat hora 9; clauditur hora 12 ante meridiem." Mr. Borrer observed that the anthers of *D. rotundifolia* were white, those of *D. intermedia* yellow, a statement which I am able to confirm.—JAMES BRITTEN.

FERTILIZATION OF CEREALS.—I have good reason for knowing that the belief that the wind does much injury by blowing off the "flowers" of the Wheat is certainly very prevalent. Farmers are extremely particular about their wheat-fields when "in flower." Nobody is permitted to walk through them when in that condition. I have myself been censured for doing so. I have never observed the same caution used with Oats and Barley. Prof. Dyer says (p. 26) it is "a general belief that the fertilization is effected in the manner described by Bidard and Dr. Boswell Syme." The belief may be general among botanists, but it certainly is not general in this neighbourhood (Bray, co. Wicklow) among the very class of men to whom it is of practical importance, *i. e.* tillage farmers. Prof. Dyer having stated that it was probable that information would be obtained on the subject in the 'Royal Agricultural Society's Journal,' I looked through some back numbers, and found an account of Hooibrenk's method in vol. xxv., which it may be of interest to give here. Hooibrenk recommends,—“1st. Rolling the corn three or four times after it is up; and, 2nd. Artificial fecundation at the flowering season.” The former is, I suppose, to give the young Wheat plants a bend, in order to ensure cross-fertilization, by causing the pollen of one plant to fall on an-

other. The second part of his method is described thus:—"It is effected by a rope twenty-five to thirty yards long; to this rope are attached pieces of woollen twist (*torsades de laine*) two feet long, so as to touch each other, and form a continuous fringe. A little piece of lead, the weight of a swan shot, is fastened to each one of the threads at intervals of four inches. The wool employed should be long and coarse." Four rods each of Wheat and Rye were cut, thrashed, weighed, and measured with the following results:—

| | Bushels. | Lb. | |
|----------------------------|----------|------|---------------------|
| Wheat fecundated | 46 | 2728 | per English acre. { |
| Wheat not fecundated . . . | 34 | 1848 | " |
| Rye fecundated | 38 | 2244 | " |
| Rye not fecundated | 25 | 1408 | " |

This experiment is entirely in favour of making use of Hooibrenk's method; but it appears that in another experiment on a much smaller scale, a square metre (39·37 inches) only being taken, the result was not nearly so satisfactory; in fact, it indicated that the method was of little or no benefit. I am inclined to think, however, that experiments on so small a scale as this last are almost useless. In conclusion, I would say that the subject is one of the deepest interest and of the greatest importance, and I sincerely hope that English as well as foreign botanists will, ere a year has passed, have settled the question, and corrected or confirmed the opinions of a great number of British agriculturists.—R. M. BARRINGTON.

FERTILIZATION OF THE HAZEL (p. 77).—I have paid some attention to this subject during the past season, but with a different result from Mr. Bennett's. I could not perceive any fixed or definite relationship between the periods of development of the male and female flowers; and I am convinced that with this species fertilization is effected by the agency of the wind, by which clouds of pollen are carried to considerable distances from the male catkins, and some of this, as I have myself seen, cannot fail to be caught by the stigmas of all the female flowers in its path. Cross-pollination, moreover, appears to be requisite to perfect fertilization; for I have long observed that Hazel-bushes growing solitarily, though producing large quantities of male and female flowers, seldom bear any fruit. Is it not rather much, considering the light that has been thrown upon the subjects of self- and cross-fertilization and of prepotency by Mr. Darwin's minute investigations, to assume, without careful experiment, that habitual self-fertilization is proved by the observed fact, however interesting in itself, of self-pollination, especially at a season when complete vigour would be more than usually necessary?—W. E. HART.

FERTILIZATION OF PLANTS.—The term "self-fertilization" appears to be used, with respect to plants, in two widely different senses, being sometimes applied to the impregnation of the ovule by pollen from the anthers of the same *flower*, and at other times to impregnation by pollen from other flowers on the same *plant*. It is in the first sense alone that, as it seems to me, the term is strictly applicable, there being really no such thing as the fertilization of a plant. It is, too, in this first sense

only that the theory (may we not call it a law?), that "nature abhors perpetual self-fertilization," has been shown with any degree of certainty to be true, or of general application in the vegetable kingdom. By far the greater number of facts adduced to prove the necessity of intercrossing between plants only go to prove such necessity between flowers; and it can scarcely fail to strike any one attentively studying the facts, apart from any previously adopted theory, that the object sought to be attained by so many and such various contrivances is intercrossing, not so much between different individual plants as between different individual flowers. This is all that is actually attained in a very great number of instances. In *Compositæ*, for example, although the stigma of any one floret in the capitulum cannot be fertilized by pollen from the anthers of the same floret, it is practically impossible but that it must be fertilized by pollen from a neighbouring floret. So, too, in the cases where insect agency is requisite, whenever a plant has more than one flower, and especially when the flowers are disposed near each other in the same inflorescence, an insect would be sure to carry pollen from flower to flower before flying off to another plant. Mr. Darwin, with his usual candour, has noticed this objection with regard to *trees* (Orig. Spec. ed. 5, p. 115), and admits that it is a valid objection to the theory of necessary intercrossing between different plants, but thinks that "nature has largely provided against it by giving to trees a strong tendency to bear flowers with separated sexes." As I have observed above, I think the objection applies with equal force to other plants as well as trees; and moreover, in the case of those trees where the sexes are separated, but are produced on the same tree, it by no means follows that intercrossing between two individual trees is ensured thereby,—although, of course, in such cases, as Mr. Darwin remarks, there is a better chance of the pollen being occasionally carried from tree to tree. I do not think this *chance* is admissible as a proof of the theory that intercrossing between different plants is necessary. In dioicous plants, of course, such intercrossing is unavoidable, as also, to a greater or less degree, in the dimorphic and trimorphic plants, which Mr. Darwin and others have shown to be more or less functionally dioicous; but among monoicous plants I do not remember to have noticed any instance in which the female flowers could not be fertilized, or were not apparently fertilized, by the male flowers on the same plant. With regard to the Hazel, for example, I may say that my observations entirely agree with those of Mr. Bennett (*supra*, 77). It does not seem necessary to assume that winter-flowering plants are specially constructed with a view of self-fertilization. The only special fact stated with regard to the *Stellaria* mentioned by Mr. Bennett (ix. 374), and the Geranium mentioned by Mr. Hart (*supra*, 25), is that the anthers were discharging pollen at the time the stigmas were receptive; there is no evidence that fertilization was the result, and, even if this were the case, the true explanation appears to me to be that given by Mr. Hart, viz. that the pollen, not having been removed by insects or otherwise, the stamens had not withered at the time the pistil came to maturity. There are, it is true, instances of genuine but abnormal self-fertilization, as of plants in greenhouses and orchard-houses, and these must, I think, be explained in the same way.—FRED. I. WARNER.

Extracts and Abstracts.

ON THE GERMINATION OF TROPÆOLUM.

By W. T. THISELTON DYER, B.A., B.Sc., F.L.S.

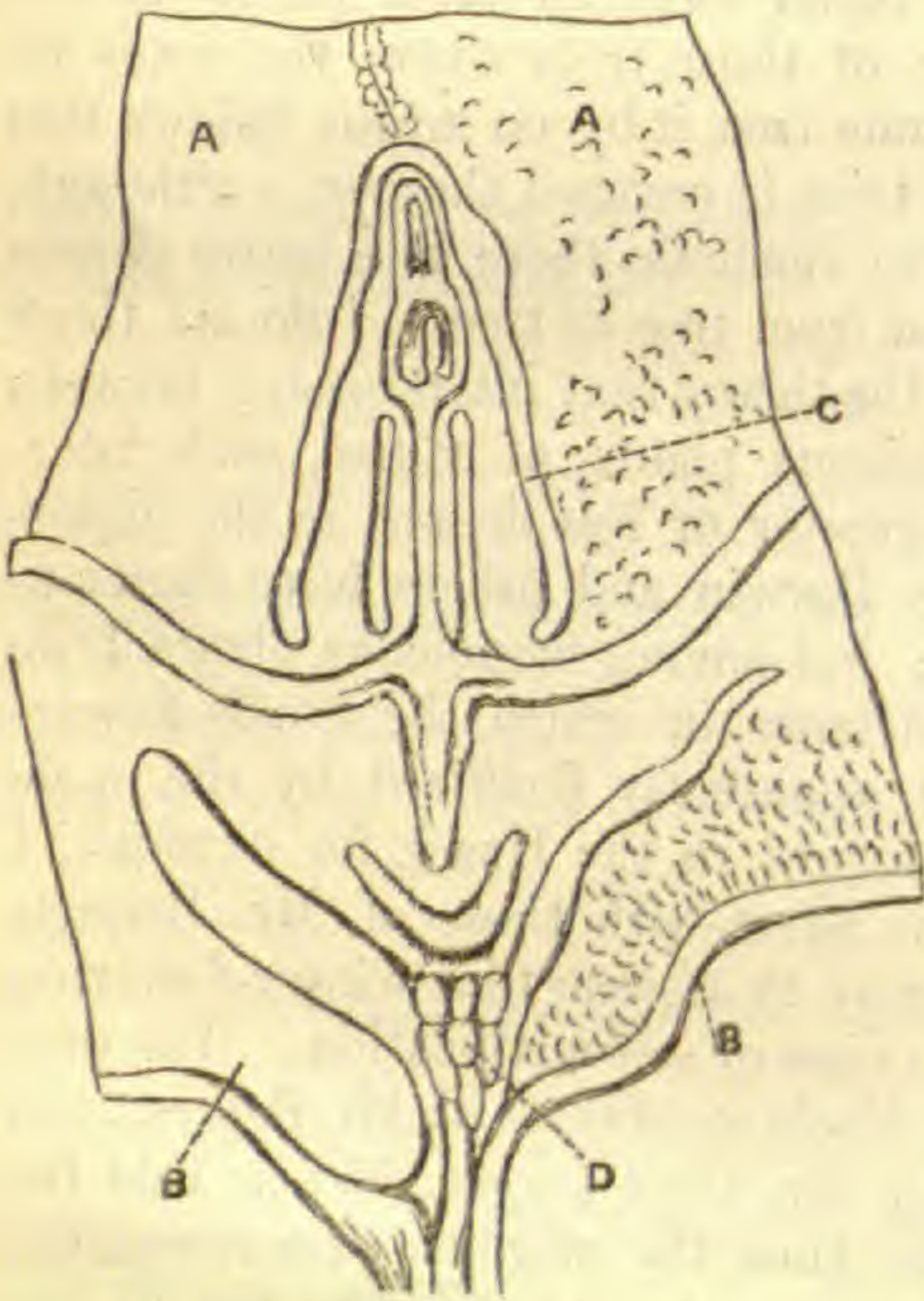
Last year, when looking through the drawings by Francis Bauer, preserved in the botanical department of the British Museum, I was struck



Germinating embryo of *Tropæolum*, showing true coleorhiza, $\times 3$.

with one which presented the germinating seeds of *Tropæolum* as unmistakably endorhizal. Having mentioned the matter in a letter to Dr. Masters, he communicated it to the Scientific Committee of the Royal Horticultural Society. This elicited a notice from "M. J. B.," a well-known contributor, who, in the 'Gardener's Chronicle' for July 9, made the following remarks:—

"It was stated some time since, at one of the scientific meetings of the Royal Horticultural Society, that the seed of *Tropæolum* is endorhizal. This surprised us so much that we immediately sowed some seed, to see how the case really stands. If a section be made in the seed through the thick cotyledons when it is just ready to germinate, it will be found that the base



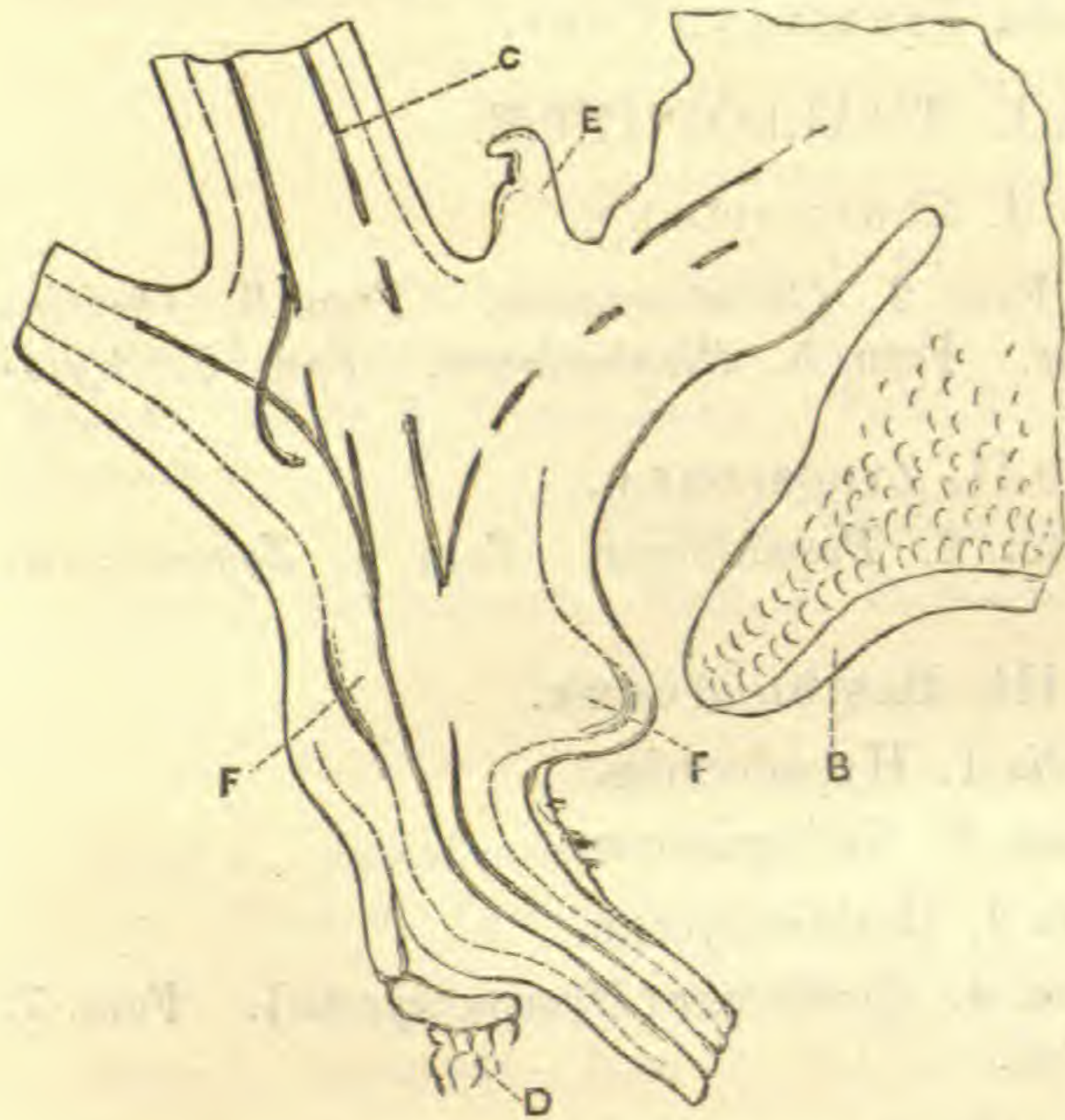
Section through the base of the embryo of *Tropæolum*, $\times 14$.

A, A, Cotyledons; B, B, Lobes from the base of the cotyledons, forming the teeth which surround the radicle; c, Plumule, with rudiments of fibrovascular bundles; d, Primary radicle, with the persistent cells of the suspensor attached.

of the cotyledons united below extends beyond the primary radicle, which is perfectly distinct, forming a sort of coleorhiza. This, indeed, is indicated in the vertical section of *Tropæolum majus* in the 'Vegetable kingdom.' (Lindley's.)"

Coming from the source from which it did, I felt that this view of the matter required consideration, and I therefore also sowed some seeds (as, indeed, I had done before), and made a very careful examination of the different stages of germination. I succeeded in ascertaining that the embryos are truly endorhizal, and that what "M. J. B." describes is perfectly correct, but that the real phenomenon in question had escaped his notice. The seed-coats of *Tropæolum* immediately inclose the embryo, of which the principal bulk consists of the enlarged, fused-together, or conferruminate cotyledons. At the base is a very minute cavity, inclosing the plumule, and the extremely short radicle is also in-

closed, and concealed by the four tooth-like lobes or downward processes from the bases of the cotyledons which "M. J. B." describes. These four teeth separate from one another in germination, to allow the outward passage of the radicle, and it is these which "M. J. B." thinks have been mistaken for a coleorhiza, but this is not the case. As early as 1811, Auguste de St. Hilaire gave in the 'Annals of the Museum of Natural History at Paris,' vol. xviii. pp. 461-471, t. xxiv. a perfectly correct account of the development of the radicle. He says, "The radicular body, by its elongation, soon makes its appearance beyond the four teeth. Its extremity is then ruptured, and the true radicle exhibits itself, emerging from a kind of sheath or cover, which forms round



Section throughout the base of the germinating embryo of *Tropæolum*, $\times 14$.

B and c, as above; D, Apex of the primary radicle thrown off laterally, forming part of the coleorhiza; E, Bud in the axil of one of the cotyledons; F, Lateral secondary rootlet.

which in germination proceeds from the radicle of the axis of the embryo, four other roots originate symmetrically from its sides. This makes a total of five roots, each of which pushes before it and pierces, in order to prolong itself externally, the root-sheath with which the embryo of *Tropæolum* is provided." Schacht, who with many other writers has studied the remarkable processes from the suspensor which are developed in *Tropæolum*, speaks of the radicle in the mature seed as "already provided with the commencement of a coleorhiza" (Ann. des Sc. Nat., 4th ser. vol. iv. p. 51).

The radicle of *Tropæolum* is also remarkable for the persistence with which the cells of a portion of the suspensor remain attached to it. Perhaps, it may be supposed, this contributes to make the exterior of the radicle tough and unyielding. As it is well known that growth takes place within the apex, elongation appears to be only possible for the future root by bursting through the investing tissues. In this way a more or

it a swelling, of which the irregularly torn borders quickly disappear" (466). He further states, "If we accept the division of phanerogams into endorhizal and exorhizal, *Tropæolum* forms amongst the last a very remarkable exception" (469). To the same effect, in 1816, Mirbel remarks in his 'Éléments de Botanique' (vol. i. 59), "It is very rare to find the radicle provided with a coleorhiza in dicotyledonous embryos; we ought, therefore, to pay particular attention to that of *Tropæolum*." I am indebted to Dr. Masters for calling my attention also to a paper by Chatin in the 4th series of the Annales des Sc. Naturelles, vol. v., where it is pointed out (p. 295) that, "in addition to the root,

less complete collar of the torn remains of the primary radicle, is formed, and it is this which is the true coleorhiza. The accompanying illustrations have been carefully drawn from specimens examined by myself, and, I think, quite confirm what has been stated by the writers I have quoted. (From the 'Gardeners' Chronicle,' 1872, p. 218.)

CONSPECTUS FAMILIARUM CRYPTOGRAMMARUM SECUNDUM
METHODUM NATURALEM DISPOSITARUM.

AUCTORE FERDINAND COHN.

CLASSIS I. THALLOPHYTÆ.

Ordo I. SCHIZOSPOREÆ.

Fam. 1. *Schizomycetæ*. Fam. 2. *Chroococcaceæ*. Fam. 3. *Oscillariaceæ*. Fam. 4. *Nostocaceæ*. Fam. 5. *Rivulariaceæ*. Fam. 6. *Scytonemaceæ*.

Ordo II. ZYGOSPOREÆ.

Fam. 1. *Diatomaceæ*. Fam. 2. *Desmidiaceæ*. Fam. 3. *Zygnemaceæ*.
Fam. 4. *Mucoraceæ*.

Ordo III. BASIDIOSPOREÆ.

Sectio 1. Hypodermiæ.

Fam. 1. *Uredinaceæ*. Fam. 2. *Ustilaginaceæ*.

Sectio 2. Basidiomycetæ.

Fam. 3. *Tremellaceæ*. Fam. 4. *Agaricaceæ* (*Hymenomycetæ*). Fam. 5. *Lycoperdaceæ* (*Gasteromycetæ*).

Ordo IV. ASCOSPOREÆ.

Fam. 1. *Tuberaceæ*. Fam. 2. *Onygenaceæ*. Fam. 3. *Erysiphaceæ*.
Fam. 4. *Sphæriaceæ* (*Pyrenomycetæ*). Fam. 5. *Helvellaceæ* (*Discomycetæ*).
Fam. 6. *Lichenes* (excl. *Collema*).

Ordo V. TETRASPOREÆ (FLORIDEÆ).

Fam. 1. *Bangiaceæ*. Fam. 2. *Dictyotaceæ*. Fam. 3. *Ceramiaceæ*.
Fam. 4. *Nemaliaceæ*. Fam. 5. *Lemniaceæ*. Fam. 6. *Sphaerococcaceæ*.
Fam. 7. *Melobesiaceæ*. Fam. 8. *Rhodomelaceæ*.

Ordo VI. ZOOSPOREÆ.

Fam. 1. *Palmellaceæ*. Fam. 2. *Confervaceæ*. Fam. 3. *Ectocarpaceæ*.
Fam. 4. *Sphaeelariaceæ*. Fam. 5. *Sphorochnaceæ*. Fam. 6. *Laminariaceæ*.

Ordo VII. OOSPOREÆ.

Sectio 1. Leucosporeæ.

Fam. 1. *Chytridiaceæ*. Fam. 2. *Peronosporaceæ*. Fam. 3. *Saprolegniaceæ*.

Sectio 2. Chlorosporeæ.

Fam. 4. *Volvocaceæ*. Fam. 5. *Siphonaceæ*. Fam. 6. *Sphaeropleaceæ*.
Fam. 7. *Ædogoniaceæ*. Fam. 8. *Coleochætaceæ*.

Sectio 3. Phæosporeæ.

Fam. 9. *Tilopterideæ*. Fam. 10. *Fucaceæ*.

CLASSIS II. BRYOPHYTÆ.

Ordo I. PHYCOBRYÆ.

Fam. 1. *Characeæ*.

Ordo II. MUSCI.

Fam. 1. *Anthoceraceæ*. Fam. 2. *Ricciaceæ*. Fam. 3. *Marchantiaceæ*.
Fam. 4. *Monocleaceæ*. Fam. 5. *Jungermanniaceæ*. Fam. 6. *Andreæaceæ*.
Fam. 7. *Sphagnaceæ*. Fam. 8. *Phascaceæ*. Fam. 9. *Bryaceæ*.

CLASSIS III. PTERIDOPHYTÆ.

Cohors I. TRICHOSPORANGIÆ.

Ordo I. FILICES.

Fam. 1. *Hymenophyllaceæ*. Fam. 2. *Gleicheniaceæ*. Fam. 3. *Schizæaceæ*.
Fam. 4. *Osmundaceæ*. Fam. 5. *Polypodiaceæ*. Fam. 6. *Cyatheaceæ*.

Ordo 2. RHIZOCARPEÆ.

Fam. 1. *Salviniaceæ*. Fam. 2. *Pilulariaceæ*.

Cohors II. PHYLLOSPORANGIÆ.

Ordo I. STROBILOPTERIDES.

Fam. 1. *Marattiaceæ*. Fam. 2. *Equisetaceæ*. Fam. 3. *Ophioglossaceæ*.
Fam. 4. *Lycopodiaceæ*.

Ordo II. SELAGINES.

Fam. 1. *Isoëtaceæ*. Fam. 2. *Selaginellaceæ*.

—(From 'Hedwigia,' Feb. 1872.)

ROYAL BOTANIC GARDEN OF EDINBURGH.

Professor Balfour, the Regius keeper, in issuing the usual list of donations during 1871, gives the following particulars of the Garden.—The Botanic Garden of Edinburgh is one of the oldest establishments of the kind, having been founded in 1670. It was used for the purpose of teaching by the professor of botany in the University of Edinburgh in the year 1676. Since that time it has undergone many changes, both as regards its situation and extent. It was first situated near Trinity College Church. The locality is now occupied by the North British Railway, which has displaced both the college church and the garden. The name Physic Garden is still applied to the locality, indicating the cultivation of medicinal plants. In the year 1763 the garden was transferred to Leith Walk, and in 1820 it was removed to its present site at Inverleith. It now contains $27\frac{1}{2}$ acres of ground. The garden is constantly used for instruction in botany. The botanical school is the largest in Britain.

The number of pupils who attended the lectures last summer (1871) amounted to 306, besides ladies who attended a popular course. In ad-

dition to the daily lectures, demonstrations are given in the hot-houses and in the open ground of the Garden; and facilities are afforded for practical investigations, to students who desire to carry on researches into the structure and physiology of plants. A special room and microscopes are provided for instruction in histological botany. There is a class museum, open daily to the public, which contains specimens for illustrating the lectures. This museum has been formed chiefly by contributions from the professor and his pupils. The museum-room has been much improved this year by the addition of a glass roof. By this means the room is better lighted, and the specimens are displayed to greater advantage. All the specimens in the museum are distinctly named. There is a very complete and valuable collection of cones, and a large series of instructive models. There is also a large herbarium, which is open for consultation,—the specimens being arranged so as to illustrate the floras of different countries. The Garden is open free to the public every lawful day, during summer, from 6 A.M. to 6 P.M., and during winter, from daylight to dusk. For the benefit of the working classes it is also open to a late hour on Saturdays during summer. The number of visitors during the year 1871, amounted to 69,260. The Garden is laid out specially for teaching, and a large portion of the ground is occupied with plants arranged in classes and orders distinctly named. There is a collection of medicinal plants, and one of British plants, arranged according to the natural system. There is a large collection of European herbaceous plants, and of hardy exotic species, from various parts of the world, capable of enduring the climate of Scotland. There is also a special collection of Alpine plants. There is an extensive arboretum, containing a valuable collection of Coniferous trees, arranged in groups and named. There are several ranges of hot-houses and green-houses, and a palm-house 72 feet in height. An important addition is now being made to the Garden by the construction of a house for half-hardy Palms, Tree-ferns, Australian trees, etc. This will fill up the vacant space in the front range of houses, and will enable the Director to make improvements in the palm-house arrangements. The Edinburgh Government School of Design is supplied with specimens from the Garden, and demonstrations are given occasionally by the Regius keeper to the working classes. The herbarium stands in need of a salaried curator, who could devote his whole time to it, and could assist visitors in examining the specimens. There is also much need of a consulting-library in the herbarium-room.

New Publications.

Statistica Botanica della Toscana. Per TEODORO CARUEL. Firenze. 1871. (Pp. 374.)

Professor Caruel has done good service to Italian botanists, and to all who are interested in plant distribution, by the compilation of this book, which contains a great quantity of well-arranged information. The district included comprehends Tuscany proper (excluding the Romagna), the whole of the duchy of Lucca, and the provinces of Garfagnana and

Lunigiana, and forms an isosceles triangle, extending from $44^{\circ} 28'$ to $42^{\circ} 14'$ N. lat., and lying between the Apennines and the seacoast, which form respectively its two long sides, the Roman provinces which bound it on the south-east forming the base. The first chapter gives an account of the physical character of this district, and this is followed by a short account of the various botanists who have investigated its flora, from Luca Ghini, of Bologna, who died in 1556, to the present time. The third chapter gives a general review of the Flora. There are no less than 2366 species of Phanerogams, and 56 of higher Cryptogams. Of these, 34 are absolutely peculiar to Tuscany, and 34 do not occur in other parts of Italy. Elaborate tables of comparison between the plants of Tuscany and those of other parts and the whole of Italy, and with the flora of Europe, are given.

In the fourth chapter the district is divided into five botanical regions, through which every species is traced. As the area of Tuscany is not much above 8500 square miles, or rather less than Mr. Watson's provinces of the Humber and the Tyne together, a very fair estimate of distribution is given. The regions, however, are more equivalent to the 'zones' of the author just mentioned, and occupy successively higher elevations from the sea level to the summits of the Apennines in the following order,—*regio maremmana*, *campestre*, *submontana*, *montana*, *alpestre*. These zones pass into one another, and cannot be accurately defined. The *regio alpestre* is small in extent, taking in only the tops of the mountains between 1600 and 2000 metres, the latter height being only reached by Monte Pisanino and the Alpe di Camporaghena. The Olive does not rise out of the *maremmana* region, reaching to between 500 and 600 metres; the Vine extends into the *regio campestre* as high as 850 metres; *Castanea vesca* is characteristic of the *campestral* and *submontane* zones to about 1100 metres; whilst the Beech does not reach lower down than the upper limit of the Chestnut, and extends through the *montane* region into the *alpine*, where it has been found at an elevation of above 1700 metres. Lists of the species peculiar to each region are given, and of those most characteristic of its flora. Under the region of the *maremma* we have included the eight islands forming the Tuscan archipelago, the flora of each of which is given in full in a series of parallel columns. Elba, by far the largest, is the richest, with 730 species, while only 16 have been collected in the islet of Pianosa. No less than 68 species of the flora of the archipelago do not occur on the mainland, but of these only 1 is found in as many as five islands, 48 being restricted to one only. Caprera has as many as 39 species, so far peculiar to it.

The floral calendar for the neighbourhood of Florence, in which the author was assisted by Dr. Levier, and which had been already printed in the 'Nuovo Giornale,' is again published here, and must prove very useful to botanists living in the late capital of Italy. An account of the flora of the Serpentine tract of Gabbro, near Leghorn, and interesting notes on the changes which have occurred in the flora of Tuscany, including introductions, extinct species, colonists, etc., concludes a volume which may be confidently recommended as a companion to any English botanist who visits the attractive district of which it treats.

H. T.

Reduction of the Meteorological Observations made at the Royal Horticultural Gardens, Chiswick, in the years 1826-1869. By JAMES GLAISHER, F.R.S., ETC. (a Supplement to Vol. II. of the Journal of the Roy. Hort. Soc., New Series). 1871.

The observations of temperature and rainfall for forty-four years are here reduced to easily-consulted tables, forming a most useful and valuable addition to the sources of information on the climate of London. The first series of tables shows the mean temperature, calculated from three daily observations, and carefully corrected for every day of each month for the forty-four years, with the extremes and means for the whole time, and a calculation of the most probable temperature of each day in the year. It appears that January 7th, 8th, and 9th are the days of lowest (36.3°), and July 9th-26th the time of highest mean temperature (63.3°). The mean temperature of each year in these tables will be found uniformly higher than those supplied by Mr. Glaisher for the 'Flora of Middlesex' (printed in Introduction, p. xxxvi.), which were obtained by combining the registers kept at Somerset House, Epping, Lyndon (Rutlandshire), and the Royal Observatory. The mean of the forty-four years at Chiswick is 49.9° . In a second series of tables is presented the difference above or below the estimated mean temperature for every day in all the years, expressed by + and - signs. The great differences of the same day in different years, and the frequent and remarkable changes from day to day, are very striking. "These extremes of temperature affect vegetation greatly, but they seldom occur alone. It is very necessary for the operation of open-air horticulturists to know for what lengthened periods these departures from averages may extend. It will be seen that very often there are long groups of + or - quantities, and that frequently several of the numbers are very large to which these signs are attached; and it is the accumulation of these departures, more than in isolated cases, which requires the attention of the horticulturist." These tables also seem to bear out the prevalent opinion that our winter months are somewhat warmer, and our summer months somewhat colder than formerly.

A very important inquiry with reference to plants is the daily range of temperature. The actual degree of cold to which a plant may have been subjected is, of course, not shown by a statement of the mean temperature of the twenty-four hours. In an extensive series of tables, the daily range for every day for forty-four years is exhibited. There is great variety in this respect. In the winter the range varies from 1° to 40° , and in the summer it may even exceed this, "being dependent on the different directions of the wind, the more or less cloudy state of the sky, and the different conditions of the weather generally." Taking the average of all the years, the smallest daily range is found on January 15th, and the largest on July 5th.

The statistics of rainfall are equally full. The fall for each day, month, and year is given. The month in which long periods without rain are most frequent is December; least frequent, February and October. Instances of sequences of fourteen days with rain are rare, but most usual in October, which is the wettest month. Falls of as much as an inch in the day in the winter months are very unusual. Such falls are most frequent in July. The heaviest fall recorded, 1.96 in., was in October, 1857.

Reckoning the rainfall in consecutive ten-day periods, the driest is from March 22nd to 31st, the wettest from October 18th to 27th. A diagram is given representing the annual march of the fall of rain; and it is satisfactory to find that this in all main characters agrees with the results obtained from fifty-five years' observations at Greenwich, where the fall is, however, somewhat greater. H. T.

The Fairfield Orchids: a Descriptive Catalogue of the Species and Varieties grown by James Brooke and Co., Fairfield Nurseries, Manchester.
London. 1872. Pp. 128.

Though this is a trade catalogue, and does not pretend to any scientific position, it possesses some novel features, so good and so well carried out, as to merit a few words of commendation.

The genera and species are arranged alphabetically, and under each we find a short description in plain language,—localities, references to figures, and indication for culture. Prefixed to the catalogue are chapters on the nature, uses, and life-history of Orchids, their structure, and the best methods of cultivation, all written concisely, and with an amount of accuracy not usually found in popular writings. The most remarkable feature of the book is a glossary, which is headed “significations of the names applied to Orchids,” and which contains, in a small compass, a great amount of information difficult to obtain elsewhere, especially about collectors and growers of Orchids. An idea of this glossary is best obtained from an example.—

“*Vanda*.—According to Sir William Jones (‘Asiatic Researches,’ iv. 302–313) *Vanda* in the Sanscrit language denotes the consecrated Mistletoe of the Oak (the Druidical history of the plant in our own island being no more than the western phrase of something more ancient), while the oak itself is *Vandaca*. From the Mistletoe the name was extended to parasites and epiphytes in general, but always with an addition, *Baculavanda* denoting the *Loranthus*, and *Amaravanda*, a tree-Orchid, the latter term corresponding with the Malayan *Angrec*” (whence the genus *Angræcum*).

The author of this book is Mr. Leo Grindon, who is to be congratulated on transforming a mere catalogue into a really useful little manual. H. T.

Materia Medica Papers.

Dr. E. Cosson, in an interesting note on *Euphorbia resinifera*, Berg, read before the Royal Botanical Society of Belgium, verifies the statement of Berg, that the Gum Euphorbium of commerce belongs to the species to which Berg gave the name of *E. resinifera*. Dr. Cosson found in Von Martius' collection at Brussels, a specimen of Gum Euphorbium with sufficient of the dried stems of the plant producing it to give a good idea of the plant. Probably Von Martius received these specimens from his brother, Dr. T. W. C. Martius.

The history of this acrid gum is very interesting. *E. Canariensis*, L.,

E. officinarum, L., *E. antiquorum*, L., and *E. tetragona*, Haw., have each been accredited with its production; but Dr. Pereira, who examined the question with his usual critical ability, stated that only *E. canariensis* fulfilled all the requisite conditions of locality, etc.; and that he felt little hesitation in ascribing the gum to this plant. He says (Elements Mat. Med. vol. ii. pt. 1. p. 399, 1855) that the specific characters "apply to the branches found mixed with the Euphorbium of commerce. They agree with the description and figure of *Tithymalus aizoides lactifluus*, the *Euphorbia canariensis* of Plukenet." Miller also (Gard. Dict. vol. i. art. Euphorbium) states that in looking over some Euphorbium in a shop, he "found several spines amongst it, which exactly agreed with those of that plant." Pereira found in some specimens of the gum, spines resembling those of *E. tetragona*, Haw.

But better materials led Berg to trace its origin to a new species, to which he gave the name of *E. resinifera*, and described from dried remains picked out of the gum. *E. resinifera* has a stem $\frac{1}{3}$ the size of that of *E. canariensis*, and stalked umbels, whilst *E. canariensis* has almost sessile flowers. Berg gives figures in 'Berg und Schmidt, Darstellung und Beschreibung sämmtlicher oin der Pharmacopœia Brussica.' The gum contains 20 per cent. of an acrid principle Euphorbin ($C_{26}H_{22}O_2$), so acrid indeed that in the collection of the gum the fingers become excoriated if brought into contact with it, and it is the practice to cover the mouth and nostrils to avoid the excessive sneezing which would otherwise ensue. The best general account of the production of this gum is that by Jackson, in his 'Account of Morocco.'

Dr. Cosson has also compared the various materials he has with a growing plant at Kew (which has not yet flowered), sent by Mr. F. Carlsen, the English Consul at Mogadore. If the history of this plant can be satisfactorily attested as being the species actually producing the gum, its flowering will be looked to with some degree of interest, as the question can then be set completely at rest.

Mr. Howard has recently cleared up another doubtful point in the cinchona question. He has described and figured in the 'Bulletin de la Société Botanique de France' a new species, named *Cinchona rosulenta*, a native of Ocaña, in New Granada. The vernacular name appended to the specimens of this plant, which were collected by Purdie in October, 1845, is "Quina de la tierra fria." *C. rosulenta* is very close, both in appearance and chemical composition, to *C. succirubra*, the bark, however, has a more roseate hue, and the leaves approach *C. ovata*, the nerves, however, being more rigid and prominent. Mr. Howard identifies this species with the *Quinquina rosé* d'Ocaña, of M. Delondre, a figure of which is given in that author's 'Quinologie;' also with M. Rampon's *quinquina à quini-dine*, described in Dr. Planchon's 'Des Quinquinas;' and also with Dr. Wittstein's 'Pseudo regia.'

This bark has long been known in French commerce under the name of "Quina rosé," and we are grateful to Mr. Howard for thus clearly settling its synonymy, and giving it a botanical position.

J. C.

Proceedings of Societies.

LINNEAN SOCIETY.—*March 7th.*—G. Bentham, Esq., President, in the chair. The following papers were read:—"Revision of the Genera and Species of *Scilleæ* and *Chlorogaleæ*." By Mr. J. G. Baker. This paper, the author stated, might be regarded as a continuation of the monograph of the capsular *Liliaceæ*, which he commenced in vol. xi. of the Linnean Proceedings. Considering the Natural Order *Liliaceæ* as composed, anomalous genera apart, of three principal sections,—*Smilacææ*, with baccate fruit; *Colchicææ*, with capsular, usually septicidal fruit and extrorse anthers; and *Liliaceæ* proper, with capsular, usually loculicidal fruit and introrse anthers—he advocated the division of the last into subsections, characterized by a gamophyllous and polyphyllous perianth; and these into two parallel series of tribes, distinguished by the nature of the rootstock and inflorescence, as follows:—

| | Inflorescence. | Gamophyllous. | Polyphyllous. |
|--------------|-----------------------------|------------------------------|--------------------------------|
| Bulbous. | Racemose | Hyacintheæ and Mas- soniæ | Scilleæ. |
| | Panicled | Odontostemoneæ . . | Chlorogaleæ. |
| | Umbellate | Milleæ | Alliææ. |
| | Caulescent | Sandersoniæ | Tulipeæ. |
| Not bulbous. | Racemose or pani- cled | Hemerocallideæ . . | Anthericææ and Eriospermeæ. |
| | Umbellate | Agapantheæ | Aphyllantheæ. |
| | Suffruticoso - car- nose | Aloineæ | Yuccoideæ. |

The gamophyllous series (with the exception of *Aloineæ*), treated in the former paper, includes about 350 species, two-thirds of which inhabit the Cape. The present paper was devoted to general remarks on the range of structure in the organs of the two first of the polyphyllous tribes and to a detailed definition of their genera and species. *Chlorogaleæ* includes only three genera and four species; three of which are North American; *Scilleæ* contains nearly two hundred species, about half of which belong to the Cape, and the others nearly all to the western half of the Old World, only two being Japanese and Chinese, one American. The genera fall into two sets; the first including *Urginea*, *Scilla*, *Eucomis*, *Whiteheadia*, and *Drimiopsis*, with perigynous, and the other, including *Ornithogalum* and *Albuca*, with hypogynous stamens. The greater proportion of the species are placed under *Scilla* and *Ornithogalum*, of a section of the former, which is represented in Abyssinia, Guinea, and Hindostan, between twenty and thirty new species have lately been discovered in the interior of the Cape district. *Ornithogalum* has been in a state of great confusion, especially as regards the arrangement of the numerous Cape species. In this paper the author has admitted seventy species, several of which are undescribed, and classified them under seven sub-

genera. *Urginea* he regards as a good genus, separable from all the rest by its uniseriate discoidal seeds, and holds that a great deal of the confusion that has arisen in the tribe has been caused by its species being placed now under *Ornithogalum* and now under *Scilla*, instead of in a separate genus apart by themselves.—“Note on the Structure of the Flowers of *Cochliostema*.” By M. T. Masters, M.D. The author desired to correct the view which he published a few years since of the structure of the andræcium in this very singular Commelynaceous genus. From his examination of the fully-developed flower he had been led to believe that there were nine stamens, the inner three at the posterior part of the flower, with the remarkable spiral anthers, two vertical and one horizontal; then three other bodies, believed to be staminodes, two anterior and one posterior, and an indication of an inner row of three more. An examination of the young condition of the flowers has, however, shown that the single posterior apparent staminode is developed long subsequently to the other two, and is evidently merely an adventitious production; there are, therefore, only six stamens.—“On *Mesotus celatus*, Mitten.” By S. O. Lindberg. Specimens were received by the author from Dr. Knight, of Auckland, N. Z., and the plant was considered to be probably a member of the *Dicranææ*.—“On a hybrid *Vaccinium*, between the Bilberry (*V. Myrtillus*) and Cowberry (*V. Vitis-Idæa*).” By R. Garner. The specimens, which were collected late in the year, in Staffordshire, were exhibited. The general opinion elicited by their examination was, that they were a luxuriant state of *V. Vitis-Idæa*, due to situation, rather than a hybrid.—“On the Marine Algæ of St. Helena.” By G. Dickie, M.D. A list of one olive, sixteen red, and four green seaweeds, collected by Mr. Melliss; none are peculiar and most are widely diffused; half are found also at the Cape of Good Hope, whence a strong current constantly sets on to the south coast of the island, from which the specimens were chiefly obtained.—“On the Fertilization of a Species of *Salvia*.” By Mrs. Barber. The plant is a native of the diamond fields of South Africa. The author described the arrangements for insect-fertilization. These were the same as have been observed in many European species by Hildebrand, Dr. Ogle, and others.—“New *Leguminosæ*, from Western India.” By M. A. Dalzell.

CAMBRIDGE PHILOSOPHICAL SOCIETY.—*March 11th.*—Dr. G. M. Humphrey, in the chair.—The following paper was read:—“A monograph of *Ebenaceæ*.” By W. P. Hiern, M.A., late Fellow of St. John's College, Cambridge. The family *Ebenaceæ* was first established by Ventenat in 1799; it was revised by Jussieu in 1804; and in 1810 it was reduced to its present limits by the great botanist Brown. In 1837, Geo. Don, in his ‘General System of Gardening and Botany,’ vol. iv., gave an account of the whole family as understood by him. He enumerated about eighty species, which he distributed among eight genera. In 1844, Alphonse De Candolle monographed the family in the eighth volume of the ‘Prodromus Systematis Naturalis Regni Vegetabilis,’ and produced 160 species and eight genera. Three of these genera were new, and several of Don's genera were not maintained. In the present monograph five genera only are recognized, namely, *Royena* and *Euclea*, from Africa; *Maba* and *Diospyros*, from various countries; and *Tetraclis*, from

Madagascar, the last of which is new: and among these are distributed about 250 species. An account is also given of the fossils that have been published as members of the family, but little confidence is placed in the determination of the genera or family in the case of the great majority of the fossil species, and they are not included in the above-mentioned estimate. For the purpose of preparing the present paper the great collections, both in this country and on the Continent, have been examined. The economic properties of *Ebenaceæ* are principally connected with the wood and the fruit, though other parts in some species are of value and importance. Ebony is the hard, heavy, and nearly black heart-wood of several species of this family; but other families, such as *Leguminosæ*, *Sterculiaceæ*, etc., supply other kinds of similar wood that also pass under the name of Ebony. The principal portion of the Ebony of commerce is probably derived from *Diospyrus Ebenum*, Koën., and is called Ceylon Ebony. When dried at 100° C., the wood is said to contain 49·8 per cent. of carbon, 5·3 of hydrogen, and 44·9 per cent. of oxygen. It is also said to contain ulmic acid. Calamander wood, a finely-variegated and scarce wood, is produced by *Diospyrus quærita*, Thw., and *D. oppositifolia*, Thw. Other species supply good, hard, useful, but not black woods. Black dyes are obtained from a few species, and some species exhibit caustic properties. A decoction of the bark of *Diospyros Paralea*, Steud., is valuable against fevers in French Guiana, and in North America *D. virginiana*, L., is used for a similar purpose. Also a decoction of the leaves of *Maba buxifolia*, Pers., in Madagascar is employed in cases of gastritis. The juice of the fruit of *Diospyros Embryopteris*, Pers. is very glutinous and charged with tannic acid, and is used throughout South India for paying the seams of fishing-boats, and for preserving fishing-lines and nets. The fruits of several species of *Diospyros*, *Maba*, and *Euclea* are edible. The head-quarters of the family is India, where the species are numerous; but of the five genera which compose the family, only two (though these are by far the largest genera) occur in the whole of the East Indian regions. Two genera are peculiar to the continent of Africa, and one, a new genus, is peculiar to the island of Madagascar. Not a single species is indigenous to Europe; one, however, is naturalized in the countries bordering on the Mediterranean sea; this one species is indigenous to the Steppes region of Asia, and to China and Japan. Tropical Africa, including Natal, has above forty species; the Kalahari region of South-West Africa, south of the tropic and north of the Orange River, has six species, and the Cape of Good Hope has above twenty species. Australia has about sixteen species, none of which occur on the western coast. The forest region of the western continent of Grisebach has only *Diospyros virginiana*, L.; the Prairie region has two species; the Californian coast region none; the Mexican region eight, and the West Indies six species. The South American region north of the equator has about a dozen species; the region of equatorial Brazil nine, and the remaining portion of Brazil fourteen species. Madagascar has twenty-three species; the Mascarene Islands six; the Seychelles two; Sandwich Islands two; Fiji Islands two, and New Caledonia eleven species. Lists are given, arranged in numerical order, of numbered collections of *Ebenaceæ*, made by the principal botanical travellers. A chronological list is also given of the published specific names, with references and localities. The Natural Orders bearing the closest affinities to *Ebenaceæ* are *Olacineæ*, *Styraceæ*,

Anonaceæ, *Ternstroemiaceæ*, *Sapotaceæ* and *Ilicineæ*. A plan is given exhibiting the affinities, including these families, and others which, at a greater distance, also bear some affinity to *Ebenaceæ*. A detailed account of the family, the genera, and the species forms the chief bulk of the paper. An alphabetical list of local names of the species, and diagrams for each genus, exhibiting the number of stamens in each species, conclude the monograph, which is illustrated by several plates.

Botanical News.

ARTICLES IN JOURNALS FOR FEBRUARY.

Annals and Magazine of Natural History.—W. A. Leighton, *Notulæ Lichenologicæ* XXXV. (Review of Nylander's 'Recognitio Monographica Ramalinarum,' with abstract and arrangement of the British species in accordance with it).—M. Micheli, "On some recent researches in Vegetable Physiology" (translated from the *Bibliothèque Univ. Arch. des Sciences*, Oct. 1871).

Monthly Microscopical Journal.—W. Carruthers. "On a leaf-bearing branch of a species of *Lepidodendron*."—R. Braithwaite, "On Bog-Mosses," part 2. (Enumeration of the European species.)

Nuovo Giornale Botanico Italiano (31st January).—G. de Venturi. "Mosses collected by Beccari at Bogos, in Abyssinia" (24 species, 20 new. *Beccaria*, C. Müll. gen. nov., described. Appendix by De Notaris of 14 species, 2 new, collected by Figari in Abyssinia).—T. Caruel, "Andrea Cesalpino and his Book 'De Plantis.'"—G. Passerini, "Fungi Parmensi," 1st part (Enumeration of 252 species of *Agaricus*, 7 new).—G. Zanardini, "On some species of *Schizymenia*."

Botanische Zeitung.—J. Baranetzky, "On the Influence of Certain Conditions on the Transpiration of Plants."—E. v. Janczewski, "On the Parasitic Habits of *Nostoc lichenoides*" (in cells of *Anthoceros lævis*, *Blasia pusilla*, and *Sphagnum acutifolium*).—H. Hoffmann, "Hernia of the Seeds (Samenbruch) in Grapes" (tab. 2).—Review of Welwitsch's 'Sertum Angolense.'

Flora.—A. Kanitz, "Recollections of a Botanical Tour" (Innsbruck).—C. Hartman, "Observations on Dr. Sauter's paper on the Liver-Mosses of Salzburg."—J. Müller, "Confirmation of Robert Brown's view of the 'Cyathium' of *Euphorbiaceæ*."—F. Arnold, "Lichenological Fragments" (tab. 2).—Obituary of Dr. Spring.—J. Klein, "On the Anatomy of the young Roots of *Coniferæ*."

Hedwigia.—F. Cohn, "Conspectus Familiarum Cryptogamarum, etc." (printed at p. 114). Review of M. C. Cooke's 'Handbook of the British Fungi.'

Bryotheca Europæa.—Fasc. XXIV. Nos. 1151–1200 (Dresden, 1872) contains the following new and rare species; each illustrated by several excellent specimens:—*Oedipodium Griffithianum*, *Fissidens intermedius*, Ruthe, *Glyphomitrium Daviesii*, Sch., *Eucalypta spathulata*, C. Müll., *Mnium medium*, Br. et Sch., *Grimmia sessitana*, D. Notaris, *Fontinalis da-*

lecarlica, Br. Eur., *Brachythecium Geheebii*, Milde, *Plagiothecium Gravetii*, Piré, *Hypnum incurvatum*, Schrd.

Mycologia Europæa.—Heft 8 and 9 contain the following species:—*Agaricus (Mycena) elegans, metatus, pterigenus, multiplex, vulgaris, corticola, filipes, gulericulatus, galopus, sanguinolentus, rosellus, alcalinus, tenerrimus, Benzoni*; *Marasmius urens, Wynnei, oreades, peronatus, graminum, archyropus, insititius, Rotula*; *Agaricus (Clitocybe) cyathiformis, pruinosis, gilvus, bellus, suaveolens*; *A. (Hygrophorus) chrysodon, murinaceus, niveus, virgineus, discoideus, hypothejus, subradiatus, ovinus, purpurascens, agathosmus, pudorinus*; *Panus Sainsonii, stypticus, torulosus*; *Agaricus (Tricholoma) equestris, tigrinus, sulphureus, rutilans, vestalis, columbetta, impolitus, albellus, personatus, nudus, terreus, imbricatus, vaccinius, gambosus*. (G. A. Kaufmann, Dresden. Price 1½ thaler.)

The first part of the second volume of Rev. R. T. Lowe's 'Manual Flora of Madeira' has come to hand. It continues *Corollifloræ*, and contains the Orders *Ericaceæ*, *Ternstroemiaceæ* (referred here by the author), *Aquifoliaceæ*, *Sapotaceæ*, *Oleaceæ*, *Jasminaceæ*, *Myrsinaceæ*, *Primulaceæ*, *Gentianaceæ*, *Apocynaceæ*, *Asclepiadaceæ*, *Convolvulaceæ*, *Cuscutaceæ*, *Solanaceæ*, and *Atropaceæ*. The *Solanum trisectum*, Dunal, formerly referred to the genus *Nycterium* by Mr. Lowe, is made the type of a new genus, *Normania*, dedicated to Commander F. M. Norman, R.N., a most successful investigator of the Madeiran flora.

The Report of the Marlborough College Natural History Society for the half-year ending Christmas, 1871, contains a table of the average dates of flowering of about 300 plants (cultivated and wild) during five or more years, drawn up in the form of a Calendar by the Rev. T. A. Preston. There are no botanical papers, but an admirable coloured figure of *Clavaria fusiformis* is given, the description of which is reserved for a future number. Additions to the herbarium and botanic garden are acknowledged; in the latter the whole of the plants have been rearranged, and their number greatly increased. It is intended to have as complete a collection as possible of Marlborough plants, and also one representative at least of all British genera or sections of genera.

From the Report of the Clifton College Scientific Society, we learn that the Director of the botanical section (Rev. M. J. Barrington-Ward) is engaged on a Flora of Clifton, and has met with great assistance from many of the boys. There is very little botany indeed in the second part of the "Transactions" lately received, a notice of some of the well-known rarities of Cheddar being the only communication. The museum of the College contains a herbarium of British plants founded on the extensive collection of the late Miss Mills, with additions from Rev. J. Heyworth, Mr. Thwaites (now of Ceylon), etc. The botanic garden has made good progress in the first year of its existence, and now contains about 1000 to 1200 species of flowering plants.

Mr. S. Watson's treatise on the Botany of Nevada and Utah, in Clarence King's 'Geological Exploration of the Fortieth Parallel' recently published, is a Flora, so far as yet known, of the vast basin lying between the Sierra Nevada and the Rocky Mountains, with descriptions of the new or little-known species.

Professor L. Reichenbach has been studying the European *Scleranthi*,

with results which are somewhat surprising. He gives a first enumeration of species which consists of no less than 147, arranged under 16 sections, by far the greater part (132) of them having Reichb. appended. Diagnoses, localities, etc., are promised in a second enumeration, which, on the principles here acted upon by the author, is not unlikely to contain as many more new species. What useful purpose, however, is served by such a treatment of a few very common and highly variable types, it is less easy to conceive. It seems invidious to decry any conscientious work, even if ill-directed; but, practically speaking, there is no doubt that this kind of labour is labour lost. It ends with its author. Who thinks it necessary to take the trouble to determine to which of M. Jordan's 53 "species" any particular specimen of *Draba verna* is to be referred? Who will ever try to master the characters of Professor Reichenbach's 147 *Scleranthi*?

In a paper on the use of inorganic salts as a most important aid in the study of the development of the lower chlorophyll-containing organisms (Bull. Acad. St. Pétersbourg, tome viii. 1871) Professor A. Famintzin describes ingenious devices adopted by him, with a view to trace the kind and amount of variability in the development of the lower *Algæ* under cultivation, incited to the observations by the desire to see how far evidence derived from the lower Cryptogams supported that afforded by Phanerogamia in respect of the variability of individual forms of the same ancestry, under like external conditions. Amongst other means he employed a solution of lime, potash, and magnesia, in which he found certain *Algæ* (*Protococcus viridis*, *Chlorococcum infusorium*, etc.) developed with remarkable freedom. Various stages of these and other species are figured.

A new botanical journal has appeared in France under the title of 'Journal de Botanique, pure et appliquée.' The editor is M. G. Huberson, and the paper will appear on the 10th and 25th of each month in the form of a small folio of eight pages. The contents of the first number (Jan. 10) consist of translations and extracts; abstracts of the botanical communications to the Académie des Sciences are given.

The recent parts of Baillon's 'Monographies' contain the Natural Orders *Menispermaceæ*, *Berberidaceæ*, and *Nymphæaceæ* (including *Sarraceniaceæ*).

Mrs. Hooker's translation of Le Maout and Decaisne's 'General System of Descriptive and Analytical Botany,' edited by Dr. Hooker, is advertised as in the press. We also observe with pleasure that Mr. Hemsley, formerly of the Kew Herbarium, is engaged on a handbook of hardy trees, shrubs, and herbaceous plants, based on the excellent 'Manuel de l'Amateur des Jardins' of Messrs. Decaisne and Naudin.

A series of fifteen photographs "In memoriam Caroli a Linné," admirably executed, and contained—with descriptive letterpress by Professor Fries—in a handsome portfolio, is now offered for sale at the following prices:—The larger size, small folio, for £2 10s.; the smaller, quarto, for £1 15s. A copy may be seen in the library of the Linnean Society, and the photographs can be obtained from Mr. A. Knös, 4, Muscovy Court, Tower Hill.

The last published part of the 'Bulletin of the Société Botanique de France' includes its proceedings during the troubled months forming the first half of the year 1871, and will constitute a remarkable, and, it is to

be hoped, unique chapter in the history of the Society. The new year found Paris closely besieged by the Germans and in the middle of the fourth month of its total isolation. The bombardment was severe on the 13th January, on which evening the Society held its usual meeting at its rooms in the Rue de Grenelle, on the south side of the Seine, and well within range of the enemies' shells. Thirteen members were present, and the first business was to nominate a commission to investigate the damage done to the museum by the bombardment. On the 27th things were no better, and the terrible reality of war was brought home to the Society by the announcement of the death of M. Léon Guillard, who was killed in the action at Buzenval on the 19th. The commission presented their report on the damage done to the Muséum d'Histoire Naturelle, a lengthy document, valuable as a historical record, but containing inferences not supported by the evidence adduced. A long list of the plants destroyed either by the shells or in consequence of exposure to the cold was given. The Society officially endorsed the energetic protest of M. Chevreul, the director of the museum, against the bombardment. The renewal of postal communications consequent on the capitulation of Paris, brought the news of the death of the son of M. le Comte Jaubert, who died in December, 1870, in captivity, having been made a prisoner by the Mecklenburg troops. A quiet time now allowed the business of the Society to be carried on more smoothly—though papers had been read at all the meetings during the siege,—and the election of officers, already postponed from January, was appointed for the 7th April. Before then, as all the world knows, the city of Paris was experiencing the tyranny of a far worse enemy than the Germans, and was again besieged, this time by would-be deliverers. Postal communication was suddenly again broken off on March 30th. At the meeting on April 14th only four members were present, and M. Cornu announced that M. Cave had been killed in an action near Dijon. On the 28th the Society was again unable to hold a regular meeting, but three members appeared, whilst on May 4th four presented themselves. No communications were read at these meetings. The awful events of the week ending with May 27th, during the whole of which Paris was a scene of bloodshed illumined by incendiary fires, utterly prevented any attempt at a meeting on the 26th. The secretary, M. de Schœnefeld, however, punctually attended at the Society's rooms and found himself absolutely alone. He had the satisfaction of assuring himself that the collections of the Society had escaped the destruction which had come upon so many neighbouring houses. Before the meeting of June 9th order had been restored in the capital.

On February 26th, Dr. Trimen delivered a lecture at the Russell Institution, Bloomsbury, on the forms and habits of Parasitic Plants. Restricting his remarks to Phanerogams, the lecturer first gave an outline of the ordinary structure and functions of the nutritive organs, and then pointed out the modifications met with in parasites as a whole. He considered it certain that a real assimilation and elaboration was effected in parasites, as in other flowering plants, in spite of the constant expiration of carbonic dioxide. Sixteen Natural Orders contain parasitic genera or species, only five or six are, however, wholly composed of them: none are polypetalous (unless *Balanophoraceæ* can be placed in that division), and only three monocotyledonous. The structure and life of the more interesting or remarkable parasites were then described, the plants being

grouped in the following manner, a modification of A. de Candolle's method:—

Without green leaves or chlorophyll—

Monobasic.

On stems (ex. *Rafflesiaceæ*).

On roots (ex. *Cytinaceæ*, *Balanophora*).

Polystomal.

On stems (ex. *Cuscuta*).

On roots (ex. *Lathræa*, *Cynomorium*).

Polyrhizal (ex. *Orobanche*).

With green leaves or chlorophyll—

On stems (*Loranthaceæ*).

On roots, partially parasitic (ex. *Rhinanthus*, *Thesium*).

Dr. W. R. M'Nab has been appointed Professor of Botany at the Royal College of Science, Dublin. The post of Professor at the Agricultural College, Cirencester, is therefore vacant.

Mr. Hensman has been appointed lecturer on botany at the Middlesex Hospital in place of Dr. T. S. Cobbold.

Mr. James Scrymgeour advertises a new edition of Gardiner's 'Flora of Forfarshire,' long out of print. It will be edited by Mr. John Sadler, of Edinburgh; and botanists who have any notes on the botany of the county are requested to forward them to Mr. Scrymgeour, 46, Reform Street, Dundee, without delay.

A correspondent at Winchester informs us that *Arenaria serpyllifolia* and *Mercurialis annua* have survived the past mild winter, and indeed continued to flower throughout it.

Mr. J. Collins, of the Pharmaceutical Society, will give a course of twenty lectures on Economic Botany at the Working Men's College, Great Ormond Street, commencing on April 16th, provided twelve members join. Fee for the course, five shillings.

The "dryers" referred to by Professor A. Gray (p. 109) can be supplied in any desired quantity from 100 sheets upwards (size of sheets 12 × 18 inches) at \$1.00 per 100 sheets, or 75 cents per 100 for 200 or over, by the Naturalists' Agency, Salem, Mass.

Mr. H. C. Sorby has an article in 'Nature' for Feb. 15th on the colouring matters found in Fungi. He has determined the existence of at least thirty distinct colouring substances; the majority of Fungi contain at least two, and many several different kinds. Fully twenty of these have such well-marked optical qualities that they could be recognized without difficulty in other plants; but only one of them, a fine orange colour, is known to exist in any plant not a fungus, *i. e.* in *Calocera viscosa*. As far as the author's observations extend, there is little or no specific agreement between the substances found in Fungi and those in Algæ and Lichens, though the two latter Orders are closely related in this respect. Details are promised.

Dr. Rottler's extensive East Indian herbarium, which was deposited many years ago in the museum of King's College, London, has been, on Dr. Hooker's application, transferred by the Council of that institution to the Royal Herbarium, Kew, where it will be of use in the preparation of the Flora of India now being actively prosecuted by Dr. Hooker and other botanists.

Original Articles.

ON A SPECIES OF *LUZULA* NEW TO THE FLORA OF EUROPE DISCOVERED BY DR. F. WELWITSCH, WITH A REVIEW OF THE JUNCACEÆ, COLLECTED BY HIM IN PORTUGAL.

BY HENRY TRIMEN, M.B., F.L.S.

(TAB. 122.)

The close connection between the floras of the Atlantic Islands and the south-west of Europe has been pointed out by several botanists, and was specially dwelt upon in the notice in this Journal of the useful Azorean list recently published in Mr. Godman's natural history of those islands. The subject of this article adds another bond to those already known to connect these floras, occurring as it does in the Canaries, Madeira, and Portugal, though apparently not yet noticed in the Azores.

When rearranging the Juncaceæ of the British Museum herbarium last year, I at once recognized in Dr. Welwitsch's "*Luzula gracilis*" from Portugal, a species not hitherto known to be European, nor was it difficult to perceive its identity with specimens from the Canary Islands, collected by Masson and by Bourgeau, in the same herbarium. By the kindness of Dr. Welwitsch, I have since been favoured with additional specimens of the plant (from one of which the accompanying drawing has been made) and with an authentic example of *L. Berthelotii*, Nees, from the Canary Islands, to which he had rightly referred them. The accompanying notes have also had the advantage of supervision by the same distinguished botanist and traveller.

The synonymy of the species is as follows:—

Luzula purpurea, Link in Buch Phys. Besch. Can. Inseln, pp. 140 and 179 (1825); Webb and Berthelot, Phyt. Canar., vol. iii. p. 351 (between 1841 and 1850); E. Meyer, Linnæa, vol. xxii. p. 397 (1849); non H. C. Watson MS. in sched.

Juncus purpureus, Buch in Abhandl. d. Kön. Acad. d. Wiss. in Berlin (1816-17) p. 362; Masson, MS. *vide* Meyer l. c.

Luzula elegans, Lowe! in Trans. Camb. Phil. Soc. vol. vi. p. 532 (1838); non Guthnick MS. in sched.

L. Berthelotii, Nees ab Es. in litt. ad cl. Berthelot; Webb! and Berth. l. c.; Kunth, Enum. vol. iii. p. 298 (1841.)

L. gracilis, Welw. MS. in sched.

Icon.—Webb and Berthelot, l. c. tab. 236.

Exsicc.—Welw. Herb. R. Acad. Scientiar. Olissip. et Fl. Lusit. Exsicc n. 95. Bourgeau, Pl. Can. n. 152.

Description:—

Radice annua (?) cæspitosa, caule gracili erecto 3-8 poll. alto folioso, foliis radicalibus late linearibus planis pilis gossypinis ad oras marginesque instructis, anthela corymboso-paniculata diffusa folio florali inferno multo longiore, ramis capillaribus primo ascendentibus deinde divaricatis, bracteis longe fimbriato-comosis, floribus subsolitariis bracteolis purpureis 2-4 ovatis imbricatis suffultis, phyllis ovato-lanceolatis acutis pellucidis subæqualibus, 3 exterioribus valde cuspidatis purpureo-cupreis, 3 interioribus apiculatis pallidioribus antheris longitu-

dine filamenti, stylo ovarii longitudine (ex Kunth), capsulis (in spec. Canariensibus) globoso-triangularibus apiculatis phyllis perianthii $\frac{1}{2}$ – $\frac{1}{3}$ brevioribus pallide brunneis, seminibus inappendiculatis.

Locality:—

On grassy declivities near the summit of a hill called Serra de S. Luiz, near Palmella, in the Serra de Arrabida (prov. Estremad. transtagana). First collected by Dr. Welwitsch, on April 4th, 1847; not yet quite in flower.

This pretty and delicate species was first noticed in the Canary Islands, by Masson, in 1778. His specimens are in the herbarium of the British Museum, labelled "*Juncus pilosus*, var." It has been since collected there by Webb, Forsyth, H. Mann, Mandon and Bourgeau. The Rev. R. T. Lowe found it in Madeira, and has kindly given me specimens. The examples from Portugal are smaller in size than those from Teneriffe, some of which are as much as 15 or 16 in. in height.

The species is a very distinct one. Its nearest ally is *L. spadicea*, De Cand., var. *L. glabrata*, Hoppe, from which it is distinguished by the much divaricated, or even reflexed, panicle-branches, the hairy leaves, the colour of the flowers, and the much shorter capsule. From *L. Forsteri*, with which its affinity is less close, it is separated by its inappendiculate seeds, its very different panicle, much smaller and more numerous flowers, and other characters. In the Canarian specimens, the panicle frequently occupies two-thirds of the whole height of the plant—a proportion which gives the plant an aspect very unlike that of its congeners.

There can be very little doubt about this being the *L. purpurea* of Link in Von Buch's list, though no description is there given; * and I have followed Webb and Berthelot in so considering it. The name has, however, been referred by Seubert (Fl. Azorica, p. 23) to his *L. purpureo-splendens*, and by H. C. Watson (Hook. Lond. Journ. Bot., vol. iii. pp. 608–9) to his *L. azorica*, which he now (Godman, Azores, p. 231) considers the same as Seubert's plant. This is figured in the 'Flora Azorica,' and is very different from our plant; there are specimens of it in the Banksian herbarium, from the Azores, collected by Masson. This Azorean species is very near *L. canariensis*, Poir, and—as well as the Madeira plant, *L. Seuberti*, Lowe, in Hook. Journ. Bot., viii. 300, for specimens of which I am indebted to Mr. Lowe—should perhaps be united with it.

DESCRIPTION OF TAB. CXXII.

Luzula purpurea, Link, from a specimen collected in Portugal by Dr. Welwitsch.—*a.* Flower; *b.* ripe capsule with perianth and bracts; *c.* seeds: all enlarged (*b.* and *c.* drawn from Teneriffe specimens collected by Bourgeau).

REVISION OF PORTUGUESE JUNCACEÆ.

Dr. Welwitsch having kindly assisted me by lending me the whole of the *Juncaceæ* collected by him in Portugal, I am able, with his permission, to give a list of them. So little has been published on the plants of Portugal since the excellent 'Flora Lusitana' of Brotero, in 1804, that any contribution towards the knowledge of the

* Link and Meyer each quote "Masson" for the name *purpurea*; but it is not found attached to his specimens, nor in his MSS. preserved in the British Museum.



J. Hipsley del. H. T. anal.

Mintern Bros imp.

Luzula purpurea Link.

flora of the country is likely to be acceptable to European botanists. The 'Prodromus Floræ Hispanicæ' of Willkomm and Lange, of which two volumes are now completed, does not include the kingdom of Portugal; and though the distribution of each species outside of Spain is traced, the authors seem to have been less acquainted with the flora of this integral part of the Peninsula than with some other countries at a greater distance; and any one who should compile a list of Portuguese species, which are also Spanish, from Messrs. Willkomm and Lange's pages alone, would possess a very incomplete one. Nyman's useful 'Sylloge Floræ Europææ' is also, for the plants of Portugal, far less complete than for any other country in Europe.

Portugal is divided into six provinces, ranging from north to south, in the following order,—Minho (Duriminium), Traz-os-Montes, Beira, Estremadura, Alemtejo and Algarvia. Those chiefly examined by Dr. Welwitsch were Estremadura, Alemtejo and the southern province, Algarvia, as well as many parts of Beira and Minho, into which he made frequent excursions during his long residence at Lisbon. The flora of Algarvia is of special interest, and is that best illustrated by Dr. Welwitsch's herbarium. The extreme south-west point of Europe and jutting out into the Atlantic, it will doubtless be found, when its flora has been critically investigated, to possess peculiar relationships not shared by other parts of the Iberian peninsula.

The following list of *Juncaceæ* is probably complete, so far as species are concerned. I have been greatly struck, however, in looking over Dr. Welwitsch's extensive series of well-selected specimens, with the great variability in so comparatively small an area of some usually well-defined groups. I believe it would not be difficult to completely connect, by a series of graduated intermediates, the species of *Juncus* numbered 7, 8, 9, and 10 in the following catalogue, and so form one large superspecies, which would be somewhat more comprehensive than *J. communis* and *J. glaucus* of this catalogue.

Specimens of all the plants here enumerated are deposited in the herbarium of the Academy of Sciences at Lisbon.

NARTHECIUM, Huds. Fl. Ang., ed. 1 p. 127.

- 1.—*N. ossifragum*, Huds. l. c. p. 128. *Anthericum ossifr.*, Brot. Fl. Lusit. i. p. 534.

By small streams. *Prov. Durim.* Serra de Gerez. Not observed in the mountains of Beira or in any of the southern provinces. Flowers in July, fruits in September. The variety "floribus luteo-cœruleis" mentioned by Brotero, was not noticed by Dr. Welwitsch.

LUZULA, DC. Fl. France, iii. p. 158.

- 1.—*L. Forsteri*, DC. Ic. Gall. Rar. I. t. 2. *Juncus vernalis*, Brot. l. c., p. 515; (non *Luzula vernalis*, DC. nec auct. plur.)

In hilly woods, etc., common. *Pr. Estremadura.* Serra de Cintra, Serra de Grandola. *Pr. Algarv.* Serra de Monchique, Foia. Fl. April—June. *L. pilosa*, Willd. (*L. vernalis*, DC.) is recorded for "Lusit." in Nyman's Sylloge, p. 383. It occurs in Spain in several places (Lange, l. c. p. 186), but I have not seen any Portuguese specimens.

- * *
- 2.—*L. purpurea*, Link in Buch Phys. Besch. Can. Inseln. pp. 140, 179 (*vide supra*).
- 3.—*L. sylvatica*, Gaud. Agrost. ii. p. 240 (1811). *Juncus maximus*, Brot. l. c. p. 515.
Shady woods. *Prov. Durim*. Serra de Gerez. *Pr. Beira*. Serra de Estrella. Fl. August.
- 4.—*L. lactea*, E. Meyer, Luz. 15. *Juncus lacteus*, Link in Schrad. Journ. Bot. ii. (1799) p. 316. *J. stœchadanthos*, Brot. l. c. p. 516. Hills. *Pr. Durim*. Serra de Gerez. Fl. June, July (sec. Brotero). Undoubtedly stoloniferous. Brotero received the specimens he describes in his Flora from Link.

- * * *
- 5.—*L. campestris*, DC. Fl. France, iii. p. 161. *Juncus campestris*, L. Brot. l. c. p. 514.

Fields, meadows, and borders of woods, through nearly all the country. Fl. March—September. The greater part of the Portuguese specimens must be referred to *L. congesta*, Lej. The characters said to separate *L. campestris* from *L. multiflora* and *L. congesta* do not appear to possess any constancy. It seems to be the practice of some botanists to call by the name *L. campestris* the tufted first year's plants; *L. multiflora* being applied to the older ones with creeping rhizomes.

- 6.—*L. cœspitosa*, J. Gay in Dur. Pl. Astur. exs. n. 216.
Exposed mountains. *Pr. Beira*. Serra de Estrella. Fl. August. Hitherto only recorded from Spain, whence specimens from Asturias are in Bourgeau's Pl. d'Espagne (1864) n. 2711. A very distinct species from *L. spicata* and from *L. pediformis*, neither of which have occurred in Portugal.

JUNCUS, Linn. Gen. 437 (excl. sp. nonnull).

- *
- 1.—*J. acutus*, L. Sp. i. p. 463, var. *a*. Brot. l. c. p. 509.
On the seashore; also by rivers away from salt water. *Pr. Estrem.* Near Valle de Zebro, where it covers an extensive tract as far as Coina, Grandola, Otta, in both places inland. *Pr. Beira.* Shores of the Mondego, in brackish water. Fl. May—August.
- 2.—*J. maritimus*, Lam. Dict. iii. p. 264. Brot. l. c. 510. *J. rigidus*, Desf. Fl. Atl. ii. p. 312. *J. Broteri*, Steud. Syn. p. 297, n. 28.
On and near the seacoast. *Pr. Estrem.* Near Seixal, Valle de Zebro. *Pr. Algarv.* Between Villa Nova and Boina. Flowers June. Differs from the *J. maritimus* of northern Europe in its greater size, much longer and more lax panicle, larger flowers in clusters of usually three, and blunt inner perianth-segments with broad membranous margins. It seems quite the same as the plant of the North African coast. Steudel describes the inner perianth-segments of his *J. Broteri* as acute, but his description agrees generally with the plant here intended, and the character in question is a variable one in many species of *Juncus*. He quotes *J. maritimus*, Brot. as a synonym.

- * *
- 3.—*J. multiflorus*, Desf. l. c. ii. p. 313, and t. 91.

In salt marshes near the sea, growing with *Frankenia*, *Melilotus messanensis*, etc. *Pr. Estrem.* Pova. *Pr. Algarv.* Near Villa Nova. Flowers June. Has not been observed on the coast of Spain, but occurs at intervals round nearly the whole of the Mediterranean.

* * *

4.—*J. communis*, E. Meyer, Junc. 12.

Var. *a.* *J. conglomeratus*, L. Sp. ed. 1. p. 326. Brot. l. c. p. 510.

Wet woody places. *Pr. Estrem.* Fl. May—July.

Var. *β.* *J. effusus*, L. l. c. p. 326. Brot. l. c. p. 511.

Wet places. *Pr. Estrem.* Flowers April—August.

Var. *γ.* *J. canariensis*, Poir. in herb. Desf. E. Meyer, Syn. Junc. p. 29.

Wet sandy places. *Pr. Estrem.* Near Vendas, between Coina and Serra de S. Luiz. Flowers July. This is doubtless the variety "panicula altiori et latiori" mentioned by Brotero; it differs from *J. effusus* only in its much more ample panicle with long lax branches.

5.—*J. glaucus*, Ehrh. Beitr. vi. p. 83. *J. diaphragmarius*, Brot. l. c. 511.

Wet fields, common. *Pr. Estrem.* and *Alemtejo.* Flowers May—August.

Var. *β.* panicula laxiore pauciflora, capsulis obtusis, vaginis pallide fulvis.

Pr. Estremad. Between Odivellas and Pova. This distinct looking plant, of which I have also seen English specimens from Cheshire, collected by Mr. Warren, does not differ from *J. glaucus* in other characters. It does not seem to be the var. *β. laxiflorus* of Lange, l. c. The pale sheaths and interrupted pith separate it from *J. diffusus*, Hoppe,* of which it has somewhat the appearance.

Var. *γ.* Panicula ampla decomposita, testaceo-fusca, ramis proli-fero-elongatis, vaginis fulvo-brunneis, perianthii phyllis acutissimis interioribus paulo exterioribus brevioribus et late albido membranaceo-marginatis. *J. paniculatus*, Hoppe, Dec. Gran. n. 146?

Pr. Estrem. Near Friellas. Almost certainly Hoppe's species. A tall plant, 3 feet high. The specimens from Friellas bear very few capsules, and those shrivelled and abortive. In what appears to be quite the same plant from the Pyrenees, however (Petit, n. 762), the capsules are much more numerous and more fully developed. It is perhaps a hybrid.

* * * *

6.—*J. obtusiflorus*, Ehrh. Beitr. vi. p. 83.

Marshy woods. *Pr. Estrem.* Bellas, Setubal, Calhariz. *Pr. Algarv.* Cabo de S. Vicente. Fl. June.

7.—*J. Fontanesii*, Gay in Laharpe Mon. Junc. n. 30. *J. articulatus* Desf. l. c. p. 313 (non. L.); *J. sylvaticus*, Brot. l. c. 517 (pro parte); *J. striatus*, Hochst. Herb. Un. It. Lusit, n. 334, and Welw. Fl. Lusit n. 295 (? Schousb). *J. Hochstetteri*, Steud. Syn.

* This is usually barren, and is probably a hybrid. *J. Angelisii*, Tenore, seems to be the same, judging from Sicilian specimens in Todaro's Fl. Sic. Exs. n. 456.

p. 299, n. 59. *J. striatus*, var. β . *diffusus*, Huet de Pav. Pl. Nap. Exs. n. 432!

Marshes. *Pr. Algarv.* Near Silves, and between Barreiro and S. Antonio. Flowers June. Differs from typical *J. Fontanesii* in the capsules which are beaked and greatly exceed the perianth leaves.

8.—*J. echinuloides*, Brot. l. c. p. 518. *J. valvatus*, Link in Schrad. Journ. Bot. 1799, ii. p. 316?

Damp places. *Prov. Estrem.* Near Bellas, Cacem, Colares. *Pr. Algarv.* Cabo de S. Vicente. *Pr. Beira* (Brot.) Fl. May—July. Has not been observed in Spain. The plant as described by Brotero, with dense globose heads of crowded, numerous (about 50) flowers, is very unlike any other European species, but it varies into a pauciflorous form, with heads of about 20 flowers, which approaches the next very closely. If Link's plant is the same, his name takes precedence of Brotero's.

9.—*J. sylvaticus*, Reichard, Fl. Mœuo-franc. ii. p. 181 (1778). *J. acutiflorus*, Ehrh. Beitr. vi. 82. *J. sylvaticus*, Brot. l. c. p. 517, pro parte.

Marshy places. *Pr. Estrem.* By the Tagus, in land overflowed in winter by salt water, at Povia and Friellas. *Pr. Algarv.* Between Olhao and Tavira, and near Silves. Fl. May—June. The typical small-flowered plant of middle and northern Europe seems scarcely to occur in Portugal, where the form is altogether more robust, with large flowers and heads with long stalks. It must probably be referred to the var. β . *macrocephalus* of Koch; some specimens it is certainly difficult to distinguish from *J. Fontanesii*.

Steudel (Syn. p. 298, n. 46) has founded a species under the name of *J. rugosus* on specimens from Cintra, collected by Dr. Welwitsch. In these, and in others from wet sandy ground near Barreiro, the whole surface of the stem and leaves is uniformly and densely covered with fine raised irregular striæ or puckeringings of the cuticle, which give a slightly rough feeling to the touch; the plant does not differ in other respects from *J. sylvaticus*.

10.—*J. lamprocarpus*, Ehrh. Calam. n. 126.

In boggy places. *Pr. Estrem.* Serra de Cintra, Costa, Friellas, Calhariz. *Pr. Durim.* Oporto. *Pr. Algarv.* Boina, Silves. Fl. June, July. A procumbent rooting form (*J. nigritellus*, Don, non Koch) occurs with the type at Silves.

11.—*J. supinus*, Mönch; Enum. Hass. p. 296.

In wet places, especially heaths flooded in winter. Fl. May—July. Very variable.

Var. β . *J. Welwitschii*, Hochst. in Steud. l. c. p. 304, n. 135; Welw. Fl. Lusit. ed. 2, n. 1057. Culmis erectis basi bulboso-incrassatis, capitulis hemisphæricis in apice culmi solitariis vel in radiis elongatis paucis terminalibus. Has somewhat of the aspect of luxuriant *J. pygmæus*.

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12.—*J. squarrosus*, L. sp. ed. 1. p. 327. Brot. l. c. p. 512.

Turfy hills. *Prov. Beira.* Serra de Estrella, where it is abundant,

forming with *Nardus stricta* the chief herbage. *Pr. Durim*. "In altioribus Gerez;" Brot. Fl. August. Not given by Lange (l. c. p. 180) as Portuguese, though mentioned by Brotero.

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13.—*J. Tenageia*, L. fil. Supp. Plant, p. 208.

Damp heathy ground. *Pr. Estrem*. About Lisbon, by the Tagus, in damp sandy places flooded in winter, with *J. bufonius* and *pygmæus*, *Panicum coloratum*, *Centunculus*, *Lobelia*, *Arenaria conimbricensis*, etc., Val. de Zebro, Calhariz, between Coina and às Vendas, etc. *Pr. Beira*. Near Coimbra. Fl. July—August. It is remarkable that this was not noticed by Brotero.

14.—*J. bufonius*, L. Sp. Pl. ed. 1. p. 328. Brot. l. c. p. 514.

Wet places. Flowers March—June. A very variable species.

Var. β . *J. foliosus*, Desf. l. c. p. 315 and t. 92, Major, caulibus 12–15 poll. alt., 4–6 folia gerentibus, paniculis longe pedunculatis ex omnibus foliorum vaginis, floribus solitariis. *Pr. Estrem*. Bellas, Rio Judéo. Lange (l. c. p. 181) retains this as a distinct species.

Var. γ . *J. fasciculatus*, Bertol, Fl. It. iv. p. 190 (non Schousb.). *Pr. Estrem*. Serra da Arrabida, Otta, Bellas, Grandola. *Pr. Algarv*. Olhao. A well-marked variety in Portugal. Lange l. c. and Nyman make this the *J. hybridus* of Brotero, but his description better tallies with the next.

15.—*J. pygmæus*, Rich. in Thuill. Fl. Par. p. 178. *J. hybridus*, Brot. l. c. p. 513 (certe pro maxima parte).

Damp sandy places. *Pr. Estrem*. Bellas, Coina, Calhariz. *Pr. Algarv*. Olhao. Cabo de S. Vicente. Fl. May—and June.

16.—*J. capitatus*, Weig. Obs. Bot. 28 (1772). *J. gracilis*, Brot. l. c. p. 514.

Damp heathy ground. *Pr. Estrem*. Bellas, S. Antonio, Calhariz, etc. *Pr. Algarv*. Between Olhao and Faro. Fl. April, May. A very depauperate state from the barren heaths between Cacem and Ramalhao, is not above $\frac{1}{2}$ inch high, and has but a single terminal flower; it looks like a *Desvauxia*.

[APHYLLANTHES, L. gen. 162.

1.—*A. monspeliensis*, L. Sp. ed. 1. p. 294. Brot. l. c. i. p. 554.

Found formerly by Hoffmannsegg in stony fields near Miranda de Doiro, but not seen by Brotero, nor ever collected by Dr. Welwitsch in middle and southern Portugal.]

REVISION OF THE NOMENCLATURE AND ARRANGEMENT OF THE CAPE SPECIES OF ANTHERICUM.

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

(Concluded from p. 101.)

ENUMERATION OF SPECIES, WITH NOTES ON THE NEW AND OBSCURE ONES, AND CITATION OF NUMBERED COLLECTIONS.

Group 1. *Bulbine*.

1. *Anthericum frutescens*, Linn. Sp. Plant. 445; Bot. Mag. t. 816; De Cand. Plant. Grasses, t. 14; Red. Lil. t. 284.—*Bulbine*, Willd.; Kunth, Enum. iv. 564; Drège, 8762 C.

2. *A. rostratum*, Jacq. Ic. t. 403.—*Bulbine*, Willd.; Kunth, Enum. iv. 564.—*A. incurvum*, Thunb. Prod. p. 62 (*Bulbine incurva*, Schultes; Kunth, Enum. iv. 566) is evidently the same plant. Stem shorter than in the last. Leaves shorter, glaucous. Burchell 3618, Zeyher 1057, 1058, 1059; Drège 8742 is a variety with more elongated, more slender leaves, or a closely-allied undescribed species.

3. *A. annuum*, Linn. Sp. Plant. 446; Bot. Mag. t. 1451; De Cand. Plant. Grass. t. 8; Red. Lil. t. 397.—*Bulbine*, Willd.; Kunth, Enum. iv. 566; Burchell 351.

4. *A. asphodeloides*, Linn. Sp. Plant. 446; Jacq. Vind. t. 181.—*Bulbine*, Schultes; Kunth, Enum. iv. 564; Burchell 1711, 2002, 2089, 2258, 6822, Burke, Gerrard 357, Zeyher 1692, 4227.—The Abyssinian *Bulbine abyssinica*, A. Rich, Fl. Abyss. ii. 334, capitally figured at t. 97, does not appear to be in any way different from the Cape plant.

5. *A. altissimum*, Mill. Ic. t. 39.—*A. asphodeloides*, Ait. Hort. Kew. i. 450, non Linn.—*A. longiscapum*, Jacq. Ic. t. 404; Red. Lil. t. 423; Bot. Mag. t. 1339.—To this belongs *A. Lagopus*, Thunb. Prod. 63, quoted doubtfully by Kunth under *Trachyandra floribunda*, p. 583.

6. *A. favosum*, Thunb. Prod. 63.—*Bulbine*, Schultes; Kunth, Enum. iv. 564.—Thunberg's plant not matched with anything else. Rootstock a stout corm, like that of *pugioniformis*. Leaves numerous, a foot long, 1-1½ line broad, 8-10-nerved, surrounded at the base with fibrous setæ. Raceme 4-6 inches long, moderately close. Pedicels much shorter than in *altissimum*, with which Willdenow joined it, and bracts also very different, minute, deltoid-cuspidate, and not exceeding the unexpanded buds.

7. *A. præmorsum*, Jacq. Ic. t. 406.—*Bulbine*, Schultes; Kunth, Enum. iv. 567.

8. *A. pugioniformis*, Jacq. Ic. t. 405; Bot. Mag. t. 1454; Andr. Bot. Rep. t. 386.—*Bulbine*, Link; Kunth, Enum. iv. 564; Burchell, 6711.

9. *A. aloides*, Linn. Sp. Plant. 446; Bot. Mag. t. 1317; Red. Lil. t. 283.—*Bulbine*, Willd.; Kunth, Enum. iv. 567.

10. *A. latifolium*, Linn. Suppl. 202; Jacq. Ic. t. 408.—*Bulbine*, Schultes; Kunth, Enum. iv. 567.—Though described as acaulescent, this forms in the succulent house at Kew a stem half a foot high beneath the rosette of leaves.

11. *A. nutans*, Jacq. Ic. t. 407.—*Bulbine*, Schultes; Kunth, Enum. iv. 567.—*A. nutans* of Thunberg, of which Kunth writes, "Si distincta species, alio nomine forsan *B. adnutans* solutanda erit," is a totally different plant, belonging to the group *Bulbinella*.

12. *A. mesembryanthemoides*, Baker.—*Bulbine*, Haworth; Kunth, Enum. iv. 568.—A plant known only by a brief phrase of Haworth's, which fits Zeyher 1068, a most curious and distinct species, gathered amongst shrubs in fields by the Zwartkop river near Uitenhage. Leaves very fleshy, not more than half an inch long, 3 or 4 in a radical rosette, globose, with a distinct broad haft. Scape very slender, 2-3 inches high. Raceme laxly 4-6-flowered. Pedicels erecto-patent, 3-4 lines long, with a minute deltoid bract at the base. Perianth 1½-2 lines long, the divisions similar to those of the other species of the group, reflexed in the expanded flower. Filaments half as long as the segments. Flowers perhaps whitish, not yellow. A similar plant (the Kew specimen has leaves only) was gathered by Dr. Harvey.

Group 2. *Bulbinella*.

13. *A. triquetrum*, Linn. Suppl. 202; Thunb. Prod. 62.—*Bulbine triquetra*, Schultes, Syst. vii. 451. *Bulbinella? triquetra*, Kunth, Enum. iv. 573.—*Phalangium capillare*, Poir. Encyc. vii. 247.—*Bulbinella? capillaris*, Kunth, iv. 572. || *Bulbinella setifolia*, Kunth, Enum. iv. 569; Drége 1503, Zeyher 1690, 1691, Wright, Harvey 109, Burchell 8043.—A common well-marked species, which Kunth describes carefully under the last of the three names under which he has it. Thunberg, in his herbarium, makes four varieties, one of which belongs to *Cauda-felis*.

14. *A. peronatum*, Baker.—*Bulbinella peronata*, Kunth, Enum. iv. 570. Founded on Drége 955. May be a mere variety of the last.

15. *A. ciliolatum*, Baker.—*Bulbinella ciliolata*, Kunth, Enum. iv. 570; Drége.—Carefully described by Kunth, but he cites "*Bulbine caudata*, Drége, Herb. Cap." The plant he really means is in the Kew set, "*Bulbine caudata*, Spreng. d;" and there is also a "*Bulbine caudata*, Spreng. a," which is sp. 17.

16. *A. gracile*, Baker.—*Bulbinella gracilis*, Kunth, Enum. iv. 571; Drége 2670 b.—*Anthericum nutans*, Thunb. Prod. 63, non Jacq.

17. *A. Cauda-felis*, Linn. Suppl. 202.—*Bulbine Cauda-felis*, Schultes, Syst. Veg. vii. 450.—*Anthericum caudatum*, Thunb. Prod. 63.—*Bulbinella? caudata*, Kunth, Enum. iv. 572; Drége (vide supra), Thom 705, Zeyher, Thunberg, Masson, etc.—Leaves 6–8, flattened, $\frac{1}{4}$ – $\frac{3}{8}$ inch broad, dry, indistinctly 10–12-nerved. Scape 1–2 feet high. Raceme dense, oblong-cylindrical, usually 2–4, but running up to 8 inches long. Pedicels erecto-patent, 3–4 lines long. Bracts lanceolate, 2–3 lines long, protruding beyond the unexpanded buds. Perianth pale yellow, 2 lines deep. Stamens and ovary as in its neighbours.

18. *A. setosum*, Willd.; Schultes, Syst. vii. 473.—*Bulbinella robusta*, Kunth, Enum. iv. 571; Drége 486, 8763, Zeyher 4211, Harvey 108, Burchell 3021, etc.

19. *A. floribundum*, Ait. Hort. Kew. i. 447.—*Trachyandra? floribunda*, Kunth, Enum. iv. 583, excluding Thunberg's synonym.—*Bulbinella latifolia*, Kunth, Enum. iv. 572; Drége, 2667 a.

Group 3. *Trachyandra*.

20. *A. canaliculatum*, Ait. Hort. Kew. i. 448; Bot. Mag. t. 1124; Bot. Reg. t. 877.—*Trachyandra*, Kunth, Enum. iv. 578.—*Bulbine*, Spreng. Syst. ii. 86; C. Wright 214.

21. *A. scabrum*, Linn. Suppl. 202; Thunb. Prod. 63.—*Trachyandra? scabra*, Kunth, Enum. iv. 585.—*Bulbine*, Schultes, Syst. vii. 451.—Thunberg's specimens not matched. Leaves 10–12, weak, flexuose, reaching a foot and a half long, 1–1 $\frac{1}{2}$ line broad, obscurely scabrous when young, glabrescent. Scape 6–12 inches, firm, scabrous. Racemes forked, laxly 20–30-flowered, the rachis persistently scabrous. Pedicels $\frac{1}{2}$ –1 inch long, finally much decurved. Bracts minute, deltoid-acuminate. Capsule depresso-globose, distinctly stalked, $\frac{1}{8}$ inch deep, glabrous, the cells 1–2-seeded.

22. *A. Gerrardi*, Baker, n. sp. Leaves 9–12, dry, firm, persistent, under a foot long, flexuose, $\frac{1}{8}$ inch broad, distinctly many-nerved, muricated with minute, persistent, white bristles, especially on the much-thickened edge and keel. Scape stout, scabrous, 3–4 inches long. Racemes in a copious panicle, with the lower branches again compound, laxly 20–30-

flowered, the flexuose rachises very rough with hard, raised points. Pedicels $\frac{1}{2}$ –1 inch long, finally patent or rather deflexed. Bracts minute, deltoid. Flower as in the last. Capsule oblong, sessile, densely glanduloso-papillose, with many seeds in each cell.—Natal, Gerrard 1527.

23. *A. asperatum*, Baker.—*Trachyandra asperata*, Kunth, Enum. iv. 574; Drége, 8735.

24. *A. longepedunculatum*, Steud. in Rœm. et Schultes, Syst. vii. 457 and 1692.—*Trachyandra? longepedunculata*, Kunth, Enum. iv. 584.—This is the plant contained in Thunberg's herbarium under the name of *Anthericum revolutum* α , but it is very distinct from the *revolutum* of Linnæus, sp. 31. C. Wright 229, from Simon's Bay, belongs here. Zeyher 1070 and Burchell 2087 are a closely-allied plant, similar in leaves and general habit, with much smaller shorter bracts, which probably will prove distinct.

25. *A. elongatum*, Willd. Sp. Plant. ii. 136.—*Trachyandra? elongata*, Kunth, Enum. iv. 584.—The plant contained amongst Thunberg's types as *Anthericum filiforme* α , Thunb. Prod. 62, but quite different from the earlier-named *A. filiforme* of Aiton. Leaves about half-a-dozen, subterete, under a foot long, $\frac{1}{2}$ line broad, dry, persistent, sparsely setose in the lower half on the face and edge. Scape flexuose, glabrous, nearly as long as the leaves. Racemes forked, 12–20-flowered, moderately close for the genus. Pedicels under $\frac{1}{4}$ inch long, equalling the lanceolate bracts. Flower $\frac{1}{4}$ inch deep. Gerrard 552, from Natal, and Cooper 747, from Basutoland, are probably the same species.

26. *A. affine*, Baker.—*Trachyandra affinis*, Kunth, Enum. iv. 579.—*A. filiforme* β , Thunb. Herb.; Drége 8727, Burchell 2342, Bolus 740.—Habit of the last, but bracts small, deltoid, and pedicels $\frac{3}{8}$ – $\frac{1}{2}$ inch long.

27. *A. flexifolium*, Linn. Suppl. 201.—*Trachyandra? flexifolia*, Kunth, Enum. iv. 579.—A well-marked plant, Drége 2671 α , of which there are four fine specimens in Thunberg's series. Leaves 6–12, hard, filiform, hairy, or glabrescent, 4–6 inches long, very much curiously spirally twisted, surrounded at the base by an involucre-like whorl of large, whitish scales. Scapes 2–5 inches. Panicle rhomboid, 2–3 inches long. Pedicels persistently erecto-patent, 3–4 lines. Bracts lanceolate-deltoid, cuspidate, $\frac{1}{8}$ – $\frac{1}{4}$ inch. Flower 4–5 lines. Capsule not seen.

28. *A. Jacquinianum*, Schultes, vii. 462.—*Trachyandra Jacquini*, Kunth, Enum. iv. 578.—*A. filiforme* γ , Thunb. Herb. !—*A. flexifolium*, Jacq. Ic. t. 412, non Linnæus; Burchell, 1602, 2344.

29. *A. hispidum*, Linn. Sp. Plant. 446; Thunb. Prod. 63; Jacq. Ic. t. 409.—*Trachyandra hispida*, Kunth, Enum. iv. 575.—*A. squameum*, Linn. Suppl. 202.—*Bulbinella? squamea*, Kunth, Enum. iv. 573.—*A. undulatum*, Thunb. Prod. 63, non Jacquin.—*Trachyandra undulata*, Kunth, Enum. iv. 583.—A very distinct plant, well-figured by Jacquin. Zeyher 1693, Masson, Sieber, Dr. Thom, etc.

30. *A. undulatum*, Jacq. Ic. t. 411, non Thunberg.—*A. graminifolium*, Willd. Sp. ii. 139.—*Chlorophytum? graminifolium*, Kunth, Enum. iv. 606.

31. *A. revolutum*, Linn. Sp. Plant. 445 (Commel, Hort. i. t. 34).—*Trachyandra revoluta*, Kunth, Enum. iv. 579.—*A. revolutum* γ , Thunb. Herb. !—*A. divaricatum*, Jacq. Hort. Schœn. t. 414.—*Trachyandra divaricata*, Kunth, Enum. iv. 580; Burchell, 897.

32. *A. falcatum*, Linn. Suppl. 202; Thunb. Prod. 63.—*Bulbine falcata*,

Schultes, Syst. vii. 451.—*Trachyandra? falcata*, Kunth, Enum. iv. 586.—*A. vespertinum*, Jacq. Hort. Schœn. t. 85; Bot. Mag. t. 1040.—*Trachyandra vespertina*, Kunth, Enum. iv. 581; Burchell, 4076.

33. *A. ciliatum*, Linn. Suppl. 202; Jacq. Schœn. t. 413.—*Trachyandra? ciliata*, Kunth, Enum. iv. 585.—*A. blepharophorum*, Schultes, Syst. vii. 461.—*Trachyandra blepharophora*, Kunth, Enum. iv. 578.—*T. bracteosa*, Kunth, Enum. iv. 582; Drège 1493, Burchell 5601, C. Wright 225.

34. *A. longifolium*, Jacq. Ic. t. 413.—*Trachyandra longifolia*, Kunth, Enum. iv. 582.—*A. fimbriatum*, Thunb. Prod. 63.—*Trachyandra? fimbriata*, Kunth, Enum. iv. 583; Sanderson 987, Dr. Gill.

35. *A. Brehmeanum*, Baker.—*Trachyandra? Brehmeana*, Kunth, Enum. iv. 586.

36. *A. thyrsoides*, Baker, n. sp. Root divisions carnose, with a whorl of large pale scales at the crown. Leaves 2-4, dry, narrow, linear, persistent, flexuose, 5-6 inches long, $1\frac{1}{2}$ -2 lines broad, closely clothed with long, soft, spreading, whitish hairs. Scape 3-4 inches, pilose, like the foliage. Inflorescence a deltoid-thyrsoid moderately close panicle 2-3 inches long. Branches and pedicels erecto-patent, the latter 2-3 lines long, with large, pale, lanceolate bracts as long as themselves. Perianth 3-4 lines, slightly pilose on the outside. Capsule not seen. General habit and bracts of sp. 24. Burchell 1231.

37. *A. paradoxum*, Schultes, Syst. vii. 459.—*Trachyandra paradoxa*, Kunth, Enum. iv. 576.

38. *A. muricatum*, Linn. Suppl. 202; Thunb. Prod. 63.—*Trachyandra muricata*, Kunth, Enum. iv. 576.—Thunberg's specimen not matched. Radical leaves several, lorate, 1-1 $\frac{1}{2}$ feet long, flat, 5-6 lines broad, flat, dry, persistent, distinctly 30-40-nerved, persistently papilloso-muricate. Scape robust, a foot long, flexuose, scabrous like the leaves. Racemes several, reaching half a foot long, laxly 20-30-flowered. Pedicels ascending, the lowest 5-6 lines. Bracts deltoid-acuminate, $\frac{1}{8}$ inch. Perianth 4-5 lines. Capsule not seen.

39. *A. hirsutum*, Thunb. Prod. 63.—*Trachyandra hirsuta*, Kunth, Enum. iv. 577.—*T. corymbosa*, Kunth, l. c.; Drège 1494, 8716, Burchell 6654, 6797.

Group 4. *Streptanthera*.

40. *A. contortum*, Linn. Suppl. 202; Thunb. Prod. 63.—*Cæsia? Thunbergii*, Schultes, Syst. vii. 1692; Kunth, Enum. iv. 610; Drège 1504 a, Burchell 726, 5748, 5951, Harvey 881.

41. *A. Dregeanum*, Baker.—*Cæsia? Dregeana*, Kunth, Enum. iv. 611; Drège 8767, 8768; Burchell 886, 887, 8011, 8313.

42. *A. filiforme*, Ait. Hort. Kew. i. 451.—*Bulbinella? filiformis*, Kunth, Enum. iv. 572.

43. *A. brevifolium*, Thunb. Prod. 62.—*Bulbinella? brevifolia*, Kunth, Enum. iv. 573.—Thunberg's specimens not matched. Leaves about half-a-dozen, narrow-linear, firm, glabrous, flat, 2-3 inches long, $1\frac{1}{2}$ -2 lines broad. Scape slender, half a foot long, bractless. Raceme simple, half a foot long, laxly 30-40-flowered. Pedicels very slender, subpatent, the lower ones half an inch long. Bracts deltoid, very minute. Flower $\frac{1}{4}$ inch long. Capsule glabrous, depresso-globose as in the other species. A variety with longer leaves and decurved pedicels, called by Thunberg "*A. brevifolium* β ," is in his herbarium.

44. *A. flagelliforme*, Baker, n. sp. Leaves absent from half-a-dozen specimens, perhaps not developed with the flowers. Scape $\frac{1}{2}$ –1 foot, glabrous, bractless. Racemes simple, reaching a foot long, with 10–40 flowers. Pedicels ascending, slender, firm, simple, the lowest 5–6 inches long, the upper ones dwindling gradually down till the uppermost are only $\frac{1}{8}$ – $\frac{1}{4}$ inch. Bracts deltoid, very minute. Perianth glabrous, 2 lines long. Capsule not seen.—Aapages river (Burke) Very different from all the other species by its whip-like habit.

45. *A. Zeyheri*, Baker, n. sp. Leaves 6–12 to a root, filiform, wiry, glabrous, persistent, overtopping the racemes, not more than $\frac{1}{8}$ – $\frac{1}{4}$ line thick, the most slender of the genus, surrounded at the base by setiform fibres. Scapes 1–3 inches, wiry, glabrous. Racemes 3–4 inches long, subsecund, few-flowered, very lax. Pedicels deflexed, the lower geminate, 3–4 lines long. Perianth glabrous, 2 lines long. Capsule not seen. Zeyher 4234.

46. *A. scilliflorum*, Ecklon in Herb. Cap. n. 35 b.—*Cæsia?* *Ecklonii*, Schultes, Syst. vii. 1691; *C. Eckloniana*, Kunth, Enum. iv. 609.

47. *A. Burkei*, Baker, n. sp. Leaves 6–8, erect, surrounded by very numerous fibres, $1\frac{1}{2}$ –2 feet long, 1 line broad, channelled down the face, triquetrous on the back, rigid, persistent. Scape glabrous, $1\frac{1}{2}$ feet long. Racemes up to a dozen, corymboso-paniculate, laxly 20–30-flowered, reaching a foot long. Pedicels all solitary, permanently ascending, $\frac{1}{2}$ – $\frac{3}{4}$ inch. Bracts deltoid, very minute. Perianth $2\frac{1}{2}$ –3 lines, glabrous. Capsule depresso-globose, $\frac{3}{4}$ –1 line deep, distinctly stalked, deeply trilobate.—Aapages river (Burke).

48. *A. intricatum*, Baker, n. sp. Ten specimens seen, all without leaves. Scape 2–6 inches, glabrous, wiry, very slender, some spirally twisted towards the base. Panicle deltoid, $\frac{1}{8}$ – $\frac{1}{2}$ foot deep, the branches several times dichotomously forked. Rachises wiry, very flexuose. Pedicels alternate, wiry, erecto-patent, the lower $\frac{3}{4}$ – $\frac{1}{2}$ inch long, the lower nodes $\frac{3}{8}$ – $\frac{1}{2}$ inch long. Bracts so minute as to be invisible without a lens. Perianth glabrous, campanulate, $\frac{1}{8}$ inch deep. Capsule not seen. Zeyher 4284. Banks of the Orange river (Burke).

Group 5. *Dilanthès*.

49. *A. triflorum*, Ait. Hort. Kew. i. 448.—*Chlorophytum?* *triflorum*, Kunth, Enum. iv. 606.—*A. bipedunculatum*, Jacq. Ic. t. 410.—*A. pauciflorum*, Thunb. Prod. 63.—*Trachyandra?* *pauciflora*, Kunth, Enum. iv. 584; Drège 8722 a, Zeyher, Cooper 783.

50. *A. Schultesii*, Baker.—*Trachyandra Schultesii*, Kunth, Enum. iv. 586.

51. *A. crispum*, Thunb. Prod. 63.—*Bulbine crispa*, Schultes, Syst. vii. 448; Kunth, Enum. iv. 568. Leaves 6–9, flat, lanceolate, $1\frac{1}{2}$ –2 inches long, $\frac{1}{4}$ inch broad, 6–10-nerved, firm, persistent, crispate towards the border, minutely but distinctly ciliated with a fringe of short, brown hairs. Scapes glabrous, $\frac{1}{4}$ –1 foot, furnished with several small, deltoid bracts. Racemes 2–6, ascending, strict or flexuose, laxly 3–6-flowered. Bracts deltoid, a line long. Pedicels $1\frac{1}{2}$ –2 lines, ascending, the lowest geminate. Perianth glabrous, $\frac{3}{8}$ inch long. Capsule not seen. Zeyher 1069, Bowker.

52. *A. pulchellum*, Baker.—*Chlorophytum?* *pulchellum*, Kunth, Enum. iv. 605; Gerrard 554, Plant 78, Krauss 74.

53. *A. rigidum*, Baker.—*Chlorophytum ? rigidum*, Kunth, Enum. iv. 604; Drége 8738, Burchell 6734, Sanderson 261.

54. *A. viscosum*, Baker.—*Chlorophytum ? viscosum*, Kunth, Enum. iv. 605; Drége 2673.

ON SOME PECULIARITIES IN THE BOTANY OF THE NEIGHBOURHOOD OF PLYMOUTH.

BY T. R. ARCHER BRIGGS, F.L.S.

When we investigate the botany of a country, the absence, from a certain tract, of any species generally common, affords well nigh as important and interesting a fact, from a scientific point of view, as does the presence of very rare or local ones in the same area.

Comparatively seldom, however, is it that such deficiencies are noticed in botanical works, the reason of which is apparent, for it requires much more minute and careful observation to enable one to assert the absence of a generally common species from a certain district, than it does to record the presence of a rare or local one in it, though too often stations of even the latter are servilely copied from one work into another without any care being taken to verify statements by personal observation. On several previous occasions I have recorded many rare and interesting plants from the neighbourhood of Plymouth in the 'Journal of Botany,' but now intend giving some particulars as to the absence, sparse distribution, or rarity, within twelve miles of this town, of certain species considered rather common, or at least not rare, in the South of England or over a yet larger portion of the kingdom.

Ranunculus arvensis, L. Very rare and only as a "casual" (*vide* Journ. Bot. Vol. IX. p. 240.) Two plants in a corn-field, near Elburton, by the road leading thence into the Fordbrook and Wembury Road, July 5th, 1871. Plentiful in a field of Wheat by the lane leading from Plympton to Elburton, July, 1871, associated with *Valerianella Auricula*, De Cand., and *Linaria minor*, Desf.

Sinapis alba, L. Quite rare as a Plymouth species. When seen, it is generally in Rape-fields, probably sown with the crop; it occasionally appears with other cultivated plants, or as a "stray" from gardens. Rather plentiful in a field near Stadiscombe village, June, 1866. In very great abundance among Mangold Wurzel, in a field between Plympton and Elburton, August, 1866. Plentiful among Rape in a field between Stadiscombe and Fordbrook, but not extending all over the field, August, 1867. In a field of Rape by the Plymouth and Exeter Road, near Plympton St. Mary Church, August, 1869. One plant, with three of *Centaurea Cyanus*, L., likewise an introduction, by the Dartmoor tramway, near Crabtree, October 3, 1865. A plant or two at Stoke Damerel, October, 1865.

Raphanus Raphanistrum, L. Quite as rare as the last, though, unlike it, apparently established as a colonist, in arable land on the coast between Down Thomas and Wembury. In a field at Common Wood, Egg Buckland, August, 1863. Seven or eight plants in a waste spot in a field by the turnpike road below Screasdon Fort, near Antony, Cornwall, July, 1871. Besides having seen this Radish at these spots, I have occa-

sionally met with an example or two in other places, manifestly simply as casual introductions or garden outcasts, in which case the petals are usually white or pinkish, and not dull yellow, as in the cornfield plant.

Sagina nodosa, Meyer. So far as my observation goes, this is absent from the district. The station, "near Ivybridge," given in Keys's 'Flora of Devon and Cornwall,' on the authority of a specimen so labelled in Herb. Plymouth Institution, is erroneous, since the plant is *Spergula arvensis*, L. Extensive commons near us, on the southern border of Dartmoor and various spots on our coast, would seem to furnish most suitable situations for this species, and it seems strange we have it not, especially as it occurs both in North Devon and at the Lizard, in Cornwall, and, according to the 'Flora Devoniensis,' in East Devon also.

Cerastium semidecandrum, L. The only authority for this plant being a species of the district, is Jones, who, in his 'Botanical Tour' (1820), p. 16, speaks of having seen it, together with *C. tetrandrum*, Curt., between Crafhole and Looe, Cornwall, and in the 'Flora Devoniensis' records it as growing on old walls in the neighbourhood of Tavistock; but in the latter case the statement might be considered to refer with equal probability either to *C. pumilum*, Curt., or to *C. tetrandrum*, as the three plants are there combined, had not he, in the 'Botanical Tour,' previously spoken of Tavistock as a station for *C. semidecandrum*. Under these circumstances I think there is occasion for the query, did Jones mistake one of the forms of the variable *C. tetrandrum* for *C. semidecandrum*?

Hypericum hirsutum, L. Only in one locality near Yealmpton, on limestone, about seven miles east from Plymouth. This appears to be its most south-westerly English station. (*Vide Journ. Bot. Vol. VI. p. 205.*)

Geranium pratense, L. This is no more indigenous at Widey, by Manadon Hill, than are the Laurels, Ilex Oaks, and other shrubs that grow in the plantation at the side of which it occurs; moreover, there are other herbaceous species that have been planted in the locality. This *Geranium* is not a native anywhere about Plymouth.

G. pusillum, L. This species is unquestionably rare, but being one very likely to be overlooked from the great resemblance it bears to the common *G. molle*, L., it may be rather more plentiful than it would seem to be, the following stations being all I am able to name under it after many years' search:—

In the tract of country watered by the Yealm: about two dozen plants near a limestone quarry in a field situated between Yealmpton village and the lane leading from Puslinch Bridge to Holberton, May, 1871. In the Plym district: by a limekiln at Pomphleet, and also by a limestone quarry on the side of the road leading from Plymstock, past the school-house, to Hooe, June, 1860; about ten or twelve plants at the latter of these stations, July, 1871. In a pit by a bushy waste spot near an abandoned limestone quarry between Pomphleet Mill and Plymstock, associated with *G. rotundifolium*, L., *G. molle*, L., *G. dissectum*, L., *G. columbinum*, L., *G. lucidum*, L., and *G. Robertianum*, L., June, 1866. This pit was filled up in 1871, so the plant has probably been destroyed at this spot. A single plant at the bottom of a wall bounding a farm court in the higher part of Plymstock village, July 5th, 1871. One plant by the roadside at Crown Hill, Knackersknowle, July 4th, 1866; probably introduced. In a fodder field at Fursdon, Egg Buckland,

doubtless introduced; *Cuscuta Trifolii*, Bab., in the same field, July 14th, 1866. In the tract of country in Cornwall lying between the Tamar and the coast: two or three plants at the foot of a wall by the roadside near Willcove, July, 1865; a single specimen on a bank by a farmhouse a quarter of a mile from the coast at Seaton, July 10th, 1871. Dr. Syme, in Eng. Bot. ed. 3, speaks of this as being common and generally distributed, except in the extreme north of Scotland.

Ononis spinosa, L.; *O. campestris*, Koch. I have never seen the true plant either in Devon or Cornwall, and, judging from dried specimens, consider that, so far as the Plymouth district is concerned, the somewhat spinous form of *O. arvensis*, L., has always been mistaken for it.

Trifolium fragiferum, L. Absent from the neighbourhood of Plymouth, although it grows in the extreme south of Cornwall, as well as in North Devon.

Vicia lathyroides, L. Recorded by Jones in his 'Botanical Tour,' p. 14, from "near Ivybridge, on the banks of the Erme," which statement he and Kingston repeat in their 'Flora Devoniensis;' but as no one has since seen it in this locality, or anywhere else near Plymouth, it is likely Jones mistook something else for it, and the plant should be erased from our list.

Sium angustifolium, L. Not found about Plymouth. Mr. Keys's station, "Tothill Lane," produces *Sison Amomum*, L., and a year or two ago I saw a few plants of *Petroselinum segetum*, Koch, there; but it certainly does not yield the *Sium*, for which, moreover, the habitat would be unsuitable.

Enanthe fistulosa, L. Not in the district; but I have had fresh specimens sent me from Slapton, between Kingsbridge and Dartmouth, South Devon.

Anthriscus vulgaris, Pers. The remarkable rarity of this plant about Plymouth has been already noticed (Journ. Bot. Vol. V. p. 310). Last year it still grew at the old station near Tamerton Folioth, which may be more precisely described as between Horsham Farm and the Blaxton Inlet. I question if it has any other local station.

Picris hieracioides, L. Extremely rare in the neighbourhood, except on and about the limestone tracts to the east of Plymouth, where its prevalence becomes a striking feature in the vegetation. Rather sparingly on the Devonian strata about Crabtree, and by the Dartmoor tramway beyond that village, near the spot where it crosses Shollover Lane. A single plant by the side of the road leading from Thornbury Corner to Common Wood, Egg Buckland, August, 1871. In 1863 I saw it growing plentifully between Ilfracombe and Combe Martin, North Devon.

Hieracium murorum, Auct.; *H. sylvaticum*, Sm.; *H. boreale*, Fries; not Plymouth species.

Carduus crispus, L. (aggregate). Remarkably local. Common in spots on the limestone between Plymouth and Elburton, and on or about the Yealmpton and Yealm Bridge beds. In a pasture near Elburton, I, in July, 1868, found several plants of *C. Newbouldi*, Lond. Cat. ed. 6, *C. nutanti-crispus*, Syme, Eng. Bot.; hybrids, I think there is no doubt, between this and *C. nutans*, L. Rare on the Devonian strata and apparently only as an introduction. In July, 1868, six or seven examples might be seen on a bushy bank above the Dartmoor tramway near

Leigham Mills, but in the following year only a single one was there. Several dozens on a bank near Shollover, a quarter of a mile from Crabtree, growing amongst wheat sown on the bank as well as in the field below, June, 1871. Not found on the granite.

Centaurea Cyanus, L. Very rare and local. I have never found this more than a "casual" about Plymouth, except in some arable fields, with a dry, light soil, between Torpoint and St. John's, where it has been known to occur for a great many years. The locality also affords our most satisfactory station for *Galium tricornis*, With.

Bidens cernua, L. Absent.

B. tripartita, L. Very rare. Two specimens in the marsh between Shollover Lane and the Efford Osier grounds, July 31, 1863. A single plant in a muddy spot in the valley at Tamerton Foliot, August 29, 1864. It appears to have formerly grown nearer Plymouth, for Mr. Keys gives the following localities: Vale between Milehouse and Deadlake, Plymouth, Banker (1853); Saltash Road, Bartlett (1863). On July 24th, 1869, I found some examples on the side of a road in a valley between Quethiock Village and Hammett Down, in the tract drained by the Lynher. On the Carboniferous strata of North Devon it seems rather common.

Artemisia maritima, L. Not known to grow anywhere in the district. There is a dried Devon specimen of this, or rather of a plant coming nearer to the var. *gallica*, Willd., than to the typical form, in the possession of Mr. N. Easton, of Plymouth, labelled erroneously, so far as the name is concerned, "*Artemisia campestris*, Banks of the Teign, C. Harper." No date is given, but it was probably collected between 1840-50. I mention this, as there is little doubt it was this plant that Mr. R. Jordan, too, called "*campestris*;" and by asserting it, under this name, to grow at the locality mentioned above (Phytol. p. 828, 1843), got *A. campestris*, L. introduced into the Devon list.

Campanula rotundifolia, L. The great rarity of this has been previously noticed (Journ. Bot. Vol. V. p. 310). Although so scarce here, it occurs considerably to the south-west of us, for Messrs. Baker, Bennett and I met with it last year in the Lizard districts, whence it was long ago recorded by Johns ('A Week at the Lizard,' p. 308).

Solanum nigrum, L. Very rare, and scarcely more than a casual. A single plant at Cattedown by the Plym estuary, July 23, 1864, introduced most probably with ballast; Bovisand Bay, Fl. Devoniensis (1829), p. 41; also Banks, Plymouth and Devonport Fl. (1830). The latter adds, "at the back of Mount Tamar House," and, across the Tamar, "at the foot of a wall at the top of the principal street in Millbrook." About ten or twelve years ago I found a single plant at Anderton, near Millbrook. Mr. Keys gives "Ivybridge," on the authority of Miss Lothman. This species occurs in the south-west of Cornwall, for I saw it near Penzance in 1866; and Messrs. Bennett, Baker and I noticed it at Poltesco, in the Lizard district, last summer.

Veronica Anagallis, L. Extinct? Banks of the Plym, Bickleigh Vale; banks of the Tamar, not far from the Weir Head (Cornwall?), Dr. Jacob, 'West Devon and Cornwall Flora,' No. 9 (1835). Never seen by me, nor noticed by any other person about Plymouth for many years past. Bude, in the extreme north of East Cornwall, is the only locality within the area of the two counties where I have ever found it.

Orobanche eu-minor, Syme, Eng. Bot. Rare, and apparently only where introduced with Clover seed.

Galeopsis angustifolia, Ehrh., b. *canescens*, Bor. Seen on several occasions in or about a field near Saltash Passage, and on a bank by the South Devon and Cornwall Railway in the same neighbourhood in September, 1863, but a very rare and local plant in the district. Mr. Keys records it from "ballast heaps in Cattedown Quarry."

Lycopsis arvensis, L. Not a Plymouth plant. I have seen it near Paignton, South Devon, and in 1866 not far from St. Just's, West Cornwall.

Lysimachia vulgaris, L. Except where it would seem to have been introduced, I have met with this only in the valley of the Lynher, and there but sparingly (*vide* Journ. Bot. Vol. VII. p. 319). Its ally, *L. nummularia*, L., is nowhere indigenous here.

Statice Limonium, L. Not known about Plymouth, at least at present. Banks, in his 'Plymouth and Devonport Flora,' published in 1830, has "near Bovisand, Mr. Radley," under this species, but I suspect some other plant was mistaken for it, since there is no other record of it as a plant of the locality, which is, moreover, a comparatively well-explored one.

S. binervosa, G. E. Sm., a. *occidentalis*, Lloyd. Very rare, growing only, so far as I am aware, on a damp cliff at Tregantle, by Whitsand Bay, whence it seems to have been recorded by almost every writer on our local botany, though the station has been diversely indicated. Doubtless it is the *Statice Limonium* mentioned by Jones in his 'Botanical Tour,' p. 16, as growing on the cliffs near Craffhole, a village in the neighbourhood; also that the Rev. W. S. Hore's record, inserted in 'Phytologist,' vol. i. p. 162, "*S. spathulata*, Desf., Whitsand Bay," has reference to the same plant and spot, together with Banks's in 'Plymouth and Devonport Flora' (1830), "*S. spathulata*. Rocks and sandy cliffs one mile west of Lugger's Cave, Rev. Dr. Jacob."

Plantago media, L. Very rare, but probably indigenous. In an old pasture on limestone at Cattedown, where I have known it for several years past (*vide* Journ. Bot. Vol. I. p. 377, 1863). In July last a plant or two still grew in the field near St. John's, whence I recorded this species in Journ. Bot. Vol. VI. p. 327; and in the same month I discovered it growing plentifully in an old pasture adjoining Albert Terrace, Torpoint, Cornwall. In Keys's 'Flora,' I am stated to have named "Roborough" as a station for it, which is a mistake, for I have never seen it there.

Rumex Hydrolapathum, Huds. In the Plymouth district only, so far as I am aware, in low wet ground near the mouth of the little river Seaton, Cornwall.

Orchis Morio, L. This grows only in two or three localities. (*Vide* Journ. Bot. Vol. IV. p. 290; V. p. 311; VIII. p. 223.)

O. conopsea, L. Very local and rare. To the previously-recorded spots (Journ. Bot. Vol. III. p. 351; Vol. VI. p. 328) I can now add another, for in June last I found it on a part of Roborough Down, where I had never before seen it, viz. on the right of the road as you go towards Buckland Monachorum from the Plymouth and Tavistock Road, in two spots. Here were about fifty flowering plants, and altogether some hundreds, perhaps, many of them very small. It occurs on Goonhilly Downs,

in the Lizard district, considerably to the south-west of Plymouth. (*Vide* Johns's 'Week at the Lizard,' p. 289.)

Alisma ranunculoides, L. This is not a Plymouth plant, though found in the extreme south-west of Cornwall.

With the absent species I have not included some which, although general, or at least not rare, in the east or south-east of England, do not extend so far to the south-west as even the eastern portion of the Plymouth district, since, as regards these, it is their absence from a considerable part of the south-west of England, and not from the smaller Plymouth tract that is remarkable.

ON A NEW CEYLONESE ACROSTICHUM.

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

ACROSTICHUM (CHRYSODIUM) WALLII, *Baker n. sp.*; rhizomate gracili reptante paleis lanceolatis subsecundis vestito, frondibus segregatis sterilibus subsessilibus anguste ligulatis glabris membranaceis viridibus nullo modo squamosis obtusis margine obscure late repandulis basi cuneatis, maculis inter costam et marginem uniseriatis valde verticaliter elongatis vena unica centrali decurvata sæpissime præditis, frondibus fertilibus gracillimis filiformibus longe petiolatis.

Discovered by Mr. George Wall and Major Hutchison near Moorowakka, Ceylon, in July, 1871.

Rhizome slender, flexuose, wide-creeping, $\frac{1}{2}$ –1 line thick, clothed with minute, subsecund, lanceolate-acuminate scales, which have a grey membranous ground vertically barred by close ribs of chestnut brown. Fronds placed on the rhizome a short space from one another, the barren ones membranous, green, the surfaces quite free from scales or hairs, subsessile, narrow-ligulate, 8–9 inches long, 2–3 lines broad at the middle, blunt at the point, the edge distantly obscurely wavy, the base cuneate; venation consisting of a single row between the midrib and edge of elongated areolæ, which are not connected with the edge, but have usually a single decurrent central free vein striking off from the outer border. Fertile fronds filiform, 6–8 inches long, on brown, slender, erect, polished stems, 3–6 inches long.

A next neighbour to *A. lanceolatum*, Hook. and Baker, *Synopsis Filicum*, p. 420, from which it differs mainly in the much narrower ligulate barren frond, with its uniserial areolation.

ON A CHINESE CULINARY VEGETABLE.

BY H. F. HANCE, PH.D., ETC.

Amongst the vegetables in esteem amongst the natives here is one called by them *Kau-sun*, and known to those Europeans who do not reject it, as some do, for the simple reason that it is Chinese, under the name of "Cane-shoots." As brought to market, this occurs in cylindrical pieces, of a white colour, $2\frac{1}{2}$ to $3\frac{1}{2}$ inches long, and 1 to $1\frac{1}{2}$ inch in diameter,

tapering upwards into a conical point, and surrounded and surmounted by the leaves and culm, from which they are readily detached. In taste the raw shoot is not unlike a half-ripe nut; but it is never eaten uncooked, but by the Chinese is stewed with meat, and by foreigners cut longitudinally into two or three pieces, well boiled and served with melted-butter. Prepared in this way, it is, to my taste, one of the most agreeable and nicest vegetables I am acquainted with. It is difficult to describe its exact flavour; but it is, perhaps, nearest to that of unripe maize, as boiled and eaten by Americans under the name of "green corn," though it possesses a peculiar richness and delicacy, to which I know no parallel in any other vegetable.

A very slight examination shows that these so-called cane-shoots consist of the solid base of the stem of a grass; but, though I had long been anxious to determine the species, it was not until the other day that I succeeded in obtaining growing specimens in flower. On examining these, I was greatly surprised to find them referable to *Hydropyrum latifolium*, Griseb., a plant discovered about forty years ago by Turczaninow, in lakes at the confluence of the rivers Schilka and Argun in Amuria; and since detected on the Upper Ussuri, in Lake Kengka, in the neighbourhood of Peking (whence I have specimens gathered by Mr. Swinhoe) and in Japan. It is not wild in Southern China, but only cultivated (in standing water) for the table; and, as I find it is also grown as a vegetable at Kiu-kiang, on the Yang-tsz, I infer, though I have no reliable data as to the extent of its culture, that it is very wide in this country.

As a species this is exceedingly close to *H. esculentum*, Link., the "Indian Rice" or "Water Oats" of North America, with which Trinius,* doubtfully combined it; and even Grisebach,† from want of specimens of the latter grass, was not satisfied of their distinctness. It differs, however, as I find on careful comparison, by the lower staminate branches of the panicle being, though spreading whilst alive, as much appressed in the dried plant‡ as the upper pistillate ones; by the male florets, which are nearly twice as long as in the American plant, having an awn from a third to half as long as themselves, instead of a mere point; and by the fertile ones, which are also twice the length of those of *H. esculentum*, tapering more gradually into the awn (which is as long as the palea, not twice the length), and being sharper at the apex, more equally roughened, and without the copious scabrous hairiness observable at the insertion of the awn in the latter species. The pedicels of the fertile florets are also more slender, and their clavate apex smaller, and less produced downwards. Grisebach remarks that the cupuliform summit of these pedicels

* *Oryza*, 19.

† Ledeb. Fl. Ross. iv. 466.

‡ A similar phenomenon occurs, as I have elsewhere observed (Ann. Sc. Nat. 5^e sér. v. 253), in the common *Chrysopogon aciculatus*, Trin., of which Loureiro truly remarks (Fl. Cochinch. ii. 676) that it is "hominibus valde incommoda; quia vestibus adhaerens taediose avellitur, cum excuti nequeat;" whence it is sometimes called by Europeans in China, "Love-grass." Whilst growing, the panicle-branches spread horizontally, forming a right angle with the stem; but, after being gathered a little while, though still retaining their rigidity, they incline inwards and give the inflorescence a narrow strict appearance, just as it is figured by Trinius (Ic. Gram. i. tab. 8), who calls the peduncles 'assurgentes' and the panicle 'contractiuscula,' neither of which characters applies to the living and uninjured plant.

is common to both sexes, though Kunth, Trinius, Endlicher, and other agrostologists, who regard it as an abortive glume,* deny this. He is, however, quite right. The same is the case, too, in the American species; but in that, the dilatation and hollowing out of the male pedicels are far less marked, and the difference between those of the two sexes is very much greater than in the Asiatic one. This character alone will readily distinguish the two. Turczaninow observes † that his species also differs by the presence of an elongated rhizome, which he asserts to be wanting in *H. esculentum*. I have no means of verifying this latter statement, but in the Chinese plant the several stems, which throw out copious stout radical fibres from the collum, are besides connected by hollow-jointed rhizomes, as thick as a swan's quill, or of even twice that diameter. These rhizomes run to some length, and are clothed at the nodes, where they put forth stout fibres, with three ovate-lanceolate tough membranous semitransparent scales, embracing their entire circumference, those nearest the collum being about an inch long. As remarked also by Turczaninow, the lower nodes of the stem are copiously fibriferous, and the fibres present the curious character of being flattened and densely pectinate, something like the paleæ of certain Ferns, as, for instance, my *Davallia Lorrainii*. I do not in the living plant find the ligula fimbriate, as described by Trinius; but, though produced to nearly an inch in length, smooth and merely bifid at the extremity.

Endlicher ‡ combined *Hydropyrum* with *Hydrochloa*, Beauv.; and Dr. Chapman, § whilst admitting the latter genus, reduces *Hydropyrum* to *Zizania*, as does also Professor Asa Gray. || Meissner** recognizes both *Hydropyrum* and *Zizania* as valid genera, referring *Hydrochloa* doubtfully to the former. It must be admitted that the Oryzeous genera are in considerable confusion, and not well distinguished, †† and the three into which the old *Zizania* of Linnæus has been divided, together, perhaps, with others, demand renewed examination, especially with regard to the homologous value of the so-called glumes of authors.

* The closely allied genus *Potamophila*, R. Br., to judge from Trinius' plate (Ic. Gram. iii. t. 249), from which alone I know it, seems to prove the inaccuracy of this view; for in it the thickened and hollowed pedicels coexist with perfect glumes. I do not myself regard this organ as of any higher structural import than the bearded calli on which the florets of *Diplachne serotina*, Lk., *D. sinensis*, mihi, and *Scolochloa festucacea*, Lk., are borne.

† Fl. Baic.-Dahur. ii. 2, 290.

‡ Gen. Plant. 79.

§ Fl. South. Un. States, 549.

|| Man. Bot. North. Un. States, ed. 5. 608.

** Plant. Vasc. Gen. 414, Comm. 317. The elder Reichenbach takes substantially the same view, admitting both *Zizania* and *Hydrochloa* (Repert. Herbarii, pt. ii. 36), to which latter he expressly refers *Hydropyrum* (op. cit. pt. i. 58.)

†† *Ex. gr.* What is the *Padia* of Zollinger and Moritzi, or the *Zizania dahurica*, Turcz., recorded by Steudel (Syn. Pl. Gram. 4), who quotes doubtfully, as a synonym, *Z. latifolia*, Turcz.? The latter is, of course, our plant; but, though the concluding volume of the 'Flora Rossica' was, according to the title-page, published two years before Steudel's monograph appeared, he does not cite it, or describe the species, but copying Trinius, places it as a variety of *H. esculentum*. If, however, there is no error in the diagnosis, *Z. dahurica* must be quite different, for it is described as having "paniculæ radiis superioribus masculis, inferioribus foemineis." I suspect, however, the position of the spikelets has been carelessly reversed, for with this exception the character given accords well that of *H. latifolium*.

It is the extreme closeness of the grass under consideration to the American species, which, though it "affords an excellent grain, somewhat resembling rice, which was in very general use among the Indians, especially of those tribes living in the vicinity of the great lakes,"* has never, I suppose, been used otherwise, which leads me to think the identification of the source of the Chinese vegetable may be of some interest and importance to American gardeners. For I can scarcely doubt that *Hydropyrum esculentum* will yield a product identical in size and flavour with that of the plant to which it is so intimately allied; and I invite the attention of the skilful horticulturists of the United States to this grass, in the belief that it is likely to repay the trouble of experimental cultivation. Our American cousins are, as a rule, fonder, and I think better connoisseurs of vegetables than we English, and habitually like a larger choice of them at their meals. If the above remarks should fortunately lead to the introduction of a new,—and as I and many others think, exceptionally delicate and choice one,—to their tables, I shall feel but too happy to have been instrumental in calling their attention to it. I trust, also, to be successful in sending home living specimens of the Asiatic species, which, from the temperature of its native localities,† would unquestionably readily become naturalized in the lakes and marshes of Northern and Central Europe; and supply, without requiring any particular care, or encroaching on the ground occupied by other crops, a wholesome and acceptable article of food.

RECENT RESEARCHES IN THE DIATOMACEÆ.

BY THE REV. EUGENE O'MEARA, M.A.

II.

The subject of the former notice of Dr. Pfitzer's useful and instructive treatise was the structure of the external silicious epiderm of the *Diatomaceæ*. The information afforded by the author on this subject cannot fail to interest the most experienced student of these forms, and much of it will be quite new to those who have been satisfied with a superficial inspection of the most obvious characters of the diatomaceous frustules.

My present purpose is to convey to my readers the views of the author regarding the contents of the cell; a department of the subject which has not received the attention it deserves. There are many students who confine their attention to frustules which have been treated with acid;

* R. E. Griffith, Med. Bot. 660 (Philad. 1847).

† The mean temperatures for the four seasons, as deduced from thirteen or fourteen years' observations, at Nerczinskoi Sawod, which is not very far from where the plant was first gathered by Turczaninow, and at Peking, where it occurs on canal-banks, are as nearly as possible:—

| | Spring. | Summer. | Autumn. | Winter. |
|-----------------------------|---------|---------|---------|---------|
| Nerczinskoi Sawod | 28° | 61° | 39° | —16° |
| Peking | 56°5 | 78° | 55° | 27·5° |

(Conf. Maximowicz, Prim. Fl. Amur. 376, 384.)

According to Loudon (Encyclop. of Plants, 788), *H. esculentum* has been acclimated in England and Scotland.

to such the characters of the cell-contents must be altogether unknown. There are others, it is to be feared relatively few in number, who, not content with such superficial knowledge, desire to understand the most recondite details of structure. Such researches are attended with considerable difficulty, in consequence of the normal condition of the cell-contents being affected by circumstances, and the application of reagents being often necessary to bring out the details with sufficient distinctness. The information given by Dr. Pfitzer on the structure of the cell-contents of the diatomaceous frustule are therefore the more important and deserving of attention.

It is necessary to premise that the views here expressed have special reference to the *Naviculaceæ*, but are, with some modifications, more or less appropriate to the other genera.

Attention is first directed to the Plasm-sac (Plasmaschlauch), consisting of a fine colourless plasm forming a closed sac of the shape of the cell, and which in the *Naviculaceæ*, as in all the other *Bacillariaceæ*, envelopes the cell-contents. It is often very difficult for the observer to make himself certain of the existence of this sac, because its refractive power differs but slightly from that of water, but the structure becomes apparent on the application of dilute hydrochloric acid. The effect of this reagent is to produce an immediate contraction of the sac, which at first, as it recedes from the cell-wall, preserves the form of the cell, and still maintains connection with it by a few pellucid threads, but after some time becomes contracted into a round mass. This result is brought out most effectively by the use of perosmic acid. Pfitzer informs us that *Bacillariæ*, which have been treated with a solution of the latter acid, at the strength of one per cent., may be satisfactorily preserved in a mixture of glycerine, alcohol, and water. This mixture should be applied to the edge of the covering-glass, and, after being allowed to evaporate, applied again. He further informs us, that iodine gives a bright yellow colour to the plasm-sac.

The next detail of internal structure to which attention is called, in the work under review, is what the author describes as a larger accumulation of plasma occurring in all the *Naviculæ*, and which lies transversely in the middle of the cell. This collection of plasma had been pointed out by Nitzsch. Kützing noticed it, and gave it the designation of transverse band (Querbinde). Ehrenberg describes it as being like "the embryo in an egg." Other writers also called attention to it, and finally Schülze gave the most accurate description of it in the case of *Pleurosigma*. This middle plasma-mass is discoverable on the side view in both valves, and forms generally but not universally a sort of irregular quadrangle. Vacuoles and oil-globules occur imbedded in the plasm, and appear distinctly in consequence of their strong refractive power. Here also, in the case of the larger forms, *Pinnulariæ*, for instance, have been observed with more or less distinctness short, dark interrupted lines which, in parallel pairs, pervade this central mass of plasma, but are most abundant from the centre to the cell-wall. These lines exhibit the same aspect in all positions of the frustule, and therefore are supposed by the author to be cylindrical threads of a thicker consistency than the remainder of the mass, and, perhaps, analogous to the plasm-threads, discovered by Hofmeister in the plasmodia of *Æthalion*.

A third detail worthy of notice is the central vesicle, which occurs in the middle of the plasm-mass to which attention has just been directed.

It is not equally distinct in all the species of the group, nor in all the individuals of the species. It is very prominent in the *Pleurosigmata*, in the *Naviculæ* proper, in *Stauroneis phœnicenteron*, *Pinnularia tabellaria*; and though in some cases, even with the most skilful management, it cannot be discovered, our author considers that nevertheless the statement of Luders may be correct, that no *Bacillaria*-cell is destitute of such a vesicle, because in many cases, when no such structure can be detected by the ordinary means, even with most careful examination, the application of reagents renders its presence manifest. Dilute hydrochloric acid is the reagent recommended by Schülze as the most satisfactory for this purpose.

In addition to these details of internal structure already referred to, a fourth is indicated by Dr. Pfitzer, namely two plates of endochrome which occur in the cell of the *Naviculæ*, of a thick substance and of a yellowish-brown colour. These endochrome plates vary in shape, conformably with the outline of the silicious epiderm; but in all the species they correspond in these particulars, namely that they lie upon the connecting bands, and also that they pervade both valves, leaving a small space down the middle free. They do not extend to the extreme ends of the cell, and are more or less constricted at the centre; their colour varies from light yellow to dark yellowish-brown, and is of the same shade throughout in each case, though varying in different specimens. These plates consist of a plasmatic substance differing in density from the plasma forming the sac and the middle mass. In case the normal condition of the cell-contents be disturbed by fracture of the silicious epiderm, the endochrome plates go together, and never commingle with the material of the plasm-sac. If the colouring matter be discharged by alcohol, the demarcation of the endochrome-plates from the rest of the plasm can be distinguished.

As to the colouring material, it has been proved by several authors to be a combination of chlorophyll and a yellowish substance, called diatomin or phycoxanthin, and is similar to the yellow colouring material found by Millardet in the *Fucoideæ*.

In addition to the parts already spoken of, the author has observed in the cells of *Naviculæ*, as well as in all other *Bacillariaceæ*, two others, namely, a water-like fluid substance, and oil-globules differing in size. These latter occur swimming freely in the cell, but abound upon the inner surface of the plasm-sac. In consequence of their strong refractive power, they strike the eye at once, and are changed into a black colour by the use of perosmic acid. As they readily combine, they have no skin. The author's experience confirms the observation of Luders, that in proportion as the oil abounds the cells have suffered from the want of pure water. The appearance of the larger oil-globules is a sign that the cell has attained its full maturity and exhausted its resources.

The oil-globules afford a means of answering the question whether the cell-contents are of a watery or of a gelatinous consistency. In favour of the former view, Dr. Pfitzer refers to the fact that very weak acid produces an immediate shrinking of the plasm-sac, as also to his observation that the oil-globules can be moved about with facility, which could not happen if the surrounding matter were of a gelatinous nature. The opinion of our author on this subject is corroborated by Focke, who discovered that the oil-globules, in consequence of their light specific gravity,

accumulate on the upper surface of the cell, and change their position in case the frustule is turned upside down.

SHORT NOTES AND QUERIES.

FLORA OF SPITZBERGEN.—In the Swedish 'Ofversigt af Kongl. Vet.—Akad. Förhandlingar' for 1869, Th. M. Fries has published a supplement to Dr. Malmgren's 'Flora of Spitzbergen,' printed in the same periodical for 1862, and translated in our pages (Vol. II. pp. 130–147, and 162–176). He adds the following species to that catalogue:—*Ranunculus Pallasii*, Schlechtendal, **R. lapponicus*, L., *Campanula uniflora*, L., **Koenigia islandica*, L., *Betula nana*, L., var. β . *relicta*, Th. Fr., *Eriophorum angustifolium*, Roth, var. β . *triste*, Th. Fr., *Carex salina*, Wahlenb., *C. ursina*, Dew., *C. lagopina*, Wahlenb., *C. incurva*, Lightf., *C. dioica*, L., var. β . *parallela*, Læst., *Poa alpina*, L., *P. cæsia*, Sm., *Catabrosa concinna*, Th. Fr., sp. nov. (with a sub-species *C. vacillans*, Th. F.) and *Hierochloe alpina*, R. S. Professor Andersson has also described in the 'Förhandlingar' for 1866 a new grass from Spitzbergen, under the name of *Colpodium Malmgreni*, And. We have, therefore, in all 17 phanerogams additional to Malmgren's list of 93 species, but Th. Fries reduces three species of that list, *Draba glacialis*, *D. rupestris*, and *Poa stricta* to varieties, so that he makes the whole phanerogamic flora of Spitzbergen to consist of 107 species. The vascular cryptogams were not given by Dr. Malmgren; the following are found in Spitzbergen:—*Cystopteris fragilis*, Bernh., *Woodsia glabella*, R. Br., *Lycopodium Selago*, L., *Equisetum arvense*, L., var. β . *alpestre*, Wahlenb., *E. variegatum* and *E. scirpoides*, Michx. The paper is illustrated by four plates representing *Glyceria vilfoidea*, Th. F.,—the *Catabrosa vilfoidea*, Anders., of Malmgren's list—*Catabrosa concinna*, Th. F., and two species of *Draba*, carefully described in the text. One of these is referred to *D. Martinsiana* of C. Gay, and the other is named *D. leptopetala*; they are the *D. pauciflora*, R. Br.? and *D. micropetala*, Hook.? of Malmgren's list; the authentic specimens of the latter from Parry's second voyage are in the British Museum, and so far as Brown's short description of *D. pauciflora* goes, it precisely agrees with the figure here given of *D. Martinsiana*, though in the absence of authentic specimens, it is perhaps safer to use Gay's name. The arctic species of *Draba* are in considerable confusion, largely caused by a multiplication of names, which it is to be hoped Dr. Fries will, from his examination of original specimens during his recent visit to England, be able to reduce to their proper position of synonyms.

FLORA OF BEAR ISLAND.—Dr. Th. Fries has also given a list of the phanerogams of Bear Island, which lies between Spitzbergen and the north coast of Norway, between lat. 74° and 75° N. This little islet has a flora of 36 species, of which four, *Rhodiola rosea*, L., *Rhododendron lapponicum*, Wahlenb., *Salix herbacea*, L., and *Luzula arcuata*, Wahlenb., var. α ., do not occur in Spitzbergen, though all are found in North Scandinavia.

*These two species were added to Malmgren's list in this Journal (l. c., pp. 135, 146) on the authority of Prof. O. Torell, of Lund.

ASARUM EUROPEUM, L. NOT A PLYMOUTH PLANT.—Mr. Britten in Journ. Bot., vol. VIII., p. 161, after making some remarks on this species as a plant of the Severn Province, goes on to say “Mr. Watson does not refer to it as having occurred in the Peninsula.” He adds, “In Banks’s ‘Devonport Flora’ it is given as growing at Ham, near Plymouth, on the authority of the Rev. C. T. Collins, and there is a specimen from this locality in Herb. Borrer, labelled “Mrs. Collins’s garden at Ham, near Plymouth; plant said to be found wild in an old quarry in the neighbourhood.” Moreover, Mr. Keys refers to the same specimen in his “Flora of Devon and Cornwall,” and also quotes the label in a note. I happen to be able to assert most positively that this plant is simply an introduction at Ham, as the gentleman (named above as the Rev. C. T. Collins, now the Rev. C. T. Collins Trelawny), who still owns and resides on the property, has himself informed me of the fact of his having planted the Asarum, together with several other reputed British species in his grounds. *Scrophularia vernalis* is one of these strangers, which he, so long ago as 1817, brought from the neighbourhood of Oxford to Ham, where it has now become very abundant, and has spread in all directions. Some years since, I, when a young botanist, found a few roots of this *Scrophularia* a little beyond the area of the others, and not then knowing anything about its having been introduced, was delighted at my presumed discovery, and sent a record of the station to Mr. Irvine for his Phytologist, where it was duly chronicled. Shortly after I received a letter from Mr. Trelawny, acquainting me with the particulars of its introduction. Mr. Banks was more than careless as regards recording garden plants as if indigenous, and in his unfinished ‘Plymouth and Devonport Flora’ such species as *Convallaria majalis*, *Datura Stramonium*, and *Vinca major* are included, the last being found, according to him, “not unfrequently in a truly wild state, far distant from cultivated places.”—T. R. ARCHER BRIGGS.

FERTILIZATION OF GRASSES. — Through the kindness of Professor Thiselton Dyer I have had an opportunity of reading Dr. Spruce’s paper on the ‘Fecundation of Grasses’ [Journ. R. Hort. Soc., N.S. iii., pp. 4–9] part of which was quoted by Mr. A. W. Bennett at p. 44. As I do not find in it any record of observations bearing on the fertilization of cereals, there is no necessity for me to discuss the opinion expressed by Dr. Spruce on the subject of the cross-fertilization of wheat. There are, however, two points in which his experience of South American grasses is at variance with what occurs amongst our British species. First—the change of colour of the anthers from some shade of purple to yellow and again back to purple; and second—that “the absence of odoriferous flowers from the grasses seems to show that insect aid is not needed for effecting their fecundation, but does not render its accidental concurrence a whit less unlikely,” which seems to imply that insects are not attracted by inodorous flowers, and as a special application of this that grasses, when in flower, are not regularly visited by insects. First, in British grasses and those ordinarily cultivated there are a few which have their anthers always purple (*Corynephorus canescens* and *Molinia cœrulea* for example); there are many in which they are pale yellow or yellowish

white (e. g. *Spartina*, *Nardus*, *Lepturus*, and all the commonly cultivated cereals; there are many also in which some individuals have purple, and others of the same species have yellowish-white anthers (e. g. *Alopecurus pratensis*, *A. geniculatus*, *Phleum pratense*, *Anthoxanthum*, *Dactylis*). But in this last case we never find the two colours of anthers on one root. My attention was directed to this by the Rev. W. W. Newbould, who wished me to see if there were not other differences between the white and purple anthered forms of *Alopecurus pratensis*, but I have been unable to find any. I was induced to examine other grasses in which similar differences in the colour of the anthers occur, in order to assure myself that the two forms of *Alopecurus pratensis* could not be separated even as named varieties. In most cases the anthers fall off without changing colour, but in a few species (*Alopecurus pratensis*, *A. geniculatus*, *A. agrestis*, *Dactylis glomerata*), they change from purple or pale yellow to fulvous brown; but this change does not take place without they are empty and dead. I suppose it is much as we see in a beech hedge on which the leaves remain in winter, but changed to brown. On the second point, in Britain most of the plants whose flowers are most attractive to insects are either scentless or with a disagreeable odour; look for example at *Salix*, *Centranthus ruber*, *Silene inflata*, *Lilium Martagon*, *Echum vulgare*; of these *Lilium Martagon* is the only one with a powerful odour, but very few persons would call it an agreeable one. In the special case of grasses, I refer to one of the best authorities for Lepidoptera, Dr. H. G. Knaggs. He says, under 'flowers as alluring baits for moths' (Lepidopterist's Guide, ed. ii., p. 92) "Grasses (especially *Glyceria fluitans*).—*S* (*tilbe*) *anomala*, *A* (*grotis*) *tritici*, *cursoria* and *valligera*, *L* (*eucania*), *impura* and *conigera*, *N* (*octua*) *umbrosa* and *glareosa*, *T* (*riphaena*) *fimbria*, *A* (*pamea*) *gemina*, *C* (*elæna*) *Haworthii*, *M* (*iana*) *arcuosa*, and many others." In my own experience I have found it useless to sugar for moths when *Glyceria fluitans* was in flower in the vicinity; on looking at it I have seen the spikelets invaded by hosts of *Leucania obsoleta*, *pallens*, *impura*, *conigera*, *Miana fasciuncula*, *Noctua umbrosa*, *Agrotis exclamationis*, *Triphaena pronuba*, &c. On Deal sandhills I have noticed a similar phenomenon, when the attraction was the flowers of *Psamma arenaria*, and at Balmuto *Dactylis glomerata* is attractive to moths, though less so than the two other grasses named. Every coleopterist knows that a field of grass in flower is one of the best grounds for 'sweeping,' and expects to find in his net a host of individuals belonging to genera not included in Diptera.—J. BOSWELL SYME.

AUCUBA JAPONICA. — I herewith send you a berry of the *Aucuba Japonica*, which, though not yet ripe, is, as you will see, very well formed. There are many berries of a smaller size on the *Aucuba* bushes here, although there is not, that I am aware, a male plant within several miles of this. I am told that about two years ago, while clearing out a neglected shrubbery, a seedling of several years growth was found, which must apparently have been sown before the introduction of the male to this country. These facts, unless we attribute them to parthenogenesis, tend to confirm a theory of mine, that all flowering plants are in a sense polygamous, the terms hermaphrodite, monœcious and diœcious having only a relative meaning.—W. E. HART. [Our correspondent is referred

to a note in the 'Gardeners' Chronicle' for March 23, on the occurrence of stamens in the flowers of mainly female plants of *Aucuba*. An editorial comment on the note adds "it is singular that the occurrence was never observed, to our knowledge, before the male plant was introduced."—ED. JOURN. BOT.]

Proceedings of Societies.

LINNEAN SOCIETY, *March 21st*, Dr. J. D. Hooker in the chair.—Mr. Bentham continued the reading of his paper on the Compositæ. He first made some remarks on the history of the Order; the geological record is very scanty, probably partly owing to the fact that so few of the species are aquatic; a few achenia have been found in some Tertiary deposits, which are perhaps referable to existing species. Notwithstanding this, the author considered that Compositæ must have existed at a very early period. The high position in the vegetable kingdom accorded to the Order by the French botanists is in many respects warranted. The author then passed in review the thirteen tribes into which the Order is divided, and made remarks on the limits and affinities of some of the genera and their geographical distribution. The *Vernoniaceæ* are tropical American and tropical African; there are divergences in different directions, *Stokesia* approaching *Cichoriaceæ*. The *Eupatoriaceæ* is an essentially American tribe; it has no special African or Asiatic forms, and is absent from Australia. Of *Eupatorium* itself there are some 400 species in America, and about 8 or 10 in the Old World, none quite the same as the former. The genus *Adenostyles* has a remarkable distribution, one species being Californian, and the other two European. The 88 genera and 1500 species of *Asteroideæ* are not well defined. *Aster* (250 species) is mainly North American; it has Cape and Australian representatives. The *Inuleæ* are chiefly Old World; the *Gnaphalieæ* are found everywhere, *Gnaphalium luteo-album* being quite cosmopolitan. The *Helichryseæ* are South African, Australian, and Mediterranean; no species is common to South Africa and Australia, though some genera are so. The *Helianthoideæ* are well defined, and apparently contain very ancient forms. They are chiefly natives of tropical America. The *Ambrosiææ* are placed here; they have also connections with *Artemisia*, and especially with *Melampodium*. The divisions proposed by Delpino, founded on the form of the styles fitted either to push or to sweep out the pollen from the anthers, are quite insufficient, as there exists every intermediate state. Passing the tribe *Helenioideæ*, the *Anthemideæ* are found principally in extra-tropical parts of the Old World. The *Senecioneæ* contain 1400 species, of which two-thirds are placed in the genus *Senecio*. This is truly cosmopolitan, though less abundant in the tropics; the species, however, have not wide areas, and no species is common to both the Old and New worlds. The author had failed to find any good subgenera or sections in this vast genus. The *Calenduleæ*, a well-defined tribe, are Mediterranean and South African; the *Arctotideæ* also South African, but the *Cynaroideæ* are quite absent from the Cape district, and indeed are all but confined to the northern hemisphere, and chiefly found in the Old World. The *Mutisiaceæ*, on the

contrary, occur in the southern hemisphere, and chiefly in America; none are found in the European and Mediterranean regions, whilst *Cichoriaceæ* are abundant in the Old World.—*April 4th*, Dr. J. D. Hooker in the chair. The President read the conclusion of his paper “On the Geographical Distribution of *Compositæ*,” and entered at some length into statistics in connection with the regions, centres, and areas of the principal genera. The number of genera in the Old and New Worlds is about equal; about 450 are represented in the former, of which 400 are confined to it, while the New World offers about 400, of which 350 are exclusively American. The New World has between 4000 and 5000 species, the Old about 4000. In the New World, the Mexican region furnishes the greatest number of small genera; out of the 240 represented, 135 are endemic, averaging scarcely three species to a genus, 64 being monotypic; there are 1250 species. In the United States region, 33 out of 118 genera are almost endemic, and 20 are entirely so, with an average of 13 species to a genus; in all there are 752 species. In the West Indian region there are 13 endemic genera, of which 9 are exclusively Cuban, 1 is common to Jamaica and St. Domingo, 3 being peculiar to the latter, and 1 to the former island; 290 species are enumerated for the region. South America was divided into the Andine, Chilian, and Amazon regions, but their limits are somewhat vague, and no statistics as to distribution were given. Passing to the Old World, the Mediterranean region, extending this to Persia and Affghanistan, contains 1400 species, divided among 140 genera, of which 74 are endemic; the *Cynaroideæ* are mainly confined to this region, as the *Helianthoideæ* are to the New World. The *Compositæ* of tropical Africa are mostly of an American type; on the western coast two or three genera of Eastern America are represented; 20 genera are endemic. In the South African region are 148 genera, of which more than 100 are endemic, averaging about 9 species to a genus; more than 1400 species are enumerated for this region, of which all except about 12 are endemic. In Australia, out of 83 genera 39 are endemic, averaging 6 species to a genus: of the species, 6 are confined to Africa and Australia, 28 are common to tropical Asia, and 58 to other regions. Speaking generally, and excluding some tropical weeds, only 66 species are common to the Old and New Worlds, and most of these are Arctic or Antarctic.

EDINBURGH BOTANICAL SOCIETY.—*14th March*—Dr. M'Bain, R.N., Vice-President, in the chair. The following communications were read:—“On the Discoveries made by Mr. John Jeffrey and Mr. Robert Brown, Collectors to the Botanical and Arboricultural Expeditions from Scotland to British Columbia between the years 1850 and 1866, with remarks on the cultivation and propagation of certain species.” By Mr. M'Nab, Curator, Royal Botanic Garden. (This is printed in the ‘Gardeners’ Chronicle’ for April 6th.) “Note on *Perichæna (Phelonitis) strobilina*, Fries.” By Mr. John Sadler. Mr. S. stated that during a recent visit to Arniston woods, near Edinburgh, he found all the old cones of *Abies excelsa* affected with this somewhat rare fungus. It was first discovered in Britain by Capt. Carmichael at Appin, on the west coast of Scotland. The author was not aware that any other British locality had been recorded for it. Dr. Greville figured and described the plant in his ‘Scottish Cryptogamic Flora’ in 1827. (vol. v. t. 275) from Capt. Carmichael’s specimens.

It is developed principally on the upper surface of the cone-scales in aggregated masses of peridia of a reddish-brown colour. The sporidia are oval, of a dull yellow, and contain round spores. The fungus seems to be confined to *Abies excelsa*, as the author examined many cones of *Pinus Strobus*, which were equally abundant in Arniston woods, but failed to find one affected with the *Perichæna*. "Report on the open Air Vegetation at the Royal Botanic Garden (No. 3, 1872.)" By Mr. M'Nab. A table was submitted giving the dates on which plants had come into flower during the month, and contrasting these with those for the last 20 years. Mr. Sadler reported having collected specimens of *Lathræa Squamaria* in full flower at Arniston on 1st March, the earliest date he had ever seen it in flower.

Botanical News.

ARTICLES IN JOURNALS.

Annales des Sciences Naturelles (ser. 5 tom. xiv. nos. 1-4, dated January, 1872).—G. de Saporta and A. F. Marion, "Remarks on a natural Hybrid between the Terebinth and the Lentisk" (tab. 1-3).—A. Brongniart, "Report on M. Gris's Memoir, 'Researches on the Pith of Woody plants.'"—A. Gris, "Extracts from the Memoir above named" (tab. 4-7).—A. Trecul, "On the proper Juice of the leaves of Aloes."—J. Martinet, "Organs of Secretion of Plants" (tab. 8-14).—A. Trecul, "Remarks on the Origin of Lenticels."—L. Cailletet, "Can Leaves Absorb Water?"—E. Bureau, "*Moreæ* and *Artocarpeæ* of New Caledonia" (enumeration of the species of *Ficus* commenced).

Botaniska Notiser (1872, no. 1, dated 15th February).—V. B. Wittrock, "Ædogoniaceæ novæ in Suecia lectæ" (tab. 1) (twelve new species of *Ædogonium* and one of *Bulbochæte*).—J. M. Norman, "Fuligines Lichenosæ or *Moriolei*" (*Moriola*, gen. nov., with seven species, *Bifrontia*, gen. nov., with two species, described.)

MARCH.

Botanische Zeitung.—Willkomm, *On the origin of "Flores Cinæ Levantici" (*Artemisia Cina*, Willk. (Berg.)).—F. Buchenau, "Proper Structure of the Leaf-apex in *Scheuzeria palustris*."—J. Baranetzky, "Process of the Development of *Gymnoascus Reessii*" (tab. 3).—G. Hieronymus, "Some remarks on the Flowers of Euphorbia, and towards an explanation of so-called axile anthers" (tab. 3, B.).—Critical notice (by R. von Uechtritz) of Hellreich's species, forms, and hybrids of Austrian *Neiracia*.

Flora.—E. Pfitzer, "On the enclosure of Crystals of Calcium Oxalate in the Plant Cell-wall" (tab. 3).—J. Klein, "On the Anatomy of young Roots of Coniferæ" (supplement).—Review (by J. Müller) of T. M. Fries's *Lichenographica Scandinavica*.—S. Kurz, "On a new species of *Pentaphragma*" (*P. grandiflorum*, from Moluccas, Teysmann.)

Hedwigia; occupied by notices of various recent publications on Cryptogamic Botany.

Annals and Magazine of Natural History.—M. Micheli, "Recent researches in Vegetable Physiology" (concluded).

* An abstract by Prof. Flükiger is given in 'Pharmaceutical Journal' for March 23rd.

Journal of the Linnean Society (Botany, no. 66, March 5).—H. Reeks "On the varieties of *Aspidium angulare* and *aculeatum*."—S. O. Lindberg, "Bryological Notes" (on *Hypnum Teesdalei*, Sm. and *H. curvisetum*, Bridel; the genus *Clasmatodon*; *Fabronia Schimperii*, De Not. and *F. pusilla*, De Not.)—N. A. Dalzell, "On *Capparis gallata*, Fresen., and *C. Murrayi*, J. Graham."—H. F. Hance, "Notes on some plants from Northern China" (includes descriptions of seven new species).—H. F. Hance, "A compendious supplement to Mr. Bentham's 'Flora Hongkongensis.'"

Characeæ Scandinaviæ exsiccataæ.—Fasc. II. contains the following species:—*Nitella tenuissima*, Desv., *N. batrachosperma*, A. Br.; *N. (Tolypella) glomerata*, Desv. (3 forms); *N. intricata*, Roth (3 forms); *Chara stelligera*, Bauer (2 forms); *C. tomentosa*, L. (5 forms); *C. hispida*, A. Br. (13 forms); *C. rudis*, A. Br. (6 forms); *P. contraria*, A. Br. (16 forms); *C. polyacantha*, A. Br. (3 forms).

In the volume for 1871 of the 'Verhandlungen d. K.K. Zoologisch-botanischen Gesells. in Wien' is an account of the flora of the island of S. Paul, in the Indian Ocean; there is a long list of marine Algæ and a few Lichens, Hepaticæ, and Ferns; the Phanerogams consist of six *Gramineæ*, one *Cyperacea*, *Plantago Stauntoni*, sp. nov., and *Sagina Hochstetteri*, sp. nov. The same volume contains, besides other botanical papers, Hohenbühel Heufler's 'Enumeration of Venetian Cryptogams,' already alluded to in our pages; Juratzka's 'Moss Flora of Upper Styria;' Krenpelhuber on the 'Lichens of Amboyna;' and Grimburg's 'Introduction to the Albanian Flora.'

NEW BOOKS.—We observe the publication of the following: *Triana*, *Nouvelles Etudes sur les Quinquinas* (with 33 plates); *Duby*, *Choix de Cryptogames exotiques nouvelles ou mal connues*; *Musci Welwitschiani*, 2nd part, *Pleurocarpi* and supplement (with 17 plates); *Engler*, *Monographie der Gattung Saxifraga* (1 plate); *Forbes Watson*, *Flowers and Gardens, Notes on Plant-beauty*.

The recent parts of Martius's 'Flora Brasiliensis' contain the *Violaceæ*, *Sauvagesiæ*, *Bixaceæ*, *Cistaceæ*, and *Canellaceæ* by Eichler, and the *Tropeoleæ*, *Mollugineæ*, *Alsineæ*, *Sileneæ*, *Portulacaceæ*, *Ficoideæ* and *Elatineæ*, by Rohrbach, whose premature death we have recently recorded.

Dr. R. H. C. C. Scheffer, *Sur quelques Palmiers du Groupe des Arécinées* in the "Natuurkundig Tijdschrift voor Ned. Indie xxxii.," just to hand, embraces monographs of the Genera *Areca* and *Pinanga*, with a revision of *Ptychosperma* and *Oncosperma*.

Dr. Balfour's 'Introduction to the Study of Palæontological Botany,' (8vo, pp. 112) is advertised to be published on May 1st. The author has received great assistance in the work from Mr. Carruthers. The book is dedicated to Professor Goeppert, of Breslau, and contains four plates and numerous woodcuts.

Mr. C. P. Hobkirk, of 7, Arthur Street, Huddersfield, is preparing a synopsis of the British Mosses, based upon the 'Bryologia Britannica,' and well brought up to date. The book will include ample descriptions of all the species; and is intended to form one small octavo volume, at

the low price of five shillings to subscribers, who should send their names direct to the author.

We see, with great regret, from the last year's Report of the East Kent Natural History Society, that in spite of a grant by the Society in 1870, scarcely any progress has as yet been made with the county Flora. The secretary of the sub-committee found the work he had undertaken too much for him, and resigned his post, which no one at present seems inclined to fill. It will not be very much to the credit of the East Kent naturalists if, after all, a Flora of their county should be produced without their assistance; but surely among the ninety members, some of whose names are well known in science, there must be some to take in hand this urgent desideratum in English botany.

The following living terrestrial Orchids were exhibited by Mr. Needle, gardener to H.R.H. the Comte de Paris, Twickenham, at the shows of, the Royal Horticultural Society, April 3rd, and the Royal Botanic Society, April 10th:—*Ophrys tenthredinifera*, *O. Bertolonii*, *O. ferrum-equinum*, *O. aranifera*, *O. bombyliflora*, *O. apiculata*, *O. aranifera*, *O. speculum*, *O. fusca*; (also under name *O. iricolor*), *O. lutea*, and *O. "mammosa"*; *Orchis papilionacea*, *O. maculata*, *O. longicruris*, and *O. "quadripunctata."*

We extract the following from a recent number of the 'Cape Monthly Magazine':—"Professor MacOwan, of Somerset East, writing to us of the extensive and well-arranged herbarium which he has created at the Gill College, says, 'Every plant added since my arrival in the colony is fairly gotten by exchange captive by my own bow and spear. The Cape section of the herbarium contains a fine set of Burchell's plants, collected in 1812-14; many from Ecklon and Zeyher, Drège and others; the more recent very extensive sets from H. Bolus, Esq., of Graaf-Reinet; others from Kennedy, Atherstone, Bowker, Ganderson, Murray, and all MacOwan's collections since 1862. It may be considered nearly complete as regards the flora of Albany, Graaf-Reinet, and Somerset.'" Details of the condition of the herbarium in reference to American, Indian, Australian, and other plants, which are well represented, are given; there is a nearly complete series of Mauritian Ferns by Sir H. Barkly, K.C.B., now Governor of the Cape Colony. In the remarks which follow this letter of Professor MacOwan, the Cape Government herbarium is spoken of as being sadly in want of a small modicum of the time and enthusiasm which Professor MacOwan devotes to the Gill College herbarium. It is, moreover, considered a subject deserving the consideration of the Governor and his executive whether a sum of money should not be placed in the hands of the honorary curator for the preservation and improvement of the herbarium. With reference to this, while it is no doubt very desirable to improve the Government herbarium, it may be remarked that the Cape Parliament will do more to further science in the colony by passing the proposed grant towards defraying the expenses of completing the 'Flora Capensis,' left by Dr. Harvey in a half-finished state at his death, at the end of the third volume.

Dr. Wirtgen, son of the well-known German botanist, writing from Coblenz, offers the originals of the 12 fasciculi of the herbarium of critical plants for £4, and also "a fine herbarium of foreign plants classified according to De Candolle's system, and containing from 10,000 to 12,000 species in good preservation," for £25.

A sale of dried plants, chiefly extra-European, took place on March

26th at Mr. Stevens's auction rooms. There was, however, but little of value, the lots consisting chiefly of very imperfect sets, or poor specimens. The prices realized were from two shillings to ten shillings a lot.

The 'Nuovo Giornale Botanico' gives some details of the Laboratory of Cryptogamic Botany, founded in Pavia by the Italian Government. It is specially intended for the study of cryptogamic parasites, of the maladies caused by them in plants and animals, and is placed under the direction of the Professor of Botany at the University, with assistants, a secretary, four working pupils, etc. This is a novel institution, and under Professor Garovaglio we may well hope that some valuable investigations into the diseases of plants will justify and reward the wise liberality of the Italian authorities.

M. E. Bommer has been appointed Professor of Botany in the University of Brussels.

The staff of the University of Strasburg is being filled by German professors. Count H. Solms-Laubach goes as Professor of Botany from Halle, and Dr. F. Schmitz, of Saarbrücken, as assistant to the botanical laboratory. Dr. De Bary will also, for the future, be resident at the Strasburg Botanical Garden.

It is with great regret that we have to record the death, at the age of 67, of one of the leading botanists of Europe, Hugo von Mohl, which occurred during the night of the 31st March, at Tübingen. He was found dead in his bed on the morning of the 1st April, having had no previous illness. Born at Stuttgart in 1805, he early devoted himself to the histological department of botany, in which he afterwards held the first rank. His prize thesis at Tübingen, printed in 1827, was on the structure and habits of climbing plants. The following year he published a memoir on the pores of the plant cell-wall, and in 1829 he contributed an important paper on the wood of Cycadeæ to the 'Munich Transactions.' Since that date his additions to vegetable anatomy and physiology have been continuous, and distinguished for their accuracy and completeness. The Royal Society's catalogue enumerates no less than 78 papers from his pen, chiefly contained in the 'Linnæa,' the 'Flora,' and especially the 'Botanische Zeitung,' of which he was an editor from its commencement in 1843, till his death. They chiefly refer to the structure of the stems of Phanerogams and Ferns, the vegetable cell, chlorophyll, cambium, the embryo, cuticle, etc. His memoir on the structure of Palm-stems was translated by Henfrey for the Ray Society. Mohl's greatest work was his 'Principles of the Anatomy and Physiology of the Vegetable Cell,' published in 1851, also translated into English by Henfrey, which produced a great change and advance in vegetable histology, and indeed in histology in general. The death of this distinguished botanist occurred at Tübingen, where he had been Professor of Botany for thirty-seven years.

* CORRIGENDUM.—In the article on *Baptisia perfoliata*, reprinted (at pp. 84, 85) from "Silliman's Journal," an error has been reproduced from the original. In lines 29, 30, of p. 85, for "fusion" read torsion, and for "adopting the foliage of" read adapting the foliage to.

Original Articles.

DIMORPHISM IN ERANTHEMUM.

BY JOHN SCOTT.

At pages 46 and 47 of the 'Journal of Botany,' I observe that Mr. Kurz has partly anticipated me in a communication which I have had long in view on dimorphic *Acanthaceæ*. I am only surprised to learn that Mr. Kurz has himself been unaware of the existence of dimorphism in the genus *Eranthemum* until his last Burmese mission in 1871; but he is greatly mistaken in supposing or implying that the late Dr. T. Anderson had similarly overlooked these by no means inconspicuous phenomena, inasmuch as it was he who first directed my attention to them. This was early in 1866, on his return from a visit to Moulmein, where, if I mistake not, the Rev. Mr. Parish and he had first examined the phenomena in *E. cinnabarinum*; and on many subsequent occasions did he and I examine the flowers of that and other similarly characterized species on the living specimens in the Botanic Gardens. In his list of *Acanthaceæ* cultivated in the gardens here, and printed in the Journal of the Agri.-Hort. Society of India, 1869, page 286, he remarks under *E. cinnabarinum* that "the large conspicuous flowers are quite sterile, seeds are produced only by small deformed flowers in which the limb of the corolla is almost wanting. These flowers are not commonly produced, and accordingly seeds are seldom obtained from this species." Dr. Anderson being thus to my knowledge perfectly familiar with dimorphism in *Eranthemum* years before he examined Mr. Kurz's Burmese species, it is a mystery to me how he should have overlooked the fact in examining an apparent form of the variable *E. crenulatum*, and as Mr. Kurz states, *even* "would not assent to call it an *Eranthemum*" at all. Supposing, on the other hand, that Dr. Anderson, unaware of the existence of the dimorphic peculiarity in any other species, had found specimens uniformly characterized by the minute flowers only, he might well have discarded it from *Eranthemum*, and taken it even as the representative of a new genus, one which assuredly would thus have had considerably better claim to acceptance than could be shown, for example, in the suggested transposition of *E. Ecbolium*. I have made a preliminary record of these facts to show that the phenomena of dimorphism in *Eranthemum* had not escaped Dr. Anderson's observation, as readers of Mr. Kurz's communication will very naturally infer.

The following notes are confined to species cultivated in the Botanic Gardens here:—

E. Ecbolium.—Under this species Mr. Kurz remarks that it "has only long and well-developed flowers which all bear fruit." I have not sufficiently attended to this species (which flowers nearly all the year round) to confirm Mr. Kurz's statement; but without wishing to cast doubt upon it, I may remark that the lower flowers in the raceme are not unfrequently abortive and replaced by minute leaf-buds. I have not yet had an opportunity of tracing the development of these. It is also noteworthy that

while dichogamy is conspicuously characteristic in, I believe, all the species, it is thus far peculiar in *E. Ecbolium* that the stigma of each flower is mature before its own pollen is ready. As the flower opens, the stigma may be observed overtopping the closed anthers, and less or more viscous; with the lengthening of the corolla-tube the stigma ultimately rests between the anthers, and if unfertilized previously by insect or other external agency it can rarely fail to be so either then or when the corolla falls. In all other species which I have examined, the anthers dehisce before the stigma is sufficiently matured to receive the pollen; and when it is ready the anthers have so diverged laterally, that without insect or other external agency, the pollen cannot reach the stigma. These remarks I need scarcely say have reference to the large and open flowers, the minute and closed ones being adapted more or less exclusively to self-fertilization.

E. cinnabarinum.—Flowers trimorphous. The *fully developed flowers* of this species have a showy corolla with a large and slender tube 16 lines long, and a spreading limb 15 lines across. These flowers seem to be perfectly sterile, as after repeated applications of their own pollen and that of the smaller flowers, I have never observed the slightest indications of fertilization. The *intermediate sized flowers* have the corolla reduced to less than half the size of the preceding; the tube being 5 lines long and the limb 6 lines across. This form is occasionally self-fertile, and I find it fairly fertile by application of pollen from both the larger and smaller sized flowers. The *smallest sized and closed flowers* are perfectly self-fertile. The corollas in this case are from 2 to 3 lines long and never open, but are naturally forced upwards and cast off by the increase of the capsule. In none of these have I seen the stigma protrude from the apex of the corolla, nevertheless the flowers, as in the similar cases of *Viola*, *Oxalis*, *Impatiens*, etc., are perfectly fertile.

E. crenulatum agrees with the preceding, having large, fully-developed, and sterile flowers; smaller, but open and occasionally fertile flowers; and minute closed and perfectly self-fertile flowers. I may also remark that in both of the above species, the large and fully developed flowers, as a rule, are produced almost exclusively in the cold season. Later, and as the heat increases in March and April, the smaller sized flowers predominate more and more. I have particularly observed this in plants under cultivation; and I suspect that this will also explain the absence and comparative rarity of the larger-sized flowers as remarked by Mr. Kurz in indigenous habitats. Few, I believe none, of the species of *Eranthemum* exhibit any floral diurnal movements, and even when fertilized they retain their beauty for two or three days. Anyhow, in the case of *E. crenulatum*, which is apparently the species under consideration by Mr. Kurz, diurnal movements of the flowers as suggested by him have nothing whatever to do with the circumstance of his having "only once met with the fully-developed large flowers." I attribute it largely to atmospheric conditions. In the cold season, as I have said, the large flowers are almost exclusively produced, so also in a hot and moist atmosphere, whereas heat and aridity have the opposite effect, and tend less or more exclusively to the production of minute, closed, and self-fertile flowers.

E. bicolor.—The large flowers have a slender corolla tube, 20 lines long, with a spreading limb 12 lines broad. These flowers are occasionally naturally fertilized, as I have observed perfectly developed

seed-vessels terminating in the long style of the large flowers, and thus at once distinguishable from the produce of the short flowers; the style in the one being from 16 to 18 lines long, in the other less than a line. The capsules seem to be also somewhat less fertile than those of the minute flowers, as I have never found them contain more than three seeds, and, as a rule, one or two only. The capsules of the small flowers yield three and four. The minute and closed flowers of these species have a reddish-tinged corolla about a line long, and nearly equally divided between the tube and the limb, the latter consisting of four nearly equal concave lobes, bilabiate in the bud. The stigma rests between the anthers, and as these have dehisced before the corolla opens or falls off, self-fertilization is necessarily secured. The corolla is ultimately thrown off vertically by the developing capsule.

The following species are very similarly characterized:—*E. Blumei*, *E. Teysmanni*, *E. Zollingerianum*, *E. erectum*, *E. lapathifolium*, *E. leuconeuron* and *E. viscidum*. In all these, the large flowers (which are almost alone produced towards the close of the rains and during the cold season) in the hot season give place either more—as in *E. lapathifolium* and *E. viscidum*—or less,—as in *E. bicolor* and *E. Blumei*,—exclusively to the minute and closed flowers. I may remark, however, that in nearly all these species I have occasionally observed the stigma protruding from between the corolla lobes, and thus exposing them to cross fertilization, which is very likely to be effected by ants haunting them for the sake of the green flies which affect the flower-buds.

We have no living specimens of *Eranthemum fœcundum* in the Botanic Gardens here; but it is evident from the figure in Edwards' Bot. Reg. t. 1494, that it also exhibits dimorphic characteristics. I infer this from the two fully-developed capsules at the base of the raceme crowned with a style scarcely more than a line long, whereas in the normal, or at least the large and open flowers it is at least 8 lines long. Again, by reference to the plate, it will be observed that those capsules are associated with several other minute flowers, of which one only has cast its corolla, and exhibits the short style projecting beyond the appressed calyx. It is a Brazilian species, closely allied to our Indian *E. crenulatum*, and this not only structurally but physiologically, as we learn from the following interesting remarks by Dr. Lindley on its precocious fertility:—"What is most remarkable in it is its unusual disposition to form flower-buds instead of leaf-buds. If anything occurs to check its growth, such as a dry atmosphere, or re-potting, or exposure to sudden cold, it is directly thrown so abundantly into a blossoming state that young plants will often commit a sort of vegetable suicide, killing themselves by their excessive fecundity." It is indeed striking that this New World species should manifest the same idiosyncrasy as its Old World congeners.

Dædalacanthus Salaccensis, *D. strictus* and *D. suffruticosus*, likewise produce large open, and more or less sterile flowers; and minute closed and perfectly self-fertile flowers. In each of these species dimorphism is conspicuous; the large and open flowers again predominating during the cold, the minute and closed in the hot season. Thus in *D. Salaccensis* the large flowers are conspicuous in the cold season and freely produced; the corolla-tube 13 lines long, with a spreading limb about 6 lines broad: very rarely is one of these succeeded by a capsule. As the hot season sets in, the large flowers give place to small, closed, and

abundantly fertile ones. The corollas of these are about 2 lines long, tubular and tapering from an inflated base. They are carried up, and ultimately cast off unopened by the growing capsule. The very general infertility of three of the commonest species in our gardens, *D. macrophyllus*, *D. nervosus* and *D. pulchellus*, is very probably due to the absence of the small-sized flowers.

Ruellia tuberosa, L., is an interesting species which I add to the list of plants producing dimorphic flowers. The minute flowers of this species are recognized by Linnæus in his specific name *R. clandestina*, as also by Nees, who makes it the type of his genus *Cryphiacanthus*—a name again indicative to us of the dimorphic peculiarity, though he does not state that it is common to the other representatives of the genus. I have had no opportunity of examining them. The *R. tuberosa* is an extremely variable plant. Nees recognizes four varieties and as many more sub-varieties. These, however, do not appear to be well established forms, as I am much mistaken if I could not have pretty well represented them all from specimens raised from a single plant and grown under different conditions in this garden. In a cool, moist and shady border, it is an erect herb about 2 feet high, with elliptical-ovate, bluntish leaves, cuneate at the petioled base, wavy, and very nearly entire, from 4 to 5 inches long by 14 to 18 lines broad; on a dry and exposed site it is almost stemless or prostrate, with small oblong-ovate leaves, tapering to the base and from 10 to 18 lines long. In both conditions the large fully developed flowers predominate in the cold season and are fairly fertile; whereas in the hot season, though I have examined regularly and closely, I have failed to get other than the small, closed, and perfectly self-fertile flowers! The normal flowers are from 18–24 lines long, the corolla-tube is dilated below the middle, and shorter than the accrescent, linear-filiform segments of the calyx; the capsule from 6–10 lines long, and from 8–10-seeded. The hot season's flowers are all closed, minute, and very fugacious, 2–3 lines long. The corolla is terete, obtuse with a more or less abruptly inflated base, and cast off vertically by the increase of the ovary. The blunt and sessile stigma is embraced by the anthers which dehisce and complete fertilization before the fall of the corolla. In no instance have I observed the apex of the ovary with its stigmatic crown piercing the corolla. The fertility of the self-fertilized and closed flowers is as a rule considerably higher than the natural fertility (I have never tried artificial fertilization) of the fully-developed and open flowers. The capsules of the closed flowers are from 10–13 lines long, and very regularly contain 18–24 seeds; whereas we have seen those of the large flowers contain only some 8 or 10 seeds.

I have also detected closed and minute flowers on *Dipteracanthus dejectus*, *D. patulus*, and *D. prostratus*, and there are not a few other species of this genus indicated by Nees as producing minute flowers. These, however, as well as those previously enumerated, are probably all mere seasonal conditions of a normal form, and are thus not even distinguishable as varieties, far less, as has been hinted, of generic or specific value.

Echmanthera Wallichii var. *gossypina* also presents dimorphic characteristics. In the cold season large and open sterile flowers only appear. These have a funnel-shaped corolla an inch long, with a regular spreading 5-lobed limb of a bluish-violet colour. These are succeeded in the hot season by minute, closed, and perfectly self-fertile flowers;

the corollas greyish-white, about 2 lines long; tubular, with a 5-toothed limb. The minute corollas in this species usually wither on the developing capsule, so that it is scarcely possible for them to be crossed with pollen from other flowers.

It may not be out of place to add a note on *Leersia oryzoides*. I have long entertained a hope that cultivation under such extremes of temperature as are naturally afforded in the plains of India might induce the development of open and normal flowers on this inveterate producer of closed and self-fertile flowers. Mr. Darwin was kind enough to send me seeds for experiment. These reached me in October, 1865, and were at once sown. They germinated freely, and yielded a vigorous progeny which began to flower in March, 1866, continuing flowering less or more to the close of the rainy season. In September they yielded an abundant crop of seeds, all of which, however, were the produce of the characteristic closed flowers. Year after year have I watched it in the hope of observing variations either in the old plants or their successive progeny, but to this day, with the exception of being somewhat less robust, the specimens differ little from those which I had originally from Mr. Darwin. Thus strongly confirmed is the habit of producing those minute abnormal flowers! Forlorn as it may appear, however, I still think that by successive changes in the modes of culture, the normal flowering habit of this interesting little genus will be restored. I entertain this view under the conviction that the tendency to produce minute abnormal flowers is mainly caused by the conditions of life being unfavourable to the production of normal ones, and that, as regards individual development, the production of small and closed flowers is a great gain to the species. This is more or less evident in nearly all the cases yet adduced; minute and closed flowers being, as I believe, always numerous produced in cold and ungenial springs and dry autumns, when there is a further paucity of flower-haunting insects to effect fertilization. In the case of the marsh-affecting *Leersia*, a herb of humble growth, and thus more or less liable to submergence and consequent sterility of all open flowers in rainy weather, the production of closed flowers equally fertile—as I know they are—in water and in air, is a very great gain. Again, in the several *Acanthaceæ* above enumerated, we have very clearly seen that the production of the two forms of flowers is largely if not wholly dependent on purely physical conditions. In other plants nature effects the same end—multiplication of the species—by other modes, *e.g.* the viviparous habits of mountain plants, which are normally reproductive in the plains, the germination of seeds of Mangroves and other such plants while attached to the parent within the tidal range, and their falling off ungerminated (as is very generally the case) when growing beyond its range on merely moist lands. Reflect also on Agaves, which are dispersed over India, and found in the most dissimilar habitats. All of these in hot and arid districts produce seeds abundantly; whereas when growing in heavy, moist, or really muddy soils—as in many parts of Bengal—the seeds almost wholly give place to a progeny of bulb-like bodies by which young plants are produced. As these habits in the latter cases become more or less confirmed and predominant, we have well-marked viviparous varieties passing by a sort of quasi-vegetative mode of reproduction (as in the leaf-bud development of apparently arrested ovules; *e.g.*, *Agave* and *Kalanchoe*) to a

less or more normal mode of sexual reproduction as illustrated by parthenogenesis and that kind of dimorphism in which the minute and closed flowers are self-fertile, as in *Leersia*, *Eranthemum*, etc. Giving due weight to these several relations, it is evident that the argument founded by H. von Mohl and others on the occurrence of minute, closed, and perfectly self-fertile flowers, in no way weakens Mr. Darwin's doctrine that no species is self-fertilized.

NOTES ON BRITISH GENTIANACEÆ.

BY JAMES BRITTEN, F.L.S.

Having lately been occupied in rearranging the *Gentianaceæ* of the British Museum herbarium, my attention has been drawn to certain British species of *Erythræa* and *Gentiana*, with regard to which there is some disagreement among writers on our own flora, and also among Continental botanists. The opportunity of examining a large series of good and authentic specimens has enabled me to clear up, in my own mind at least, many of the difficulties which I had previously experienced, to correct several published errors of name, and to add some further facts with reference to the distribution of the plants, which may be of use to students of our native species.

Erythræa littoralis, Fr. Mr. Watson (Comp. Cyb. Brit. 248) queries Moray for this species, and Dr. Boswell Syme states that he has "not seen specimens" (Eng. Bot. ed. 3, vi. 66). I have examined specimens from the following localities on the shores of the Moray Firth:—"Seaside near Brodie House," Elgin, distributed by G. Don in his Herb. Brit. Fasc. i., under the name of *Chironia pulchella* [see Hook. Fl. Scot., p. 322], and salt-marsh, near Campbellton, Inverness" (Gardiner), which are small and usually uniflorous. These are in Herb. Mus. Brit.; in Herb. Borrer are specimens from the marshy shore at Inverness; and in Herb. Kew., others from the "South shore of the Moray Firth, between Burghead and Findhorn (Rev. G. Gordon)", and from the "Solway coast." The two forms figured in Eng. Bot. ed. 3, are well represented in Herb. Mus. Brit., where there is a remarkably fine set of the British species of the genus. In the useful but unfortunately incomplete 'Flora of Liverpool District,' issued in 1866-68 with the 'Liverpool Naturalists' Journal' is the following note upon the varying habit of this species:—"Very variable in habit, the extremes being a large bushy plant fully a foot high; a single-stemmed, single-flowered plant of an inch or less to four inches in height, and a squat tufted plant from one to two inches high. The last has been collected and distributed as *E. pulchella*." This species was first published and described as British by Dawson Turner in Bot. Guide, p. 469 (1805); but Don had previously distributed it as *C. pulchella* in 1804, as above stated. Mr. Brodie was the first collector of the species; Mr. Winch found it in the Northumberland localities on "July 19 and 20, 1804." Winch's Bot. Guide, p. 22 (1805).

E. latifolia, Sm. The "*Erythræa latifolia*, L.," of Mr. Hemsley's Sussex list (Journ. Bot. vi. 264), given on the authority of specimens in Herb. Borrer, is that form of *E. Centaurium* which is frequently miscalled *latifolia*, as in Mr. Keys' 'Devon and Cornwall Flora,' and which was figured as such in E. B. S. t. 2719. The true *E. latifolia* is not represented in

Herb. Borrer. The Isle of Wight *E. latifolia* of the Thirsk Report for 1862 (Journ. Bot. i. 146) has since been correctly referred to *E. Centaurium* var. *capitata*, R. and S., by Mr. A. G. More in Journ. Bot. ix. 167. Small specimens of *E. littoralis* also have been distributed as *E. latifolia*. The only locality in the world in which the true plant of Smith has certainly been found is the neighbourhood of Liverpool, as stated by Mr. Watson in Godman's Nat. Hist. of the Azores, p. 195, and there only on the Lancashire side of the Mersey. The 'Flora' from which I have above quoted being little known, I make no apology for extracting from it the following very interesting details regarding the occurrence of this species:—
 "The following localities are all where the true plant has been met with, given in the order of discovery. In all, however, excepting the last, it has not been found for years; and in the last, a careful search in 1866 and the present year (1867) was unsuccessful. Bootle (R. Bowman, etc.; the specimen in Smith's Herbarium probably from this locality). Seaforth Common (Hall, Flora), and in a stubble field in the greatest profusion, in 1852, but never since met with beyond one or two stray specimens; the field formed part of what was formerly included in Seaforth Common (H. S. Fisher). It is from this place and by Mr. Fisher's liberality that most of the British herbaria have been supplied. Damp spots in a large valley amongst the sandhills near to Ainsdale, in the direction of Birkdale (F. M. Webb). Not met with in 1866 and 1867, but the plant is very erratic in its appearance, and any year it may be expected in quantity. The new plate in ed. 3 of Eng. Bot. is from a specimen collected in the Ainsdale locality."

The plant was first described by Sir J. E. Smith in Fl. Brit. p. 1393 (1804) as a variety of *E. Centaurium*, and subsequently as a species under the name of *E. latifolia* in Eng. Fl. i. 321 (1824). It was discovered in 1803 by Dr. Bostock and Mr. J. Shepherd, then Curator of the Liverpool Botanic Garden; there are specimens collected by the latter in July, 1805, "four or five miles north of Liverpool," in Herb. Mus. Brit. Mr. Watson (Comp. Cyb. Brit. 248) says, "formerly in Cheshire (?)" but I have met with no record of it for that county. He also suggests "an irregular growth of *Centaurium*?" I have looked carefully through the very large series of *E. Centaurium* contained in Herb. Mus. Brit. and Herb. Kew., but have seen no examples which bear out this suggestion. The true *E. latifolia* appears to me, judging from dried specimens, to be a very well-marked and easily recognized plant.

Dr. Syme (Eng. Bot. ed. 3, vi. 65) considers that Grisebach (De Cand. Prod. ix. 58) is "well acquainted with the true plant;" but in this opinion I cannot concur, as he cites the E. B. S. figure for his plant, and places as a variety of it the very different *E. tenuiflora*, Link.* The Azorean plant is also quoted by him as *latifolia* (op. cit. p. 561). Moreover, the specimens labelled by Grisebach in Herb. Kew. as probably belonging to *E. latifolia* are *E. Centaurium* and *E. littoralis*. The plants distributed by Willkomm (It. Hisp. secund., no. 395) from Spain† and Pichler from Dalmatia under the name "*E. latifolia*,

* *E. tenuiflora* seems to me to differ from *E. pulchella* only in the narrower and more acute corolla lobes; and in some instances I find it impossible to say positively to which species or form a given specimen belongs.

† In Willkomm and Lange's Prod. Fl. Hisp. ii. 661, this number is cited for *E. tenuiflora*, of which the authors say, "Vix varietatem constituit." This, as well as their description of *E. latifolia*, conclusively proves their ignorance of Smith's plant.

Sm." have no connection with the true plant, and belong to the *E. tenuiflora*, Link. The Liverpool plant appears to be quite unknown to Continental botanists; thus Grenier and Godron (Fl. de France, ii. 484) say of *E. tenuiflora*, which they place under *E. latifolia*, "Ne nous a pas paru assez importante pour la distinguer du type," although, as I have already observed, the two plants have not even a superficial resemblance. Nyman (Syll. p. 111) evidently refers to the plant of E. B. S.

E. pulchella, Fr. The original *Gentiana pulchella* of Swartz was a uniflorous state scarcely an inch high, as shown by specimens sent by him to Sir Joseph Banks, and now in Herb. Mus. Brit. Exactly similar specimens from Münster, Westphalia, are in the same herbarium, named "*E. pulchella*, Fr.; β . *tenella*, Bngl.;" and others collected by Dickson on Mitcham Common in 1804. In Herb. Kew. are similar examples from St. Helen's, Isle of Wight, named in MS. by Dr. Bromfield "*var. perpusilla*." Of course every intermediate in size between this and the *E. pulchella* as generally received may be traced. The original Eng. Bot. figure, from Gorleston specimens, represents a stunted form; the additional and much more characteristic plate in ed. 3 is from a specimen gathered near Liverpool, on the Cheshire side of the Mersey, where the plant appeared "in great profusion on the land made from the soil excavated when Wallasey Pool was converted into the Great Float; it was previously quite unknown in that neighbourhood" ('Flora of Liverpool District').

Gentiana Amarella, L. The examination of a large series of European examples of the varieties assigned in De Cand. Prodr. to this and to *G. germanica* leads me to the conclusion that the two are not specifically distinct. Extreme forms of each are readily recognizable; but a chain of intermediates connects them. According to Grisebach, the true *Amarella* occurs in Scotland;* the var. γ . *axillaris* in Britain (specimens from Yorkshire authenticated by him are in Herb. Kew.); and the var. δ . *pyramidalis* in Scotland. The plant generally known as *G. Amarella* in England is referred by Grisebach to the var. β . *minor* of *G. germanica*; but this view is not generally maintained. Specimens from Maltby, near Doncaster, in Herb. Mus. Brit. approach *G. spathulata*, Bartl., which Grisebach places as var. γ . *præcox* of *G. germanica*. *G. livonica*, Esch., should be included under *G. Amarella* as a form, or at most a subspecies; specimens of the former from Dorpat and Ingermannland exactly correspond with those distributed as *G. Amarella* from Pomerania by F. Schultz (Herb. Norm. Cent. 3, no. 319). I should be inclined to regard *G. Amarella* as a widely distributed super-species, including under it, besides *G. germanica* and *G. livonica*, *G. mexicana*, Gr., *G. Hartwegi*, Bth., both from Mexico, the Indian *G. Moorcroftiana*, Wall. Cat. 4390 (not 4300 as cited in DC. Prod.), *G. lingulata*, Ag. from Lapland, and the North American *G. acuta*, Mich. So far as the two last are concerned, this course has been adopted by Dr. Hooker in Linn. Trans. xxiii. 297. In the British Museum set of Hall and Harbour's Rocky Mountain Plants, no. 473, one specimen is quite *G. germanica* of European botanists. In Dr. Asa Gray's Enumeration of these plants, is the following note upon this number:—"On examination of a series of specimens Dr. Engelmann is inclined to view *G. tenuis*, Gr.†

* Also in Cambridgeshire (Journ. Bot., ii. 65).

† A species of the section *Arctophila*, and, according to Grisebach, intermediate between that section and the section *Amarella*. It appears to me that *G. umbellata*, M.B., and *G. propinqua*, Richardson, are equally referable to *G. acuta*.

as an extreme form of *G. acuta*, and also to adopt the conclusions of those who regard the latter as specifically identical with *G. Amarella* of the Old World." A yellow-flowered variety of *G. Amarella* is recorded from Betchworth Hill in Phyt. i. 78, o.s., but is omitted from the 'Flora of Surrey.'

Our text-books state that this species flowers in autumn. As far as the typical form is concerned, this is correct; but a variety (the β . *præcox* of Smith, the *G. fugax verna seu præcox* of Ray's 'Synopsis,' ed. 2, 156) was "found by the late Sir John Cullum on a heath between Grantham and Ancaster, June 6, 1774," and "seems by his specimens a dwarf variety which had survived the winter." (Eng. Fl. ii. 31.) This is no doubt the plant which has been erroneously recorded as *G. verna*, as by Mr. R. Chambers in Mag. Nat. Hist. ii. 38, n.s., from "chalky meadows between Tring and Aston Clinton;" there are specimens of the same form from Tring in Herb. E. Forster. According to Smith it flowers from April to June. It is not the same as the var. γ . *præcox* of *G. germanica* in De Cand. Prod. ix. 96.

Gentiana germanica, Willd. Dr. Syme (Eng. Bot. ed. 3, vi. 77) says that this subspecies "is not known with certainty to occur anywhere except near Tring;" Mr. Watson (Comp. Cyb. Brit. p. 537) adds the county of Hants, on the authority of Mrs. Russell. In Herb. Mus. Brit. are specimens from Herb. E. Forster, labelled, "in a meadow between Henham and Chickney" (Fl. Essex, p. 204). In Fl. Surrey, p. 151, it is recorded by Mr. J. S. Mill "from between Banstead and Chipstead;" and Mr. Pamplin notes its occurrence at Streatley, Berks, in Phyt. i. 381, o.s. In Herb. Kew. are examples from "Watership Chalkpit, Hants," collected by Miss Worsley (now Mrs. Russell); and others from "near Ripon," collected by Brunton, and identified by Grisebach with *G. germanica*. In South Buckinghamshire, the plant occurs in the Tring district at Drayton Beauchamp, Buckland, and Aston Clinton (Rev. H. Harpur-Crewe!); on many of the chalky commons round High Wycombe, as on Keep Hill! Green Street! etc.; and at Danesfield, near Great Marlow (Mr. J. C. Melvill)*: in North Buckinghamshire, in an old disused chalkpit at Bufflers Holt, near Buckingham (Mr. W. Walker!). The county distribution of this form is, therefore, Hants! Surrey, Bucks! Berks, Essex! Herts! Yorks! From a note in 'Flora Hertfordiensis,' p. 188, *G. germanica* would appear to have been discovered near Tring as early as 1812, by Mr. Jas. Dickson and Mr. W. Anderson, of Chelsea. In working up its history a careful paper by Mr. George Luxford in Phyt. i. 381-389, o.s., should not be overlooked. Eng. Bot. ed. 3, t. 918 does not well represent the plant; Journ. Bot. ii. t. 15 is much more satisfactory.

Gentiana Pneumonanthe, L. This species still grows in the locality where it was so long ago first discovered by Johnson (Ger. Emac. 438)—Nettleton Moor, near Caistor, Lincolnshire. I gathered it there in 1862.

G. acaulis, L. Two specimens of this plant, from M. de St. Amans, its reputed discoverer at "Haverfordwest, South Wales," are in Herb. Mus. Brit. They were sent to Sir Joseph Banks by König, according to a note on Sowerby's original drawing for E. B. 1594, which was made from one of them. It was first published as British in König and Sims' 'Annals of Botany,' ii. 196 (1806). Sir J. E. Smith (Eng. Fl. ii. 29) says that the form *G. alpina*, Vill. "is exactly represented by the figure in Eng. Bot."

* There is a specimen in Herb. Benth., labelled "Marlow, J. Mill, 1823."

SUPPLEMENTARY NOTES ON THE ERYSHIPHEI OF THE
UNITED STATES.

BY M. C. COOKE, M.A., AND C. H. PECK.

Since our communication, published in the January number of this Journal (pp. 11-14), some additional facts have come to our knowledge which render it necessary to communicate these supplementary notes.

Podosphæra Kunzei, Lev. Under this species we included the form found on *Spiræa salicifolia*. Mr. E. C. Howe, of New Baltimore, N.Y., in some notes since published refers a species of *Podosphæra* "on leaves of *Spiræa*" to *P. clandestina*, Lev. In the absence of specimens of the form found by Mr. Howe, we see no reason to revise our determination of this species. We have the same species on *Cerasus* from Dr. Curtis.

Phyllactinia guttata, Lev., var. *N.*; we have this form on *Quercus falcata*, from Dr. Curtis, found in Carolina. The form on *Celastrus scandens* from Salem, Mass. (E. C. Bolles.)

Uncinula spiralis, B. and C.; Berkeley's Introduction, p. 278, f. 64 a, we have received from Dr. Curtis on leaves of *Vitis*, and it seems to be the same as Mr. Howe has described anew under the name of *Uncinula americana*, with the following diagnosis:—"Mycelium web-like, evanescent. Conceptacles minute, globose, scattered. Appendages coloured, simple, numerous, 3-6 times longer than the diameter of the conceptacles. Sporangia 4-6, ellipsoid, pedicellate, with 4-6 sporidia." On leaves of *Vitis*.

Uncinula intermedia, B. and C. On leaves of *Ulmus alata*.—Carolina. We have received this also from Dr. Curtis, but it is necessary to examine it in a fresher condition before we can determine satisfactorily whether it is identical with the form included by us under *U. Bivonæ*.

Uncinula adunca, Lev. The form on Willow is the only one we have seen from the United States, but we suspect from the description given by Mr. Howe that the supposed new species, which he calls *Uncinula luculenta*, on leaves of Poplar, is not distinct from *U. adunca*, as found on Poplar leaves in Europe. The following is his description, from which we gather no satisfactory basis for the construction of a new species:—"On both surfaces, mycelium floccose, effuse, persistent; conceptacles minute, globose, scattered or gregarious; appendages simple, numerous (20-30), 3-4 times as long as the diameter of the conceptacles; sporidia 6-10, ellipsoid or ovate, pedicellate, with 4-6 rather large, vacuolate sporidia." On leaves of *Populus*.—Fort Edward, 1868; New Baltimore, 1870. From Dr. Curtis we have *U. adunca* also on leaves of *Æsculus*.

Uncinula Wallrothii, Lev.; Cooke's Handbook, n. 1915; is recorded by Mr. E. C. Howe as occurring on leaves of *Ampelopsis* at New Baltimore, N.Y.

Uncinula parvula, C. and P. This is very distinct from *Uncinula polychæta*, B. and C., which is found also on *Celtis*. Not only is the mycelium thinner and more evanescent, but the conceptacles are not half the diameter of those in that species, and the appendages are shorter and far less numerous. Hypophyllous. Mycelium effused, delicate, evanescent; conceptacles scattered, globose, minute; appendages simple, numerous, scarcely as long as the diameter of the conceptacles; sporangia elliptical, rostrate; sporidia 6. On leaves of *Celtis occidentalis*.—Poughkeepsie, N.Y. (C. H. P. n. 189.) This species was detected by Mr. W. R. Gerard, who takes an active

interest in the Fungi of the United States, for which he deserves the commendation and encouragement of his countrymen.

Microsphaera sparsa, Howe. "On both sides of the leaf, mostly epiphyllous. Differs from both *M. Hedwigii* and *M. penicillata* in the number of its sporangia, which is 6-10, as well as in the number of its sporidia, 4-6."—Leaves of *Viburnum Lentago*.—New Baltimore 1870. This is Mr. Howe's description of a form which we included with some hesitation under *M. Hedwigii*, from a reluctance on our part to increase the number of species, wherever we could avoid it. Our examination resulted in fixing the number of appendages at 8-14, equal to, or a little longer than the conceptacles; sporangia 4-6; sporidia 4-6. There is a slight discrepancy between our results and those of Mr. Howe; both of us, however, found that 6 sporangia and 6 sporidia occur, whereas 4 is the number assigned to *M. Hedwigii*. We have the same species on *Viburnum dentatum* from Saratoga (C. H. P. n. 202).

Microsphaera penicillata, Lev., var. *Alni* (*Erysiphe Alni*, Tul.). This is another form which diverges considerably from the normal type. The appendages are from 6 to 16, sporangia 5-8, sporidia 8, rarely 6 or 7. On leaves of *Alnus*.—Buffalo, N.Y.; Greenbush, N.Y. (C. H. P. n. 200.) The most material difference between this form and *M. penicillata* as found in Europe seems to be the number of sporangia, which is 4 in European, 5-8 in American specimens, unless some error has inadvertently occurred in the examination. For the present, therefore, we prefer retaining it in its association with *M. penicillata*. We have also the typical form on *Corylus rostrata*, from Buffalo, N.Y. (C. H. P. n. 196.)

Microsphaera densissima, C. and P. (*Erysiphe densissima*, Schwz.) Hyphasma very dense, between filamentose and himantioid, in definite suborbicular patches $\frac{1}{2}$ -2 inches broad, somewhat radiating at the margin, persistent; conceptacles few, scattered; appendages 6-10; sporangia 4-8; sporidia 8. Remarkable for the definite orbicular patches of mycelium. On leaves of *Quercus*.—Saratoga, N.Y. (C. H. P. n. 197.)

Microsphaera Dubyi, Lev., on leaves of *Lonicera*.—Salem, Mass. (E. C. B.); Buffalo, N.Y. (C. H. P. n. 201); New Baltimore, N.Y. (E. C. Howe). In this also, which has normally 4 sporangia and 4 sporidia, we find sometimes 5 of both.

Microsphaera holosericea, Lev. On both surfaces, mycelium arachnoid, evanescent; conceptacles minute, globose, scattered or gregarious; appendages 12-16, many times as long as the diameter of the conceptacles, vaguely dichotomous, setulose at the tops or slightly incrassated; sporangia 4-8; sporidia 4 (rarely 5). On leaves of *Astragalus Cooperi*.—Buffalo, N.Y. (C. H. P. n. 198.)

Erysiphe lamprocarpa, Lk. In addition to the forms named in our former communication, we refer to this species the Erysiphe found in the United States on *Solidago* and other *Compositæ* (C. H. P. n. 161); on *Chelone glabra* (C. H. P. n. 204), which seems to be the *Erysiphe Chelones* of Schweinitz. On cultivated *Phlox*.—Albany, N.Y. (C. H. P. n. 204), which is undoubtedly the *Erysiphe Phlogis* of Schweinitz. Rav. Exs. n. 69—Pennsylvania (Dr. Curtis.) The Erysiphe on leaves of *Xanthium* distributed by Dr. Curtis, under the name of *Erysiphe horridula*, Lev., seems to us to be also the same species.

Erysiphe communis, Schl.—On leaves of *Thalictrum Cornuti*, Greig, N.Y. (C. H. P. n. 207); on leaves and stems of *Thalictrum anemonoides*, West

Albany, N.Y. (C. H. P. n. 206) and on *Ranunculus acris*, Albany, N.Y. (C. H. P. n. 205). Dr. Curtis also refers to this species the *Erysiphe Verbenæ* of Schweinitz, but our specimens are too old for satisfactory determination.

SHORT NOTES AND QUERIES.

CAREX DAVALLIANA, *Smith*.—Some of our more recent writers on the British flora have stated, either in so many words or inferentially, that this plant was *C. dioica*. In the Botanical Department of the British Museum the original specimens collected by the late Mr. Edw. Forster “on Lansdown in a boggy place on the south side of a hill, in which is the first clump of Firs, about one mile and a quarter from Bath,” are preserved. They are, Dr. Trimen informs me, “undoubtedly the right plant.” I have known the spot for more than forty years, but before I first knew it the water had been nearly all drawn off to supply houses in Bath, and all such plants as *Carex Davalliana* destroyed. The place is just above the Wesleyan College on the Lansdown Road. I think that we are not justified in saying that *C. dioica* was the plant intended by Forster and Smith, unless we are prepared with Bentham to consider *C. dioica* and *C. Davalliana* as forms of one species. What authority Mr. Watson has for saying that the locality near Bath is “not quite satisfactory,” I do not know. If a plant is stated to have become “lost by drainage,” some of our botanists are ready at once to stigmatize it as a “mistake” even although, as in this case, the original specimens are easily accessible for examination, and the authority on which their history rests indisputable.—C. C. BABINGTON.

This plant has been alleged to grow in Aberdeenshire, and in the neighbourhood of Belfast, Ireland, as well as near Bath. Indeed the species appears to have been founded by Sir J. E. Smith, in *Trans. Linn. Soc.*, v. p. 266 (1799) on specimens sent from the first locality by Dr. Beattie. Although this would seem decisive as to the occurrence of the plant there, yet it is not impossible that Smith really described the Swiss specimens which he says were sent him from Davall, and somewhat hastily referred to it the plant from Aberdeenshire. I am led to this opinion from an examination of the original drawings and specimens for ‘English Botany,’ preserved in the British Museum. The originals of the plate of *C. Davalliana*, E. B. 2123, were from Forster, and gathered at Tunbridge Wells, as stated above by Prof. Babington, the fruit having, however, been added from Swiss specimens. Besides the drawing for this figure, is another unpublished one on which Sowerby has written “*C. Davalliana*, Templeton, Jan. 1802, Ireland,” and “Prof. Beattie, Scotland, 1800 or 1801”; from whichever locality the specimen drawn was derived, it is certainly only *C. dioica*. Sowerby’s Herbarium throws but little light on the matter, in consequence of both *C. dioica* and *C. Davalliana* being fastened on to one sheet and intermingled, whilst the Scotch, Irish, and English localities are all written below without any indication of the specimens to which they severally refer. The Irish plant is almost certainly *C. dioica*, but it would be worth while for Scotch botanists who have the opportunity to search for its near, though easily distinguishable ally.—HENRY TRIMEN.

FRUIT OF VINCA (Journ. Bot. IX., 14, 336, 373.)—In Eng. Bot. t. 514 the fruit of *V. major* is figured, and it is stated to be “produced every year in Mr. Kett’s grounds at Seething, Norfolk;” the specimens from which the drawing was made are in Herb. Sowerby (Brit. Mus.). In the Kew Herbarium are fruiting specimens from Heringfleet, D. Turner! Waterhouse (Watch-house in Fl. Vect.) Point, Herb. Bromfield! ex horto, Rev. G. R. Leathes! and Herb. Borrer! Fontainebleau (cult.)! and Uriage, Isère, Hanbury! The only specimen of *V. minor* in fruit which I have seen is in Herb. Kew. from the last named locality; in the same Herb. are fruits of the allied species *V. media*, Link et Hoffm., and *V. herbacea*, W. & K. From Fl. Vect. 306, 307, it would appear that Dr. Bromfield had seen fruit of both *V. major* and *V. minor*.—JAMES BRITTEN.

LATHRÆA SQUAMARIA.—It may be interesting to some of your readers, and to students of English botany in particular, to know that *L. Squamaria* may at this time be seen in flower in the Royal Botanic Gardens, Kew. About 38 years ago I was sent by Mr. Aiton, the superintendent at that time of the Royal Gardens, to Dorking, in Surrey, to collect as many species of British Orchids as I could find in that neighbourhood . . . The *Lathræa* I found growing on the border of a dry wood, some plants of which I brought away and planted them in a shrubbery in the old arboretum near the Temple of the Sun, which shrubbery no longer exists, but the plants spring up there every season in the month of April on the same plot of ground.—A. CHOULES, in ‘Gardeners’ Chronicle,’ p. 466. [It is well thus to put on record the history of this locality, as it is stated in the ‘Flora of Surrey,’ p. 169, on Mr. H. C. Watson’s authority, that the plant “is said to be a native or spontaneous inhabitant” in Kew Gardens.—ED. JOURN. BOT.]

THE FALL OF THE LEAF.—Dr. Ledeganck has been investigating the cause of the fall of leaves in autumn in a number of trees, and has published his observations in the Bulletin of the Belgian Botanical Society (tom. x. pp. 133–167). His results are quite corroborative of those of Dr. Inman, which were published in the Proceedings of the Literary and Philosophical Society of Liverpool for 1844-5, and reprinted in the ‘Botanical Gazette’ (i. pp. 59–61), but with which the Belgian botanist does not seem to have been acquainted, so that it is the more interesting to see how closely their results correspond. Inman, as well as the author, used Iodine, and thus demonstrated the great deposit of starch which accumulates in the cushion of the leaf. The gradual formation of a layer of peridermal cells through the petiole—“subérification” Dr. Ledeganck calls it—is described in almost exactly similar language by both writers, save that Inman speaks more positively to having seen this process taking place in the fibro-vascular axis of the leaf as well as its parenchyma, though he says nothing as to the mode in which it is here effected. There is no doubt about the formation of an uninterrupted layer of corky tissue through the whole petiole, which after the fall of the leaf forms a cicatrix. The *immediate* cause of the fall of the leaf is considered by the author to be cold, which operates by causing a greater contraction of the half-dead spongy tissues of the petiole than of the tense cushion, and so ruptures the cells.

VARIETY OF THE BEECH.—Some specimens of *Fagus sylvatica* collected last October by Mr. Carruthers and Professor W. T. Dyer at a place called Brookwood Stumps, on Woking Common, present remarkable deviations in the characters of their leaves from the usual condition. These are rotund in outline and only from half to one inch long, exceedingly obtuse, and with a perfectly entire margin. They are not, however, merely reduced in size, but, as it were, abbreviated, the number of secondary veins on either side of the midrib being reduced from 6–8, the usual number, to 2–4. Only a single tree was observed, having a peculiar compact upright habit, which seems due to a tendency to suppression or very slow increase in length of the lateral buds or twigs. Dr. Brushfield, who has known the tree for many years, informs me that it leafs at the same time as other Beeches in the neighbourhood and that the leaves have always maintained their peculiar character.—HENRY TRIMEN.

MISTLETOE ON THE OAK.—There is a fine old Oak with Mistletoe on it in Lord Sondes' Park at Lees Court, Kent. I saw it for the first time in 1867. I do not know if it was known before that time that the parasite was growing upon it in five different places. I have been to look at it to-day (April 2nd), and I see that some ruthless hands have cut away the two largest pieces since I saw it, so that there are now only three pieces left. There are hundreds of oaks of all sizes growing around it, from saplings to hoary-headed fellows that have stood the tear and wear of time for centuries, but on none can I find the parasite growing, except on the solitary one just named.—J. PINK, in the 'Garden,' May 4, 1872.

AN OLD ENGLISH HORTUS SICCUS.—I have recently had the opportunity of examining an old 'Hortus Siccus,' containing at least 500 specimens of indigenous British or garden plants, collected about 140 years ago. It is now in the possession of a friend, Mrs. Clark, of Efford Manor, near Plymouth, to a member of whose family, the ancient one of Treby, of Plympton, it was presented by the author, for in the title page is written 'To ye Hon. Mrs. Treby this Hortus Siccus is presented by your Humble Servant, Wm. Paine, Botanist, collected from the Sea, Rivers, Fields, Woods and Gardens of Most Parts of ye West of England, Anno Dom. 1732.' A number of names of persons, quaintly arranged according to their dignities or professions, follow, being those to whom the author had presented similar collections. In some cases the specimens are only leaves and difficult to identify, but for the most part they exhibit the characters of the species sufficiently well to enable one to say what they are. What adds to the interest of the work is the fact that under most of them the author has written the English name, and it is with the view of saying a word or two about some of these popular names, and in the endeavour to ascertain if more of the Horti Sicci of William Paine be in existence, that I write this note. *Heracleum Sphondylium* bears the name of 'Clodweed,' which Dr. Prior does not mention, though probably only a corruption of Clogweed, which he gives. A poor specimen, which seems to be one of *Melampyrum pratense*, is named 'Cow-wheat Eyebright,' which he applies to *Bartsia odontites*. 'Chydling Pink' is here *D. Armeria*, not *D. prolifer*. *Epipactis latifolia*, not the much rarer *Cypripedium Calceolus*, is 'Lady's Slipper.'

Chrysanthemum inodorum is 'Stinking Mayweed' or 'Mathern,' not Mather or Mauther, given by Prior as an old name for this or other species resembling it. *Apium graveolens* is 'Sallory or March.' *Campanula hederacea* has the extraordinary name 'Symblaroe' under it. The names 'Wart Wort and Hart's Horn' are bestowed on *Coronopus Ruellii*: Dr. Prior gives the latter as belonging to *Plantago Coronopus*, and says, "from its furcated leaves," which is applicable to either plant. Several names occur as in Dr. Prior's interesting and learned work, amongst them are 'Banewort,' *Ranunculus Flammula*; 'Bloodwort,' *Rumex sanguineus*; 'Nep,' *Nepeta Cataria*; 'Parkleaves,' *Hypericum Androsæmum*; 'Spatling Poppy,' *Silene inflata*; 'Wilding or Crabb Tree,' *Pyrus Malus*; etc. A host of names in this old herbarium are those still in use, so do not call for special remark.—T. R. ARCHER BRIGGS.

[Mr. Britten, who has paid great attention to English plant-names, has furnished the following observations on the above note:—The names quoted by Mr. Briggs are mainly such as are found in books of the period of this herbarium; some of the transferred names, such as 'Chylding Pink,' which properly belongs to *Dianthus prolifer* and not *D. Armeria*, may be accounted for by a general resemblance between the two plants. The only name calling for special note is 'Symblaroe,' which at first sight is somewhat puzzling; it is a corruption of *Cymbalaria*, *Campanula hederacea* having been called by C. Bauhin (Prodr. p. 93.) and subsequently by Johnson (Ger. Emac. 452) and other English authors, *Campanula Cymbalariae foliis*.]

RANUNCULUS CHÆROPHYLOS, L., IN JERSEY.—Dr. M. M. Bull has sent me specimens of this species collected by him on the 13th of May, near St. Aubin's in Jersey. This excellent and careful botanist, who possesses an accurate knowledge of the botany of the Channel Isles and West of France, thus describes his discovery:—"Brébisson's 'Flore de la Normandie' gives as one of its stations the cliffs of Carteret, separated from this island by not more than 20 miles of sea. This determined me to look for it here. Passing over a dry rocky slope of small extent where grows *Hypochæris glabra* and the quinquevulnerate form of *Silene anglica*, my attention was caught by what seemed to be the flower of the *Ranunculus repens* on an upright stem. The leaves were concealed by an intervening obstacle, but when I got near I found that the foliage resembled that of *R. bulbosus*, but that the calyx was not reflexed. Pulling up the plant to look at the root, I saw at once what it must be. I gathered only the two specimens sent, but observed other plants on the same slope. They were mostly if not all single-flowered. It is not unlikely that, now attention will be directed to it, it will be found in other localities." The specimens sent are young, but present several characteristic features quite sufficient to identify the species, which is abundantly distinct from all those found in Britain. The fact of the occurrence of the plant in Jersey is not, perhaps, of very great importance in a botanico-geographical point of view, as it extends its known range so very slightly, but as it is the practice to include the plants of the Channel Islands in British Floras, this is a *bonâ fide* addition to our list, and will add another attraction to the Channel Islands for English botanists. A figure and account of the species will be given shortly in this Journal.—HENRY TRIMEN.

CONDURANGO, (pp. 65, 137).—M. Triana, in a paper on this alleged remedy for cancer presented to the Académie des Sciences on March 25th, refers the plant to the genus *Gonolobus*, and from examination of the specimens at the Ecuador consulate, has found reason to consider it a new species, which he thus defines:—*G. Condurango*, ramulis sulcatis, petiolis pedunculisque pube grisea indutis, foliis longiuscule petiolatis cordatis sinu lato cuspidatis supra puberulis subtus cinereo tomentosissimis mollibus a basi 5-nerviis, folliculis ovato-oblongis ventricosis 4-alatis glabris.

Reports.

OFFICIAL REPORT FOR 1871 OF THE DEPARTMENT OF BOTANY IN THE BRITISH MUSEUM.

BY WILLIAM CARRUTHERS, F.R.S.

The additions that have been made to the General Herbarium during recent years have been so extensive that the cabinets in which the collection of plants were some years ago redistributed, became too crowded to permit of further incorporation. During the year a large series of cabinets, which had been gradually acquired for some years, were added to those containing the Herbarium, so as to increase the accommodation for the arranged General Herbarium by more than a third its previous dimensions. This necessitated the redistribution of the Herbarium itself throughout the whole series of cabinets. Space has been in this way secured for the incorporation of the plants that have been named and mounted, but which for want of cabinet space were crowded out of the Herbarium proper. The work of incorporating all these plants has been actively carried on, and has made considerable progress.

In the later months of the year the Exhibition Rooms were closed to the public, for the purpose of having them cleaned and painted. Advantage has been taken of the necessary removal of a large proportion of the exhibited collections to re-arrange them, and to introduce several changes with the view of making the Exhibition Rooms more instructive and attractive to visitors. Among these changes, which are yet in progress, the following may be specified:—The re-arrangement in a more strictly systematic method of the specimens exhibited in the wall cases, thereby giving the student in a continuous series a view of the principal modifications and characteristics of the great natural divisions of the vegetable kingdom. The exhibition of an extensive series of specimens of the Natural Order *Proteaceæ*, an Order selected because it is not only well defined from the Natural Orders allied to it, but contains within itself a great variety of habit and foliage, and because it is believed to have formed an important element in the extinct Tertiary Floras of Europe, though now almost confined to the southern hemisphere. A case has been devoted to parasitic plants, in which is placed a fine series of *Balanophoreæ*, *Rafflesiaceæ*, etc., and an extensive collection of Mistletoe on Oak and other trees, presented by the Rev. Robert Blight: many of these specimens are prepared so as to show the relation of this parasite to the supporting plants. A series of microscopic preparations of fossil plants, selected partly from the collection bequeathed by Robert Brown,

and partly from the specimens subsequently acquired by the trustees, has been exhibited, so as to show their minute structure by the help of light reflected from mirrors. The exquisite water-colour drawings of Australian plants by Ferdinand Bauer, the companion of Robert Brown in his expedition to Australia, have been carefully placed in sunk mounts, so as to preserve from injury these unique and unsurpassed productions, and a selection from them has been framed, and placed on the walls of the first public room.

Besides this more general work in the Herbarium and the public rooms, the principal business done in the department during the year 1871 has consisted in the re-arrangement in the General Herbarium of the *Umbelliferae*, *Ericaceae*, *Polygonaceae*, *Juncaceae*, *Diatomaceae*, *Desmidiaceae*, and *Fungi*.

In the naming, arranging, and laying into the General Herbarium of collections of plants made in Morocco by Durand, and in Tunis by Kralik, the nomenclature of which was critically revised by M. Cosson during his visits to the Herbarium; of an extensive collection of plants from Yucatan, formed by Dr. Arthur Schott; and of Portuguese plants gathered by the late Daniel Sharpe.

In the re-arrangement in the British Herbarium of the *Leguminosae*, *Umbelliferae*, *Primulaceae*, *Polygonaceae* and *Lichenes*.

The following are the principal additions made to the collections of the Department during the year 1871:—

I.—*To the Herbarium.*

General Herbarium.

Phanerogamia.

| | |
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| 168 | Species of plants, forming Schultz's 'Herbarium Florae Istriacæ.' |
| 135 | " " from Portugal; collected by D. Sharpe. |
| 53 | " " from Madeira; collected by C. Lemann. |
| 17,000 | " " chiefly from Central Europe, Alsace, the Jura, the Lower Rhine, Spain, the Songarei in the Ural territory, Mexico, and Labrador, being the Herbarium of Auerswald, of Leipsig. |
| 1,000 | " " from Yucatan; collected by Dr. Arthur Schott. |
| 50 | " " from Scandinavia; collected by Dr. Zetterstedt. |
| 200 | " " from Sicily, forming fasc. 11 and 12 of Todaro's 'Flora Sicula.' |
| 1,030 | " " from Russia; collected by Gruner, Bunge, etc. |
| 185 | " " from the island Swatoi, in the Caspian Sea; collected by Dr. Bruhus. |
| 556 | " " from the country around Catherinslav; collected by Dr. Gruner. |
| 378 | " " from Uman; collected by Dr. Golde. |
| 371 | " " from Woronetz; collected by Dr. Gruner. |
| 253 | " Compositæ, forming Schultz's 'Cichoriaceotheca.' |
| 400 | " plants from North Africa; collected by Col. Paris. |
| 323 | " from Malaya; collected by the late Dr. Maingay. |
| 1,625 | " from Scandinavia; collected by Ahlberg. |
| 272 | " <i>Salix</i> ; collected by Wimmer. |
| 62 | " plants from Lower Egypt; collected and presented by Messrs. Calvert and Hurst. |
| 17 | " " from St. Helena; presented by J. C. Melliss, Esq. |

- 219 Species of plants from Italy; arranged according to Tournefort's system, in two folio volumes, by Liberato Sabbati, 1718.
- 192 " " from the Cape; collected by Roland Trimen, Esq., and presented by Dr. Trimen.
- 27 " " from Barbadoes; collected by Dr. W. B. Murray.
- Cryptogamia.*
- 1,150 Species of European mosses, forming 23 fasc. of Rabenhorst's 'Bryotheca Europæa.'
- 125 " Vascular Cryptogams of Europe.
- 50 " Characeæ of Europe.
- 25 " European Lichens, forming fasc. 33 of Rabenhorst's 'Lichenes Europææ.'
- 30 " European Hepaticæ.
- 150 " Cryptogamic plants, being fasc. 8, 9, and 10 of the 'Erbario Crittogamico Italiano.'
- 75 " Cryptogamic plants from Scandinavia; collected by Prof. Zetterstedt.
- 410 " Lichens, collected by Anzi in Lombardy.
- 28 " Italian Cladoniæ; collected by Anzi.
- 90 " Abyssinian mosses; collected by Schimper.
- 258 " Mosses from the Cape of Good Hope; collected by Breutel.
- 215 " Mosses from Greenland; by Breutel.
- 90 " " from Labrador; by Breutel.
- 310 " " from Tropical America; by Breutel.
- 390 " " from South America; collected by J. Weir.
- 225 " Fungi, from Germany; collected by Holt and Schmidt.
- 200 " Cryptogamic plants; collected by Kneiff and Hartmann.
- 400 " Belgian Cryptogamic plants; collected by Westendorf and Wallay.
- 60 " Algæ, forming Nos. 221-226 of Rabenhorst's 'Algæ Europææ.'
- 100 " Fungi, forming No. 16 of Rabenhorst's 'Fungi Europæi.'
- 60 " Algæ, from the Barbadoes; named by Agardh, and presented by Dr. J. E. Gray.
- 75 " Ferns, from the Cape; collected by R. Trimen, Esq.
- 84 " " from India; collected by Dr. Powles, and presented by Dr. Trimen.

*British Herbarium.**Phanerogamia.*

- 100 Species of Critical British plants; collected by Prof. W. T. Thiselton Dyer.

Cryptogamia.

- 304 Species of British Fungi; collected by W. G. Smith, Esq.
- 200 " " Lichens; collected by the Rev. J. M. Crombie.
- 343 " Cellular Cryptogams; presented by Dr. W. Lauder Lindsay.
- 6 " Diatomaceæ; presented by J. Staunton, Esq.
- Specimens of *Elaphomyces granulatus*; presented by W. G. Lettsom, Esq.

II.—*To the Structural Series.**Fruit Collection.*

- Pod of *Afzelia*, from Old Calabar ; presented by W. C. Small, Esq.
 Fruit of *Bignonia echinata*, from Quito ; presented by George Bruce, Esq.
 Cone of *Pinus excelsa*.
 Pods of *Mucuna umbellata*, from Angola ; presented by Dr. Welwitsch.
 11 species of fruits, from Nicaragua.
 Cones of Wellingtonia and Fruits of *Sagus Vitiensis* ; presented by H. J. Veitch, Esq.
 Cones of *Dion edule* and *Zamia muricata* ; presented by Mrs. Yates.
 Cones and Fruits of *Welwitschia mirabilis* and Seeds of *Musa ventricosa* ; presented by Dr. Welwitsch.

General Collection.

- Portion of the Great Dragon-tree of Orotava ; presented by the Trustees of the Christy collection.
 Three "Wooden Roses," from Guatemala.
 Specimen of an Indian-rubber found under ground on the Upper Rio Negro ; presented by A. H. Wickham, Esq.
 Specimen of *Welwitschia mirabilis*, from Central Africa ; from Dr. Welwitsch.
 300 sections of Recent Woods ; prepared by Dr. Nordlinger.
 A large series of specimens illustrating the parasitism of the Mistletoe on nine different species of trees grown in England ; presented by the Rev. Robert Blight.
 A flowering stem of *Littæa geminiflora* ; presented by Mrs. Yates.

III.—*To the Fossil Series.*

- Specimen of an unopened bud of a fossil Palm from Antigua ; presented by Dr. F. J. Farre.
 Specimens of fossil plants from trappean rocks near Burntisland ; presented by G. Grieve, Esq.
 Specimens of carboniferous fossils from the Ash Bed at Arran ; presented by E. Wunsch, Esq.
 Cone of *Flemingites gracilis*, and other fossils, from the Airdrie Coal-field ; collected by Mr. J. Russell.
 A fine series of Devonian plants from Kiltorkan, Ireland.
 Sections of Calamites and other stems ; from Mr. J. Butterworth.
 Specimens of Coniferous woods in flint, from the chalk.
 Specimens of dicotyledonous woods from the Crag
 73 specimens of fossil woods ; prepared by Mr. Norman.
 Specimen of fossil wood from Beadon, Berks ; presented by Prof. T. Rupert Jones.

The number of visits paid during the year to the Herbarium for the purpose of scientific research, was 1413. The following foreign botanists may be specified as having used the Herbarium in prosecuting their different studies :—Cosson, of Paris, for his investigations into the Flora of Northern Africa ; Areschoug, of Lund, for his work on *Rubi* ; Fries, the younger, of Upsala, for his Lichenological researches, and his account of the plants of Greenland ; Ascherson, of Berlin, for his memoir on Marine Phanerogams, and for other plants ; Castracane, of Florence, for the study of the *Diatomaceæ* ; Van Heurck, of Antwerp, for his work on

Bromeliaceæ; and Boissier, of Geneva, for his 'Flora Orientalis.' Of botanists residing in Britain, the following may be specified:—Mr. J. Miers, for his memoirs on *Hippocrateæ* and *Lecytheæ*; Mr. G. Bentham, for his 'Flora Australiensis'; Prof. Dyer, for the 'Flora Indica'; Mr. Hiern, for his monograph of the *Ebenaceæ*; the Rev. R. T. Lowe, for his 'Flora of Madeira'; Dr. F. Welwitsch, for his investigations into the Flora of tropical Africa; the Rev. J. M. Crombie, for his work on British Lichens; Mr. M. C. Cooke, for his memoirs on British Fungi; and the late Dr. Seemann, for his 'Flora Vitiensis.'

REPORT FOR THE YEAR 1871 OF THE HERBARIUM
AND LIBRARY OF THE ROYAL GARDENS AT KEW.

BY J. D. HOOKER, C.B., M.D., F.R.S.

About 10,000 specimens have been received, of which the following are the most important contributors:—

Dr. Wight, F.R.S., late Superintendent of Cotton Plantations in Madras, has presented to the Royal Gardens his unrivalled Indian Herbarium, the results of thirty years' investigation of the vegetation of the Indian Peninsula, and containing upwards of 4000 species. This collection contains the types of the species published by Dr. Wight in his extensive standard works on Indian Botany, including the 'Icones Plantarum Indiæ Orientalis' (with 2000 plates), the 'Illustrations of Indian Botany,' and Wight and Arnott's 'Prodromus Floræ Peninsulæ Indiæ Orientalis,' and, in fact, embraces the history of Southern Indian botany during nearly half a century.

Europe.—Denmark, Dr. Lange; Dalmatia, Mrs. W. G. Smith; Rhodes and the Mediterranean region, Dr. Cosson, of Paris; Ireland, Prof. Dyer; Spitzbergen, Dr. N. J. Anderson and B. Leigh Smith, Esq.; France, etc., M. Duval Jouve; Lapland, Dr. Lindberg, of Helsingfors.

M. Patin, Palms from the garden of M. Linden, of Brussels.

Asia.—Dr. Henderson, a very complete and valuable collection of Yarkand plants, the first ever made in that region; W. Ferguson, Esq., Ceylon Algæ; British India, Dr. J. L. Stewart; Assam, G. Maun; Madras Presidency, Major Beddome; Sikkim Himalaya, H. J. Elwes, Esq.

Africa.—Marocco, the director, J. Ball, and G. Maw; Egypt, Herb. Imp. Berlin, and Capt. Hurst; Algeria, Dr. Cosson; Zanzibar, Dr. Kirk; South Africa, Messrs. Bolus, Kennedy, P. MacOwan, T. Baines; Seychelles Islands and Mauritius, Col. Pike (United States Consul), Dr. E. P. Wright and Mr. Horne, Botanical Garden, Mauritius.

North America.—Arctic Regions, Mrs. Parry (an interesting collection made by the late Sir E. Parry); Greenland, North German Polar Expedition; Utah and St. Domingo, United States Agricultural Department; United States, S. F. Olney; Rocky Mountains, Prof. A. Gray, the executors of the late H. Christy; Cuba, C. Wright.

South America.—Guiana, W. H. Campbell; New Granada, R. B. White; Argentine Republic and Ecuador, Prof. Jameson; Brazil, Imp. Herb. Berlin, Dr. Regnell, M. Glaziou; Andes, Mr. J. Weir (a large collection of mosses, purchased); Chili, R. Sainthill (through W. D'Urban),

South Kensington Museum, J. Ball, F.R.S., the Lords Commissioners of the Admiralty (the Chilian and Fuegian collections formed by Dr. Cunningham during the voyage of H.M.S. Nassau to the Straits of Magelhaens).

Australia.—Brisbane, C. Prentice; Lord Howe's Islands, C. Moore, Esq., F.L.S.; North Australia, Dr. R. Schomburgk; various parts, Baron von Mueller; New Caledonia, the late Dr. Lenormand (of Vire), and E. Caldwell, Esq. (of Mauritius).

PUBLICATIONS.

The second volume of the 'Flora of Tropical Africa,' by Prof. Oliver and others, has been published under the authority of the First Commissioner of Her Majesty's Works.

The fourth part of the 'Icones Plantarum,' a work devoted to the illustration of the new and rare plants in the Herbarium.

The 97th volume of the 'Botanical Magazine,' with figures of plants, chiefly such as have flowered at Kew.

The printing has been commenced of the 'Forest Flora of North-Western India,' which will be published by Drs. Brandis and J. L. Stewart, under the authority of the Secretary of State for India.

The *Compositæ* for Dr. Von Martius' 'Flora Brasiliensis' are being elaborated by Mr. J. G. Baker.

Col. Grant is preparing an account, with illustrations, of the plants collected by himself during his and Capt. Speke's expedition to the Nile lakes.

Dr. Henderson has named and drawn up an account of his Yarkand collections, made during the mission to that capital.

Dr. Ascherson, of Berlin, has named the tropical African collection, from Schweinfurth and others, and Mr. Melliss his St. Helena ones.

Mr. W. P. Hiern has described the Natural Order *Ebenaceæ* for a work to be published by the Cambridge Philosophical Society.

M. Triana, of Bogota, has published his elaborate monograph of *Melastomaceæ* in the Linnean Society's Transactions.

Dr. Cunningham has been engaged, under the authority of the Lords Commissioners of the Admiralty, in arranging his Chilian and Fuegian plants of the voyage of H.M.S. Nassau, under Capt. Mayne, R.N.

'The Flora of British India,' which will be published under the authority of the Secretary of State for India, is being actively prosecuted at the Herbarium by the Director, Prof. Lawson of Oxford, Prof. Dyer of the Royal Horticultural Society, Dr. Masters, Mr. Edgeworth, Mr. A. W. Bennett, and Mr. J. G. Baker.

The 6th volume of the 'Flora Australiensis,' by Mr. Bentham and Baron von Mueller, is in progress, under the authority of the Government of the various Australian colonies.

The second volume of the 'Genera Plantarum,' by Mr. Bentham and the Director, is far advanced.

The English edition of Decaisne and Maout's 'Traité de Botanique' is passing through the press, under the editorship of the Director.

Extracts and Abstracts.

ADDITIONS TO THE FLORA OF HERTFORDSHIRE.

The Rev. R. H. Webb, one of the authors of the "Flora Hertfordiensis," has contributed the following list of species and localities additional to this county, to the "Hertfordshire Mercury." He says in introduction,—“It is pleasing to see, while we are losing some of our wild flowers from their former habitats by the enclosure and drainage of lands, others are being brought to light by the keen observation of friends. Several of the plants named are new discoveries to the county, and several more to the districts where they occur. I take this opportunity of thanking my correspondents for the information they have sent me; and I hope, if their researches are continued through the present year, to have such a body of matter as will make it worth while to print a third supplement to our County Flora. A list of species likely to occur in any of the districts, but not yet ascertained to do so, will be gladly sent on application; and it is requested that a recent specimen should accompany all information.” The plants marked thus (*) are newly included in the "Flora Hertfordiensis."

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| <i>Clematis Vitalba</i> , L.—Welwyn. | <i>Erodium cicutarium</i> , Sm.—Welwyn and Codicote. |
| <i>Anemone Pulsatilla</i> , L.—Hitchin. | * <i>Oxalis corniculata</i> , L.—Hatfield Woodside. |
| <i>Helleborus viridis</i> , L.—Welwyn, Hoddesdon, and Watford. | <i>Rhamnus Frangula</i> , L.—Welwyn and Hitchin. |
| <i>Aquilegia vulgaris</i> , L.—Ayot St. Peter's, and Cottered. | <i>Melilotus arvensis</i> , Wallr.—Highdown. |
| <i>Berberis vulgaris</i> , L.—Broadwater. | <i>Trifolium ochroleucum</i> , L.—Easneye, Welwyn, and Hitchin. |
| <i>Papaver hybridum</i> , L.—Pirton. | <i>T. medium</i> , L.—Ayot Green, |
| * <i>Alyssum incanum</i> , L.—Easneye. | * <i>T. glomeratum</i> , L.—Easneye. |
| * <i>Teesdalia nudicaulis</i> , Br.—Colney Heath. | <i>Lathyrus Nissolia</i> , L.—Easneye. |
| <i>Camelina sativa</i> , Crantz.—Hertford and Easneye. | <i>Spiræa Filipendula</i> , L.—Pegsden and Barn-holes. |
| <i>Iberis amara</i> , L.—Highdown and Pegsden. | <i>Rubus macrophyllus</i> , Weihe.—Easneye. |
| <i>Barbarea vulgaris</i> , Br.—Walsworth Common. | <i>Rosa rubiginosa</i> , L.—Welwyn and Ickleford. |
| <i>Cheiranthus Cheiri</i> , L.—Hitchin. | <i>Pyrus torminalis</i> , Ehrh.—Essendon. |
| <i>Reseda lutea</i> , L.—Welwyn. | <i>Epilobium angustifolium</i> , L.—Sherbards. |
| <i>Helianthemum vulgare</i> , L.—Welwyn. | <i>Hippuris vulgaris</i> , L.—Oughtonhead and Charlton. |
| <i>Parnassia palustris</i> , L.—Oughtonhead. | <i>Sedum dasyphyllum</i> , L.—Gosmore. |
| <i>Dianthus Armeria</i> , L.—Datchworth. | <i>S. Telephium</i> , L.—Welwyn and Woolmer Green. |
| <i>D. deltoides</i> , L.—Easneye. | <i>Saxifraga tridactylites</i> , L.—N. Mimms. |
| <i>Saponaria Vaccaria</i> , L.—Easneye. | |
| <i>S. officinalis</i> , L.—Stevenage. | |
| * <i>Lychnis Viscaria</i> , L.—Easneye. | |
| <i>Spergula arvensis</i> , L.—Hitchin. | |
| * <i>Althæa hirsuta</i> , L.—Easneye. | |

- Ægopodium Podagraria*, L.—Welwyn.
- Bupleurum rotundifolium*, L.—Hertford.
- Adoxa Moschatellina*, L.—Hoddesdon-bury and Barnes Green.
- Cnicus acaulis*, Willd.—Lockley's W., and Walsworth Common.
- Silybum Marianum*, Gaert.—Easneye.
- Carlina vulgaris*, L.—Welwyn, Red Hill, and Highdown.
- * *Lapsana pusilla*, L.—Easneye.
- Eupatorium cannabinum*, L.—Westmill.
- * *Erigeron canadensis*, L.—Hertford.
- Solidago Virgaurea*, L.—Harmer Gr., Wigginton Common.
- Chrysanthemum segetum*, L.—Easneye and Ippolytts.
- Tanacetum vulgare*, L.—Tewin Green and Ayot St. Peter's.
- Tragopogon pratense*, L.—Charlton.
- Picris echioides*, L.—Easneye.
- Prenanthes muralis*, L.—Welwyn.
- Hieracium umbellatum*, L.—Welwyn.
- Campanula hybrida*, L.—Easneye.
- Erica Tetralix*, L.—Wigginton Common.
- Calluna vulgaris*, Salis b.—Welwyn.
- Monotropa Hypopitys*, L.—Easneye and Coles.
- Menyanthes trifoliata*, L.—Oughton Head.
- Erythræa Centaurium*, Pers.—Welwyn,
- Cuscuta Epithymum*, L.—Easneye.
- C. europæa*, L.—Welwyn, Hitchin, and Ippolytts.
- Lycopsis arvensis*, L.—Watford.
- Solanum nigrum*, L.—Welwyn and Hitchin.
- Hyoscyamus niger*, L.—Wymondley, Offley, and Ippolytts.
- Lathræa Squamaria*, L.—Easneye Warren-gate, Loudwater, Hitchin, and Preston.
- Melampyrum cristatum*, L.—Easneye.
- Veronica Buxbaumii*, Ten.—Welwyn.
- Mentha rotundifolia*, L.—Hatfield Park.
- Galeopsis versicolor*, Curt.—Hertford and Broxbourne.
- Stachys palustris*, L.—Westmill.
- Ajuga Chamæpitys*, L.—Highdown.
- Scutellaria galericulata*, L.—Water-End and Welwyn.
- Hottonia palustris*, L.—Walsworth Common, Ippolytts, and Stevenage.
- Lysimachia vulgaris*, L.—Hatfield, Tyler's C.
- Samolus Valerandi*, L.—Oughtonhead.
- Chenopodium rubrum*, L.—Walsworth.
- Polygonum Bistorta*, L.—Wormley, Cottered, and Walsworth Common.
- Daphne Laureola*, L.—Welwyn.
- Euphorbia Helioscopia*, L.—Hitchin and Pirton.
- Juniperus communis*, L.—Aldbury.
- Lemna polyrrhiza*, L.—Easneye.
- Typha latifolia*, L.—Cadwell.
- Hydrocharis Morsus-ranæ*, L.—Watford.
- Orchis latifolia*, L.—Braughin, Walsworth.
- Gymnadenia conopsea*, Br.—Highdown, Pegsden, and Barn-holes.
- Ophrys apifera*, L.—Loudwater Woods.
- Listera Nidus-avis*, L.—Essendon Glebe Wood.
- Epipactis latifolia*, Sw.—Bogner Green.
- Iris foetidissima*, L.—Easneye.
- Convallaria maialis*, L.—Sherrards.
- Ornithogalum umbellatum*, L.—Welwyn.
- O. nutans*, L.—Aspenden and Little Hadham.
- Allium vineale*, L.—Woolmer Green, Braughing.
- A. ursinum*, L.—Welwyn.
- Tulipa sylvestris*, L.—Bayford.
- Gagea lutea*, Ker.—Easneye.

- Fritillaria Meleagris*, L. — Totteridge Park. *Blechnum boreale*, Sw. — Woolmer Green.
Asplenium Trichomanes, L. — Ayot. * *Lycopodium clavatum*, L. — Broxbourne Wood.

New Publications.

On the Bryology of Portugal.

Among the numerous German publications on cryptogamic botany, some of which we have, to our regret, only lately become acquainted with, there is a very interesting paper on the Mosses of the South of Portugal, published in Latin as an inaugural dissertation at Halle, by Count Solms Laubach, well known to botanists by his able monograph of the Order *Chloranthaceæ* in De Candolle's 'Prodromus,' and by several other contributions to systematic botany. The pamphlet bears the title *Tentamen Bryogeographiæ Algarviæ, Regni Lusitani Provinciæ. Halis, 1868 (8vo., 43 pp.)*

The author, during a stay of seven months in Algarvia, mainly directed his attention to the investigation of the Mosses of that, the southernmost province of Portugal. He describes in the introduction to his pamphlet the prominent physical and geological features of the country, and divides the whole territory into five botanical regions, characterised respectively and in ascending order by the *alluvial, tertiary, dolomitic, schistous* and *granitic* quality of their soil; he then points out the special botanical features of each of these regions as indicated by the more or less frequent appearance of striking phanerogamous plants, both wild and cultivated, and enumerates at the same time the species of mosses which predominate in each region. He states that the granitic or uppermost region with the two culminating peaks, called respectively Foia and Picota (about 2800 feet above the sea) is the most favourable to mosses, observing, however, that it is by no means the highest elevations of the peaks, but the extensive chestnut forests at their base, surrounding the Villa de Monchique, which are the most productive localities, both as to quantity and luxuriance of individuals, as well as to number of species.

The same scarcity of mosses in the more elevated territories of Portugal, I have myself observed, not only in my excursions in the Serra de Monchique, but also in the mountains of Estremadura, and even more so in the alpine region of the Serra d'Estrella in the Province Beira, where, notwithstanding an elevation of nearly 8800 feet above the level of the ocean, and the presence of several lakes and permanent snow-ravines not far from its summit, there is, besides the dark-brown patches of *Andræa Rothii*, and the green and purplish variegated cæspites of *Scapania undulata*, scarcely anything like the extensive emerald moss-carpet which charm and delight the botanist on corresponding elevations in the highlands of central Europe, or in the lower forest-regions of Portugal, as for instance, in the Serra de Cintra, Serra de Bussaco, and still more in the extensive forest districts which encircle the Serra de Gerez in the Province Minho.

After some further observations on the distribution of the Algarvian mosses, of which several species were met with in only a single spot or

even restricted to a single tree, Count Solms makes some interesting remarks about three phanerogamous plants occurring in the Serra de Monchique, viz., *Caladium antiquorum*, *Rhododendron ponticum*, and *Myrica Faya*, which by some botanists are regarded as introduced, but which our author (at least as regards *Myrica Faya*) considers as quite indigenous to this part of Algarvia. As I hope to have an opportunity of discussing in a future article the naturalization or immigration of several phanerogamous plants of Portugal, I refrain here from any remarks on this historico-botanical matter, and return to my account of the bryological features of Count Solms' paper.

In chapter vii the author gives us a complete list of all the mosses met with during his rambles in Algarvia, consisting of 107 species distributed under 52 genera, of which *Barbula* with 12 species, *Bryum* with 9, and *Hypnum* (divided after Schimper's generic views) with 21 species are the most numerous represented. Many of the *Hypnoidea*, viz., *Thuidium punctulatum*, De Not., *Hypnum imponens*, Hedw., *H. concinnum*, De Not., *H. demissum*, Wils., and *Fabronia pusilla* are interesting additions to the bryological Flora of Portugal, and so are also *Ceratodon corsicus*, *Dicranella heteromalla*, *Trichostomum flexipes*, Br. and Schp., *Bryum canariense* and *Brachysoleum (Glyphomitrium) pulvinare*, Mitt., which Count Solms declares specifically different from *Brachyst. crispatum* of the Cape of Good Hope, although identical with Holl's plant from Madeira.

Besides these are four species considered to be entirely new and fully described in the eighth and last chapter of this valuable paper, viz.: *Anomobryum juliforme*, Solms, *Hypnum deflexifolium*, Sms., *Fissidens algarvicus*, Sms., and *Campylosteleum strictum*, Sms., most of them met with in the Serra de Monchique, and finally we have descriptions of a very remarkable variety of *Bryum atropurpureum* under the designation of β . *dolioloides*, Solms, and of *Dicranella heteromalla castanetorum*, Sms. The paper concludes with critical observations on the already mentioned *Campylosteleum strictum*, and on the rather intricate synonymy of *Grimmia ancistrodes*, Mtn., of which the Italian *Grimmia sardoa*, De Not., likewise met with in Algarvia, is justly considered by the author as a variety.

With reference to the main features of the bryological vegetation of Algarvia, the author states its nearest affinity to be with that of the Mediterranean territory, a statement which is not only in perfect harmony with the general character of the phanerogamic flora of Portugal, but fully corroborated by the strong affinity or even identity of many of the Algarvian mosses with Sardinian, Corsican, and Algerian species. I may here be permitted to add that the Mediterranean character of the bryological flora extends further northward into the provinces of Alemtejo and Estramadura of Central Portugal, where I have likewise collected the greater part of the mosses enumerated by Count Solms from Algarvia, as may be seen by a perusal of Mr. Mitten's publication,* based upon my collection distributed in London by Mr. Pamplin, in the year 1852. It is not till after passing the Tagus northward, and entering the provinces of Beira and Minho that a somewhat different physiognomy of moss-vegetation is met with, indicated by the successive appearance of *Homalia lusitanica*, *Hookeria lucens*, *Fissidens grandifrons*, *Cynodontium*

*An Enumeration of the *Musci* and *Hepaticæ* collected in Portugal 1842-50 by Dr. F. Welwitsch, with brief Notes and Observations by William Mitten, A.L.S.

Bruntoni, *Mnium undulatum*, *Ulota Hutchinsiae*, *Hypnum fallax* and *loreum*, *Thuidium tamariscinum*, and many other more northern types of mosses.

In discussing the bryology of Portugal, it would be unjust not to mention Brotero, who in his classical *Flora Lusitanica** (vol. ii., pag. 403 and seq.) describes besides 26 *Hepaticæ*, 61 species of mosses, and in his *Phytographia Lusitanicæ* (Fasc. i., No. 34) gives a very tolerable figure of *Leptodon Smithii* under the name of *Hypnum cincinatum*, Brot.; although the descriptive part of this enumeration partakes of the laconic brevity in fashion at that period (1804), most of the species can be easily identified, the more so as the habitats and the Hedwigian Synonyma are nearly always carefully noted, and the author's acknowledged truthfulness in all his references must lead us to consider Brotero's list, however incomplete, as the groundwork for any future bryography of Portugal.

I have been hitherto unable to ascertain if Link and Hoffmausegg have published any separate account of the mosses observed on their travels in Portugal, although it is evident that Professor Link must have paid some attention to them, as he is cited in Brotero's enumeration as the discoverer of *Nickera complanata* and *N. crispa* in the Serra de Gerez, near the Spanish border of the Province Minho, where also Brotero says *Jungermannia* (*Sarcocypth.*) *emarginata* and *Jungermannia* (*Aneura*) *pinguis* were discovered by Link. A complete list of all the cryptogams met with by these two distinguished German travellers has been long a prime desideratum.

I expected to find a much fuller account of the mosses of Portugal in Colmeiro's catalogue of the cryptogamic plants of Spain and Portugal,† published 63 years after the appearance of the learned Portuguese Professor's *Flora Lusitanica*; but, to my great regret, I am obliged to confess that in this hope I have been totally disappointed. Though published in 1867, Colmeiro's volume contains—relative to Lusitanian mosses—nothing but a mere compilation of the species already enumerated in Brotero's *Flora*, arranged after C. Müller's system; it is evidently got up without any knowledge of Schimper's valuable *Synopsis*, in which particular attention is devoted to the mosses of the Pyrenean Peninsula, and where even some rarer Portuguese species, as for instance, *Fissidens serrulatus* and *Homalia lusitanica* are especially noted with their respective habitats, which are in vain sought for in Colmeiro's enumeration. The author frequently refers to Vandelli, Grisley, and other still more doubtful and less scrupulous explorers, who will hardly be considered by bryologists as valuable authorities, whilst the ominous *non vidi* appended to more than the half of the enumerated species, renders the catalogue still less trustworthy, for not guesses, but only well defined and exactly determined species can be considered satisfactory material for phyto-geographical investigations.

We find a better arrangement and greater accuracy in a paper by Estacio de Veiga, inserted in the *Journal of the Royal Academy of Science of Lisbon*,‡ in which the author, who resides in Algarvia, gives—besides an

*F. A. Brotero, *Flora Lusitanica*. Olissipone, 1804, 2 vol. 8vo.

†Enumeracion de las Criptogamas de España y Portugal, por D. Miguel Colmeiro. Madrid, 1867–1868, 8vo.

‡Plantas da Serra de Monchique, observadas em 1866, par S. P. Estacio de

enumeration of some phanerogams, ferns, &c.—a list of mosses observed by him in the Serra de Monchique. Although this list, which contains 42 species, adds, with the exception of *Atrichum undulatum* and the somewhat doubtful *Campylopus brevopilus*, nothing new to the enumeration by Count Solms, of whose excursions the author, as he tells us, was a constant sharer, we have great pleasure at welcoming a Portuguese who, the first since his celebrated countryman Brotero, is paying an earnest attention to the cryptogamic Flora of his beautiful country, and we cannot refrain from here expressing the hope that Senhor Veiga will extend his explorations into the many districts of Algarvia not yet visited by any bryologist, amongst which we may particularly mention the whole western coast from Cape St. Vincent to Odesseixe, and also the territory along the right bank of the River Guadiana, between Azinhal and Alcoutim.

In concluding this account of what I find published on the bryological flora of Portugal, it should be mentioned that both Professor Willkomm and M. Bourgeau have visited some parts of Algarvia, but I am unacquainted with any publication relative to the bryological materials brought home from their respective travels.

If I have extended this review somewhat beyond the space generally permitted to bibliographical notices, I may perhaps be excused when the rarity of publications on the cryptogamic flora of the Pyrenean Peninsula in general, and particularly of Portugal, is considered. I may also plead the importance which every contribution on the Flora of Portugal bears to a future thorough investigation of its geographical relations with North Africa and the neighbouring Atlantic Islands on the one side, and on the other side with the more northern parts of Western Europe, and with the British Islands.

F. WELWITSCH.

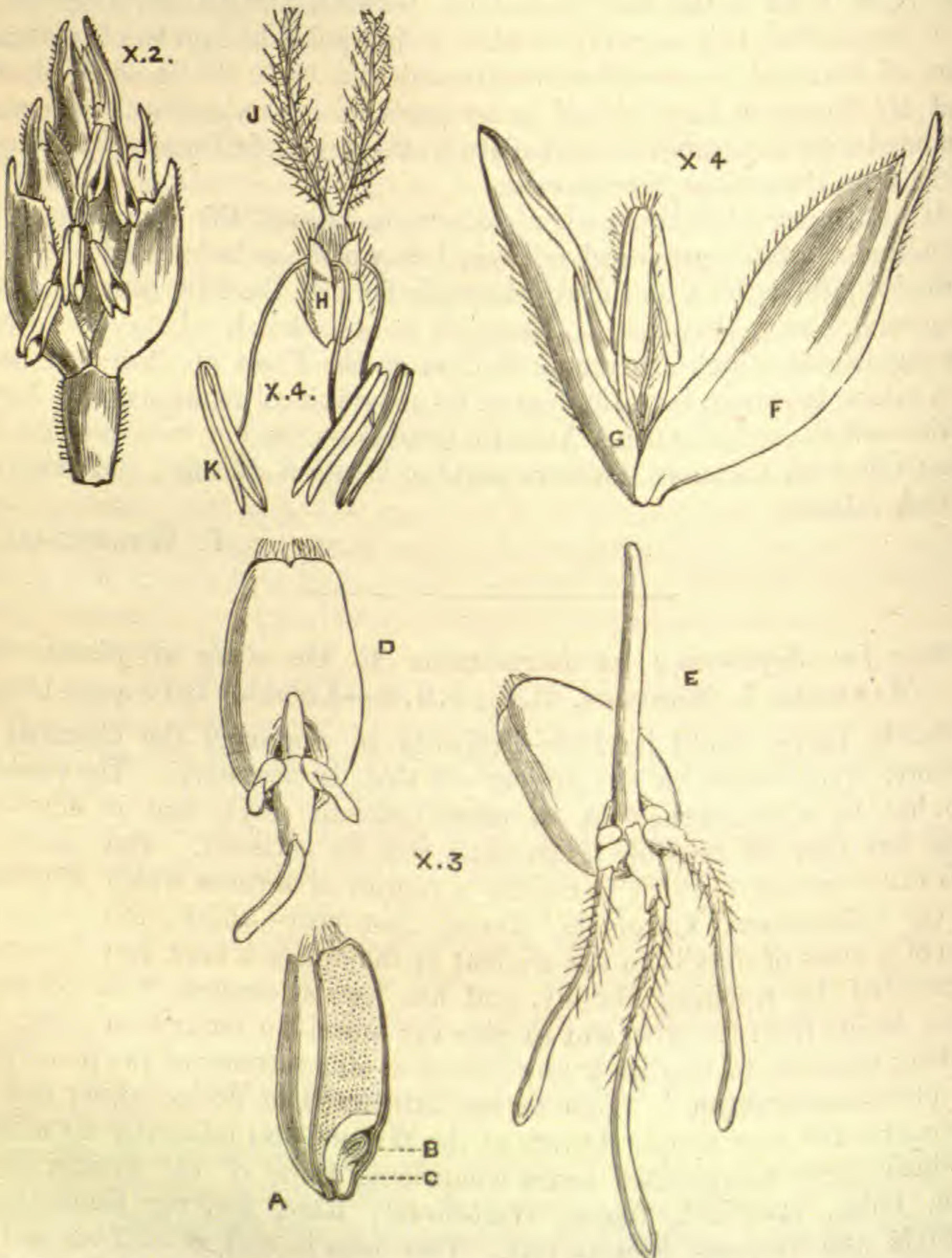
Botany for Beginners: an introduction to the study of plants.—By MAXWELL T. MASTERS, M.D., F.R.S.—London, 1872 (pp. 185).

Surely there would be little difficulty in acquiring the elements of Botany, were books on the subject all that is necessary. The subject, too, has been approached in so many different ways, that it might be supposed that all possible needs must now be satisfied. The author of this little volume—which is mainly a reprint of articles which appeared in the 'Gardeners' Chronicle' during last year—thinks the presentation of a mass of details to the student at the outset a fault very generally committed in teaching Botany, and has here attempted "to correlate these details from the first and to give the pupil an interest in them, by making manifest to him their importance as illustrations of the principles of plant-construction." This he has attempted to do by taking first in the course the very simple flowers of the Willow, and following up with a gradually more complicated series comprising those of the Poplar, Ash, Elm, Tulip, Hyacinth, Apple, Wall-flower, Rose, &c., the Compositæ, Orchids and Grasses coming last. This idea is well carried out in the book, but experience must show whether it is better to thus familiarise the student at once with flowers whose structure, though apparently

Veiga. *Jornal da Academia Real das Sciencias de Lisboa*. No. vi., Maio, 1869, pag. 124-127.

simple, deviates so greatly from the common, or to make him first acquainted with those which show the usual type of floral architecture, leaving the exceptions till he has mastered the general pattern. Our author's arrangement here was perhaps, however, partly a result of the original papers having been published at weekly intervals through the spring and summer, and the early spring flowers being taken first.

Interspersed with the descriptive matter are very judicious indications of subjects of larger importance, little more than hints, but still sufficient to stimulate in the reader a desire to know more about such physiological processes as fertilization by insects and hybridization, geographical distribution, the permanence or instability of species, and other subjects which now so largely occupy the attention of botanists. In the way in



which these points are handled, though so slightly, it is easy to see the author's superiority over the bulk of mere compilers of introductory textbooks, who are scarcely ever up to the time in knowledge of their subject. The last three chapters on classification and plant life are excellent

introductions to these subjects, and much ahead of what we find even in more pretentious English text-books.

There is little to call for special remark. A new term, "*inseparate*" is used to express the conditions usually termed cohesion and adhesion by botanists. This term should need no apology; it is expressive and accurate and in conformity with our language. It seems impossible to avoid a classification of fruits, even in such an outline of botany as this, and there is accordingly a table of 15 varieties with their names. Seeds, however, are passed over very shortly. Exception may be taken to a point or two; for instance, that sedges (Cyperaceæ) "may be recognised at once from Grasses by their triangular stems and leaves destitute of ligules" is far too absolute a statement; terete stems are by no means uncommon in Cyperaceæ, and the ligule of such sedges as *Carex muricata* is quite evident, differing from that of Grasses (in so many of which it is difficult to detect) in being adherent to the blade of the leaf.

Dr. Masters' little book is exceedingly well got up, and illustrated with some 80 wood cuts, mostly by Mr. W. G. Smith. This Journal is indebted to the publishers for permission to use those illustrating the flowers and germination of wheat, which were copied (with slight modifications) from Francis Bauer's beautiful drawings preserved in the Botanical Department of the British Museum. It is to be hoped that the book may have the wide circulation among the class for whom it is intended which it certainly deserves.

H. T.

Principal Economic Products from the Vegetable Kingdom, arranged under their respective Natural Orders, with the names of the Plants and the Parts used in each case (pp. 31). Hardwicke.

This little pamphlet is said by its compiler to have been put together especially for the use of students preparing for examination in botany. As an aid in cramming for the most superficial examination, and for very young students, it may perhaps be of some use, but it certainly is not calculated to overtax even the most juvenile mind. The mere fact of knowing that the leaves or roots or fruits or stems of certain plants are useful to man in some way or other, seems sufficient, according to the compiler's notion, to pull the student through his examination. Each page of the book is divided into three columns; the first being occupied with the Natural Order, the second with the common and scientific names, and the third with the part of the plant used. Thus, under *Myrtaceæ*, we find:—"Cajeput oil, *Melaleuca cajeput*. Obtained from the leaves.—Cloves, *Caryophyllus aromaticus*. Dried flower-buds.—Allspice, *Eugenia pimenta*. Dried unripe fruit." But there is no mention whatever of the actual uses of these products; this kind of information being given only in very few instances.

Taking the two following examples from opposite pages, what instruction do we get?—"Watercress, *Nasturtium officinale*. Part used, herbage.—Weld, *Reseda luteola*. Part used, herbage." Any one unacquainted with the use of weld might suppose it to be an edible, like watercress. Again, the use of the bare term *exudation* against such products as gum tragacanth, balsams of Peru and tolu, copaiva, copal,

etc., is not very edifying. Nor do we know the meaning of the following — “Gum-lac, *Elythrina monosperma*. Resinous exudation,”—unless it refers to *Butea frondosa*, an Indian tree, from the bark of which a red astringent juice exudes, which upon hardening becomes brittle, has somewhat the appearance of kino, and is used by the natives for tanning and dyeing purposes.

We do not prophesy an extensive sale for the little pamphlet, Oliver's ‘Guide to the Kew Museums,’ at a third the price, being a complete cyclopædia in comparison.

J. R. J.

Botanical News.

ARTICLES IN JOURNALS FOR APRIL.

Botanische Zeitung.—F. Schmitz, “On the Formation of Auxospores in *Cocconema Cistula*, Ehrb.”—O. Brefeld, “The Development of *Penicillium*.”—Mohr, “Hernia of Seeds in Grapes.”—F. Hildebrand, “On the Development of Hairy Appendages to Seeds,” (tab. iv.)—F. Thomas, “On the Origin of Insect-galls and allied Excrescences on Plants.”—P. Ascherson, “Short Botanical Notes” (on *Sciadoseris* and *Cleistanthium*, Kze; on *Salvia cleistogama*, De Bary and Paul; on *Montia lamprocarpa*, Cham).

Flora.—F. Arnold, “Lichenological Fragments, xiv.”—L. Celakovsky, “Further Attempt to Explain the Flowers of *Euphorbia*.”—H. G. Reichenbach, “On *Lælia Jongheana*.”—F. Schwendener, “Discussion on the Gonidia Question,” (tab. iv.)—A. Kanitz, “Recollections of a Botanical Tour (Padua).”—S. Kurz, “On *Tetranthera ochrascens*, Miq.”

Hedwigia.—Abstracts, extracts, and critical remarks on various recently published memoirs on Cryptogamic botany.

Nuovo Giornale Botanico.—G. Passerini, “Fungi Parmensi” continued (112 species of Agaricini, 4 new).—G. Archangeli, “Arborescent Plants of the Botanic Garden at Pisa.”—F. Ardissoni, “On the Use of Diatoms in Determining the Penetrative Powers of Objectives,”—Ibid, “Note on some species of *Schizymeria*.”

Monthly Microscopical Journal.—J. Murie, “On the Development of Vegetable Organisms in the Thorax of Living Birds,” (plate xii.) (3 cases given, plants referred to *Aspergillus*).

Scottish Naturalist.—M. C. Cooke, “Description of a Scotch *Venturia*, new to science,” (*V. atramentaria*; on leaves of *Vaccinium uliginosum* at Lochnagar).

Geological Magazine.—W. T. T. Dyer, “On some Coniferous remains from the lithographic stone of Solenhofen,” (description and figure of the cone-scales of *Araucarites Häberleinii*, n. sp).

New Books.—J. D. Hooker and others, “Flora of British India,” (part 1) Orders Ranunculaceæ to Polygalaceæ (part).—J. H. Balfour, “Introduction to the Study of Palæontological Botany.”—Mr. T. Masters, “Botany for Beginners.”—J. A. Knapp, “Die bisher bekannten Pflanzen Galiziens und Bukovinas.”

Pringsheim's 'Jahrbücher für wissenschaftliche Botanik' for 1872 contains the following memoirs:—"On Pilobolus," by J. Klein, with 8 plates. "On the Pollen of *Ceratozamia longifolia*, Miq.," by L. Jurányi, with 4 plates. "On the Size of the Wood-cells of *Pinus sylvestris*," by K. Sanio, and "On some peculiar spherical Crystals in the Epidermis of *Cocculus laurifolius*," by G. Kraus, with one plate.

In the first part of a new botanical periodical, 'The Transactions of the St. Petersburg Imperial Botanic Gardens,' dated 1871, are several important systematic papers besides the report of the gardens for the previous year. E. R. Trautvetter publishes observations on the plants collected by Radde in Turcomania and Transcaucasia in 1870, and a catalogue of the Phanerogamic plants of the islands Nova Zembla, 105 in number; and Regel describes some new species in cultivation in the gardens, and gives useful revisions of the genera *Crataegus*, *Dracæna*, *Horkelia*, *Larix*, and *Azalea*.

The 3rd and 4th parts of Pritzel's 'Thesaurus Literaturæ Botanicae' have recently appeared, and carry on the catalogue of authors to "Tournefort." We notice that Merrett's 'Pinax' is entirely omitted, though included in the former edition, and that only three out of some twenty of Petiver's works find a place. The entire want of cross-references is a serious drawback in the usefulness of this valuable and indeed indispensable book.

We have received the report for 1871 of the Rugby School Natural History Society. Mr. Kitchener, the president, contributes a table showing the heat, rainfall, and early or late flowering, deduced from numerous observations in 1871. The report of the botanical section, signed by H. G. Wauton, specifies the new discoveries in the neighbourhood, and gives an interesting list of late-flowering plants, from which it appears that as many as 95 species were in flower on November 1st, or a few days later.

'May Flowers,' by the Rev. James Harris, M.A., Head Master of the Cathedral Grammar School, Chester, contains a popular description of the wild flowers of the month, with localities in the neighbourhood of Chester for a few of the more interesting.

Recent numbers of the 'Garden' contain lists of the ferns of Kelso, N.B., and of Kildare, with notes upon those of other parts of Ireland; also notes upon Buckinghamshire Orchids, etc., in which *Listera cordata* and *Pyrola media* are erroneously recorded for the county.

At the last meeting of the Literary and Philosophical Society of Manchester the following naturalists were elected honorary members of the Society:—Prof. Huxley; Prof. Julius Sachs; Prof. Schimper; M. A. Trécul; and Mr. H. C. Watson.

Professor de Bary will be succeeded at Halle by Dr. Krauss, of Erlangen.

The death of Louis Alphonse de Brébisson, at the age of 74 years, occurred at Falaise on April 26th. Best known as a botanist, and especially as an algologist, he had paid considerable attention to Geology and Zoology, his first paper, published in 1806, being a description of a new genus of Hymenoptera. As the author of the excellent 'Flore de la Normandie,' of which a fourth edition appeared in 1869, the deceased botanist was well and favourably known to many students of our flora.

The herbarium and instruments of the late eminent botanist Von Mohl, are left to the University of Tübingen, where he was so long professor.

Mr. Travers, the son of the well-known New Zealand geologist and botanist, has just returned to Wellington from the Chatham Islands bringing with him a fine collection of botanical and zoological specimens, including live plants of *Olearia Traversii* and *semidentata*, *Hedera crassifolia*, *Gingidium Dieffenbachii*, *Myrsine chathamica*, *Hymenathera chathamica*, and several other valuable acquisitions. He intends this year to devote his energies to the re-exploration of the Auckland, Campbell, and Bounty Islands, remaining in the former group at least four months, and is open to receive and execute, as far as practicable, commissions to collect living or dried plants, skins and skeletons of birds, shells, fish, lizards, etc., or other objects of natural history. His address is Wellington, New Zealand.

A collection of carefully prepared leaf-skeletons, mounted on black-glazed paper, by Herr H. Lindemuth, of the Berlin Botanical Garden, is offered at 50 species for 5 thalers. Many of the specimens show the ready separation of the wood proper and bast elements of the vascular bundles. The collection is well spoken of by Prof. Hanstein, of Bonn, in a notice in the 'Botanische Zeitung,' 1871, p. 381.

The first number of a new monthly Journal devoted to Natural History in all its branches, to be called the 'Yorkshire Naturalists' Recorder,' will be published, under the auspices of the West Riding Consolidated Naturalists' Society, on July 1st. The subscription will be three shillings per annum, post free, and communications must be addressed to the editor, care of J. Wilcock, printer, Northgate, Wakefield.

We notice with pleasure the appointment of our contributor, Mr. M. J. Barrington-Ward, B.A., to be one of Her Majesty's Inspectors of Schools.

The usual annual meeting of the Linnæan Society was held on the afternoon of May 24th, the anniversary of the birth of Linnæus. In accordance with custom, the president, Mr. Bentham, delivered an address. As this will be printed in due course, it is sufficient to say that it was mainly occupied with the very important and most interesting subject of plant-distribution, Grisebach's recent work on Botanical Geography being carefully examined and, in parts, minutely criticised. Mr. Bentham found it necessary, as would be expected from the divergence in their views of the production of species, to differ widely from some of the conclusions of the author he criticised.

Corrigenda, p. 157, l. 13 from bottom, for "Hellreich" read Neilreich.
P. 158, l. 20 from bottom, for "17" read 5.

Original Articles.

RECENT ADDITIONS TO OUR MOSS FLORA—PART V.

BY R. BRAITHWAITE, M.D., F.L.S.

(PLATES CXXIII. and CXXIV.)

TRICHOSTOMACEÆ.

Weissia calcarea, C. Müller, Synop. i. p. 659. *Gymnostomum calcareum*, Nees and Hsch. Bryol. Germ. i. p. 153, t. x. fig. 15. (1823.)—Dioicous, in small dense tufts, with brown radicles at base; stems short, slender, nearly simple, both the stem and innovations being almost naked at base, and comose leaved at apex. Lower leaves very small, ferruginous, erecto-patent, narrowly lanceolate, upper much larger, deep green, lineal-lanceolate, rather obtuse concave, the nerve stout, vanishing below apex; margin minutely crenulate; perichaetial leaves lanceolate with a very concave base, rather acute, capsule erect on a pale yellow seta, oblong, short-necked, pale brown with a reddish mouth, subcylindric and a little contracted below the mouth when old; annulus persistent; lid conical-subulate. Calyptra cucullate, straw coloured, with a darker subulate point.

Var. δ . *brevifolium*, Schpr. Synop. p. 40.—Plants very slender and branched. Lower leaves very minute, distant, upper crowded ovato-lanceolate, recurved in the upper part, short; capsule oval. Plentiful in the South of Europe on damp rocks and walls in calcareous districts. A few barren specimens of the var. δ . were sent to me in August, 1871, by the Rev. J. Fergusson; it was detected by Mr. Sim at Blackhall, near Banchory, Deeside.

SPLACHNOBRYUM, C. Müller, Verhandl. z. b. Wien, 1869, p. 501.

Calyptra dimidiate, enclosing the whole theca, and embracing spirally the upper part of the seta, cleft at the side, smooth, fugacious. Peristome simple, arising below the orifice of capsule; teeth 16, very narrow, linear-lanceolate, acicular, with the articulations remote. Columella immersed. Dioicous, male flower terminal, gemmaceous, without paraphyses. Plants small, slender, with distant spathulate leaves. Natives of equatorial America and India.

S. Wrightii, C. Müll. l. c. *Entosthodon minimus*, Hunt, Proc. Lit. and Phil. Soc. Manchester, xi. p. 19 (1871). *Amblyphyllum hibernicum*, Lindberg, MS. (Plate CXXIII.)

Dioicous, minute, gregarious. Stems one-third to a quarter of an inch high, simple, subflexuose, pale red, with a few slightly branched radicles. Leaves bright green, distant, with a narrow and slightly decurrent base, patent, flattish, obovate or spathulate, rounded at apex, the margin somewhat reflexed in the lower half, entire or minutely serrulate in the male plant, crenulate in the upper part in the female; nerve thick, prominent at back, vanishing below apex, less clearly defined in the male plant;

cells lax, large, pellucid, smooth, incrassate, rhombo-rectangular at base, rhomboidal above, smaller and nearly circular at margin, especially in the male. Male flower terminal, bracts erect, resembling the leaves, antheridia 3 to 8, without paraphyses. Seta slender, twisted to the left, pale brownish-yellow; capsule erect, obconical at base, subcylindric, wide mouthed, pale brown; operculum conical, acute; teeth of peristome very slender, pale red, erect. Calyptra long, conical, very narrow, its cells arranged spirally, spores smooth. Fr. August.

HAB. Top of the wall of a forcing-pit in the Botanic Gardens, Glasnevin, Dublin. (Mr. D. Orr.)

I fear this interesting little moss can hardly be regarded as indigenous, for the spores have most probably been mixed with soil attached to some exotic plant, and thus accidentally scattered on the sandstone wall where it was found. So much do the leaves resemble those of Splachnaceæ in areolation that at first I was inclined to follow C. Müller and Hampe, in referring it to that family; but on the other hand, the equally high authorities Mitten and Lindberg place it in Trichostomaceæ, and after careful consideration I am satisfied that in the structure of the peristome, the calyptra like that of *Tortula*, and the place of growth, it entirely accords with that family.

The type of the genus is *S. obtusum*, C. M. *Weissia obtusa*, Bridel, Sp. Musc. i. p. 118 (1806). *Didymodon? splachnifolius*, Hook. Musc. Exot. t. 126 (1820). *Dissodon rotundifolius*, C. Müll. Synop. i. p. 140 (1849), from the Antilles, to which the present species was at first referred by Sullivant in the 'Musci Cubenses Wrightiani' (Proc. Amer. Ac. of Arts and Sc. 1861), but it is separated by C. Müller in his paper quoted; and with the Cuba plant the Irish specimens entirely agree, except that they are much smaller, and though Müller describes the leaf as "marginem integerrimo," those of the Cuban moss are crenulate, exactly like the one figured.

The other species of the genus are: 3. *S. Wullschlägefii*, C. M., from Surinam. 4. *S. Bernoullii*, C. M., from Guatemala. 5. *S. flaccidum* (*Weissia flaccida*, Harvey), Hook. Ic. Pl. t. 18. f. 3, from Nepal. 6. A species from Tranquebar, growing among *Trichostomum indicum*, and having papillose cells, thus affording another character common in Trichostomaceous mosses.*

GRIMMIACEÆ.

The two principal genera of this family, *Grimmia* and *Rhacomitrium*, pass into each other so gradually, that they must be united in any strictly natural arrangement, as has been done by C. Müller and Mitten. In the more typical *Rhacomitria* we have indeed a distinctive areolation in the narrow elongated cells with sinuous walls, but in many true *Grimmiæ* we also find similar cells, and *R. patens* quite connects the two. To the perseverance of the Rev. J. Fergusson, and a few other Scotch botanists, we are indebted for important additions to the British species of *Grimmia* within the last few years, and we may reasonably expect that *G. arenaria*,

* In the last number of 'Linnæa' (Band iii. Heft 2 p. 174,) Dr. Müller describes two more species of the genus, *S. Indicum*, Hampe and C. Müll. from the Botanic Garden, Calcutta, and *S. Spruceanum*, C. Müll. = *Weisia* (§ *Tapeinodon*) *splachnifolia*, Mitten, Musc. Aust. Amer., from the Andes.

alpestris and *mollis* will yet be added to the list. The great similarity of many species, especially in a barren state, renders their determination difficult, and none should be hastily passed over by the Alpine collector.

GRIMMIA.

SECT. I.—SCHISTIDIUM.

Theca smooth, immersed in the perichæcium on a very short straight pedicel; calyptra small, scarce covering the operculum, cleft at base into several lobes.

1. *G. conferta*, Funck.

Var. δ . *incana*. *G. pruinosa*, Wils. MS. Plants more robust; perichæcial leaves broader, with long hair points; capsule more elongated, with thicker walls; teeth of peristome stronger, nearly entire, red.

HAB. Trap rocks, King's Park, Edinburgh, 1847 (Dr. Greville). Largo Law and Dunbarnie Links, Fife, on decomposed tufa (Mr. Howie.); Arthur's Seat (Mr. Bell).

Having examined a number of specimens sent by Mr. Howie, I do not find characters sufficient to separate this plant from *G. conferta*, which thus seems to pass through a series of forms, parallel to those of the closely allied *G. apocarpa*.

2. *G. apocarpa* (L.). 3. *G. maritima* (Turner).

SECT. II.—GASTEROGRIMMIA.

Plants very short, pulvinate. Theca just emerging from the perichæcium, ventricose on one side, on a short curved pedicel. Calyptra five-lobed or cucullate.

4. *G. anodon*, B. and S., Bryol. Eur. iii. t. 236. Monoicous, in small hoary, fragile cushioned tufts. Lower leaves minute, laxly imbricated, muticous; upper much larger, broadly oblong-lanceolate, concave, with plane margins, nerved to the point, and extended into a longish serrated hair; cells at base pellucid, elongated, above incrassate, quadrate, opaque toward apex. Capsule immersed, oval, ventricose at base on one side, thin, tawny, gymnostomous, when old with the mouth very wide; annulus simple; lid plano-convex, umbonate, yellow.

HAB. Walls and dry calcareous rocks. Arthur's Seat, Edinburgh, 1869 (Mr. Bell).

5. *G. crinita*, Bridel, Sp. Musc. part i. p. 95 (1806). Bry. Eur. iii. t. 237.

Monoicous; in low diffuse flat tufts, silky on the surface, with long white hair, which form a pencil-like tip to the branches. Stem simple, or but slightly divided. Leaves imbricated, erecto-appressed, lowest lanceolate, muticous, upper obovate-oblong channelled, with a broadly diaphanous apex continued into a hair as long as the lamina, which in the perichæcial leaves extends far above the capsule; nerve vanishing below apex; margin erect or plane; cells at base elongated, diaphanous, above finely chlorophyllose, oblong or rounded, large, incrassate; capsule on a weak sigmoid pedicel, subcernuous, subventricose ovate, lightly striate, brown, furrowed when dry; operculum convex, with an obtuse conical point; annulus broad, compound; calyptra dimidiate, bilobed; teeth of peristome red, erect, bi-trifid to the middle.

HAB. On the mortar of old walls, and sometimes on calcareous rock, in the Mediterranean region; wall of a canal bridge near Hatton, Warwick, June, 1872 (J. Bagnall). This interesting addition to our Moss flora precisely accords with Italian specimens.

SECT. III.—EUGRIMMIA.

Leaves ending in a hair point. Theca plicate, exerted on a curved pedicel; calyptra multifid at base, or with a single cleft at side.

6. *G. orbicularis*, B. and S. 7. *G. pulvinata* (L.). 8. *G. Schultzii* (Brid.), *G. decipiens* (Lind.).

9. *G. subsquarrosa*, Wilson, MS., Dr. B. White in Trans. Bot. Soc. Edin. vol. ix. p. 142 (1868). (Pl. CXXIV. Fig. 1.)

Dioicous, in lax tufts, dull dark green above, fuscous at base. Stem one-third to three-quarters of an inch high, erect, repeatedly dichotomous, the branches short, a little curved, turgid. Leaves erect and appressed when dry, patent and somewhat squarrose when moist, the lowest muticous, from an ovate base, gradually lanceolate, upper longer and extended into a denticulate hair point a quarter to half length of lamina, complicato-carinate above, nerve strong, margin recurved; cells at base hyaline, quadrate, narrow and elongate at margin, above minute, rounded-quadrate. Male flower near the apex of a branch, perigonial bracts short, ovate, acute, laxly areolate. The fruit is reported to resemble that of *G. trichophylla*.

HAB. On rocks. Hill of Kinnoul and Balthayock, Perth, 1864 (Dr. B. White). Moncrieff Hill, Perth (Dr. Stirton). Arthur's Seat and Braid Hills, Edinburgh. Dumbreck, near Bowling, in fruit (Dr. Stirton). Mr. Fergusson sends a small dense fuscous form under the name *G. edinensis*.

10. *G. robusta*, Fergusson, MS. *G. ambigua*, Wilson, MS. (Pl. CXXIV. Fig. 3.)

Dioicous? in large loosely cohering tufts, black below, dark green and hoary at top. Stem dichotomous, fastigiate, soft, naked at base. Leaves appressed when dry, erecto-patent when moist, lowest short and muticous from a slightly contracted ovate base becoming lanceolate, upper longer, gradually tapering into a nearly smooth hair point one-third to half length of lamina; keeled at back with the strong nerve, margin recurved in the lower half; cells quadrate incrassate, those at centre of base elongated, above minute and irregular in outline, a single row at the margin of basal wing hyaline. Female inflorescence with about six slender archegonia, the perigynial bracts resembling the upper stem leaves, but more attenuated, with laxer and more pellucid areolation.

HAB. Rocks in Alpine districts. Clova mountains, at 2000 feet (Mr. Fergusson). Fairhead, Ireland (Dr. Moore). Cardross and Bowling (Dr. Stirton). Ross-shire (Mr. Hunt). I adopt this species on the authority of Mr. Fergusson, who has had ample opportunity of observing the plant in a living state, and whose active investigation of the Clova district we hope may lead to the discovery of its fruit. It closely resembles *G. Schultzii*, which, however, has a spinulose hair-point, and the cells larger and more sinuose; and also *G. commutata*, in which the base of leaf is longer and more contracted, with its central cells narrower and more elongated.*

* In a letter just received from Prof. Lindberg, he says, "I am quite unable to separate *G. robusta* from *G. decipiens* (Schultz), *G. Schultzii* (Bridel).

11. *G. contorta* (Wahl.), Fl. Carpatica, p. 346. *G. uncinata*, Kaulfuss, in Sturm's Deutsch. Fl.

Dioicous, in small soft tufts, black below, deep green above, cohering at base by radicular tomentum. Leaves patent incurved, curled when dry, from lanceolate becoming lineal subulate, with short diaphanous hair points, at base carinate-concave, with the margin recurved, above subcomplicate carinate; cells at base diaphanous, elongate, hexagono-rectangular, above sinuose quadrate. Perichæcium elongated of eight or nine erect sheathing leaves. Capsule on a subarcuate pedicel, cernuous, erect when dry, oval, smooth, yellowish, small. Lid convex, conical, obtuse, orange red. Annulus broad, of three rows of cells. Teeth of peristome rufous, cleft below the middle and lacunose, reflexed when dry.

HAB. Quartz rocks in Central Europe. Bellyside Hill and West side of Henhole, Cheviots, May, 1868 (Hardy). Cloch-na-Ben, Kincardine (Sim). Bach-na-Gairn and Glen Callater (Fergusson). All barren. Easily recognized by the strongly curled leaves, with long narrow points.

12. *G. torquata*, Grev. *G. torta*, Nees and Hsch.

13. *G. funalis*, Schwgn. *G. spiralis*, H. and T.

14. *G. Muhlenbeckii*, Schpr. Synop. p. 212. *G. incurva*, Bry. Eur.

Dioicous, in lax soft tufts, olivaceous-green, hoary. Stem tall, erect or procumbent, repeatedly dichotomous, rooting at base. Leaves densely crowded, patulous, erect when dry, elongate-lanceolate, channelled, margin plane, nerve stout, prominent at back, hair-point very rough, with recurved teeth. Cells at base elongated, above incrassate, rounded-quadrate. Capsule on a short arcuate pedicel, minute, oval, glossy, rugulose when dry, thin walled, yellowish-brown. Annulus very narrow; lid convex, with a short beak, red. Teeth lanceolate, entire or cleft, purple.

HAB. Granite rocks. Clova, May, 1870 (Fergusson). Probably not rare in the North, but overlooked or mistaken for the next species. Prof. Lindberg has given an excellent diagnosis of them in 'Notiser ur Sällsk. pro Faun. et Fl. Fenn.' ix. p. 262.

15. *G. trichophylla*, Greville.

16. *G. Hartmanni*, Schimper, Synop. p. 214. (Pl. CXXIV. fig. 4.)

Dioicous, in broad, loose yellow-green tufts, blackish at base. Stem elongated procumbent, rigid, arcuate-ascending, dichotomous. Leaves elongate-lanceolate, the uppermost secund, and ending in a very short smooth hair point, carinate-concave at base, with the margin reflexed; toward the apex acutely carinate, with the margin curved outward, patulous when moist, laxly incumbent and somewhat incurved when dry. Cells at base short, rectangular, hyaline; above minute, incrassate-quadrate, opaque, irregular. The fruit has recently been found in Austria.

HAB. Granite rocks in the mountains of Wales and Scotland. Easily recognized by its tall yellow-green lax tufts.

17. *G. elatior*, B. and S., Bry. Eur. iii. t. 245.

Dioicous, robust, in broad, lax, incoherent tufts, fuscous green, hoary at top. Stem sparingly branched, elongate, decumbent and naked at base. Leaves nearly equal, very long, curved patent, from an oblong base, with revolute margins, very longly lanceolate, subcomplicate-carinate, prolonged into a long, smoothish hair; cells at base linear, rectangular, wider toward margin, above minute, rounded, incrassate, and

opaque. Capsule ovate, 10-ribbed, pale brown, when dry oblong, deeply furrowed; lid conical or somewhat acicular, annulus compound. Teeth rather broad, cleft at apex, orange-coloured.

HAB. Granite rocks, Clova, 1868 (Fergusson). Closely resembling *G. Schultzi*, for which it has probably been mistaken. The strongly toothed hair point and crenulate cells in the leaf of the latter, readily distinguish them.

SECT. IV.—GUEMBELIA.

Leaves not curling, generally piliferous. Theca smooth, on a straight pedicel; calyptra multifid at base, or cucullate.

18. *G. Doniana*, Smith.

19. *G. Unger*, Juratzka, Die Insel Cypern, p. 169 (1865). *G. intermedia*; Fergn. MS. (Pl. CXXIV. Fig. 2.)

Monoicous, in compact, irregular tufts, two to three inches in diameter, blackish-green, hoary. Stems short, simple or dichotomous. Leaves erecto-patulous, lower smaller, muticous, the upper larger, with an obovate base, lanceolate, gradually or suddenly running out into a smooth hair one-third to half length of lamina, the margin plane; cells at base hyaline quadrate, with the horizontal walls notably thickened, then incrassate-quadrate, and in the upper two-thirds of leaf, quite opaque and indistinct. Capsule exerted on an erect pale brown pedicel, small oval, smooth, thick-walled, ferruginous brown, not annulate; lid conical, somewhat obtuse; calyptra cucullate. Teeth of peristome ferruginous purple, entire, or slightly perforated at apex, spreading outward when dry.

HAB. On earth in the crevices of rocks at 1600 feet, near Ballater, Aberdeen (Rev. J. Fergusson). This fine addition to our flora has hitherto only been met with in the island of Cyprus, and its occurrence in such a northern station as Clova could never have been anticipated. Mr. Fergusson, its acute detector, thought at first it was a form of *G. Doniana*, but soon distinguished the latter by its pale thin-walled annulate capsule and different areolation. In habit and structure of leaf it comes very close to *G. alpestris*, but that species is dioicous, and has an annulate capsule.

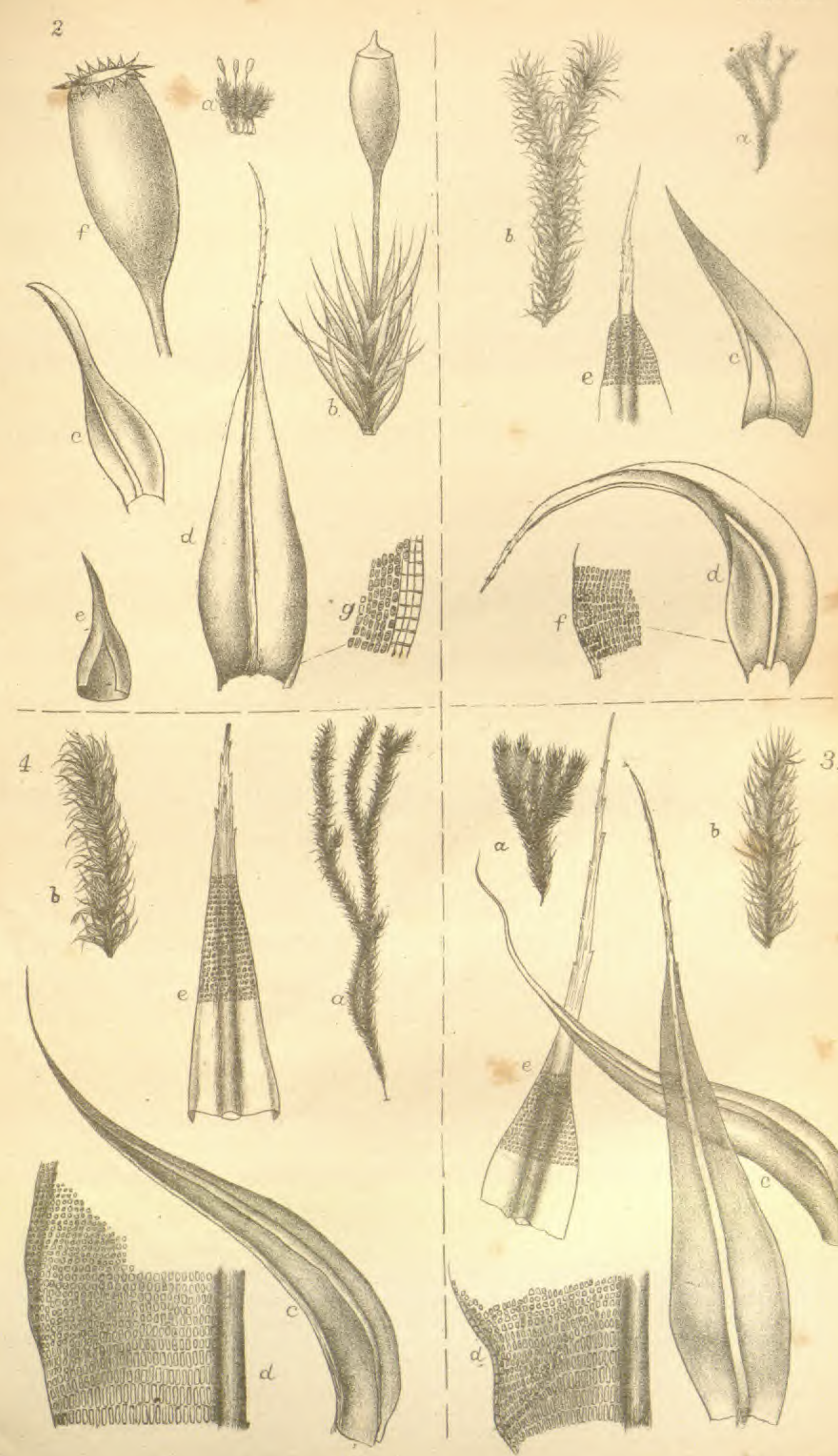
20. *G. ovata*, Weber and Mohr.

21. *G. leucophæa*, Greville.

22. *G. commutata*; Huebener, Muscol. German. p. 185. *Dryptodon ovatus*; Bridel, Br. Univ. i. p. 202.

Dioicous, in large blackish-green, incoherent tufts, hoary at top. Stem slender, flexuose, naked at base. Leaves imbricated, patulous, the lower small, the rest much longer, ovato-lanceolate, with a smoothish hair point, gradually becoming more elongated as the leaves ascend, all channelled with incurved wings, and the margin scarce reflexed toward the base; nerve slender, extending to apex. Cells at base rectangular, with the transverse walls thickened, the upper quadrate. Peduncle erect, pale red; capsule ovate, erect, smooth, brown, thick walled; lid conical, obliquely rostrate. Annulus broad, compound; teeth of peristome, deep red, smooth, bi-trifid. Calyptra cucullate, rostrate.

HAB. Alpine rocks. Moncrieff Hill, Perth, 1864 (Dr. Stirton). Stenton rocks, Dunkeld (Dr. B. White). Clova, in fine fruit (Rev. J. Fergusson). This distinct species has been frequently confounded with *G. ovata*; and although Hedwig's *G. ovalis* is universally referred to



G. commutata, the calyptra he figures is that of *G. ovata*, which name is also used on his plate, though *ovalis* appears in the text.

23. *G. montana*; Br. and Schpr. Bry. Eur. iii. t. 250.

Dioicous, in low densely cushioned hoary tufts. Stems slender, dichotomous. Leaves erecto-patent, oblongo-lanceolate, with a long hair point, very concave, the margin erect; cells at base diaphanous, quadrato-hexagonal, above minute, rounded, incrassate, opaque. Capsule erect on a short pedicel, ovate, small, brown, very smooth; annulus simple; lid obliquely rostrate; calyptra large, cucullate, long beaked. Teeth of peristome irregularly torn.

HAB. On sandstone and granite rocks. Deeside, Aberdeenshire, 1869 (Prof. Barker and Mr. Roy). On micaceous rocks, Bolt-head, Devon, in fruit (Mr. Holmes). Another species much resembling *G. alpestris*, but more slender, with smaller leaves, and a different capsule and lid.

24. *G. elongata*, Kaulfuss, in Sturm Deutschl. Flora.

Dioicous, in cushioned tufts, readily separating, black below, the innovations olive green, with hoary tips. Stem slender, repeatedly dichotomous, naked below, without radicles. Leaves patulous, the lower lanceolate, muticous, the upper elongato-lanceolate, obtuse, with the apex diaphanous; the margin erect, cells at base rectangular, hyaline at margin, above gradually becoming minute and quadrate. Capsule on a straight pedicel, ovate, erect, smooth, pale brown; lid obtusely conical, annulus narrow; teeth of peristome lanceolate, red, entire, or slightly perforated. Calyptra multifid, long beaked.

HAB. Alpine rocks. Glen Callater and Glen Phee, Clova, 1868 (Fergusson); near Glasgow (Dr. Stirton).

25. *G. unicolor*, Greville. 26. *G. atrata*. Mielichf.

DESCRIPTION OF TAB. 123 AND 124.

Tab. 123.—Fig. 1, 2, *Splachnobryum Wrightii*, male and female plants, nat. size. 1a, 2a, ditto mag. 3. Capsule and operculum. 4. Calyptra. 5. Two antheridia. 6. Leaf of male plant. 7. Leaf of female plant.

Tab. 124.—Fig. 1, *Grimmia subsquarossa*. a. Plant nat. size. b. Upper part of a shoot. c. A lower leaf. d. An upper leaf. e. apex, and f. basal wing of same. Fig. 2, *Grimmia Ungerii*. a. Plant nat. size. b. Upper part of a branch. c. A lower leaf. d. An upper leaf. e. Calyptra. f. Capsule. g. Cells of basal wing. 3. *Grimmia robusta*. a. Plant nat. size. b. Upper part of a shoot. c. Leaves. d. Basal wing, and e. apex of same. 4. *Grimmia Hartmanni*. a. Plant nat. size. b. Upper part of a shoot. c. Leaf. d. Basal wing, and e. apex of same.

LIST OF PLANTS FOUND IN THE ISLAND OF SARK.

BY MARTIN M. BULL, M.D.

The following list consists of the plants given as natives of Sark by Professor Babington in his "Primitiæ Floræ Sarnicæ" (1839), together with those observed by me in the island in 1871. It was compiled late in the season, and as I had no botanical work with me, I felt some uncertainty about some of the segregates, and tried in vain to get over to the island again in order to clear up my doubts; but such as the list is, it is at your service.

The plants are arranged in the order of Professor Babington's book above mentioned; those found also by me are distinguished by a note of

admiration, and those which I have added to his list by an asterisk. Many common plants are conspicuous by their absence. I took no note of trees in my own list, as a visitor to Sark in 1673 writes:—"We have very little wood, and no timber at all growing throughout the whole island."

- Ranunculus hederaceus*, L. !
R. Ficaria, L. *
R. Flammula, L. !
R. acris, L. !
R. repens, L. !
R. hirsutus, Ait. *
Fumaria capreolata, L.
Nasturtium officinale, R. Br. !
Cochlearia danica, L. !
Cakile maritima, Scop.
Sisymbrium officinale, Scop. !
Alliaria officinalis, DC. *
Senebiera Coronopus, DC. !
Capsella Bursa-pastoris. !
Lepidium Smithii, Hook. *
Sinapis arvensis, L.
S. Cheiranthus, Koch. *
Reseda Luteola, L. !
Viola sylvatica, Fr. var. Riviniana. *
V. tricolor, L. !
Polygala vulgaris, L. !
 var. *oxyptera*, Koch.
Silene maritima, With. !
S. anglica, L. !
Lychnis diurna, Sibth. !
L. vespertina, Sibth. ! *
L. Githago, Lam.
Sagina procumbens, L. !
S. maritima, Don.
S. apetala, L. !
S. ciliata, Fr.
Spergula arvensis, L. !
S. subulata, Sw. !
Stellaria media, With. !
S. uliginosa, Murr. *
Lepigonum rubrum, Fr. *
L. marinum, Fr. !
Arenaria peploides, L. !
Cerastium glomeratum, Thuill. !
C. triviale, Link. !
C. tetrandum, Curt.
 var. *atrovirens*, Bab.
Malva moschata, L. !
M. sylvestris, L. !
M. rotundifolia, L. !
Lavatera arborea, L. !
Hypericum Androsæmum, L. *
H. tetrapterum, Fr. !
H. humifusum, L. !
H. pulchrum, L. !
Geranium molle, L. *
G. dissectum, L. !
Erodium cicutarium, Sm. !
E. moschatum, Sm.
E. maritimum, Sm. *
Linum angustifolium, Huds. !
Radiola millegrana, L. !
Oxalis corniculata, L. *
Ulex europæus, L. *
Sarothamnus scoparius, Koch. !
Ononis arvensis, L. *
Anthyllis Vulneraria, L. !
Trifolium ornithopodioides, L. !
T. repens, L. !
T. subterraneum, L. !
T. pratense, L. !
T. arvense, L. !
T. scabrum, L. !
T. striatum, L. !
T. suffocatum, L. *
T. procumbens, L. !
T. minus, Sm. !
T. filiforme, Sm. !
Lotus corniculatus, L. !
L. major, Scop. !
L. angustissimus, Ser.
L. hispidus, Desf. !
Ornithopus perpusillus, L. !
Vicia Cracca, L. !
V. sativa, L.
V. angustifolia, Sibth. !
V. hirsuta, Koch. !
V. tetrasperma, Koch. !
Prunus spinosa, L. !
Geum urbanum, L. *
Rubus rhamnifolius, W. & N.
R. discolor W. & N. *
Potentilla Tormentilla, Sibth. !
P. reptans, L. !
P. Fragariastrum, Ehrh. *
Agrimonia Eupatorium, L. *
Rosa spinosissima, Sm. !

- R. micrantha*, *Sm.* !
R. canina, *L.* *
Cratægus Oxyacantha, *L.*
Epilobium montanum, *L.* *
E. tetragonum, *L.* !
E. obscurum, *Schreb.* *
Callitriche verna, *L.*
Polycarpon tetraphyllum, *L.*
Scleranthus annuus, *L.* !
Cotyledon Umbilicus, *Huds.*
Sedum anglicum, *Huds.* !
Hydrocotyle vulgaris, *L.* !
Eryngium maritimum, *L.*
Petroselinum sativum, *Hoffm.*
Helosciadium nodiflorum, *Koch.*
H. repens, *Koch.* !
H. inundatum, *Koch.*
Cenantha crocata, *L.* !
Æthusa Cynapium, *L.* *
Fœniculum vulgare, *All.* *
Crithmum maritimum, *L.* !
Pastinaca sativa, *L.*
Heracleum Sphondylium, *L.* *
Daucus Carota, *L.*
Torilis Anthriscus, *Gaert.*
Anthriscus vulgaris, *Pers.* *
Conium maculatum, *L.* !
Smyrniolus Olusatrum, *L.*
Hedera Helix, *L.* !
Sambucus nigra, *L.* !
Lonicera Periclymenum, *L.* !
Sherardia arvensis, *L.* !
Rubia peregrina, *L.*
Galium Mollugo, *L.* !
G. verum, *L.* !
G. Aparine, *L.* !
Dipsacus sylvestris, *L.*
Eupatorium cannabinum, *L.* !
Nardosmia fragrans, *Reich.* *
Bellis perennis, *L.* !
Inula Conyza, *DC.* !
I. crithmoides, *L.* !
Pulicaria vulgaris, *Gaert.* *
P. dysenterica, *Gaert.* !
Anthemis arvensis, *L.* !
A. nobilis, *L.* !
A. Cotula, *L.* !
Achillea Millefolium, *L.* !
Chrysanthemum Leucanthemum, *L.* !
C. segetum, *L.* !
Matricaria Chamomilla, *L.* *
M. inodora, *DC.* !

- M. Parthenium*, *DC.* !
Artemisia vulgaris, *L.* *
A. Absinthium, *L.* !
Gnaphalium uliginosum, *L.* !
Filago germanica, *L.* !
Senecio vulgaris, *L.* !
S. sylvaticus, *L.* !
S. Jacobœa, *L.* !
Arctium Lappa, *L.* !
Carlina vulgaris, *L.* !
Centaurea nigra, *L.* !
Carduus nutans, *L.* !
C. tenuiflorus, *Sm.* !
C. lanceolatus, *L.* !
C. arvensis, *Curt.* !
C. palustris, *L.* !
Lapsana communis, *L.* !
Cichorium Intybus, *L.* *
Hypochaeris glabra, *L.*
H. radicata, *L.* !
Thrinacia hirta, *DC.* !
Apargia hispida, *Sm.*
A. autumnalis, *Don.*
Helminthia echioides, *Gaert.* *
Taraxacum officinale, *Koch.* !
Crepis virens, *L.* !
Sonchus oleraceus, *L.* !
S. asper, *Vill.* *
S. arvensis, *L.* !
Hieracium Pilosella, *L.* !
H. umbellatum, *L.* *
Jasione montana, *L.* !
Erica cinerea, *L.* !
Calluna vulgaris, *L.* !
Ligustrum vulgare, *L.* !
Fraxinus excelsior, *L.*
Erythraea Centaurium, *Pers.* !
Convolvulus arvensis, *L.* !
C. sepium, *L.* *
Echium vulgare, *L.*
Lycopsis arvensis, *L.* !
Myosotis repens, *Don.* !
M. arvensis, *Hoffm.* !
M. collina, *Hoffm.*
Solanum nigrum, *L.* !
S. Dulcamara, *L.* !
Verbascum Thapsus, *L.*
V. nigrum, *L.* !
V. Blattaria, *L.* *
Orobanche minor, *Sutton.*
Digitalis purpurea, *L.* !
Antirrhinum Orontium, *L.* !

- Linaria Elatine, *Mill.* !
 L. vulgaris, *Mill.* !
 Scrophularia aquatica, *L.* !
 Pedicularis sylvatica, *L.* !
 Bartsia viscosa, *L.* !
 Euphrasia officinalis, *L.* !
 Sibthorpia europæa, *L.* !
 Veronica serpyllifolia, *L.* !
 V. Beccabunga, *L.*
 V. officinalis, *L.* !
 V. Chamædrys, *L.* !
 V. agrestis, *L.* !
 V. arvensis, *L.* !
 Mentha aquatica, *L.* !
 M. arvensis, *L.* *
 Thymus Serpyllum, *L.* !
 Prunella vulgaris, *L.*
 Nepeta Glechoma, *Benth.* !
 Lamium amplexicaule, *L.* *
 L. purpureum, *L.* *
 L. incisum, *Willd.* *
 Leonurus Cardiaca, *L.* *
 Stachys sylvatica, *L.* !
 S. palustris, *L.* !
 S. arvensis, *L.* !
 Marrubium vulgare, *L.* !
 Teucrium Scorodonia, *L.* !
 Verbena officinalis, *L.* *
 Lysimachia nemorum, *L.* *
 Anagallis arvensis, *L.* !
 A. tenella, *L.* !
 Primula vulgaris, *Sm.* !
 Samolus Valerandi, *L.* !
 Statice occidentalis, *Lloyd* !
 Armeria maritima, *Willd.* !
 Plantago Coronopus, *L.* !
 P. maritima, *L.* !
 P. lanceolata, *L.* !
 P. major, *L.* !
 Salsola Kali, *L.*
 Chenopodium murale, *L.* !
 C. album, *L.* !
 C. polyspermum, *L.* !
 Atriplex angustifolia, *Sm.* !
 A. deltoidea, *Bab.* !
 A. hastata, *Sm.*
 A. arenaria, *Woods.* !
 Beta maritima, *L.* !
 Rumex conglomeratus, *Murr.*
 R. pulcher, *L.* !
 R. obtusifolius, *L.* !
 R. crispus, *L.* !
 R. Acetosa, *L.* !
 R. Acetosella, *L.* !
 Polygonum Convolvulus, *L.* !
 P. Hydropiper, *L.* *
 P. Persicaria, *L.* *
 P. lapathifolium, *L.* *
 P. aviculare, *L.* !
 P. Raii, *Bab.*
 E. Peplis, *L.*
 E. Helioscopia, *L.* !
 E. Paralias, *L.*
 Euphorbia portlandica, *L.* !
 E. Peplus, *L.* !
 E. amygdaloides, *L.*
 Mercurialis annua, *L.* !
 Urtica dioica, *L.* !
 Humulus Lupulus, *L.* *
 Ulmus suberosa, *Sm.*
 U. montana, *Sm.* !
 Salix cinerea, *L.* ; var. oleifolia, *Sm.*
 Quercus Robur, *L.*
 Orchis maculata, *L.* *
 Spiranthes autumnalis, *Koch.* *
 Iris Pseudacorus, *L.* !
 I. foetidissima, *L.*
 Trichonema Columnæ, *Reich.* !
 Scilla autumnalis, *L.* !
 Endymion nutans, *Koch.* !
 Juncus conglomeratus, *L.*
 J. effusus, *L.* !
 J. acutiflorus, *Ehrh.* !
 J. uliginosus, *Roth.* !
 J. bufonius, *L.* !
 Luzula campestris, *DC.* *
 Arum italicum, *Mill.* Only seen in
 fruit.*
 Lemna trisulca, *L.* *
 Zostera marina, *L.* !
 Cyperus longus, *L.* !
 Scirpus Savii, *Hook.*
 S. setaceus, *Sm.* !
 Carex muricata, *L.* !
 C. divulsa, *Good.* *
 C. flava, *L.* !
 C. pilulifera, *L.* *
 Anthoxanthum odoratum, *L.*
 Alopecurus geniculatus, *L.* *
 Gastridium lendigerum, *Gaud.* *
 Agrostis alba, *L.*
 A. vulgaris, *L.* *
 Phragmites communis, *Trin.* *
 Aira præcox, *L.*

| | |
|--|---|
| A. caryophyllæa, L. ! | B. racemosus, <i>Auct.</i> * |
| A. flexuosa, L. | B. sterilis, L. ! |
| Arrhenatherum avenaceum, <i>Beauv.</i> | B. diandrus, <i>Curt.</i> , var. rigidus, <i>Bab.</i> |
| Holcus lanatus, L. | Brachypodium sylvaticum, <i>Beauv.</i> |
| Triodia decumbens, <i>Sm.</i> ! | Lolium perenne, L. ! |
| Poa annua, L. ! | Triticum repens, L. ! |
| P. pratensis, L. * | Hordeum murinum, L. |
| P. compressa, L. * | |
| Glyceria fluitans, <i>R. Br.</i> * | Equisetum palustre, L. |
| Sclerochloa loliacea, <i>Woods.</i> | Polypodium vulgare, L. |
| Briza minor, L. * | Asplenium marinum, L. ! |
| Cynosurus cristatus, L. ! | A. lanceolatum, <i>Huds.</i> |
| Dactylis glomerata, L. ! | A. Adiantum-nigrum, L. ! |
| Festuca bromoides, L. ! | Athyrium Filix-fœmina, <i>DC.</i> ! |
| F. ovina, L. | Scolopendrium vulgare, <i>Sm.</i> ! |
| F. rubra, L. | Pteris aquilina, L. ! |
| „ var. sabulicola, <i>Bab.</i> | Aspidium angulare, <i>Sm.</i> * |
| Bromus mollis, L. ! | |

Of the additional species a few have not been previously published for the Channel Islands—*Viola sylvatica Riviniana*, *Epilobium obscurum* and *Lysimachia nemorum*—though all, with the exception of the last, are included in the larger flora of Jersey.

To the above may be added a few species observed in Sark by the Rev. W. W. Newbould in 1841-2 :—

| | |
|--------------------------------|-----------------------------------|
| Papaver Rhœas, L. | Mentha rotundifolia, L. |
| Raphanus maritimus, <i>Sm.</i> | Linaria repens, <i>Ait.</i> |
| Viola arvensis, <i>Murr.</i> | Juncus lamprocarpus, <i>Ehrh.</i> |

Mr. C. Bailey is inclined to refer some specimens which he collected in the rocks in the northern part of Sark to *Hieracium strictum*, *Fries.* (*Proc. Manch. Lit. and Phil. Soc.*, 1868, p. 197).

RECENT RESEARCHES IN THE DIATOMACEÆ

BY THE REV. EUGENE O'MEARA.

III.

We come now to consider the most interesting portion of Dr. Pfitzer's valuable contribution to the study of the *Diatomaceæ*, namely, the characteristic arrangement of the cell contents in the different groups, and the changes they undergo during the process of division.

Naviculaceæ.

It is to be premised that, according to Dr. Pfitzer's conceptions, this family is very much less comprehensive than preceding writers have regarded it. Several genera hitherto included among the *Naviculaceæ* are by our author separated from it and transferred to other families. *Navicula sphaerophora* (Kütz.) is made the type of a new genus, *Anomoeoneis*, and transferred to the *Cymbelleæ*. The reason assigned is that though the outline is symmetrical, the valves are unsymmetrical, in consequence of a lacuna in the striation on the one side. The same peculiarity is noticeable in *N. sculpta* (Ehren.), and *N. bohémica* (Ehren.) which forms are

therefore placed under this new genus. The genera *Donkinia* (Pritch.), *Amphiprora* (Ehren.), and *Amphitropis* (Rab.), by some comprehended in the *Naviculaceæ*, are considered by our author to be a group nearly related to the *Nitzschiæ*, while he regards *Toxonidea* (Donk.) as allied to the *Cymbelleæ*; *Berkleya* and *Rhaphidogloea* to the *Amphipleureæ*, following in the latter case the suggestion of Grunow; and *Mastogloia*, according to the same authority, to the *Cocconeidæ*. However he remarks in the case of the last-named genus that, in consequence of the similarity that exists in the structure of the auxospores, it seems more nearly related to the *Naviculaceæ*. In some of these suggested transpositions I feel inclined to concur; there are others, however, which appear to me open to serious objection. Still, further, a new genus is suggested, named *Neidium*, of which I shall speak presently.

Navicula (Bory de St. Vinc.).—The distinctive characteristic of this group is that in the process of cell-division, the endochrome plates, advancing along the wall of the cell, move across from the girdle-bands upon the valves, and are there separated by an oblique fissure. Whatever minor differences are observable in the various species of *Naviculæ*, they all agree in this general feature that two mother-cells co-operate in producing two auxospores. The latter term is employed by Pfitzer to designate the result of conjugation, and is suggested by the fact that the sporangial frustule is ever about twice the size of the parent frustules.

Neidium (gen. nov.).—The features in which the species of this genus differ from the *Naviculæ* proper are, first, that the endochrome plates do not move, but are divided while still remaining on the girdle-bands; second, that the process of division is effected not by an oblique fissure, but one parallel to the longitudinal axis of the cell.

In this genus two mother-cells co-operate to produce two auxospores, as appears from the observations of De Bary, who saw *N. firmum* in "copulation." In this new genus are placed *Navicula firma* (Kütz.), *N. Amphigomphus* (Ehren.), *N. affinis* (Ehren.), *N. limosa* (Kütz.), forms included in Grunow's natural group of *Limosæ*. Whether the circumstances referred to are sufficient to justify the establishment of a new genus, I leave my readers to form their own opinion.

Pinnularia (Ehren.).—This genus was originally distinguished from *Navicula* by the fact that the striæ in the former are uninterrupted or costate, as is the common designation, whereas in the latter they are resolvable into dots. This distinction some later writers consider insufficient, as Grunow, Schuman, Ralfs, Heiberg, Cleve, who have therefore included the species of *Pinnularia* in the genus *Navicula*. Pfitzer, however, re-establishes *Pinnularia* as an independent genus. His observations on the subject are worthy of consideration. The so-called costate striæ of the *Pinnulariæ* were thought by Dippel to be thickened and elevated portions of the siliceous covering. Pfitzer, on the contrary, regards them as depressions of the outer surface of the valve. This structure, though quite observable in the larger forms, as he thinks, such as *P. lata*, is not so manifest in the smaller species; and for this reason he regards the distinction as doubtful. Another distinction attributable to Schuman is noticed, namely, that in the *Naviculæ* the striæ in one direction are of a uniform character; whereas in the *Pinnulariæ*, between the deep broad striæ, fine lines are interposed. These finer lines referred to by Schuman, Dr. Pfitzer has never been able to discover, and my experience coincides with his.

The characters on the strength of which the independence of the genus *Pinnularia* is maintained, are the unsymmetrical nature of the valves and the peculiar construction of the endochrome plates in the act of division. The former of these characters is open to doubt, as the valves appear generally as symmetrical as those of the *Naviculæ*; the latter feature, however, is noteworthy. In *Pinnularia* the endochrome plates move from the girdle-bands across the valve, as is the case in the *Naviculæ*; but, as occurs in *Neidium*, the fission takes place from the ends in a direction parallel to the longitudinal axis. In this genus two mother-cells produce two auxospores.

Stauroneis (Ehren.).—This genus is distinguished from *Navicula* by the transversely-expanded middle nodule, but corresponds with it in the disposition of the cell contents. Before the cell-division, there occurs a movement of the endochrome plates, which are often deeply constricted, and sometimes even interrupted in the middle. *Stauroneis phœnicenteron* has been seen in copulation, and in this case, as observed by Archer, two mother-cells produced but one auxospore.

Pleurostaurum (Rab.).—This genus was established by Rabenhorst in 1859, and thus defined—"Frustula *Stauroneis* sed 3-5-8 in fasciam conjuncta, decussatim striata et a latere visa, vittis longitudinalibus flexuosis instructa," (Flor. Europ. Alg. sect. 1, p. 258). To the above diagnosis Pfitzer adds the peculiar unstriated border, somewhat analogous, as he says, to the thickening of the walls occurring in the parenchyma of the leaves of the Pine.

In the structure of the primordial cell, *P. acutum* and *P. legumen*, the only species of the genus, correspond with *Navicula*. A central kernel is observable. The condition of the endochrome plates in the process of division has not yet been ascertained.

Pleurosigma (W. Sm.).—This genus, distinguished by the sigmoid form of its valves, as respects its inner structure is closely allied to *Navicula*. In the freshwater species *P. attenuatum* (Kütz.), *P. acuminatum* (Kütz. and Grunow) = *P. lacustre*, W. Sm. (our author says, *P. Spencerii*, W. Sm., but this is an oversight) the endochrome plates are only notched to within a little distance from the margin, just as is the case with the marine species, *P. fasciola*, according to the description of Schultze. The larger marine forms, *P. balticum* (Ehren.), *P. angulatum* (W. Sm.), *P. elongatum* (W. Sm.), *P. decorum* (W. Sm.), have the endochrome plates usually interrupted by the interposition of frequent lacunæ. Long before the division takes place in the case of the freshwater forms of *Pleurosigma*, the endochrome plates are cleft in the middle, so that there are four of them. They then move in pairs across the valves, whereupon the fission of the plasma takes place. Auxospores have not yet been found in the genus *Pleurosigma*.

Frustulia. Supposing the peculiarities of this group to be so marked as to justify the separation of the forms comprehended in it from the genus *Navicula*, and the establishment of a new genus to receive them, the name *Frustulia* has not been happily selected. The genus *Frustulia* as established by Agardh embraced very heterogeneous forms; and though afterwards considerably narrowed by the author in his 'Systema Algarum,' remained still indefinite. The genus was adopted by Rabenhorst, and was defined, Süsw. Diat. p. 50, "*Naviculæ* having on the side view longitudinal lines interrupted in the middle without central nodule, nestling in a gela-

tinous mass." The indefiniteness of this description is not removed by the illustrative figures of the forms. Subsequently the last-named author amended the genus and thus described it, "*Frustula navicularia solitaria vel geminatim—conjuncta, libera vel in muco amorpho nidulantia, valvis elliptico-lanceolatis nodulo centrali terminalibusque destitutis linea media medio interrupta.*" (Flora Europ. Alg. sect. 1, p. 227.) It is doubtful whether the character expressed in these words, "nodulo centrali terminalibusque destitutis," really applies to the forms Rabenhorst embraces in the genus; but if it be correct, it can scarcely agree with Pfitzer's description of the genus *Frustulia* as adopted by him, the characters of which are the strong longitudinal lines placed on either side of the median line, and the very peculiar form of the *nodules*. The arrangement of the internal contents of the cell is in the main the same as in that of the *Naviculæ*, but distinguished by this peculiarity, that the endochrome plates on either side in the middle of the cell are pushed out from the cell-walls by the interposition of a half-spherical mass of plasma. The division of the endochrome plates in the case of *N. saxonica* occurs by fission from the ends throughout, without any movement of the plates within the cell.

The genus as described by Pfitzer has the merit of possessing very distinctive and easily recognizable characters; it is nearly equivalent to the group of *Naviculæ* which Grunow names *Crassinerves*, as also to the genus *Vanheurckia*, adopted by De Brebisson.

As regards the auxospores in this genus, the circumstances are the same as in the *Naviculæ*.

Colletonema and *Schizonema*.—*Colletonema vulgare* as regards the structure of the cell very closely approximates *Frustulia*. A central granular plasma-mass and two endochrome plates lying on the girdle-bands are observable here, as are also the two masses of plasma interposed in the middle, between the cell-wall and the endochrome plates. Division of the endochrome plates is accomplished by fission from the ends without any movement of the plates. Other species of *Colletonema*, *C. neglectum*, and *C. eximium*, are more akin to *Navicula* and *Pleurosigma*; and Pfitzer consequently suggests that the genus *Colletonema* should be divided, or, better still, the species it embraces included in *Frustulia* and *Pleurosigma*.

The only species of *Schizonema* which Pfitzer has had the opportunity of observing in a living state is *S. cruciger*, and in this the circumstances of the movement and division of the endochrome plates were just as in *Navicula*.

In *Colletonema subcohærens*, according to the observation of Thwaites, two mother-cells produce two auxospores, and the process occurs occasionally outside the gelatinous tube. In *Schizonema Grevillii*, according to Smith, one mother-cell produces one auxospore, but according to Lüders this is abnormal, and occurs only when one of the auxospores withers off, the general rule being that two cells co-operate to produce two auxospores.

NOTES ON THE FLORA OF MALTA AND GOZO.

BY J. F. DUTHIE, B.A.

A residence of five months in Malta during the past winter and a portion of the spring has enabled me to gain some information concerning

the flowering plants of that island and the neighbouring one of Gozo. The flora is a rich one, considering the extremely rocky nature of the ground, a large portion of the surface of which consists of bare sheets of rock. In the fissures of these rocks many plants obtain nourishment, and the water which has collected during the winter in some of the depressions supports a few aquatics, such as *Ranunculus aquatilis*, *Callitriche*, *Zannichellia*, *Chara*, etc. The most characteristic plants must be sought for on the steep sides of some of the rocky valleys. There are a great many of these valleys, both in Malta and Gozo. In the former island they lack for the most part a continual flow of water, but nearly all of them show marks of having recently been subjected to the action of a considerable body of water. The greater portion of Malta has been denuded of those upper deposits which in Gozo are so favourable for the formation of springs; hence Gozo is on the whole much more fertile than Malta, and contains many plants not to be found in the latter island. Very little attention had been given to the flora of Malta until it was visited by Dr. Gavino Gulia, by whom several additional species were found. Dr. Gulia has commenced to publish a flora of these islands in the nos. of 'Il Barth,' a medical and natural science journal, of which he is the editor.* A catalogue of Maltese plants, by Dr. Grech Delicata, was published in 1853, and a very few localities for Gozo are there given. The introduction contains an account of the work done by previous botanists, among whom is Zerapha, who gave in his 'Floræ Melitensis Thesaurus' (1827 and 1831) a list, with short descriptions, of 644 species, *i. e.* 9 cryptogams, 489 phanerogams, and 146 cultivated for various purposes. Delicata enumerates 716 indigenous species, not including cryptogams. A great many species have since been added, and there is no doubt that continued work, especially in Gozo, will be the means of adding many more. Nearly all the plants of these islands are to be found in Sicily; a few are of African origin, but these are, generally speaking, local, and seem rather to be the remnants of a flora that existed previous to a migration from the north. The orders most largely represented are the *Leguminosæ*, especially *Trifolium* and *Medicago*, and the *Gramineæ*. With the exception of one or two sandy bays on the north-west of Malta, there are few localities suitable for the growth of seashore plants, as nearly the whole coast-line consists of steep bare cliffs.

The following are a few notes principally on plants observed by me in Malta and Gozo up to the end of March, 1872; and in offering them I feel conscious how very defective they are, and how much more complete they might have been had I been previously acquainted with the Mediterranean flora. I must not omit to acknowledge how much I am indebted to Dr. Gulia for his great kindness in helping me in very many ways:—

Clematis cirrhosa, L. A local plant in Malta. I found it flowering in November.

Anemone hortensis, L. I gathered a few specimens in Wied Babu† on Feb. 29th. It was mentioned by Zerapha as growing in Malta, but is not included in the later list of Delicata.

A. coronaria, L. Very common in fields from January to March.

* Dr. Gulia has given a list of Maltese *Compositæ* in the Bulletin of the Soc. Bot. France, tome xvi. p. 253.—[ED. JOURN. BOT.]

† Wied Babu is a gorge on the south coast, where many rare and some of the most interesting plants are to be found.

Ranunculus aquatilis, L. A variety of this is common, growing in the rocky pools in company with *Chara*, *Zannichellia*, and *Callitriche*. It is probably the *R. truncatus*, Koch. *R. peltatus*, De Cand., is also to be found in the island.

R. bullatus, L. Covering the open rocky ground and the slopes of the fortifications in November and December.

Papaver Rhœas, L., and its var. *P. strigosum*, Bönn. In cornfields.

P. dubium, L. Many varieties, including *P. Lamottei*, Bor., and *P. Lecogii*, Lam.

Fumaria capreolata, L. Several varieties, including one of which as yet I have seen no description. It is common in Wied Babu, and the following are its chief characters: — *Sepals* oblong, pointed, toothed, about equal to the fruit; *pedicels* twice as long as the acuminate bracts, ascending, dilating towards the apex, which is narrower than the neck of the fruit; *racemes* rather lax-flowered, elongate, and spreading after flowering; *fruit* globose, with two black dots at the apex. I have examined a great many specimens from different parts of the valley, in all of which the above characters are constant. I hope to be able to raise it from the seed.

Cardamine sylvatica, Link. Wied Xlendi, Gozo, Feb. 20th. Not previously recorded for these islands.

Diplotaxis scaposa, DC. Wied Babu and other places.

Draba verna, L. Two localities in Malta, in which island it was not known before. Dr. Gulia has gathered it in Gozo, where it is scarce.

Bunias Erucago, L. El Lunziata, Gozo.

Viola odorata, L. Rare. I found it in the Migiar Valley, Gozo.

Silene vespertina, Retz. One of the commonest plants of Malta; a more hairy form, having thicker leaves, and with the spaces between the calyx teeth more open, grows by the sea in sandy soil at Melleha and Marfa.

Silene inflata, var. *angustifolia*, De Cand. One specimen in Wied Xlendi, Gozo, with lilac flowers.

S. fruticosa, L. Very rare. I saw it in Wied Xlendi, Gozo, but not in flower, on March 21st.

Polycarpon alsinifolium, De Cand. On the hill Ta Harrax, Gozo, and at Melleha Bay, Malta. Not previously recorded for these islands, although Dr. Gulia told me that he had had reason to suspect the existence of more than one species of *Polycarpon*.

Malva hirsuta, L. Wied Xlendi, Gozo, March 21st.

Hypericum ægyptiacum, L. Common on the rocks by the sea, especially on the south and west coasts of Malta and Gozo. The flowers are dimorphous, having the stamens longer than the styles, and *vice versâ*, but never, as far as I could find, with both kinds of flower on the same plant.

Geranium Robertianum, L. A variety of this, resembling the *G. purpureum*, Jord., is common in many of the valleys, especially in Gozo.

Linum angustifolium, L. Sandy bay near Marfa, March 22nd. Not previously recorded.

Oxalis cernua, L. This plant, which was first noticed in Malta in 1811, has now become almost ubiquitous, and a pest to the farmer. Few spots appear uncongenial to its growth, for it may be found alike in the rich soil of the valley and by the sides of dusty roads and on wall-tops.

It is called in Malta 'Haxixa ta l'Englisi' (the English plant). It is a native of South Africa, whence, as Dr. Gulia says, it was introduced to the Botanic Garden, and from there as a centre it appears to have spread.

Ceratonia Siliqua, L. The Carob (Harruba, in Maltese) is quite a feature in the scenery of Malta, the dark foliage contrasting remarkably with the white rock. Dr. Gulia mentions two varieties, the one having large, smooth legumes, whilst in the other they are smooth and roundish.

Hedysarum capitatum, Desf. Marfa, March 22.

Rosa sempervirens, L. One plant, not in flower, in a crevice of a rocky valley near the village of Ashiack, Feb. 6th. Dr. Gulia has found it in Gozo.

Callitriche truncata, Guss. Abundant in the rocky pools. Dr. Gulia mentions three other species—*C. verna*, *C. stagnalis*, *C. pedunculata*, which last is very rare.

Senecio vernus, L. Wied Xlendi, Gozo. There is plenty of this in the neighbourhood of Cape San Dimittrio, in the north-west of the island.

Calendula sicula, Cyr. This handsome plant is plentiful in Wied Xlendi, Gozo.

Centaurea crassifolia, Bertol. Known only in the island of Malta. It was first described by Dr. Zerapha under the name *C. spathulata*, but Bertoloni gave to it the name by which it is at present known, Tenore having previously described a *C. spathulata* from Naples. It grows on the steep rocks in Wied Babu, and along the coast for some distance. I left Malta too early to see it in flower.

Prenanthes bulbosa, De Cand. Valley near Capo San Dimittrio, Gozo. New to Gozo.

Leontodon Taraxacum, L. The form I have chiefly noticed in Malta has rather long, narrow, pinnatifid leaves; all the bracts appendiculate below the tip; fruit light brown, its beak nearly twice its length.

Anagallis arvensis, L., and *A. cærulea*, Schreb. Very common by the roadsides, and often growing together in thick patches. Both have the edges of the corolla lobes glandular-ciliate, which does not seem to be generally the case with the latter.

Euphorbia Helioscopia, L. Very common. Stems always pilose in Malta.

E. melitensis, Parl. Plentiful on the south and west coasts of Malta and Gozo. The want of spinous branches, together with a few differences in the shape of the bracts and leaves distinguish it from *E. spinosa*, L.

E. melapetala, Gasparr. Wied Xlendi and Capo San Dimittrio, Gozo. New to Gozo.

E. exigua, L. Two forms, both common, the one having narrow acuminate leaves, the other with shorter leaves, which are very retuse at the apex (*E. retusa* of Gussone).

Mercurialis annua, L. One of the commonest plants in Malta. I did not succeed in finding the monœcious form.

Ophrys lunulata, Parl. Wied Babu, March 12th. Previously known only in Sicily. I have since heard that another locality has been found for it in Malta.

O. Speculum, Link. I was fortunate in finding a few specimens of this lovely *Ophrys* in Wied Xlendi, Gozo, March 21st. There is no previous record for it in these islands. It is found, according to Prof. Parlatore,

in Portugal, Spain, Sardinia, Naples, Sicily, Greece, Smyrna, Rhodes, and Algeria. Shortly afterwards some fine specimens were gathered in a valley near St. Julian's, Malta.

O. lutea, Cav., is another plant not before recorded for Malta, which is rather surprising; as, after finding a few specimens on March 3rd, I came, on the 27th, to a place where the ground was completely covered with it for some distance. Its presence in Malta is in accordance with its geographical distribution as given by Parlato.

O. fusca, Link. Rather common in Malta and Gozo. I saw some fine specimens in the latter island, one of them measuring over two feet. It varies much in the colour of the labellum.

O. bombyliflora, Link. Very common in Gozo on the sides of the valleys; less frequent in Malta.

Trichonema Columnæ, Reich.

Tamus communis, L. Migiar, Gozo, March 22nd. It grows also in Wied Xlendi. Not found in Malta.

Cyperus mucronatus, Rottb. Moist ground in a valley near Cape San Dimitrio, Gozo.

Schœnus mucronatus, L. Sandy ground, Melleha Bay, Feb. 21st.

Carex gynobasis, Vill. Wied Babu; valley near Ashiack.

Scolopendrium Hemionitis, Sw. Wied Xlendi, Gozo, Feb. 20th.

The following are the species I am able to record additional to those previously known:—*Cardamine sylvatica*, *Diploaxis scaposa*, *Bunias Erucago*, *Malva hirsuta*, *Hedysarum capitatum*, *Polycarpon alsinifolium*, *Senecio vernus*, *Ophrys lunulata*, *O. lutea*, *O. speculum*, *Trichonema Columnæ*, *Cyperus mucronatus*, *Schœnus mucronatus*, *Carex gynobasis*, *Scolopendrium Hemionitis*.

These are new to Malta:—*Draba verna*, *Rosa sempervirens*. And these had not been previously found in Gozo:—*Medicago elegans*, *Prenanthes bulbosa*, *Euphorbia melapetala*.

SHORT NOTES AND QUERIES.

SURREY ORCHIDS.—Recent numbers of the 'Gardeners' Chronicle' have been rendered more than usually interesting to English botanists, by several notes on the question as to what species of Orchideæ grow or have been found on the chalk of Surrey. In a letter printed at p. 466 of the 'Chronicle,' Mr. A. Choules mentioned that thirty-eight years ago he collected in the neighbourhood of Dorking nineteen orchids, including some very rare ones. This statement having (p. 542) been called in question by Mr. A. W. Bennett, and apparently (p. 564) by another correspondent, Mr. Choules was induced to publish a list of the species he found at the time alluded to. He says (p. 670): "On referring to my herbarium of British plants, I find that the following are the species that were collected by me: *Orchis ustulata*, *mascula*, *militaris*, *pyramidalis*, *maculata* and *Morio*; *Gymnadenia conopsea*; *Ophrys apifera*, *aranifera* and *muscifera*; *Listera ovata*; *Epipactis latifolia*; *Cephalanthera grandiflora* and *ensifolia*; *Aceras anthropophora*; *Habenaria bifolia*; *Neottia Nidus-avis* and *spiralis*, *Herminium Monorchis*." To these he has since (p. 734) added *Cephalanthera rubra* 'from Boxhill,' which he 'omitted

to insert' in the previous enumeration. With the exception of three, all these are well known to London botanists to occur, in greater or less abundance in different years, in the district, and are all given in Brewer's 'Flora of Surrey.' The three exceptions are *Orchis militaris*, *Ophrys aranifera*, and *Cephalanthera rubra*, the first and last of which have never been recorded for Surrey, whilst the second stands on dubious authority (see Fl. of Surrey, p. 229). By the kindness of Mr. Britten, I have been enabled to examine the plant called *O. militaris* by Mr. Choules, and can vouch for its correct nomenclature. It is a very interesting addition to the Surrey flora, and extends the range of the species, which has been much confounded with *O. Simia*, Lam. The counties which are known to have produced restricted *O. militaris*, are Kent, Surrey!, Middlesex! (see Journ. Bot. viii. 87), Herts, Bucks!, Berks!, Oxford!; but it is probably extinct in the first three or four. Mr. Choules's specimen was gathered "between Mickleham and Boxhill." The *O. aranifera* is wrongly named; the form of the lateral petals differs slightly from that of ordinary *O. apifera*, and the plant may perhaps be referred to *O. arachnites*, Reichard. As for *Cephalanthera rubra*, one of our rarest orchids, and only certainly known to have been found in Gloucestershire, an inspection of Mr. Choules's specimen shows that he mistook for it *Epipactis media*, a frequent plant on the Surrey chalk downs.—HENRY TRIMEN.

AUCUBA JAPONICA (p. 154).—In the instance recorded by Mr. Hart, hermaphrodite flowers appear to have been produced on plants derived from cuttings of the female originally introduced into Europe in 1783. The editorial note in the 'Gardeners' Chronicle,' that this occurrence was never remarked before the introduction of the male plant, is explained by the fact that in all the cases hitherto recorded, the hermaphrodite plants have been raised from seed produced in Europe. Further information will be found in a tract by E. Morren, 'L'Origine des variétés sous l'influence du climat artificiel des Jardins.' Changes in the mode of disposition of the sexual organs in diclinous plants are not very uncommon. Hermaphrodite maize is occasionally met with*; male plants of *Carica Papaya* are sometimes seen with a fruit at the extremity of some of their racemes; Dr. Moore has described a seedling plant of *Nepenthes distillatoria*, Hort. (*N. Khasiana*, Hook. f.) as bearing pistilliferous flowers at the base, and staminiferous at the top of its first produced raceme.† The Rev. M. J. Berkeley has recorded a case where flowers of a female plant of *Lychnis diurna* were attacked with *Ustilago*,‡ and in every case the rudimentary stamens had been forced into development.†—W. T. THISELTON DYER.

RUMEX BRITANNICA, L. I think I have been able to determine the *Rumex* to which Linnæus gave this unfortunate name. The source of the name is to be found by following up his reference to "Mat. Med. 17," i. e. 'Materia Medica,' paragraph 177 (not 17), where, under reference to Fl. Suec. 292, "Europæ nostræ paludes," is added "*Pharm. Herbaræ Britannicæ radix*." The North American plant to which he applied this name was one in his herbarium sent to him by Gronovius from Clayton's

* Himalayan Journals, 2nd ed. i. 148. † Trans. R. Irish. Acad. v. xxiv.

‡ Journ. R. Hort. Soc. 1872. p. xxxii.

herbarium of the Flora Virginica. The fruit of it is not well developed, but the slender pedicels and the foliage show that it is the *R. orbiculatus* of the later edition of my 'Manual.' But the specimen retained in Clayton's herbarium to represent the species, and the only *Rumex* in that herbarium, is quite different, has some long-awned teeth to the valves, and is, as I believe, *R. obtusifolius*. The difference in the plants accounts for the remark of Linnæus: "Plantam Gron. in Fl. Virginica habui a Cl. Authore, quæ non rubra erat caule aut costis." For Clayton's character, as printed by Gronovius in the first edition of Flora Virginica, was:—"Lapathum foliis longis latis vix acuminatis, costis caulibusque rubentibus, radice intus crocea." That probably relates to the plant retained by Gronovius. And the specimen sent was perhaps Clayton's other species, viz.,—"Lapathum aquaticum foliis longis," etc., which Linnæus referred to *R. verticillatus*. As to the *R. Britannica* of Michaux, Pursh, and even Meisner, it is uncertain whether they had in view the plant called by me in the 'Manual' by that name, but named by Professor Wood *R. altissimus*, or that which Wood and probably Pursh took for *R. Britannica*, and I named *R. orbiculatus*. The latter proves to be the Linnæan species, and must claim the name, unless that be regarded as a *nomen falsum*, in which case we must take up that of *R. Claytoni*, Campdera, who may be presumed to have meant the Linnæan plant, although there is nothing in his character to certify it. A considerable difficulty in identifying the Linnæan species by the description grew out of the comparison in the 'Species Plantarum' with *R. verticillatus*, with which when in fruit it has little in common, except the slender pedicels. It should also be noticed that there is a transposition in the naming of the specimens in the Linnæan Herbarium, which, however, has been corrected by Smith.—ASA GRAY, in Proc. Am. Acad., 1872, p. 399.

ANTHEMIS ANGLICA, Spreng. In the Banksian Herbarium of the British Museum are good specimens of this plant, which Dr. Syme (Eng. Bot. ed. 3. v. 51) no doubt rightly considers a maritime form of *A. arvensis*, labelled "Scotland, Mr. Parsons, 1766, Burrostowness." The true plant has been elsewhere found only at Sunderland, but the maritime form of *Pyrethrum inodorum* has frequently been mistaken for it.—JAMES BRITTEN.

ORCHIS TROLLII, Hegetsch. (*O. apifera*, var. *Trollii*, Reichenb.) A fine pot of this curious form containing some dozen specimens was shown at the Royal Horticultural Society's meeting on June 19th, by Mr. Green, gardener to W. Wilson Saunders, Esq. The plants were obtained near Reigate. I am indebted to Prof. Dyer for a specimen which agrees well with Reichenbach's figures (Ic. Fl. Germ. vol. viii., tab. 457, f. 2 and 465, f. 5), but less well with Hegetschweiler's original one (Fl. der Schweiz, tab. VIII.), which has the labellum much more prolonged, but may be an exaggeration. Reichenbach's definition "labello acute triangulo elongato lobis lateralibus plus minus obsolete" fits well the English specimens. The plant seems very scarce, having only been met with in Switzerland and France.—HENRY TRIMEN.

SALIX PONTEDERANA, Schl.? (p. 106.) The male plant. Shoots of the preceding year from two to four feet long, variable in colour from greenish to chestnut brown, quite smooth as well as the pointed buds. The

catkins are sessile with 1-3 bracts which are smooth above, ciliated at the margin, and downy beneath. Catkins about half an inch long and twice as long as broad, oval, blunt, less cylindrical than those of *S. rubra*, Huds., opening first at one side. The immature anthers both in *S. rubra* and in this plant are pink or red, but when withering they turn to a blackish brown. The filaments in the supposed *S. Pontederana* are combined very nearly throughout, giving to the anthers a somewhat notched appearance; but afterwards they are often separated, about half-way, as in *S. rubra*. The filaments are smooth. Nectary a single blunt rather short gland; scale black, blunt, but often tinged with pink at the base. The scale in *S. rubra* is very similar, but the filaments are always more decidedly cloven, and the nectary is longer; catkins and leaves alternate. Whatever this willow may be considered eventually, it has little resemblance to the Cinereæ with their downy shoots and buds and reflexed leaves when young. The leaves in *S. Pontederana* are elliptical, pointed, green, shining and smooth above, glaucous beneath, with wavy somewhat reflexed denticulations, sprinkled below with a few hairs, on a short downy petiole with a strong yellowish-brown midrib. The leaves are an inch and a half long and about half an inch broad, much more resembling those of the *Phylicifoliæ* than the Cinereæ both in texture and pubescence. The stipules are generally wanting, but when present are narrow lanceolate. When I first met with this willow at Rothbury, in Northumberland, by the side of the Coquet, where I have again seen it this year (1872), I took it for *S. rubra*, Huds., and was very much surprised when I saw the leaves. The male of *S. Pontederana*, Schl., is unknown to me, nor can I hear of any authentic specimens, therefore I add to the name a mark of doubt. When I first showed my specimens to an experienced friend, he named them *S. Croweana*, Sm., and it is rather singular that Trautvetter in Fl. Alt. vol. iv. p. 264, gives *S. Croweana* as a synonyme of *S. Pontederana*, Schl.' W., but he does not seem to have met with the male. In many respects the description in Flora Altaica agrees with my plant. I have specimens from Prof. Koch of *S. Pontederana* female, and also of *S. discolor*, Host. The latter has broader leaves and less coarsely serrated than my plant; the former agrees very well with what I have published as *S. Pontederana* female. Not having seen specimens of Dr. Wimmer's *S. Pontederana* I do not venture any opinion as to that distinguished botanist's views regarding this species.—J. E. LEEFE.

Extracts and Abstracts.

THE PHANEROGAMIC FLORA OF NOVA ZEMBLA ISLANDS.

BY E. R. V. TRAUTVETTER.

[The following list is taken from the author's 'Conspectus Floræ Insularum Nowaja Semlja,' published in the first volume of the 'Trudui Imperatorskago S. Peterburgskago Botanicheskago Sada' (Transactions of the St. Petersburg Imperial Botanic Garden), pp. 43-88; the critical notes, special localities, and occasional descriptions being omitted. It may be compared with interest with the list of Spitzbergen plants, by Malmgren, printed in the second volume of this Journal,

and with Prof. Babington's 'Flora of Iceland,' in the eleventh volume of the 'Journal of the Linnean Society.' The principal sources of information on Nova Zembla plants are the explorations of Baer in 1837, and Middendorff in 1870.]

1. *Thalictrum alpinum*, L.
2. *Ranunculus lapponicus*, L.
3. ——— *hyperboreus*, Rottb.
4. ——— *pygmæus*, Wahlenb. *R. affinis*, var. *leiocarpæ* forma *macrocalyx*, Trautv. Fl. Taimyr. no. 121!
5. ——— *nivalis*, L.
 Var. *typica*, Trautv.
 Var. *sulphurea*, Wahlenb. *R. sulphureus*, Soland. *R. altaicus*, Laxm. *R. sulphurei*, var. *altaica*, Trautv. in Bull. de la Soc. des Nat. de Mosc. 1860, i. p. 69.!
6. ——— *affinis*, R. Br. *R. affinis*, var. *dasycarpa*, Trautv. En. pl. Songor. in Bull. de la Soc. des Nat. de Mosc. 1860. i. p. 70.!
7. ——— *borealis*, Trautv. in Bull. de la Soc. des nat. de Mosc. 1860. i. p. 72.! *R. acer*, Schrenk. Samoj. Reise ii. p. 485 (saltem ex parte). *R. propinqui* var. *hirsuta*, Trautv. et Mey. Fl. Ochot, no. 16.! *R. lanuginosus*, Regel & Til. Fl. Ajan, p. 33.! *R. glabriusculus*, Rupr. Fl. Samoj. p. 19.! *R. lanuginosæformis*, Selin (sec N. J. Fellm). *R. acris*, var. *borealis*, Regel. Fl. Ussur. p. 9. *R. acris* var. *pumila*, Trautv. Fl. Taimyr. no. 122.!
8. *Caltha palustris*, L.
9. *Papaver alpinum*, L.
 Var. *nudicaulis*, Fisch. and Trautv. in Ind. iii. Semin. Hort Petrop. p. 13.! *P. nudicaule*, L.
10. *Matthiola nudicaulis*, Trautv. *Parrya nudicaulis*, Regel in Bull. de Mosc. 1870. ii. p. 256.! *Parrya macrocarpa*, R. Br. *P. arctica*, R. Br.
11. *Arabis alpina*, L.
12. ——— *petræa*, Lam.
13. *Cardamine bellidifolia*, L. *C. lenensis*, Andrz.
14. ——— *pratensis*, L.
- 15? *Schivereckia podolica*, Andrz. *Mönchia podolica*, Bess. En. pl. Volh. p. 36, 103.! *Draba podolica*, Rupr. Fl. Cauc. p. 291.
16. *Draba algida*, Adams.
 Var. *pilosa*, Trautv. *D. pilosa*, Adams in Mem. de la Soc. des Nat. de Mosc. iii. p. 248.
 Var. *ochroleuca*, Trautv. *D. ochroleuca*, Bunge Verz. der im J. 1852, im östl. Altai ges. Pflz. p. 69.! *D. samojedarum*, Rupr. Verbr. d. Pfl. in Nördl. Ural p. 30 (?)
 Var. *caulescens*, Trautv.
17. *Draba alpina*, L.
 Var. *legitima*, Lindbl.
 Var. *hebecarpa*, Lindbl. *D. macrocarpa*, Adams in Nouv. Mém. de la Soc. des. Nat. de Mosc. iii. p. 240 (forma *stigmata sessili*)?
D. alpina var. *glacialis* Th. M. Fries Pl. Ins. Spetsberg. no. 25.!
 Var. *caulescens*, Trautv.
18. ——— *glacialis*, Adams in Mém. de la Soc. des Nat. de Mosc. v. p. 106 (*leiocarpa*).

- Var. *trichocarpa*, Trautv. *D. glacialis*, var. γ . Hook. Fl. Bor. Americ. i. p. 51.
19. — *pauciflora*, R. Br.
 Var. *lasiocarpa*, Trautv. *D. lasiocarpa*, Adams in Mém. de la Soc. des Nat. de Mosc. iii. p. 248. *D. Adamsii*, Ledeb. Fl. Ross. i. p. 147. *D. astyla*, Bge. in Schrenk Samoj Reise i. p. 488! (sub *D. alpina*).
20. — *altaica*, Bge. Del. Sem. Hort. Dorp. a. 1841, p. viii.! *D. androsacea*, Baer in Bull. Scient de l'Acad. des Sc. de St. Petersb. iii. p. 174.!
21. — *nivalis*, Lilj. *D. muricella*, Wahlenb. Fl. Lapp. p. 174. t. xi. fig. 2.
22. — *arctica*, Vahl.
 Var. *typica*, Trautv. *D. arctica*, Fl. Dan. t. 2294. *D. rupestris*, Trautv. Fl. Taimyr. no. iii. ! (excl. synonym). *D. frigida*, Regel Fl. ajan. p. 49. ! *D. stellatæ* var. *hebecarpa*, Regel in Bull. de la Soc. des Nat. de Mosc. 1861, no. iii. p. 193.!
- Var. *scapigera*, Trautv. *D. arctica*, Th. M. Fries. Pl. Ins. Spetzberg, no. 29.!
23. — *hirta*, L.
 Var. *leiocarpa*, Regel & Tilg. Fl. Ajan. p. 49. *D. hirta*, Baer in Bull. Sc. de l'Acad. de Sc. de St. Petersb. iii. p. 174.
24. *Cochlearia officinalis*, L. *C. oblongifolia*, Dec. *C. arctica*, var. *oblongifolia*, Trautv. Fl. Taimyr. no. 114.!
25. — *arctica*, Schlecht. *C. anglica*, Wahlenb. Fl. Lapp. p. 177 (non Dec. Syst. Veg. ii. p. 364). *C. Wahlenbergii*, Rupr. Fl. Samoj. p. 21. *C. fenestrata*, Schrenk. Samoj. Reise ii. p. 489. ! *Cochlearia*, Baer in Bull. Scient. de l'Acad. des Sc. de St. Petersb. iii. p. 173.
26. *Sisymbrium alpinum*, Fourn. Rech. sur de genre Sisymb. p. 131. *Braya alpina*, Sternb. and Hoppe, Dec. Prod. i. p. 141.
 Var. *macrocarpa*, Trautv. *Braya purpurascens*, var. *longesiliquosa*, Trautv. Fl. Taimyr. n. 117.!
- Var. *glabella*, Trautv. *Braya glabella*, Richards. *B. purpurascens*, Ledeb. Fl. Ross i. p. 195 (exc. synonym). *Platypetalum purpurascens*, Baer l. c. p. 174, 180.!
27. — *Edwardsii*, Trautv. *Entrema Edwardsii*, R. Br.
 Var. *typica*, Trautv. *E. Edwardsii*, Ledeb. l. c. p. 197.
 Var. *parviflora*, Trautv. *E. parviflora*, Turcz. in Bull. de la Soc. des Nat. de Mosc. 1842. ii. p. 283.!
28. — *pygmæum*, Trautv. *Hesperis Hookeri*, Ledeb. Fl. Ross i. p. 174. ! *H. pygmæa*, Hook. Fl. bor. Am. i. p. 60. *H. Pallasii*, Torr. and Gray, Fl. N. Amer. i. p. 667. *Cheiranthus pygmæus*, Adams, l. c. vi. p. 114.
29. *Silene acaulis*, L.
30. *Lychnis apetala*, L. *Melandryum apetalum*, Fenzl.
 Var. *typica*, Trautv. *Lychnis apetala*, Baer l. c. iii. p. 180. ! *Wahlbergella apetala*, E. Fries. *Gasterolychnis uralensis*, Rupr. Verbr. d. Pfl. im. Nördl. Ural p. 30, 53. ! *Physolychnis uralensis*, Rupr. Sert. Tiansh. p. 41.
31. *Alsine verna*, Bartl.
 Var. *glacialis*, Fenzl. *Alsine rubella*, Wahlb. Fl. Lapp. p. 128. t. vi.

- Arenaria rubella*, Hook. *Alsine verna*, Schrenk. Samoj. Reise ii. p. 493. ! (ex parte).
32. *Arenaria ciliata*, L.
 Var. *frigida*, Koch. *A. ciliata*, Schrenk. l. c. ii. p. 493. !
33. *Stellaria longipes*, Goldie. *S. Edwardsii*, Rupr. Fl. Samoj. p. 20.
S. peduncularis, Bge.
 Var. *humilis*, Fenzl. *S. Edwardsii*, Trautv. Fl. Taim. p. 52. !
34. *Cerastium alpinum*, L. *C. vulgati* var. *heterophylla et Fischeriana*, Rupr. Fl. Samoj. p. 27. *C. vulgati* var. *grandiflora*, Rupr. Verbr. d. Pfl. in Nördl. Ural, p. 54. !
 Var. *hirsuta*, Wahlenb. l. c. p. 136.
 Var. *lanata*, Koch. l. c. p. 135.
 Var. *glabrata*, Wahlenb. l. c. p. 136. *C. alpini* var. *cæspitosa* (*C. cæspitosum*) Malmgr. Spetzberg. Fl. no. 30.
35. *Oxytropis sordida*, Pers. *O. campestris*, var. *sordida*, N. J. Fellm. Pl. Lapp. or. p. 18.
36. *Astragalus arcticus*, Bge. Astrag. i. p. 23. ii. p. 27. *Phaca astragalina*, Trautv. Fl. Taim. no. 87. ! Fl. Bogan, no. 73. !
Astragalus alpinus, Rupr. Fl. Samoj. p. 28.
37. ———— *umbellatus*, Bge. Astrag. i. p. 24, ii. p. 29. *Phacæ frigidæ* var. *littoralis*, Trautv. Fl. Taim. no. 86. !
38. *Hedysarum obscurum*, L.
39. *Dryas octopetala*, L.
40. *Potentilla sericea*, L.
 Var. *dasyphylla*, Ledeb. *P. dasyphylla*, Bunge Turcz. d. im J. 1832. im östl. altai ges. Pfl. p. 43, n. 148. ! *P. multicaulis*, Turcz. cat. pl. baic. in Bull. de la Soc. Mosc, 1838, p. 91 !
41. ———— *verna*. L. *P. salisburgensis*, Ledeb. Fl. Ross. ii. p. 55.
P. maculata, Malmg. Spetsb. Fl. n. 39.
42. ———— *fragiformis*, W. *P. gelida*, C. A. Mey.
 Var. *parviflora*, Trautv. *P. fragiformis*, Trautv. Fl. Taimyr. no. 85. !
P. emarginata, Pursh. *P. gelida*, var. *pilosior*, Ledeb. l. c. p. 59.
Potentilla fol. ternalis, Gmel. Fl. Sib. iii. p. 183, tab. xxxv. Fig. 2.
43. *Sedum Rhodiola*, L. *Rhodiola rosea*, L. *Sedum elongatum*, Ledeb. l. c. p. 178. *R. elongata*, Rupr. verbr. d. Pfl. in nordl. Ural. p. 60. !
 Var. *latifolia*, Regel and Til. Fl. Ajan, p. 89. *S. Rhodiola*, Schrenk, l. c. ii. p. 499. !
44. *Saxifraga oppositifolia*, L. *S. biflora*, Ledeb. l. c. ii. p. 205. ! (non All.)
45. ———— *flagellaris*, W.
 Var. *platysepala*, Trautv. Fl. Taim. n. 63.
46. *Saxifraga aizoides*, L.
47. ———— *Hirculus*, L.
48. ———— *stellaris*, L.
 Var. *foliolosa*, Turcz. in Bull. de la Soc. des Nat. de Mosc. 1838, i. p. 93. *S. foliolosa*. R. B. *S. stellaris*, var. *comosa*, Poir.
49. ———— *nivalis*, L.
50. ———— *hieracifolia*, Waldst. & Kit.
51. ———— *cernua*, L.
52. ———— *rivularis*, L.

53. *Saxifraga cæspitosa*, L.
54. *Chrysosplenium alternifolium*, L. *C. altern.*, var. *tetrandra*, Malmg. Spetsb. Fl. no. 32. *C. tetrandrum*, Th. M. Fries, l. c. n. 56.
55. *Pachypleurum alpinum*, Led. l. c. ii. p. 331. *Neogaya simplex*, Meisn.
56. *Valeriana capitata*, Pall.
57. *Nardosmia frigida*, Hook. *Tussilago frigida*, L. *Petasites frigida*, Fr. Summ. Veg. Scand. p. 4, 182.
58. *Erigeron alpinus*, L.
Var. *uniflora*, Trautv. En. pl. Song. in Bull. Mosc. 1866, ii. p. 340!
Erigeron uniflorus, L.
59. *Matricaria inodora*, L.
Var. *phæocephala*, Rupr. *Pyrethrum ambiguum*, Led. l. c. ii. 547!
60. *Artemisia vulgaris*, L.
Var. *Tilesii*, Led. l. c. p. 585. *A. Tilesii*, Ledeb.
61. ——— *borealis*, Pall.
Var. *Purshli*, Bess. *A. borealis*, Schrenk, l. c. p. 507.!
62. *Antennaria carpathica*, Bluff & Fingerh. *Gnaphalium carpath.*, Wahlenb.
63. *Senecio resedifolius*, DC.
64. *Taraxacum vulgare*, Schrenk. *T. officinale*, Weber.
Var. *arctica*, Trautv. *T. Scorzonera*, Trautv. Fl. Taim. no. 63! *T. phymatocarpum*, Th. M. Fries. l. c. no. 5! (non. Fl. Dan.)
65. *Campanula uniflora*, L.
66. *Vaccinium uliginosum*, L. *Vaccinium*, Baer, l. c. p. 175, 180.!
67. *Androsace septentrionalis*, L.
Var. *ciliata*, Trautv.
68. *Trientalis europæa*, L.
69. *Polemonium cæruleum*, L.
Var. *humilis*, Hook. Fl. Bor. Amer. ii. p. 71. *P. humile*, W. *P. pulchellum*, Bunge. *P. arcticum*, Nyland., Herb. Mus. Fenn. p. 107. *P. Richardsonii*, Grah. *P. cærulei* var. *pulchella*, N. J. Fellm. l. c. p. 44.
70. *Myosotis sylvatica*, Hoffm.
Var. *alpestris*, Koch. *M. alpestris*, Schmidt. *M. suaveolens*, W. & K.
71. *Eritrichium villosum*, Bge. *E. latifolium*, Rupr. Fl. Samoj. p. 50. *E. Chamissonis*, Rupr. Verbr. de Pfl. im Nördl. Ural. p. 68!
E. nanum, Schrenk, l. c. p. 360.
72. *Pedicularis sudetica*, W. *P. eriostachys*, Ledeb. herb.!
73. ——— *lanata*, Pall. *P. Langsdorfii*, var. $\beta.$, Stev. in Mém. Mosc. vi. p. 49.
Var. *dasyantha*, Trautv. *P. lanata*, Rupr. Ural. p. 27, 69! *P. Langsdorfii*, var. *gymnostemon*, Trautv. Fl. Taim. no. 40.!
74. ——— *hirsuta*, L.
75. ——— *versicolor*, Wahlenb. Fl. Suec. i. p. 404. *P. flammea*?
Baer, l. c. iii. p. 131.
76. *Oxyria reniformis*, Hook. *O. digyna*, Campd.
77. *Polygonum viviparum*, L.
Var. *alpina*, Wahlenb. Fl. Lapp. p. 99.
78. *Salix glauca*, L. *S. lanata*, Baer, l. c. p. 181, 190.!
79. ——— *arctica*, Pall. *S. reticulata*, Baer, l. c. p. 190.!

80. *Salix myrsinites*, L.
 Var. *genuina*, Trautv. *S. Brayii*, Baer, l. c. p. 180, 189. ! (non Ledeb.)
81. ——— *rotundifolia*, Trautv. Sal. frig. no. 15, t. xi. *S. retusæ* var. *rotundifolia*, Trevir. *S. herbacea*, Schrenk, l. c. p. 523. *S. herbacæ*, fol. integerrimis, N. J. Fellm. l. c. p. 56. *S. herbacea*, var. *flabellaris*, Anders. in DC. Prod xvi. p. 298. *S. Nummularia*, Anders. l. c. p. 298.
82. ——— *polaris*, Wahlenb.
83. *Luzula arcuata*, Wahlenb. *L. arctica*, Baer, l. c. p. 181.
 Var. *hyperborea*, N. J. Fellm. l. c. p. 68. *L. hyperboreæ* var. *major*, Hook. *L. hyperborea*, Malmg. l. c. no. 68. *L. arcuatæ* var. *confusa*, Ledeb.
 Var. *Hookeriana*, Trautv. *L. hyperboreæ* var. *minor*, Hook. *L. arctica*, Blytt. *L. hyperborea*, Th. M. Fries, l. c. no. 72. !
84. *Juncus biglumis*, L.
85. *Eriophorum vaginatum*, L. *E. cæspitosum*, Host.
86. ——— *Scheuchzeri*, Hoppe. *E. capitatum*, Host.
87. ——— *angustifolium*, Roth.
88. *Carex misandra*, R. Br. *C. fuliginosa*, Fries. Summ. Veg. Scand. p. 70. *C. frigidæ*, var. β . Trevir. in Led. l. c. iv. p. 294.
89. ——— *pulla*, Good. *C. vesicariæ* var. *alpigena*, Fries.
90. ——— *rigida*, Good. *C. saxatilis*, Wahlenb.
91. *salina*, Wahlenb. Fl. Lapp. p. 246. *C. subspathacea* and *C. salina*, Led. l. c. iv. p. 304, 313.
 Var. *nana*, Trautv. *C. salina*, Th. M. Fr. l. c. no 78. ! *C. livida*, Schrenk, l. c. p. 31. !
92. *Festuca ovina*, L.
 Var. *violacea*, Gaud. Var. *alpestris*, N. J. Fellm. l. c.—*Forma normalis*. *F. ovinae* var. *violacea*, Malmg. l. c. no. 92. *F. ovina*, Trautv. Fl. bogan, no. 7. !—*Forma vivipara*; *F. ovinae* var. *vivipara*, L.
93. ——— *alpina*, L.
94. ——— *arctica*, R. Br. *P. flexuosa*, Wahlenb. *P. cenisia*, Fries.
95. ——— *pratensis*, L.
96. *Catabrosa algida*, Fries. *Phippsia algida*, R. Br. *Poa algida*, Rupr. Fl. Samoj. p. 61.
97. *Dupontia Fischeri*, R. Br. *D. pelligera*, Rupr. l. c. p. 64. !
Dupontia sp. e Nowaya Semlja. Rupr. l. c.
98. *Pleuropogon Sabinii*, R. Br. Supp. to App. of Parry's Voy. p. 189, t. iii.
 Var. *humilior*, R. Br. l. c.
99. *Hierochloe pauciflora*, R. Br. *H. racemosa*, Trin.
100. ——— *alpina*, R. and S.
101. *Aira subspicata*, Clairv. *Trisetum subspicatum*, Trin.
102. ——— *cæspitosa*, L. *Deschampsia cæsp.*, P. B.
 Var. *borealis*, Trautv. Var. *minor*, Trautv. Fl. Taim. no. 6. ! (non Kunth.)
 Var. *brevifolia*, Trautv. *Deschampsia brevifolia*, R. Br.
 Var. *grandifolia*, Trautv. l. c. no. 6. !—*Forma normalis*.—*Forma vivipara*, *Aira alpina*, Th. M. Fries, l. c. no. 102 ! (non Wahlenb.).

103. *Arctagrostis latifolia*, Griseb. *Colpodium latifolium*, R. Br. *Cinna Brownii*, Rupr. l. c. p. 14, 66.
104. *Equisetum arvense*, L.
Var. *arctica*, Ledeb. l. c. iv. p. 436. *E. arcticum*, Rupr. distr. Crypt. vasc. p. 21.
105. *Cystopteris fragilis*, Bernh. *Woodsia ilvensis*, Baer, l. c. iii. p. 181.

Proceedings of Societies.

LINNEAN SOCIETY.—*April 18th*, G. Bentham, Esq., F.R.S., in the chair. The following communications were read:—"On *Begonella*, a new genus of Begoniaceæ from New Granada," by Prof. Oliver. *B. Whitei*, the only species, was described. It is an erect herb, with thin velvety leaves, the flowers have a gamophyllous perianth, and are monœcious; there are four stamens, apparently didynamous, the ovary is that of *Begonia*. "On three new genera of plants in the Malayan herbarium of the late Dr. Maingay," by the same. *Maingaya*, referred to Hamamelideæ, and *Ctenolophon* and *Pteleocarpa* (with two species) to Olacineæ. "Note on the determination of *Camellia? Scottiana*, Wall. and *Ternstroemia coriacea*, Wall." by Professor Thiselton Dyer. In the 'Journal of the Asiatic Society' (iv. p. 42) it is stated in an official letter from the committee of tea culture, on the subject of the recent discovery of the Tea plant in Assam, that "so far back as 1826 the late ingenious Mr. David Scott sent down from Munipore specimens of the leaves of a shrub which he insisted was a real tea." In Dr. Wallich's Herbarium at the Linnean Society there are two leaves from Munipur labelled *Camellia? Scottiana*, which may be referred without hesitation to the Tea plant. They are accompanied by the postscript of a letter from D. Scott to James Kyd, of Calcutta, in which it is stated "that a Chinaman that is here says that it" (the plant to which the leaves belonged) "is the true tea plant." There is, therefore, no reason to doubt that these two leaves (the only existing authentic specimens of *Camellia Scottiana*) are historically the earliest recognised evidence of the existence of the Tea in Assam. Owing to an error in the labelling of the Wallichian plants in the Hookerian Herbarium, Choisy, without consulting the original types, identified *Camellia Scottiana* with *Adinandra dumosa*, Jack, and his determination is quoted without question by Seemann. Through a similar error *Ternstroemia? coriacea*, Wall. which appears to be *Adinandra acuminata*, Korth, is identified by Choisy with *Polyspora axillaria*, Don (*Gordonia anomala*, Spreng). "On *Zoopsis*," by Dr. Lindberg, communicated by Dr. Braithwaite.

May 2nd, G. Bentham, Esq., F.R.S., in the chair. John Miers, Esq., exhibited specimens of a fibre from Brazil, as fine as cotton, and stated it to be the produce probably of some Apocynous plant. The following paper was read:—"Note on *Alibertia*," by J. Correa de Mélo, translated by J. Miers, Esq., and communicated by D. Hanbury, Esq. *Alibertia edulis* is a small Rubiaceous tree, found near Campinas, which produces a globose berry, the pulp of which is of good flavour and edible. The male plant seems to be the *Gardenia sessilis* of Velloso.

BOTANICAL SOCIETY OF EDINBURGH, 11th April.—Alexander Buchan, M.A., Vice-president, in the chair. The following communications were read:—"Notes on the cultivation and preparation of Lactucarium," by Thomas Fairgrieve, communicated by Jas. Paton; on "Fossil Plants found in the Coal-fields of Slammanan, Falkirk, Deeside, and Tillicoultry," by C. W. Peach, A.L.S.; Report on the open-air vegetation at the Royal Botanic Garden (No. III., 1872), by Mr. McNab.

9th May.—Professor Wyville Thomson, President, in the chair. The following communications were read:—Unpublished letters by the late Dr. Alex. Carroll Maingay, communicated by Sir Walter Elliot; "Results of Botanical Travels in the region of the Rocky Mountains, during the years 1863 to 1866," by Robert Brown, Ph. D.; Notice of new localities for plants near Edinburgh, by I. Bayley Balfour. The author enumerated upwards of thirty species of plants which he had met with in the neighbourhood of Edinburgh, in localities not hitherto recorded. Some of them, however, were not indigenous in these stations, *e. g.* *Helleborus viridis*, *Erysimum orientale*, *Koniga maritima*, *Geranium nodosum*, *Onobrychis sativa*, *Aster salicifolius*, *Polygonatum multiflorum*, and *Allium paradoxum*. The latter plant was found abundantly in woods at Carlowrie; it had formerly been gathered at Arniston and Binny Craig. Professor Balfour exhibited growing plants of Ipecacuan in flower. He stated that the Ipecacuan plants which had been long cultivated in the Botanic Garden, and flowered freely, produced only flowers with long stamens and short styles.

Botanical News.

ARTICLES IN JOURNALS.

Linnaea (April, 1872). O. Böckeler, "The Cyperaceæ of the Royal Berlin herbarium" (concluded).—C. Müller, "Musci australici præsertim Brisbanici novi."—E. Hampe, "Hypna duo Australiæ."—P. Rohrbach, "Contributions to a knowledge of the Caryophyllineæ."

Bulletin de la Soc. Bot. de France, tom. xviii. no. 2 (Séances 14 July—10 Nov. 1871).—A. Delondre, "Recent progress of Cinchona plantation in British India."—C. Roumeguère, "On two Hymenomycetous Fungi destructive to woodwork (*Merulius lacrimans* and *Polyporus obducens*)"—E. Cosson, "Directions for making botanical observations and collections" (concluded).—Germain de S. Pierre, "On the course of the sap and the origin of the tissues."—A. Brongniart and A. Gris, "Supplement to the Coniferæ of New Caledonia" (three new species described, *Araucaria Balansæ*, *A. montana*, *Libocedrus austrocaledonica*).—A. Brongniart, "On the nature of the cone in Coniferæ."—J. B. Martinet, "On the grandular organs of Rutaceæ."—Chaboisseau, "On *Nitella syncarpa*, Thuill. and *Chara connivens*, Salzm." (Tab. I.)—F. S. Cordier, "On the genus *Cordiceps*."—A. Delondre, "On the introduction of new species or varieties of Cinchona into British India, etc."—E. Mer, "The physiological action of freezing on plants."—D. Clos, "On the genera *Pavia* and *Timbalia*" (= *Cratægus pyracantha*, L.)—Boulay, "On the distribution of Mosses in the Vosges and the Jura."—A. Brongniart and

A. Gris, "Note on *Garniera*, a new genus of Proteaceæ (*Cenarrhenes spathulæfolia*, A. Br. and A. Gris in Ann. Sc. Nat. ser. 5. t. iii.)—*A. Chabert*, "Plants of the neighbourhood of Fontainebleau" (*Viola arenicola*, sp. nov., very near *V. sylvestris*, Fries).—*Chaboisseau*, "Notes on some rare and curious botanical books."

MAY.

Monthly Microscopical Journal.—*H. J. Slack*, "The supposed Fungus on *Coleus* leaves, and notes on *Podisoma fuscum* and *P. Juniperi*" (The bodies believed by Mr. Berkeley (see pp. 23 and 72) to be a species of *Synchytrium*, are referred to glands on the exterior of the leaf.*)

Geological Magazine.—*W. T. T. Dyer*, "On Oolitic Coniferæ" (Revision of *Athrotaxites*; *Pinites Solenhofensis*, sp. nov.; *Condylites*, gen. nov.)

Botanische Zeitung.—*F. Buchenau*, "On the development of the flowers in the Compositæ" (Tab. 5).—*J. Sachs*, "Researches on the growth of roots in length."—*E. v. Janczewski*, "Comparison of the modes of development of Archegonia."

Flora.—*S. Schwendener*, "Discussion on the gonidia question."—*A. Ernst*, "Further observation on the structure of the flowers of *Euphorbia*" (tab. 5).—*A. Geheeb*, "Bryological notes from the Rhöngebirge."

Journal of the Linnean Society.—(29th May). *N. A. Dalzell*, "Remarks on *Dolichos uniflorus*, Lam."—*A. W. Bennett*, "On the floral structure of *Impatiens fulva*, Nutt., with especial reference to the imperfect self-fertilized flowers" (Tab. 3).—*D. Hanbury*, "Note on *Amomum angustifolium*, Sonnerat."—*M. J. Berkeley*, "Australian Fungi, principally from Baron F. von Mueller and Dr. R. Schomburgk."—*G. Dickie*, "On the marine Algæ of the island of St. Helena."—*S. O. Lindberg*, "Remarks on *Mesotus*, Mitten."—*N. A. Dalzell*, "New Leguminosæ from Western Asia."—*S. O. Lindberg*, "On *Zoopsis*."

New Books.—*A. Smee*, F.R.S. 'My Garden, its Plan and Culture, together with a general description of its Geology, Botany, and Natural History.' (Bell and Daldy, 21s.) *J. H. Balfour*, 'First Book of Botany.' *J. Boswell Syme*, 'English Botany, part 83,' completing the Grasses (Hardwicke). *R. de Visiani*, 'Floræ Dalmaticæ Supplementum (with 10 plates).' *Asa Gray*, 'How Plants Behave' (Iverson, New York).

Two parts of the 4th volume of Prof. Baillon's Monographies have appeared, one containing Nyctaginacées and Phytolaccacées, and the other Malvacées.

An addition to the Rev. W. A. Leighton's 'Lichen Flora of Great Britain' has been issued by the author, consisting of an Introduction to the study of Lichens (pp. i.-ix.), a list of authors cited (pp. x.-xv.) a glossary of terms (pp. xvi.-xlvii.), and an appendix (pp. 468-485) of additions and corrections. There is also a complete index to species and synonyms. The absence of these parts considerably impaired the usefulness, as an elementary text-book, of the original volume, and it is

* Mr. Berkeley himself has doubts as to the bodies being parasitic organisms.

satisfactory to get them now. It is, however, to be regretted that the Introduction to Lichenology was not made somewhat fuller; though of course what we have is accurate, it is far too condensed. Some of the space occupied by the glossary, which is unnecessarily copious, might have been better filled by more details of the general structure of the Order, to which no more than two pages and a half are devoted. The "additions and corrections" contain a re-arrangement of the genus *Ramalina* in accordance with Nylander's recent monograph, and numerous additional localities. Those who possess Mr. Leighton's book as at first issued, will find it necessary to obtain this useful Supplement, which is evidently intended to be bound up with it.

Mr. Alexander Irvine of 28, Upper Manor Street, Chelsea, S.W., is preparing a new work on the British plants, a condensed summary of the characters of the orders, genera, and species; as he is very desirous to get information about all recent additions to the species and hitherto unpublished localities, any assistance on these heads will be duly appreciated and thankfully acknowledged. The price to subscribers will not exceed 5s.

The Linnean Society has been very prolific lately in publications. The recently issued first part of the 29th volume of the 'Transactions,' is occupied by the first instalment of the Botany of the Speke and Grant Expedition from Zanzibar to Egypt in 1860. This consists of an introduction by Col. Grant containing an outline of the route, illustrated by a capital map, and remarks on the aspect of the country, an extensive list of native plant-names, and an enumeration of the species as far as Leguminosæ, with descriptions where necessary, and general remarks. *Oncoba stipulata*, Oliv. and *Tephrosia eriosemoides*, Oliv. are the only species additional to those included in the recently published volumes of the 'Flora of Tropical Africa.' A selection of thirty-seven of the more interesting species is figured, Col. Grant having undertaken to have no less than one hundred plates drawn at his own expense to illustrate this valuable contribution to African botany.

The 'Proceedings of the American Academy of Arts and Sciences' for Feb., 1872 (issued May, 1872), contains Dr. Asa Gray's determination of Elihu Hall's collections made in Oregon in 1871 about 700 species of Phanerogams and Ferns with descriptions of most of the new species, about fourteen, and various notes of value. There are also some supplementary remarks on N. American Labiatae by the same author, in which several new species are described.

Space will not allow us to reproduce Mr. Bentham's valuable address to the Linnean Society, which has been printed and distributed to the Fellows. Very extensive extracts have appeared in 'Nature.'

In the first part of the 'Berichte des nat. med. Verein in Innsbrück,' for 1872, A. Kerner has described ten new *Rubi* from the Tyrol.

Several papers, specially interesting to English botanists, are to be found in the last-published part of the 'Abhandlungen' of the Natural History Society of Bremen, especially a Flora of the Islands of East Friesland (including Wangeroog) by C. Nöldeke, with the Mosses by C. E. Eiben, and an account of the *Salicorniæ* of the German coast of the North Sea, by F. Buchenau and W. O. Focke.

There is a curious remark in a foot-note to Dr. Lindberg's valuable and suggestive paper on *Zoopsis*, printed in the 'Journal of the Linn.

Soc.' Quoting from a letter of Dr. Carrington's, he writes: "Dr. Gray says that a friend of his named Bennett, a most promising young botanist who died early, undertook the Hepaticæ in Gray's 'Nat. Arr.'" Dr. J. E. Gray has distinctly claimed the authorship of the "systematic" portion of S. F. Gray's "Natural Arrangement" in the Ann. and Mag. of Nat. Hist. for 1861 (p. 405), and his statement is quoted by Mr. Carruthers, in a paper on the nomenclature of the British Hepaticæ in this Journal (vol. iii., p. 297). Dr. Gray acknowledges the help which he received from others, but it cannot be correct to quote any authority but "Gray" for the names given in the book. The "promising young botanist who died young," must have been E. T. Bennett, at one time secretary to the Zoological Society, and brother to J. J. Bennett, who lately resigned the Keepership of Botany in the British Museum.

Mr. James Britten, British Museum, will be glad to send his recently printed list of Berkshire plants to any botanist desirous of possessing it.

Professor Hofmeister will replace the late Von Mohl at the University of Tübingen.

Dr. M. T. Masters has been elected a Corresponding Member of the Royal Society of Liège.

Professor Crépin has been appointed Conservator of the Royal Belgian Museum of Natural History, with special care of the section of vegetable Palæontology.

The 42nd meeting of the British Association will be held at Brighton in the week August 14th—21st.

The death is announced, at Grazeley Lodge, near Reading, of Robert Wight, M.D., F.R.S., on May 26th. Dr. Wight was 76 years of age, and had spent much of his life in India, to the flora of which he devoted himself. He went out to Madras in 1819, and had care of the Botanic Gardens there for some years, and was also surgeon to a native regiment. The 'Prodromus Floræ Indiæ Orientalis,' published in conjunction with Dr. Arnott in 1834, unfortunately never extended beyond the first volume (to the Dipsacaceæ), but is remarkable for the great and uniform accuracy and sagacity displayed by its author. The 'Illustrations of Indian Botany' was commenced in 1838 and terminated in 1850, containing 102 coloured plates, whilst the 'Icones Plantarum Indiæ Orientalis' has uncoloured plates, 2101 in number. Dr. Wight's untiring energy in very adverse circumstances was further shown by other works, of which the 'Spicilegium Neilgherriense' is the most important, and by numerous papers in English and Indian journals. He finally left India in 1853, and shortly before his death presented to the Kew Herbarium his important Indian collection of over 4000 species. Dr. Wight greatly interested himself in the naturalization of cotton in India, and was superintendent of the cotton plantations at Coimbatore, Madras.

Mark John McKen, late Curator of the Botanic Garden, Natal, died on April 20th, at the age of 48, from hepatic disease. He was a native of Galloway, and spent some of his earlier years in Jamaica. He went to Natal in 1850 and became Curator of the Garden there the next year, but resigned the appointment in 1853, having accepted a situation in connection with the Tongut Sugar Estate. After making several botanical expeditions in the Zulu country, he again in 1860 took charge of the Natal Garden, and from that time till his death has devoted himself to his duties there. The Royal Gardens at Kew are greatly indebted to Mr.

McKen for living plants and seeds of South African species, and our herbaria have been much enriched by the results of his explorations in Natal and the adjacent districts.

On May 22nd, died G. F. Reuter, at Geneva, where he held the post of Director of the Botanic Gardens. He was the author of 'Catalogue des plantes vasculaires de Genève,' (1832), and of 'Essai sur la végétation de la nouvelle Castille,' (1843), besides the monograph of the Orobanchaceæ in DC.'s Prodrômus, vol. xi, and in conjunction with Margot of an essay on the flora of the Island of Zante. He was on terms of intimate friendship with the eminent botanist M. Boissier, and was with him part author of 'Diagnoses plantarum nov. Hispanicarum,' and 'Pugillus plant. nov. Africæ borealis, etc.'

We greatly regret to have to chronicle also the death, at 25 years of age, of Robert Creaser Kingston, of the Herbarium of the Royal Gardens, Kew. After employment in the Gardens themselves, he entered the Herbarium in 1868 and worked there indefatigably, acquiring a very extensive knowledge of plants. His death, which occurred on June 21st, after a long illness, doubtless the result of overwork, is a loss to the small staff of the Kew Herbarium, which it will be difficult to supply. His name is commemorated in the genus *Kingstonia* (Anonaceæ), recently defined by Dr. Hooker in the Flora of British India. Mr. Kingston had collected material for a Flora of the East Riding of Yorkshire.

We can only allude to the deaths of Dr. G. M. v. Martens, on the 24th Feb., at Stuttgart, in his 84th year, author of Floras of Venice and of Wurtemberg; of Dr. M. A. Curtis, the well-known American cryptogamist, which occurred suddenly on April 10th, just before completing the 64th year of his age; and of Dr. G. Dolliner, author of a Flora of Lower Austria, in India, on April 16th.

For sale, a large herbarium of British Plants, containing upwards of 5000 specimens, both Phanerogams and Cryptogams, carefully selected, named and mounted in 50 half-bound Russia portfolios. Apply to S. G., Messrs. Gladding and Son, Aldine Chambers, 13, Paternoster Row, E.C.

Dr. Rabenhorst (Dresden) has for sale the following selection of species from Valdivia (Chili), collected in the winter of 1870-71, by his son Rudolf. The plants have been examined and determined by Herr v. Krempelhuber. The price is six shillings, carriage free. *Lecanora punicea*, Ach., var. *septem-ocularis*, Krphb., *L. coarctata*, Ach., *L. conizæa*, Ach., *L. addubitata*, Krphb. *nov. spec.*, *Arthonia*?, *A. epipacta*, Ach., *Chrysothrix nolitangere*, Montagne, *cum fructu!*, *Bacidia effusa*, Borr.?, *Blastenia fusco-ferruginea*, Krphb. *nov. spec.*, *B. cinnabarina* (Ach.) Mass., *Physcia chrysophthalma* (L.) Schaer., *Ramalina Ekloni*, Spr., *Usnea ceratina*, Ach., *Lecidea æruginosa*, Nyl., *L. crustulata*, Flk., f. *hypothecio infusato*, *atro-fusco*, *Parmelia proluxa*, Ach., *P. conspersa*, Ach., *Physcia flavicans*, var. *acromela*, Pers., *Buellia tumida* (Mass.), Krphb. (= *B. italica*, var. *tumida* Mass.), *B. italica*, var. *lactea*, Mass., *Pertusaria Wawreana*, Mass., f. *spermagonifera*, *P. melanospora*, Nyl., *Amphiloma murorum*, Hoffm., *Lichen dubius*, non rite evolutus.

Corrigenda: p. 172, line 13 from bottom, for "Tunbridge Wells," read "Bath." P. 179, last line, for "Van Heurck of Antwerp," read "Morren of Liège."

Original Articles.

RANUNCULUS CHÆROPHYLLUS, L., AUCT. IN JERSEY.

BY HENRY TRIMEN, M.B., F.L.S.

(PLATE CXXV.)

I have been asked by Dr. Bull, who had the good fortune to detect the subject of this article in Jersey (as noticed at p. 175 of this volume), to write a description of it to accompany a figure. Though it is not possible to consider the flora of the Channel Islands as other than a portion of that of Western France, the plants found in them have been so constantly included in all English descriptive Floras, as to have acquired a sort of right to be reckoned British. It is hoped, too, that by calling attention to a species very liable from several causes to be overlooked, a search may be set on foot in suitable spots of our southern and western counties (especially Cornwall and Devon), which may not improbably result in showing *Ranunculus Chærophyllos* to be really an English plant.

The specimens sent by Dr. Bull were collected in the early part of May, on a small piece of dry uncultivated land sloping to the west, and on clay slate, close to the town of S. Aubin's. At that time the plant was in full flower, and possessed but few leaves, these apparently decaying mostly before the flowers open. All attempts to obtain ripe fruit from Jersey have been unsuccessful; the carpels of the plants in their native place did not develope themselves, the whole plant dried up rapidly, and at the end of June no trace of it could be seen; but the spot had been grazed down by cows. Four plants transplanted into the garden by Dr. Bull however, also withered and dried up without the carpels swelling; and he thinks it likely that in these extreme limits of its geographical distribution, the plant rarely fruits, but depends on the subterranean stolons for its propagation. He adds, "as it dries up and disappears so early in a damp season like this, it is no wonder that it has escaped the notice of other botanists."

The following description is, with the exception of that of the fruit, entirely drawn up from Jersey specimens, to which only it applies.

Ranunculus Chærophyllos, L., Auct. *Root* composed of numerous short, ovoid, whitish tubercles, blunt or tapering into long filiform fibres, mixed with slender ordinary root-fibres; *stem* erect, six inches to one foot high, surrounded at the base with the fibrous remains of leaf-stalks, terete, usually unbranched, rarely with one or two branches, covered with white silky hairs somewhat spreading, except in the upper part where they are sub-pressed; *stolons* three to five inches long, very slender, arising from the crown of the root immediately above the tubercles, and at points situated between adjacent ones, with a loose, amplexicaul, colourless scale at two or three points, and terminated by a plantlet consisting of several small tubercles, and a few little ovate or three-toothed

hairy leaves on long petioles; *leaves* (radical) in the flowering plant few, on long petioles somewhat dilated at base, trifoliolate, the terminal leaflet long-stalked, all deeply divided into 3 to 5 wedge-shaped segments, which are cut into, usually, 3 more or less broadly linear bluntish divisions; stem-leaf usually single, rarely two or three, simple, deeply divided into 3 linear or linear-lanceolate, entire, or trifid segments—all covered on both sides with hairs similar to those on the stem; *flower* usually solitary, terminal (rarely two, three or more), large, 1 to $1\frac{1}{4}$ inch in diameter; *peduncle* not furrowed, somewhat thickened upwards, densely hairy beneath the flower; *receptacle* conical in its lower part, upon which the floral envelopes and stamens are inserted, narrowed below the pistil, and ending in a slender fusiform portion to which the carpels are attached; *sepals* with a broad membranous margin, bluntish, pale brown and hairy externally, smooth and yellow within, spreading in recently expanded flowers, and quickly caducous; *petals* broadly ovate, with a wedge-shaped base; nectary covered by an oblong truncate yellow scale; *stamens* very numerous, longer than the pistil, filament dilated upwards, connective broad, anther innate, blunt, slightly curved backward; *carpels* very numerous, densely crowded, falcate, style long; *fruit** consisting of numerous closely-packed achenia, forming an oblong squarrose head $\frac{1}{2}$ – $\frac{5}{8}$ inch long by $\frac{1}{4}$ inch wide; achenia greatly compressed, upper edge carried on into an acute slightly curved beak, lower edge rounded, sides minutely shagreened (under a lens), brownish, with a conspicuous green margin.

Though easily passed by for *R. bulbosus* on a superficial view, there is no possibility after examination of mistaking this for any British species of the genus.

In Continental specimens there is great variety in the form of the root-leaves, which range from roundish or fan-shaped with a few large teeth (*R. flabellatus*, Desf.), through trifid (*R. gregarius*, Brot.), to such as those described above. Several authors have described the sepals as reflexed, but this is not the case in any specimens which I have seen. The peduncles are not furrowed, but, as noticed by Mérat (Fl. des Env. de Paris, ii. p. 350), when dry with ripe fruit, striæ can be seen after the hairs are detached.

Good descriptions are given in Cosson and Germain's 'Flore de Paris' (ed. 2, p. 16), Bertoloni's 'Flora Italica' (vol. v. p. 525), etc. It is less easy to quote a satisfactory figure. Barrelier's, given by many authors, is very unsatisfactory, and probably a different thing. Columna's, though so old (1616), is as usual very carefully done, and Morison's (Hist. Oxon. sect. 4, tab. xxx. fig. 44) fair. The only modern figure is the artistic drawing of '*R. flabellatus*' in Fl. Græca, t. 520, which is, however, very imperfect and even inaccurate. The specimens published in Billot's 'Exsiccata,' nos. 910 and 910 bis, are quite like the Jersey plants.

Distribution.—Widely spread through the Mediterranean region, extending as far east as the Lebanon range, and occurring also in N. Africa, the islands of the Greek Archipelago, and most parts of southern and western Europe. There are specimens in the British Museum from:—*France*, near Paris, and many places in the western and southern provinces (Jordan, Bourgeau, Chaboisseau, J. Woods, etc.); *Spain* (Bourgeau,

* Described from French specimens.

Graells); *Portugal*, *R. gregarius*, Brot. ! (Masson, Sir T. Gage) and *R. dimorphorrhizus*, Brot. (Welwitsch); *Corsica*, *R. insularis*, Viv. (Soleirol), *N. Italy* (Savi, Woods); *Sicily* (Huet de Pavillon, Todaro); *Greece* (Heldreich); *Crete*, *R. flabellatus*, Desf. (Heldreich); *Algeria* (Balansa). It is also recorded from Turkey, Dalmatia, and the islands of Sardinia and Cyprus. Nyman gives Belgium, but the species is not included in Crépin's 'Manuel.' The addition of Jersey does not greatly extend its range, as it occurs on the cliffs at Carteret, in the department of La Manche, Normandy, scarcely twenty miles away. Dry grassy spots near the sea appear to be the favourite localities.

It has been doubted whether the name *R. Chærophyllus*, L., is rightly applied to this species, and with some justice. Linnæus founded his species (Sp. Plant. ed. 1, p. 555) on the descriptions and figures of Columna, (Ecphrasis, p. 312 and t. 311), Barrelier (Plant. Gall. etc. p. 56, fig. 581) and Guettard (Obs. Etamp. i. p. 275), adopting for his definition word for word the descriptive name of the latter author, *R. calycibus retroflexis, pedunculis sulcatis, caule erecto, foliis compositis, radice granulosa*, which is certainly a very faulty one if intended for the plant. In the second edition of the 'Sp. Plant.,' Linnæus (p. 780) rendered his definition still less characteristic of the plant in question by omitting the character of the root, and added *unifloro* to the stem, and *lineari-multifidis* to the leaves; he, however, quotes additional synonyms, and also the description of C. Bauhin, made from Italian specimens, in his 'Prodromus,' p. 95, n. iv., which is a very good one of our plant. It is probable, therefore, from a consideration of his synonymy—for, though what Barrelier meant is doubtful, Columna's description and figure are excellent,* and even Guettard's bad description doubtless meant the same—that Linnæus intended by the name *R. Chærophyllus* the plant generally now so called, though it seems certain that he only knew it from books.

This appears still more evident from an inspection of the Linnæan herbarium. The specimen there named '*Chærophyllus*,' is a bad one, in three fragments, and without fruit or petals; it is not very easy to name it, but it is certainly not the species we are considering.† I think a dissection of the flower would show it to be a starved specimen of the narrow-leaved variety of *R. orientalis*, to which the name '*R. lybicus* ‡ *pulsatillæ folio*, T. Cor.,' written on the back of the sheet belongs. (A specimen labelled by Tournefort himself is in the Banksian herbarium in the British Museum.) What is still more to the point is this, the type specimen of *R. bulbosus*—labelled by Linnæus—is the *R. Chærophyllus* of botanists! There is no indication of the origin of this specimen, which is a young uniflorous plant, and not very typical, but has sufficient character to show its affinity. As there can of course be no doubt that Linnæus was perfectly well acquainted with *R. bulbosus*, the faulty labelling in this case must be considered an example of what is not very unfrequent in the Linnæan herbarium. Valuable as that collection very often is, yet

* Sir J. E. Smith, however (Rees' Cyclop. vol. xxix.), referred these to *R. millefoliatus*, Vahl.

† Sir J. E. Smith in Rees' Cyclop. vol. xxix., has carefully described, as *R. Chærophyllus*, L., this specimen, and says it is the only one of the plant he had seen. Smith must have known the common S. European species by another name.

‡ An accidental error for *lybicus*, which is Tournefort's name.

it is sometimes better to judge of what Linnæus intended by an examination of his publications than his specimens. It would be productive of the greatest confusion, and no benefit, to adapt our nomenclature invariably to that of the Linnæan herbarium.

DESCRIPTION OF TAB. 125.

Figs. 1 and 2. *Ranunculus Chærophyllus*, L., Auct., from a specimen collected at S. Aubin's, Jersey, by Dr. M. M. Bull. 3. A young plantlet originally produced at the extremity of a stolon. 4. A sepal. 5. A petal. 6. A stamen. 7. Ripe fruit. 8. A single achenium. (Figs. 7 and 8 from a French specimen. Figs. 6 and 8 enlarged.)

NOTES ON POTAMOGETONS.

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

Potamogeton lanceolatus (Smith).—I have been recently examining these doubtful plants, and think that Mr. Boswell Syme (in 'English Botany,') is correct in considering my *P. lanceolatus* from Buttermere to be a variety of *P. polygonifolius* to which he gives the name of *pseudofluitans*. The nuts which I have described in the 'Manual' belong to a similar form, which was found at the Gap of Dunloe, co. Kerry. This, therefore, disposes of two doubtful plants, namely, my plant from Buttermere and the Killarney plant mentioned in the 'Cybele Hibernica' (p. 311). The other two plants from Connemara and Antrim referred to on that page may be *P. polygonifolius*, but the specimens are barren and doubtful. Some specimens gathered by myself and also by Dr. D. Moore at Killarney are also probably *P. polygonifolius*. There is yet another Irish plant found at Kilmacduah, co. Galway, which may be referred, although with doubt, to *P. polygonifolius*. Thus we get rid of all the British specimens known to me which have been called *P. lanceolatus*, except the original plant from Anglesea which must retain that name, for I cannot see what it has to do with *P. nigrescens* of Fries.

P. sparganiifolius (Laestad.)—Mr. Boswell Syme states that the plant from Lough Corrib is not like the authentic specimens so named by Fries and Laestadius in the Kew Herbarium; but I firmly believe that my specimen contained in Fries's Herb. Normale (xiv. 75.) belongs to the same species as the Irish plant. The submersed leaves of one of my Irish specimens (which is well dried) are "bright grass-green," and the floating leaves on another specimen (badly dried) agree very well with those given in the Herbarium Normale, and with the right-hand uncoloured figure on Syme's plate (Syme's Eng. Bot. MCCCIII.); but what is intended by the other, left-hand uncoloured leaf, I cannot say, as it does not represent the leaves of the Irish or Lapland specimens. I also suspect an error concerning the peduncles, for Syme describes them as "long, rather slender," whereas they are drawn thicker than the stem. Fries states that his plant has "caulis simplissimus," but I see a tendency to branch on his own specimen; and that objection to our and his plant being the same, may, therefore, perhaps be considered as of little weight. On the whole, therefore, I cannot follow Syme in his proposed name *Kirkii*, or Hooker (Student's Fl., p. 371), in considering the plant as a form of *P. natans*, which, according to his views, is singularly polymorphous.



Ranunculus Chærophyllus, L. Auct.

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P. Lonchites (Tuckerm).—In the first place the name of this plant is *Lonchites*, not *Lonchitis* as printed by Syme and Hooker, although the former has spelt it correctly on his plate (Eng. Bot. MCCCCIV.) I have not seen the American plant, and only know it from the description given by Asa Gray (Bot. North. States, ed. 5, 486), which seems to accord remarkably well with my specimens from the river Boyne, for which I am indebted to the kindness of Dr. D. Moore. In the 'Manual' I erroneously referred them to *P. sparganiifolius* but now agree with Syme in thinking that they may be *P. Lonchites*, especially as Syme inserted a note in the Journal of Botany (viii. 263) to inform us that the fruit of the Irish is similar to that of the American plant. I cannot see its relationship to *P. salicifolius*, although the figure in Eng. Bot. much more resembles that plant (*P. lanceolatus*, Rchb. Fl. exsic. No. 2401 and Icones vii. 55) than it does my Irish specimens. The submersed leaves of the Irish specimens are sessile, or often not quite stalkless, rather than "semi-amplexicaul." Asa Gray's description does not convey to me the idea of an amplexicaul leaf, for he says that they are "very long, lanceolate, and lance-linear." At present I think that we must admit *P. Lonchites* as a British species.

P. decipiens (Nolte).—This much resembles *P. lucens*, but I cannot find any trace of the "serrulate" or "subserrate" structure near the tip of the leaves, described by Syme and Hooker. Certainly the leaves are wavy near the tip, but not at all serrulate as are those of *P. lucens*. I cannot therefore combine it with that species.

P. longifolius (Gay).—I think that my Irish specimen of this plant is of the same species as the *P. longifolius* of Reichenbach (Fl. Germ. exsic. 2501.) Hooker (p. 372) says that the *P. longifolius* of Gay is rightly referred by Grenier and Gordon to *P. lucens*, and as Gay's Herbarium is at Kew he ought to know; but Syme remarks that there are numerous specimens of the plant in Gay's Herbarium and that they are probably the same species as the Irish specimen. If Syme had known the specimen as well as the figure of it (E. B. Supp. 2847) he would have seen that there is next to no difference between the plants; and if Reichenbach's *P. longifolius* is the same as that of Gay, as I believe to be the case, I am confirmed in my belief of the identity of Gay's plant and mine. But Syme agrees with Hooker in thinking that this plant is probably a state of *P. lucens*, notwithstanding the absolutely entire leaves of my plant. I may venture to add that I think Moore and More treat the plant with somewhat unmerited contempt in the 'Cybele Hibernica' (312).

ON A NEW SPECIES OF IRIS.

BY H. F. HANCE, PH.D., etc.

3690
Iris tomiolopha, sp. nov. Acaulis, rhizomate albido crasso tortuoso noduloso tenuiter annulato, innovationibus sessilibus, foliis læte viridibus arcte equitantibus falcato-ensiformibus acutis ob nervos 6 reliquis paulo fortiores 3 pagina superiore 3 inferiore parum prominulos subplicatis pedalibus medio 12-16 lin. latis, scapis subcompressis subpruinosis folia subæquantibus, spathis herbaceis complanatis bifloris trivalvibus valva exteriori lanceolato-lineari 5-pollicari florem prius explanatum superante

altera ovata acuta 2-pollicari tubo floris serius expansi æquilonga intima conformi eo dimidio brevior, floribus diurnis inodori 3½ poll. diametro erectis, pedicellis ovarii longitudine, perigonii tubo crassiusculo viridescente pollicari ore callis 6 glandulosis instructo, laciniis subæqualibus, exterioribus late unguiculatis inferne erecto-patentibus superne reflexis ungue albido venis violaceis percurso crista simplici conspicua grosse inæqualiter laciniata alba violaceo-striata usque ad medium laminam producta apiceque dimidiam fere ejus latitudinem adæquante aucto et præterea lineis 3 elevatis laminam haud attingentibus utrinque notato lamina obovato-rotundata obtusa margine crispulo-undulata lilacina maculis linearibus saturatoribus picta, interioribus erectis angustius unguiculatis ungue lateribus conniventi-inflexis albido purpureo-picto lamina dilute lilacina præter imam basin immaculata cochleariformi obtusa margine crispulo-undulata, filamentis liberis complanatis pallide lilacinis antheras albas lamellulam haud attingentes duplo longioribus, stylo inferne tubo perigonii adnato superne libero, stigmatibus magnis ligulatis sursum sensim paulo latioribus dilute lilacinis perigonii laciniis dimidio brevioribus cristis ad basin usque bifidis divaricatis oblique truncatis extus irregulariter argute serratis lamellula papillulosa angustissima truncata laminæ æquilata.

The above character is drawn up from specimens which flowered with me in April of this year for the first time, the rhizomes having been obtained two years ago from a native garden, where the plant was cultivated for ornament. It is probably a native of one of the interior provinces. Though the rhizomes are almost tasteless, they leave in the throat, when chewed, a very unpleasant sensation of heat, acridity, and dryness. The affinity of this very handsome species is with the Japanese *I. tectorum*, Maxim.; the Nipalese *I. decora*, Wall.; and the North American *I. cristata*, Ait. The former differs from the description * in having very acuminate and deeply keeled leaves, a two-valved spathe, with the valves blunt, and I suppose nearly equal; both series of the perigone-segments reflexed and alike in shape, besides other points. The second has longer, narrower, and sharper leaves,—I believe a two-valved spathe,—the perigone-segments are differently coloured and split, the crest is smaller and merely toothed, and the stigmas are of a different shape and longer. *I. cristata*, which agrees with the Chinese plant in its 3-valved spathe, is much smaller; the leafy shoots are stalked, the perigone-tube is thread-like, exceeds the spathe, and is much longer than the segments, which are uniform in colour, and with a different crest, etc.

The section to which this plant and its allies belong,—and which might be called *Lophiris*,—has been altogether overlooked by M. Spach in his revision of the genus, † which, notwithstanding its many omissions,—arising mainly from a praiseworthy resolution not to attempt to class species of this difficult genus only known to him from dried specimens,—is, in my judgment, a more successful attempt at a natural grouping of the species than those which have since been made by Parlatore, Willkomm, Klatt, and Alefeld. Although the genus *Iris*, as usually circumscribed, shows considerable diversity of structure, yet the different modifications are so variously combined, that no two of the botanists who have proposed its dismemberment are at all agreed as to the limits of the genera

* Mém. Biolog. Acad. Pétersb. vii. 563.

† Ann. Sc. Nat. ser. 3, v. 89. sqq.

to be admitted, those of one author in every instance encroaching on those of others, and including one or more species classed differently by some other writer.* This in itself seems to me a convincing proof that the old genus is far more natural than the proposed segregates. I think, however, that *Hermodactylus*, which is distinguished by the remarkable character of a unilocular ovary, has been rightly separated by Parlatore, but with this exception, so far from dismembering the genus, I should be rather inclined, as suggested by M. Spach, to augment it by the addition of *Moræa*. Mr. Baker has recently detached the bulbous species from those furnished with a rhizome;† but it is to be observed that these differences are not associated with co-extensive peculiarities of floral structure, plants which agree in this respect being sometimes manifestly allied to members of the other series. Moreover, I believe it to be unphilosophical to found a genus on a solitary vegetative character; and, although there is a tendency on the part of pteridologists and bryologists to exalt such characters at the expense of those derived from the reproductive organs, or at any rate to assign them a co-ordinate value, such a course, when dealing with flowering plants, is certainly opposed to the *consensus* of botanists. If Mr. Baker's views are adopted, it will be necessary, in the allied Order *Liliaceæ*, to separate the section *Rhiziridium* from the bulbous *Allia*.

NOTES ON THE LICHENS IN SOWERBY'S HERBARIUM.

BY THE REV. J. M. CROMBIE, M.A., F.L.S. AND G.S.

No. I. *Usnea*—*Solorina*.

Having recently been engaged in arranging the lichens in the herbarium of the British Museum, I purpose in this and subsequent papers to make some observations upon several of the more interesting specimens in Mr. Sowerby's herbarium. For critical purposes, this herbarium, as might be expected, is most valuable, inasmuch as it contains many of the identical specimens from which the drawings in Smith's 'English Botany' were made; though unfortunately in this respect, as will afterwards be seen, it is by no means so complete as could be desired. In consequence of the specimens drawn having until quite recently been inaccessible to British lichenists, the figures, in several important instances, have hitherto been misunderstood, and referred to species which they do not represent. In addition, however, to the specimens figured, it contains many others sent to Mr. Sowerby from various parts of Great Britain, which have neither been described nor drawn in the above well-known work, probably from his not having forwarded them to the editors for their opinion. The following observations, therefore, will be both acceptable and useful, not only as illustrating the Lichenological portion of 'English Botany,' but also as recording species gathered at a much earlier period than supposed. I commence with that portion of the herbarium, which I have now duly examined and mounted, extending from the genus *Usnea* to *Solorina* inclusive, according to the order followed in my '*Enumeratio*' and in Leighton's '*Lich. Fl.*'

* E.g. *Iris caucasica*, Hoffm., has been referred to *five* different genera by recent authors.

† Journal of Botany, ix. 9. sqq.

All the species of these and the intermediate genera figured and described in E. B., with one or two exceptions, as well as several additions, are to be found in Herb. Sowerby.

1. *Lichen plicatus*, E. B. t. 257, = *Usnea barbata*, var. *plicata*, L.—Under this name there occurs also a plant referable to var. *ceratina*, Ach., gathered by Sir J. E. Smith at Hafod, in Cardiganshire. The specimen, however, is not quite typical, being papilloso-rugose only on the under side of the apothecia, and not on the branches which are covered simply with soredia. It thus seems intermediate between the type and sorediferous states of var. *plicata*. The short crowded papillæ, by which this form is characterized, are generally supposed to be rudimentary branches, but, as would appear, they scarcely ever become branches proper, in consequence of their development being previously arrested, in which case in old plants they are often dissolved into soredia.

2. *Lichen ochroleucus*, E. B. t. 2374, = *Alectoria ochroleuca*, Ehrh.—The specimen figured, to which no locality is affixed, bears more of the aspect which this species presents on the continental Alps than on those of more northern regions, where it is more robust and coarsely branched at the apices. In all probability, therefore, it was not drawn from any of the few Scotch specimens gathered by Sir W. Hooker on Cairngorm. Along with this in herb. Sowerby is a specimen of *A. nigricans*, Ach., stated to have been received from Mr. Harriman, but without either name or locality. Leighton, in his 'Lich. Fl.' p. 87, quotes for *A. ochroleuca*, 'Teesdale, Harriman,' where this truly Arctic or alpine species, confined in Britain to one or two of the loftier Highland mountains, evidently could not have occurred. Whether *A. nigricans* may have been gathered there I know not, though as it sometimes descends to a low altitude on the Grampians, it is just possible that it might have been found on the mountains of N. England. Apart from other characters, a very easy way of distinguishing these two somewhat closely allied species, is the circumstance that the thallus of *A. nigricans*, as well as the paper to which it is attached, becomes reddish when long preserved, which is never the case with *A. ochroleuca*.

3. *Lichen sarmentosus*, E. B. t. 2040, = *Alectoria cincinnata*, Frs.—The larger specimen figured from the Cairngorm mountains (Borr. and Hook.), though by no means a very characteristic one, is evidently referable to this plant, with which *A. sarmentosa* has always been confounded by British authors up to the time of Leighton's 'Lich. Fl.' True *sarmentosa*, Ach., occurs in Dickson's Herbarium, but without any locality assigned, so that in the absence of any record of its having even been gathered in Scotland, we are not justified in regarding it as a British species. At the same time it is not improbable that it may have been gathered by Dickson in the central Highlands, since in his day several portions of the old Caledonian Forest, where it might be expected to have occurred, were still in existence. The smaller figure, which represents a specimen gathered on Ben Luighal, Sutherlandshire, is not referable to *sarmentosa*, but to *ochroleuca*. Of this it may be regarded as a "smaller, erect form, with more slender branches, concolorous at the apices," *f. tenuior*, mihi, corresponding with a specimen gathered by myself on Morrone, Braemar, and improperly assigned to *f. crinalis*, Frs. On the plant in herb. Sowerby, a single small apothecium appears as figured in E. B., which is lateral and not pseudo-terminal as in the normal form.

4. *Lichen jubatus*, E. B. t. 1880, = *Alectoria jubata*, L.—This formerly composite species has more recently and accurately been divided by Nylander (in litt. 8th June, 1870) into the two following:—1. *A. jubata* (Lin.) Nyl. (*prolixa* and *chalybeiformis*), with olive-brown thallus and reaction K. = ; 2. *A. capillaris* (Ach.) Nyl. (*cana* and *setacea*), with greyish-yellow thallus and reaction, K. ± To which of these the two lower figures in E. B. belong, it is impossible to say, as only separated ramules are drawn, and both occur in herb. Sowerby. The upper figure usually referred to var. *chalybeiformis*, L., as in Hook. Br. Fl. ii. p. 227, seems rather to belong to *f. lanestris*, Ach., “a smaller state, with shorter and more slender branches, densely entangled.” No specimen, however, is extant in Sowerby's Herb. either of this or of true *chalybeiformis*.

5. *Lichen lanatus*, E. B. t. 846, = *Alectoria lanata*, L.—Of this species, which by most recent authors has been regarded as a *Parmelia*, the middle figure may be accepted as representing the type, such as it more usually occurs and is described. In all essential respects, according to Nyl., in litt., it is entirely an *Alectoria* closely allied to *A. jubata*; though Th. Frs. says, in Lich. Scand. p. 126, that younger specimens are affixed to the substratum by minute rhizinæ. These; however, I have not been able to detect in any British plants I have yet examined. The upper figure in E. B. represents what I conceive to be a good variety, which I have gathered on Morrone, in Braemar,—var. *parmelioides*, Cromb., in MSS. (including *f. subciliata*, Nyl.). It is distinguished by having “the thallus suborbicular, somewhat closely appressed, black or blackish (not olive-brown as in the type), opaque, the laciniaë shorter, more intricately divided, margin of apothecia granulato-unequal or ciliated.” To the typical form, as a young condition, is also to be referred *Lichen scaber*, Huds., E. B. t. 2318, the small right-hand figure, which in the description is given as a synonym of *Lichen pubescens*, and apparently identical with *Parmelia lanata*, *f. minuscula*, Nyl. Lapp. Or. p. 120. Two specimens of this occur in herb. Sowerby; the one from Snowdon, and the other from Ben Lomond.

6. *Lichen stictoceros*, E. B. t. 1353, = *Evernia prunastri*, var. *gracilis*, Ach.—The specimen figured, which is a smaller plant than might be supposed from the drawing, which was evidently made from it in a wet and consequently swollen condition, shows that this is not identical with var. *stictocera*, Ach., L. U. p. 442, with which it has hitherto been confounded. And, indeed, the description given in E. B., where it is stated to be “alike on both sides,” ought of itself to have prevented this mistake. Var. *stictocera*, Ach., is simply *E. prunastri* typical, with small foreign tubercles scattered on the laciniaë, a state not uncommon in Britain, and abundant in the fir-wood above the manse at Killin. The tubercles on *stictoceros* of E. B. are said to be situated on the apices, and to be minute, black, convex, solitary, smooth, such as are proper to *Cladonia*. Unfortunately these, if ever present in any quantity, have nearly disappeared from the specimen in herb. Sowerby; but from the remains visible, they appear to partake of the character of cephalodia, rather than of the tubercles referred to above. In connection with this, vide Mr. Parfitt's note in Leight. Lich. Fl., Supp. p. 470.

7. *Lichen fastigiatus*, E. B. t. 890, = *Ramalina fastigiata*, Pers., and *R. fraxinea*, L.—The former of these is represented by the lower left-hand figure; and the specimen drawn, sent from Bedfordshire by Mr.

Abbot, is very characteristic. Of the two other figures in the plate, the upper one is referable to a smaller state of *R. fraxinea*, and the lower appears to be a hybrid between them, though not so well marked as other specimens we have seen. Though *R. fraxinea* and *R. fastigiata* have been given as distinct species by Nylander in his recent *Ram. Mon.*, yet from the frequent occurrence of various transition states, it would appear that he is quite correct in saying of *fastigiata* "vix est nisi varietas *R. fraxineæ*, thallo magis contracto et subfastigiato-diviso."

8. *Lichen pollinarius*, E. B. t. 1607, = *Ramalina evernioides*, Nyl.—With respect to this very distinct, though long overlooked species, which appears to be not uncommon in various parts of England and Ireland, I need not here repeat the observations which I have already made in this Journal, p. 73. The figure on the whole is sufficiently characteristic, though the specimen drawn presents fewer of those farinose and generally confluent soredia, which appear on others which I have seen, especially in *f. monophylla*, Cromb. On the thallus is occasionally found a parasite which I have not yet been able to determine.

9. *Lichen pinastri*, E. B. t. 2111, = *Platysma juniperinum* * *pinastri*, Scop.—As appears from a note by Sir J. E. Smith, appended to Sowerby's original drawing of this plant, the specimen figured was not British, but from the herbarium of Linnæus; and, indeed, the few authentic British specimens which I have seen are either much smaller in size, or when larger, greenish-yellow, with the margins less regularly citrino-sorediate. The *Lichen juniperinus* of our earlier writers, as stated by Withering (*Arr.* iv. p. 34), and in E. B. t. 194 (*descr.*) and proved by specimens in the older herbaria, is not the true plant, but only a state of *Physcia parietina*. In herb. Salwey it is confounded with *Physcia lychnea corticole*.

10. *Lichen sæpincola*, E. B. t. 2386, = *Platysma sæpincola*, Ehrh., and var. *ulophylla*, Ach.—The specimen represented in figure 1, from near Yarmouth (Turner), though not in good condition, is apparently referable to the type, which seems sufficiently rare in Britain. This is better represented in figure 2, which, however, is drawn from a continental specimen. That from which figure 3 is taken, collected in Scotland by Borrer, is var. *ulophylla*, of which the lower left-hand figure is a portion of the thallus magnified. It is common in many of the older fir-woods in the central Highlands of Scotland, but we have never there seen it properly fruited, but only with abortive apothecia.

11. *Lichen Fahlunensis*, E. B. t. 653, = *Platysma commixtum*, Nyl.—Though the entire specimen drawn does not occur in herb. Sowerby, yet the portion of it as magnified in the lower figure is attached to the original drawing. As might readily be inferred from the character of the laciniae as there represented, and the smoother receptacle and nearly entire margin of the apothecium, it is not true *P. Fahlunense* (Lin.) Nyl., and this is indubitably confirmed by the ellipsoid spermatia. This latter is evidently a rather rare species in Britain, much more so than *P. commixtum*, which is abundant on some of the higher mountains of Braemar.

12. *Lichen aleurites*, E. B. t. 858, = *Platysma diffusum*, Web., of which *Parmelia placorodia* (Ach.) Nyl., is a synonym. The specimen figured is from Henham, Suffolk (Turner), and is quite identical with *Lichen diffusus*, Dicks., *Crypt.* iii. p. 17, t. 9, f. 6, according to a specimen from Croft Castle Park in his own herb. As shown by Th. Frs. in *Lich. Scand.* p.

110, the character of the spermogones and spermatia warrant us in assigning this species to the genus *Cetraria* (*Platysma*). For the correct synonymy, which is certainly rather intricate, *vide* Nyl. Animad. circa F. Arnold, in 'Flora,' 1872, p. 267. As so far corroborative of this, we may observe that in a small collection of Lichens presented by Acharius in 1809 to the Linnean Society of London, there are under the name of *aleurites* several specimens of a species afterwards to be noticed, and two of the present species, clearly indicating that at that date his *aleurites* was the plant before us only *pro minima parte*.

13. *Lichen resupinatus*, E. B. t. 305, = *Nephromium lusitanicum*, Schær.—The specimen drawn, at least the one labelled as above by Sowerby, from Cornwall (Turner), is proved by the yellow medulla and the reaction, to belong to this species and not to *N. lævigatum*, Ach., as previously supposed. This is further confirmed by a small scrap attached to the original drawing, in which the medulla and the reaction are still more decided than in the larger specimen. In herb. Sowerby, there are three specimens of *L. resupinatus*, all of which very singularly belong to *N. lusitanicum*, a not uncommon species in the western mountainous tracts of Britain. It is also *L. resupinatus*, var. 2, With. Arr. iv. 71, of which the locality given is Garthwin, in Wales (Griffith).

14. *Lichen spongiosus*, E. B. t. 1374, = *Solorina limbata*, Smmrft.—Of this there is unfortunately no specimen preserved in herb. Sowerby or attached to the original drawing, and, like other terricole species in this long neglected herbarium, has probably crumbled into dust. In Sir J. E. Smith's Herb., however, to whom possibly, as in other cases, the plant may have been returned by Sowerby, there occurs a specimen of *L. spongiosus* marked 'Teesdale, Harriman,' exactly corresponding with *S. limbata*, Smmrft. We may, therefore, quite legitimately conclude that the lichen of E. B. and that of Smmrft. are identical. The figure in E. B. is not very characteristic of the thallus, and, moreover, is too deeply coloured, which in connection with the description given, has no doubt led to some confusion as to the plant really represented. Whether the thallus usually described as that of this species be proper, or whether the plant be simply an old condition of *S. saccata*, we need not here inquire.

SHORT NOTES AND QUERIES.

PLANTS OF KILMANJARO.—A small but very interesting collection of plants has been sent to Kew by Dr. Kirk which was made by the Rev. Mr. New in his ascent of Kilmanjaro, the highest peak of the chain which bounds Zanguebar on the west, reaching the zone of perpetual snow within three degrees of the equator at a point about opposite the south end of the great Victoria Nyanza Lake. "The vegetation," Dr. Kirk writes in a letter to Dr. Hooker, "stops far below the snow line, and a zone of wind-swept rocks encircles the dome and rolls down its avalanches and snow-shoots. This dome rises to a height of 20,000 feet, and some alpine climber may one day scale it. Mr. New, I must tell you, never dried a plant in his life before, but in sending him letters to the chiefs he would pass in the way, I asked him in return to do me the favour of cramming into any old book what he could of the highest vegetation of the mountain. You have the result in about fourteen species more or

less determinable, and indicating the same flora as that of the Cameroons, Dzourba and other mountains east and west. To look at the plants, they seem almost my old Dzourba species, which were lost on the way home. These were collected at 8000 feet in S. lat. 18° , which would make 12,000 feet under the equator, and probably plants do not reach Kilimanjaro higher than that."

The following is what can be made of this collection:—

Helichrysum abyssinicum, Schultz-Bip., and five other species of the same genus;

Senecio, one species;

Artemisia apparently *afra*, Jacq.;

Ericinella? not in flower.;

Blæria spicata, Hochst. ?;

Labiæ not in flower, perhaps *Tinneæ*;

Bartsia, near *longiflora*, Hochst.;

Gladiolus (Antholyza) abyssinicus;

Cyperaceæ? in leaf only;

and two quite doubtful. On the lower slopes were gathered an *Asclepiad*, which is probably a new genus of *Periploceæ*, the same *Adenocarpus* which Mann got on the Cameroons (*A. Mannii*, Hook., fil.) a new *Tephrosia* and many other species of interest.—J. G. BAKER.

PINGUICULA ALPINA—A vote of thanks from British botanists is richly due to Mr. Fletcher, of Liverpool. A few years ago this gentleman, who is a wealthy merchant, purchased the Rosebaugh estate, in the Black Isle of Ross, on which *Pinguicula alpina* was discovered in 1831 by the Rev. G. Gordon. He has brought a large area of its waste land under cultivation, and upon being informed by the Liverpool botanists that he was in danger of eradicating by his agricultural improvements one of our rarest British plants, promised to do all that he could to avoid such a disaster. This promise he has lately carried into effect by enclosing with a strong wall the tract of swampy heath on which the plant grows, with the intention of keeping all within the wall safe from draining-tile and ploughshare; and it is to be hoped that in the humid climate of West Ross-shire the plant by this means may be preserved for many years to come.

POLYPOGON MONSPELIENSIS, L., IN SURREY.—This grass occurs in great profusion in the meadow at Kew Bridge which has long been known as a locality for introduced plants (See *Journ. Bot.* I. 375.) It grows at intervals along the edge of the small slope at the upper part of the meadow which is flooded at high tide and in the winter. The plant has not been observed there in previous years, though the spot is annually visited.—F. NAYLOR.

VEGETABLE BROOM MATERIALS. (*Journ. Bot.* IX., 51, 111.)—Having recently received at the Kew Museum some specimens of the materials used for making carpet-brooms, and clothes and velvet brushes, I send what information I can gather about them. There seems no doubt that, as Professor Dyer states (p. 51), the materials used for carpet-brooms and

clothes-brushes are the panicles of *Sorghum vulgare*, Pers., the general trade term for which is "whisk," of which three kinds are known amongst brushmakers, namely, Florence, Venetian and French whisk. The first fetches rather a higher price in the market, being whiter than the Venetian. Both kinds arrive in this country done up in bundles composed of several smaller bundles and with a number of short pieces of the bare stalk tied up in the centre. French whisk is that peculiar crinkled material used principally for velvet brushes; it likewise arrives in small bundles flat at one end and tapering to a point at the other. The source of this material has been long unknown. Professor Dyer, in the note above referred to, quotes from the Jurors' Reports of the Exhibition of 1851, where it is stated to be furnished by an *Andropogon*. I am told by a large manufacturer who has instituted some inquiries amongst the importers that it is the fibrous root of the same plant that yields Florence and Venetian whisk, and that it should be so seems to me very possible, indeed highly probable.—JOHN R. JACKSON.

Reports.

REPORT OF THE BOTANICAL EXCHANGE CLUB FOR THE YEAR 1872.

BY J. BOSWELL SYME, LL.D., F.L.S.

Ranunculus heterophyllus, Bab. "Pond in Balmuto Garden, Fife."—J. BOSWELL SYME. This is the first time I have noticed this form in Scotland. It was certainly not sown by me intentionally, and as I have not had mature carpels of the plant in my possession since I came to Scotland, I cannot think that I have had anything to do with its appearance in the pond. Still it certainly was not there before 1871, and I have never observed it in the neighbourhood, where *R. peltatus* is the only form which occurs. This year it is not likely to put in an appearance, as, owing to the wet weather, the pond, which is really a dammed up stream, has been for months constantly traversed by a strong current of water several feet deep. This plant is, no doubt, *R. radians*, Revel, of Mr. Hiern's paper in 'Journal of Botany,' 1871, p. 99, as the leaves are rather thick and hairy beneath, and the carpels hispid. Specimens precisely similar are sent by the Hon. J. L. Warren, from the Woking Canal, Surrey.

R. tripartitus, De Candolle (?). "During the past dozen years very few specimens of this plant have been obtained in the recorded localities about Esher, Surrey. In the early summer of 1871 it appeared rather plentifully in a spot to which collectors can readily be directed,—namely, in the small drainlets cut alongside the rifle practice ground near Esher. Mr. Hiern separates it from the *tripartitus* of De Candolle, chiefly by the absence of submerged leaves, naming it *intermedius*, Knaf in 'Flora.'"—H. C. WATSON. Mr. Borrer, from the seeds of the British *R. tripartitus*, raised a plant with capillary submerged leaves, of which I possess specimens through the kindness of the Rev. W. W. Newbould, who received them from Mr. Borrer himself, with this information concerning their parentage.

Ranunculus acris, L., var. *vulgatus* (*R. vulgatus*, Jord.). "Primrose Hill, Middlesex."—J. L. WARREN. The common form of *R. acris* about London is, according to my experience, *R. tomophyllus*, Jord.; but Mr. Warren's specimens have the elongated horizontal rhizome and the broader leaf-segments of *R. vulgatus*, Jord.

R. acris, L., var. *Boræanus* (*R. Boræanus*, Jord.). "Under a rock, in damp ground, about 500 feet, Arrochar, Dumbartonshire."—FRED. TOWNSEND. This seems to be a small, slender form of the true *R. Boræanus*. The root-stock is quite vertical, the base of the stems glabrous, the petioles thinly clothed with adpressed hairs, and the leaves are deeply cut into very narrow segments. The flowers are very much smaller than in French specimens of *R. Boræanus*, being scarcely half an inch across, and the whole stem little more than six inches high.

Caltha palustris, L., var. *Guerangerii*. "Between the paper-mills and West Moulsey, Surrey."—H. C. WATSON. A specimen in flower, and one in fruit; the former with very narrow sepals, and the latter with gradually-acuminate longly-beaked follicles, are very characteristic examples of this form. From the same locality Mr. Watson sends equally characteristic examples, in flower and fruit, of the typical *C. palustris*.

Helleborus viridis, L. Arnside. "I have seen the Arnside station for the *Helleborus* mentioned in some edition of Gerarde's 'Herbal,' but cannot put my hands on the reference. The locality was described as 'in the lane leading to Arnside Tower.' This agrees exactly with the fact, and the station must be more than 200 years old. I have met with the plant on three different years, but never saw it in flower."—CHARLES BAILEY.

Delphinium Consolida, L. "On rubbish, at Forres Morayshire."—J. KEITH. This is the true *D. Consolida*. The Rev. J. Keith mentions that "it occurred on a mass of cinders and rubbish from a sulphuric acid manufactory." It is thus scarcely worth notice in the Report, except on account of its being the true plant, not the *D. Ajacis* of Cambridgeshire, which is the casual plant of most districts, both in England and Scotland.

Actæa spicata, L. "This species grows here, in Liley Wood, about five miles from Huddersfield, in considerable abundance, covering an area of about 250 to 300 square yards. Though I cannot look upon it as a truly native species, particularly as we have not a particle of limestone within twenty miles of Liley Wood, yet it is perfectly naturalized, and there is not the slightest clue to its origin in our district. There is a garden at a small farmhouse above the edge of the wood, removed some forty yards from the exact localities of the plant, but the garden contains not a single root of it, and was never known to do so; indeed it is solely devoted to growing potatoes, cabbages, gooseberry-bushes, etc., but without any flower-root culture."—C. P. HOBKIRK.

Papaver Lecoqii, Lamotte. "Near Burntisland, Fife."—J. BOSWELL SYME. The true plant, with orange-yellow juice. The root is yellow, from the colour of the juice showing through the thin epidermis. That of *P. Lamottii*, in which the juice is white, is of this latter colour.

Meconopsis cambrica, Vig. "I send a specimen of this plant, which I picked last summer in the neighbourhood of Llanthony Abbey, Monmouthshire. The spot where it was growing was close to the borders of

Monmouthshire and Breconshire, and I do not know precisely to which county it belonged; if, however, to the former, it is new to the province, according to the 'Compendium of the Cybele Britannica.' It was evidently in a perfectly wild state, growing in several small tufts in the middle of a precipice on the mountain side."—A. LEY.

Fumaria pallidiflora, Jord. "Waste ground, Mount Stewart, Co. Down."—S. A. STEWART. This is the most northern station I am acquainted with for this form of *F. capreolata*. Mr. J. Harbord Lewis sends it from the Mersey ballast hills.

Fumaria Vaillantii, Lois. "Plentifully in several cornfields on the chalk down called 'Hog's Back,' near Guildford. From *F. parviflora*, which occurs in fields on the same down, the true *Vaillantii* is distinguishable at a glance by the darker tints of the whole plant."—H. C. WATSON. I believe I gathered a small specimen of *F. Vaillantii* in a field on the south slope of the 'Hog's Back,' about twenty years ago. (See 'Flora of Surrey,' p. 13.)

Cochlearia anglica, L. "Salt marsh, Bidston, Cheshire."—J. HARBORD LEWIS. Very different from the South-England form, being much smaller, with the leaves more abrupt at the base, often ovate or rhombic-ovate; the pods smaller and shorter in proportion, and apparently without any constriction between the valves. The southern form is, no doubt, the var. *gemina*, Hort., and appears to be as different from the form described above, as *C. officinalis* is from *C. alpina* and *C. danica*.

Camelina sylvestris, Wallr. "Among *Trifolium incarnatum*, near Penny Cross Church, Devon."—T. R. ARCHER BRIGGS. This is the first time that I have seen British specimens of this sub-species of *C. sativa*.

Sisymbrium pannonicum, Jacq. Railway banks, Crosby, Lancashire. "This has become well established in the borders of fields, roadsides waste places, etc., at Crosby, Lancashire. It was first observed (1858) here by Mr. H. S. Fisher, and is now almost the commonest Crucifer in the neighbourhood of Crosby Station. I do not think the plant has been introduced with ballast, or foreign hay, but am inclined to think it was sown,—this assumption, from seeing a specimen dated 1816, in the herbarium of the Liverpool Botanic Gardens, as having been grown in the garden; and knowing that certain men in the botanic garden were good local botanists at about the year of the *Sisymbrium* being first found, they very likely sowed seeds which have now resulted in a common plant about Crosby."—J. HARBORD LEWIS.

Brassica Napus, L. and its allies. "Very few examples of the Rape, the Swede, and the common Turnip, sent in order to show their differences when flowering in spring, or early summer, as the casual relicts from sown crops of the preceding year. These three plants appear to be sufficiently distinct species, although ill-distinguished and incorrectly described in books. *Napus*, or the Rape, is described as having all the leaves smooth; but this is a mistake. The young leaves of the young plants are thinly covered with soft bristles, from petiole to marginal dentations. As the leaves expand, and also under pressure in the drying papers, many or most of these bristles fall off; and all have disappeared, through the fading of the lower leaves, long before the plants come into flower. Once fairly known, however, there is no difficulty in distinguishing these three species, either as young plants the first season, or as flowering plants of the following year. The three gradations of size and the three varieties

of tint in the flowers are perhaps the best practical distinctions in the living plants. The relative position of open flowers and unopened buds is somewhat uncertain; and the forms of the stem leaves vary with the vigour of the plants."—H. C. WATSON.

Polygala oxyptera, Reich. Sandhills, Wallasey, Cheshire. "In 'English Botany,' third edition, vol. ii., p. 36, this is said to grow at Seacombe. As the *Polygala* is, with us, a sandhill plant, Wallasey must have been intended when Seacombe was quoted. On the Cheshire side the plant grows at Hoylake and Wallasey in great quantity. On the Lancashire side it grows at Waterloo and Formby. If the sandhills round the country were well looked over, *P. oxyptera* would doubtless prove more frequent than we now know it to be. Grassy spots are the places it most frequents, and not so much in the 'hollows' of the sandhills."—J. HARBORD LEWIS.

Polygala austriaca, Crantz. "Rough chalky bank on the border of Copsewood, Wye Downs, Kent."—J. F. DUTHIE. The occurrence of this plant in Kent has been already recorded by Mr. Duthie in the 'Journal of Botany,' 1871, p. 212. This is the typical form of the species, as it has the base of the capsule rounded, although the flowers are of a pale, dull blue, in spite of Reichenbach's statement in 'Fl. Germanica Excursoria,' "Flores semper albi." But the colour of the flowers in *Polygala* is evidently of very little importance. It is to be hoped that some of the metropolitan botanists will endeavour to obtain a sufficient supply of this interesting addition to the Kentish flora for the Botanical Exchange Club.

Sagina ciliata, Fries. Perth.—F. BUCHANAN WHITE.

Silene annulata, Thore. "With *Trifolium incarnatum* at Prospect, Western Peverill, Plymouth, Devon."—T. R. ARCHER BRIGGS. Mr. Briggs states that he saw about twenty plants.

Stellaria nemorum, L. "Canlochan, Forfarshire, 2500 to 2700 feet."—J. ROY.

Stellaria media, Vill. var. *umbrosa*. Breinton, Herefordshire, AUGUSTIN LEY; Messing, Essex, E. G. VARENNE; Pirniss Wood, Balmuto, Fife, J. BOSWELL SYME; and Bath, G. S. STREATFEILD. The following remarks of the Rev. G. S. Streatfeild are interesting, as being at variance with the experience of Mr. H. C. Watson, recorded in the compendium of the 'Cybele Britannica,' p. 492:—"I think it may be worth mention that in the specimens I send the petals were considerably longer than the sepals, and that the anthers were of the same reddish-brown tint as those of *Stellaria graminea*. Those, for all I know, may be usual characteristics of this variety, but so long were the petals, and so deceiving were the anthers, that when I first caught sight of it I thought it was the *S. graminea*. I found plenty of this same variety, but less strongly marked, near Bristol. It may be interesting to you to hear that I sowed some of the seed of the variety in my own garden, but it came up and flowered with not the slightest mark to distinguish it from the ordinary type. Even the acute tubercles of the seed, which you will see are strongly developed in the specimens from Bath, had entirely disappeared."

Stellaria Holostea, L., var. with foliaceous panicles, "Bank by the Plymouth and Tavistock Road, Devon."—T. R. ARCHER BRIGGS. A curious monstrosity, in which the flowers are replaced by series of sepal-like organs, arranged in alternate pairs one within the other.

Cerastium triviale, Link., var. *alpinum*. "Little Kilrannoch, Clova, Forfarshire."—F. BUCHANAN WHITE. This very remarkable plant is readily known from all the other forms of *C. triviale*, by the petals being fully half as long again as the sepals. It is much to be wished that if any member of the Club visit Craigindal this summer he will collect a supply of the plant for distribution. Ripe seeds or living roots would be thankfully received by myself, so as to test its constancy under cultivation.

Erodium prætermissum, Jord. "This, the common London form of *E. cicutarium*, I have compared with specimens named by Boreau. It is at first rosulate-acaulent, but the stems soon lengthen out. Stems moderately densely clothed with white spreading hairs; divisions of leaf-pinnæ not reaching down to midrib; petals deep purple, much exceeding sepals, two, rarely three, smaller than the rest, marked with an oblong mottled dark brown spot near the base; stigmas deep purple, slightly shorter than fertile filaments; beak of fruit with short indistinct hairs; pit at apex of carpels round."—J. G. BAKER. This is the plant I have called var. *chærophyllum*. I have no authentic specimens of *E. prætermissum*, Jord., but Mr. Baker's specimens do not at all agree with Boreau's description, "Sépales . . . couverts de poils glanduleux," for this form is remarkable for being the only British one I have seen in which the sepals are destitute of glandular hairs, in which point it agrees with *E. triviale*, Jord. But authentic specimens of that plant which I possess have the leaflets less divided, and the beak of the carpels much longer.

Impatiens parviflora, DC. "Hedges of a field, Oxtou, Cheshire."—H. S. FISHER. This alien seems steadily to increase its area in Britain, although totally ignored in Dr. Hooker's 'Student's Flora.' Mr. Watson, 'Comp. Cyb. Brit.,' p. 496, considers that it is likely to become an established alien.

Trifolium maritimum, Huds. "River Hamble, Botley, Southampton. I know of only one patch of this clover in this neighbourhood, but it is of course more than likely that there is more."—G. S. STREATFIELD.

Rubus imbricatus, Hort. I have the authority of Mr. Baker for pronouncing the specimens which I send to be this. It was picked in company with and under the guidance of Mr. B. M. Watkins, at the precise spot indicated in Prof. Babington's 'British Rubi,' as "by the tramroad above Redbrook."

Rubus pyramidalis, Bab. Handsworth Wood, Birmingham. "This I look upon as a form about midway between *pallidus* and the original *pyramidalis* as found at Llanberis and in Devonshire. This plant differs from that by its quinate leaflets, more compound panicle, more abundant prickles and fewer setæ, etc. I have seen forms substantially identical with it in Westmoreland, Yorkshire, and Devon."—J. G. BAKER.

Rosa britannica, Desegl. "First observed by a friend of Mr. F. Arnold Lees, to grow, early this year, by the shore of Menai, near the Suspension Bridge, Carnarvonshire. I saw only one bush at edge of brushwood over the beach."—J. HARBORD LEWIS.

Cratægeus oxyacanthoides? "Some examples sent thus labelled, to illustrate the cross combinations of character. Here we have the less lobed leaves of *oxyacanthoides* combined with the pubescent calyx of *eriocarpa* or *monogyna*, the styles being single or double or forked. In other instances, the deeply lobed or incised leaves of the latter accompany the glabrous calyx or the double styles of the former. Are these hybrids?"

—few plants are more frequented by insects than *Cratægus*.”—H. C. WATSON.

Pyrus communis, var. *Briggsii*, Syme (provisionally), E. C. Rep., 1870. Flowering specimens of the plant, and some with spines. “What is very remarkable is the late period—the beginning of May—at which it flowers, corresponding as to this, not with our pears generally, which are in blossom quite a fortnight or three weeks before, but with the apple and crab, or being a few days later than the last in unfolding its petals.” ‘Journ. Bot.,’ vol. ix., p. 215.—T. R. ARCHER BRIGGS.

Pyrus rupicola, Syme. Silverdale, near the Westmoreland border, North Lancashire.—CHARLES BAILEY.

Pyrus scandica, Bab. (var. *Mougeotti*). “The odour of the flowers of this is very sickly and disagreeable in the Devonshire plant.”—T. R. ARCHER BRIGGS.

Claytonia alsinoides, Sims. Hayfield, Derbyshire.—R. H. ALCOCK.

Enanthe pimpinelloides, L. Botley, Southampton. “This is a very common plant in this immediate neighbourhood. It grows in greatest profusion in meadows sloping down to the banks of the tidal river Hamble. It does not grow on ground overflowed at high tide, but there it is replaced by *Enanthe Lachenalii*, which grows in some abundance in the salt marshy ground.”—G. S. STREATFIELD.

Lonicera Xylosteum, L. “There are about a dozen bushes scattered at intervals in a hedge, at Birkby, about a mile from Huddersfield. This hedge joins the fence of a farmer’s garden, and one bush alone is found in the garden fence. It is certainly not native, and does not occur any where else in the district, but my opinion is that it was originally planted in the hedge, whence it has spread in both directions, and not that it is an escape from the garden. It has been here over seventy years.”—C. P. HOBKIRK.

Fedia carinata, Stev. “Grows in profusion for nearly a mile along the ditch bank of an old road leading from the village of Dundonald in County Down to Holywood. It is a plant not known in cultivation here. I have known this plant in the above station since 1867; it seems quite established, and with every appearance of being truly wild. I am not aware of it being found anywhere else in Ireland.”—S. ALEX. STEWART.

Hieracium stoloniflorum, “W. and K.,” *fide* Trimen; *H. Pilosella*, *virescens*, Fries. “Railway bank near the Edinburgh Botanic Garden.”—J. BOSWELL SYME. I have sent out in each parcel specimens of this remarkable plant, which appears to me distinct both from *H. stoloniflorum* and *H. Pilosella*. I sent specimens to the greatest living authority on Hieracia, the venerable Fries, and received from him a letter, of which the following is a copy:—“*Hieracium mihi transmissum est H. Pilosella virescens et ab H. stolonifloro omnino diversum. Lego, semper locis humidis, immo vere inundatis. In eadem pagina fragmenti dissertationis* Sorbus fennica est varietas S. Aucuparia.† Hæc conjunctio sine dubio pendet a forma S. scandicæ foliis profundis incisis sub-pinnatifidis, sed hæc certissime diversa a genuina S. fennica, cujus fructus (præcocii molles coccinei, acidi) plane differunt a S. scandica. In exemplaribus meis e manu Walrothii inscriptum ab auctore H. pedunculare.*”

* The Exchange Club Report for 1870.

† Evidently a clerical error for “*scandica*,” see Botanical Exchange Club Report for 1870, p. 11, which page of the report I sent to Dr. Fries.

The Edinburgh plant is certainly an intermediate form between *H. Pilosella* and *H. stoloniflorum*; and were I compelled to place it under one or the other I should have no hesitation in referring it to *H. Pilosella*, with which it agrees in the pubescence, the shape of the fruiting receptacle, and the size of the flowers. *H. stoloniflorum* has far fewer short gland-tipped hairs and more numerous long bristly spreading hairs on the scape, and especially on the phyllaries, than the Edinburgh plant. The flowers are smaller, and even on the primary stem collected into small corymbs at the extremity of the branches of the scape. The leaves are thinner in texture and clothed with more distant and more bristly hairs with very little stellate down between them. The fruiting involucre I have not seen, but Koch says of it, "planta viva facillime dignoscitur ab omnibus varietatibus *H. Pilosellæ*; involucrum, præcipue fructiferum, basi ventricosum, quasi annulo ventricoso cinctum, quæ vero nota, quod dolendum, in planta sicca et compressa perit." The only foreign specimens I possess which agree with the Edinburgh Hieracium are those in the Flora Ingrica of Dr. Memshausen, of St. Petersburg, which are under the name of *H. Pilosella, pleiocephalum*.* I sowed a pot full of the apparently mature seeds of the Edinburgh plant, but none of them have germinated. I have little doubt that the railway bank has received its *Hieracium* from the Edinburgh Botanic Garden, as the same plant occurs in the garden under several names and the distance between the two is inconsiderable. It now, however, exists in great abundance, and out of thousands of specimens which I saw there last June not one could I find with the scape unforked. The place is not wet, far less inundated, as stated in Fries' letter, so that the difference from ordinary *Pilosella* cannot be referred to situation. In the Transactions of the Botanical Society of Edinburgh, vol. xi., part 1, plates are given of the different appearance of this plant at different seasons, with notes by Professor Balfour.

Carduus nutanti-crispus, Syme, E. B., edition 3. "A series of hybrids between *C. nutans* and *C. crispus*, growing in a pasture with plants of the two species, near Elburton, Devon."—T. R. ARCHER BRIGGS. I should refer all these specimens to *C. nutans*, but possibly when growing there may have been a difference which has disappeared in the dried plant. It is certainly not the Essex plant described in the third edition of English Botany as *C. nutanti-crispus*, the *C. Newbouldi* of the London Catalogue, 6th edition. Hybrids sometimes incline more to one parent than the other. The Essex plant is as nearly half way between the two supposed parents as may be.

Carduus nutanti-tenuiflorus?—"By the sea under the Hoe at Plymouth."—F. O. BALKWILL. A curious plant differing from *C. tenuiflorus* in its longer stalked and consequently less aggregated anthodes, with larger and more globose periclones, broader and more spreading phyllaries. The leaves are said by Mr. Balkwill to be largely marked with white like those of *Silybum Marianum*.

Aster, sp. ?—"I have sent a few specimens of an Aster which is apparently not unlikely to become established on the banks of the Itchen and smaller streams below Winchester. The specimens were gathered in

* Mr. C. H. Watson informs me he has a cultivated specimen, named *H. 'stoloniferum'*, from Dr. Grenier, identical with the Edinburgh *Hieracium*.

September last from a good-sized patch on the side of the Canal, about a mile below the city. I am not sufficiently acquainted with the species of Aster which have been lately described and distributed to decide whether this plant belongs to either of them. I have forwarded the specimens, however, thinking they may possibly prove acceptable to some who are interested in introduced species."—F. I. WARNER. I believe this to be one of the forms of *A. carneus*, Nees.

Phyteuma spicatum, L. Seggeiden, Perth. "Having observed (some eight or ten years ago), in the spring, the leaves of a plant of which I was not quite certain coming up among the grass under the shade of some old trees, I had wire netting placed around it for protection, when it proved to be *P. spicatum*, from which the present specimens are taken. It is a solitary plant, and has slowly increased since its first discovery. The first year it threw up only two spikes; this year there were several, but only a few have been taken off for fear of injuring the plant. There is no record of it having been cultivated in the garden here, from whence it might have escaped."—H. M. DRUMMOND HAY.

Pyrola rotundifolia, L. Near Multy Farnham, Westmeath.—W. T. THISELTON DYER. Professor Thiselton Dyer's specimens seem to me identical with the var. *arenaria* from Southport.

Pyrola minor, L.—"Without flowers, in a coppice of oak and birch scrub, a short half mile across the bog, eastward from Ascot Station, Berks. A new locality probably, if not also a species new to the flora of the county as hitherto recorded.*"—H. C. WATSON.

Erythræa latifolia, Sm. (vera).—"I only found two specimens, both very dwarf in habit, on the 19th of July, 1871. They were growing in a grassy spot among the sand-hills near Freshfield Railway Station, Formby, Lancashire."—ROBERT BROWN. The specimen sent by Mr. Brown is certainly the true *E. latifolia*. It is satisfactory to know that this extremely local plant is not extinct, of which there seemed to be some probability from the habitats being destroyed by building operations.

Verbascum Blattaria, L. (with cream-coloured flowers). "I know of only one spot in Botley where this grows, and in this spot the area is extremely limited. It grows a good distance from any house, in the middle of a large plantation of fully-grown larches and Scotch firs, with some other plants worth mention, *Pyrola minor*, *Epilobium angustifolium*, *Epipactis latifolia*, *Scutellaria minor*, etc."—G. S. STREATFIELD.

Mimulus guttatus, De Candolle. In a stream on a wild moor, in Vale of Nidd, Yorkshire. Collected by H. Sneyd Kynnersley, and communicated by Mary Edmonds. The specimens which I have seen from the station for *M. luteus* on the Wooler Water, near Earl Mill, given on the authority of Mr. J. Hardy in Mr. Baker's 'New Flora of Northumberland and Durham,' all belong to *M. guttatus*, and I observed this plant in 1870 by the side of the river, near the Crook of Devon, Kintyre-shire.

Salvia pratensis, L. "Charlbury, Oxon."—E. F. LINTON. Though Oxford has been known to produce this *Salvia*, doubtless few botanists have seen British specimens except from Kent.

Plantago lanceolata, L., var. *Timbali*, Jord. ? "A perennial, tufted, and perfectly glabrous-leaved variety of *P. lanceolata*, seemingly *P. Timbali*,

* Given, on Mr. Watson's authority, in Britten's "Contributions to a Flora of Berkshire."—[*Ed. Journ. Bot.*]

as described in E. B., ed. 3, from a cliff at Port Wrinkle, Cornwall, where it is likely enough to be indigenous."—T. R. ARCHER BRIGGS. This is certainly not the same as the plant so often noticed in the south of England in fields of sown grass, but it agrees with it in its mode of growth, as the apex of the root-stock is divided into very numerous crowns; but the spikes have not that silvery white appearance which is so characteristic of *P. Timbali*.

Atriplex patula, L., var. *serrata*, Eng. Bot., ed. 3. "It is remarkable that this frequent weed of our tilled fields should have been unknown to Smith at the date of the fourth volume of his 'English Flora,' published in 1828. Examples are sent for distribution, partly because the name does not appear in the London Catalogue, partly because the plant itself appears still to be imperfectly known. It is the *A. erecta* of several English collectors, and is very probably also the usual or normal state of the extra-luxuriant variety to which the name of *erecta* is restricted in the third edition of 'English Botany.'"—H. C. WATSON.

Polygonum nodosum, Reich. (*P. laxum*, E. B. Supp., London Cat.). "Shores of Loch Leven, Kinross, and Kinghorn, Loch Fife."—J. BOSWELL SYME. These are the first Scotch specimens I have seen.

Euphorbia Cyparissias, L. "Several plants growing between the stones of a tomb in an old churchyard at Botley, Hants."—F. I. WARNER.

Juniperus communis, L., var. Kynance, Cornwall. "The specimens of Juniper I send you grew on some rocky ground at the head of Gue Graze Cove, not far from Kynance, a long way from any habitation, and certainly not planted by any of the natives. It is of interest as showing the fusion of *J. communis* and *J. nana*."—JOHN CUNNACK.

Allium triquetrum, L. "Antron, near Helston, Cornwall."—J. CUNNACK. Unfortunately, Mr. Cunnack does not state whether this *Allium* has any claims to be considered native in Cornwall; or, if not, how it is likely to have been introduced.

Muscari comosum, Mill. "I have the following account of this plant from Mr. B. M. Watkins, who visited the spot where it was growing. More than thirty plants of this species were found in flower in July last, in a field of wheat at Gillow, near Ross, Herefordshire. They averaged in height from one to two and a half feet, the bulbs being from one to ten inches in the soil. No doubt introduced in the course of cultivation, with foreign clover seeds, as there is neither garden, path, nor road near the field in question. From the size of the bulbs (some of them measuring over four inches in circumference), it may be presumed that the seed, if introduced, must in the usual course of farming have been sown six years; the plants, each year until the present, having been cut down by hoeing, etc., before their time for flowering. The long spikes of flowers were very conspicuous among the ripening corn, and could readily be seen from a considerable distance."—AUGUSTIN LEY.

Sparganium natans, Bab. "Grantown, Morayshire, 10th Aug., 1871." Rev. J. KEITH.

S. minimum, Fries. "Possil Marsh, Lanarkshire."—RICHARD M'KAY. These *Spargania* are, of course, inserted here only on account of the uncertainty of their separate distribution, arising from their having formerly been both included under *S. natans*.

Typha angustifolia, L., var. "An example of a plant having the male

spikes furnished with about three foliaceous bracts. From muddy ground by the Lynher, near Trematon Village, Cornwall. The three specimens I have of this all have the bracts; but, not being aware of the peculiarity when I gathered them, I omitted taking a larger supply."—T. R. ARCHER BRIGGS.

Luzula pilosa, var. *Borreri*, Bromfield. "Between Maristowe and Milton, Devon."—T. R. ARCHER BRIGGS; and "Miles Cole Wood, Gloucestershire."—AUGUSTIN LEY.

Scirpus uniglumis, De Candolle. "Freshwater, Isle of Wight."—W. W. SPICER.

Carex Ehrhartiana, Hoppe? "Near Multy Farnham, Westmeath, June 26th, 1871."—W. T. THISELTON DYER.

C. Watsoni, E. B., ed. 3. "Banks of the Spey, Moray."—J. KEITH; and "Bog near Hamilton, Lanark."—R. M'KAY. The Rev. J. Keith believes that the Spey-side *C. Watsoni* is the *C. acuta* of Dr. Gordon's 'Collectanea.' With regard to the Clydesdale stations, I may mention that Mr. M'Kay has permitted me to inspect a specimen of true *C. acuta* collected by Mr. G. Ross on the banks of the Clyde, Kenmuir, about three miles above Glasgow.

Agrostis setacea, Curtis. "From Bisley Common, Surrey. Sparingly also between Aldershot and the Long Valley, Hants. These are supposed to be unrecorded localities, more northerly than those in which this grass is usually found."—H. C. WATSON.

Aira uliginosa, Weihe, var. Strachan, Kincardine, July 1871, collected by Mr. Thomas Sim, communicated by J. Roy. The members of the Club will doubtless be glad to receive Scotch specimens of this plant, the rediscovery of which on Deeside was announced by Dr. Roy in last year's Report.

A. uliginosa, Weihe, var. "A very pale variety, rather smaller also than the usual state with dark glumes. It grows with the latter in the limited locality near Woking Station, Surrey, and is there restricted to a few yards of the ground only. The same species occurs by a pond close to the railway station, about a mile west from Brookwood Station, making a third locality in Surrey."—H. C. WATSON.

Avena fatua, vars. "Beanfield, Claygate, Surrey."—H. C. WATSON. Mr. Watson's specimens include a series connecting var. *pilosissima* with var. *intermedia*. They may be placed under three forms. Var. *a. pilosissima*, Gray. Lower pale ultimately dark brown, densely clothed with fulvous hairs from the base to the point where the awn is inserted. Var. *β. pilosa*. Lower pale ultimately pale yellowish-olive, rather thinly clothed with yellowish-white hairs from the base, nearly to the point where the awn is inserted. This form I had not seen when I wrote the grass volume of 'English Botany.' Var. *γ, intermedia*. Lower pale ultimately pale yellowish-olive, glabrous, except at the base or in the lowest floret, also with a few widely-scattered hairs about the insertion of the awn.

Glyceria plicata, B *subspicata*, Parnell? "See also 'Contributions to the Flora of Scilly Isles,' in the 'Journal of Botany,' vol. ii., p. 118. Wet places, Head of Loch Long, N.B."—FRED. TOWNSEND. Col. Drummond-Hay sends the typical form of *G. plicata* from the shore end of St. Andrew's, Fife.

Festuca rubra, Linn. (Lond. Cat.). *F. arenaria*, Osb. "Sandhills, Wallasey, Cheshire."—J. HARBORD LEWIS. This is the extensively creeping coast plant with involute leaves, but the florets are finely

scabrous or puberulent at least towards the apex, while they are often subglabrous at the base, not pubescent all over as in the typical *F. arenaria*.

Bromus commutatus, Schrad. var. *racemosus*. "Courtfields, Monmouthshire."—AUGUSTIN LEY. These specimens belong to the *B. racemosus* of Fries and the continental botanists.

Bromus arvensis, L. "Primrose Hill, Middlesex."—W. T. THISELTON DYER.

Triticum acutum, D.C. "Burntisland and Kirkcaldy, Fife."—J. BOSWELL SYME. "St. Andrew's, Fife."—Col. DRUMMOND HAY. This plant appears to be abundant on the Fife shore of the Frith of Forth. Many of the specimens have the spikelets smaller than usual, and the spike occupying a less portion than one fourth of the whole stem, which was the least proportion that I had seen when writing the description of the plant for 'English Botany.'

Lolium Linicola, Sond. "Newton Ards, County Down."—E. F. LINTON.

Hordeum pratense, Huds. "Sent from its being a rare grass about Plymouth. I have never seen it west of the Tamar."—T. R. ARCHER BRIGGS.

Lastrea cristata, Presl. Achmere, Cheshire. "This is a new locality for this rarity—if not the first time it has been recorded in Mid-Cheshire." J. F. ROBINSON.

Pseudathyrium alpestre, Newman. This plant, which was pretty abundant along the cliffs in Glendole, Clova (but never seen at a lower level than 2,500 feet) was so eaten down by sheep, that it was with the greatest difficulty an old frond in fruit could be found. At the Well of Dee, however, where there were no sheep to molest it, it was in great beauty. It is curious the preference the sheep have for this fern, for though there were other ferns of similar appearance growing along with it in abundance, they were never touched, but the *Pseudathyrium* whenever it occurred was invariably eaten over."—H. M. DRUMMOND-HAY.

May 31st, 1872.

Extracts and Abstracts.

PLANTS FOUND ON THE SITE OF THE EXHIBITION OF 1862, S. KENSINGTON.

One does not look for British Botany in a Penny Guide, but "The Key" to the London International Exhibition for June 17th contains a list of the plants which have been found by Prof. Dyer (the compiler of the list) and other botanists growing on the site of the Exhibition of 1862 at S. Kensington,—now a desolate weedy waste, and surrounded by houses—from 1865 till the present time. Most, if not all, of these have been published in the 'Flora of Middlesex' (1869), or the pages of this Journal. As many as 160 species are enumerated, and their origin is traced to—"1, the weeds originally indigenous to the ground; 2, plants formerly cultivated upon it; 3, seeds brought in packing material at the time of the Exhibition; 4, seeds similarly brought at the time of the Botanical Congress, 1866."

BRITISH PLANTS.

- Ranunculus acris.
 „ repens.
 Barbarea præcox.
 Erysimum cheiranthoides.
 Sinapis nigra.
 „ arvensis.
 „ alba.
 Armoracia rusticana.
 Lepidium ruderale.
 Senebiera Coronopus.
 Raphanus Raphanistrum.
 Reseda lutea.
 „ Luteola.
 Silene inflata.
 Lychnis Flos-cuculi.
 „ vespertina.
 „ Githago.
 Arenaria serpyllifolia.
 Stellaria graminea.
 Cerastium triviale.
 Malva sylvestris.
 Hypericum perforatum.
 „ hirsutum.
 Geranium dissectum.
 Ulex europæus.
 Sarothamnus scoparius.
 Medicago lupulina.
 Melilotus officinalis.
 „ arvensis.
 Trifolium pratense.
 „ medium.
 „ hybridum.
 „ repens.
 „ minus.
 Lotus corniculatus.
 „ tenuis.
 Vicia hirsuta.
 „ angustifolia.
 Lathyrus Aphaca.
 Rubus Idæus.
 „ rhamnifolius.
 „ leucostachys.
 „ carpinifolius.
 Cratægus Oxyacantha.
 Epilobium angustifolium, *vars.* brachycarpum and macrocarpum.
 „ parviflorum.
 „ tetragonum.
 Carum Carui.
 Pimpinella Saxifraga.
 Æthusa Cynapium.
 Fœniculum vulgare.
 Pastinaca sativa.
 Heracleum Sphondylium.
 Daucus Carota.
 Conium maculatum.
 Erigeron acris.
 Pulicaria dysenterica.
 Achillea Millefolium.
 Matricaria Parthenium.
 „ inodora.
 „ Chamomilla.
 Chrysanthemum leucanthemum.
 Artemisia Absinthium.
 „ vulgaris.
 Gnaphalium uliginosum,
 Senecio Jacobæa.
 Arctium intermedium.
 Centaurea nigra.
 „ Cyanus.
 Carduus lanceolatus.
 „ arvensis.
 Cichorium Intybus.
 Hypochæris radicata.
 Apargia hispida.
 Tragopogon pratensis.
 Lactuca muralis.
 Sonchus oleraceus.
 „ arvensis.
 Crepis virens.
 Convolvulus arvensis.
 Echium vulgare.
 Lithospermum arvense.
 Solanum nigrum.
 Hyoscyamus niger.
 Verbascum Thapsus.
 „ Blattaria.
 Linaria vulgaris.
 Veronica polita.
 „ Buxbaumii.
 Prunella vulgaris.
 Nepeta Glechoma.
 Labium album.
 Stachys sylvatica.
 Ballota fœtida.
 Verbena officinalis.
 Plantago lanceolata.
 „ media.
 Chenopodium polyspermum.
 „ album.
 „ ficifolium.
 Atriplex deltoidea.
 Rumex conglomeratus.

BRITISH PLANTS—*continued*.

Rumex obtusifolius.
 „ crispus.
 Polygonum lapathifolium.
 „ Convolvulus.
 Euphorbia helioscopia.
 „ platyphylla.
 Mercurialis annua.
 Salix Smithiana.
 „ caprea.
 Carex muricata.
 „ hirta.
 Phalaris arundinacea.
 Phleum pratense.
 Alopecurus pratensis.
 Apera Spica-venti.
 Agrostis vulgaris.
 „ alba.
 Aira cæspitosa.
 Trisetum flavescens.
 Arrhenatherum avenaceum.
 Dactylis glomerata.
 Bromus sterilis.
 Serrafalcus mollis.
 Equisetum arvense.

BRITISH PLANTS (BUT NOT FOUND
IN LONDON DISTRICT).

Glaucium luteum.
 Medicago falcata.
 Symphytum tuberosum.

EXOTIC PLANTS.

Camelina sativa.
 Lepidium Draba.
 Raphanus sativus.
 Reseda suffruticosa.
 Saponaria officinalis.
 Kitaibelia vitifolia.
 Malva crispa.
 „ verticillata.
 Sida spiciflora.
 Hibiscus Trionum.
 Medicago sativa.
 Melilotus sulcata.
 „ cærulea.
 Trifolium incarnatum.
 „ resupinatum.
 Œnothera biennis.
 Erigeron canadensis.
 Artemisia scoparia.
 Carduus arvensis.
 „ var. setosus.
 Centaurea Jacea.
 Nicandra physaloides.
 Nicotiana rustica.
 Datura Stramonium.
 „ Tatula.
 Melissa officinalis.
 Rumex alpinus.
 Echinochloa Crus-galli.
 Setaria viridis.
 Panicum miliaceum.
 Phalaris canariensis.

 Reviews.

Monographie der Gattung Saxifraga. Von Dr. A. Engler. Breslau: Max Muller. 1872. (Pp. 292, with a Map.)

This is an excellent monograph, which we have much pleasure in recommending to the attention of all our readers who are interested in Saxifragæ. Though only a young man, Dr. Engler has paid special attention to Saxifragaceæ for several years. When in 1865 he acquired his degree of Doctor of Medicine, he took the genus *Saxifraga* as the theme of his thesis, giving a general key to all the species, but full descriptions only of those of the Dactyloid group. Since that date he has devoted himself entirely to botany, and has gone to Munich to fill the place that Dr. Eichler left vacant when he went to take the directorship of the Botanic Garden at Gratz. He has written on the order in the 'Linnæa' and Proceedings of the Vienna Natural History Society, and monographed its Brazilian representatives in the great 'Flora Brasiliensis' of Martius, and now returns to *Saxifraga* again, with a complete monograph of all the known species,

and a separate discussion of points of interest connected with its range of structure and a detailed account of its geographical distribution.

A good working handbook of the genus has been much wanted both by botanists and gardeners. The last general *résumé*, the Supplement to Count Sternberg's well-known elaborate illustrated Monograph, is now forty years old; and during these forty years a mass of new species has been added from the Mediterranean region, the Himalayas, and North America. Since the taste for Alpine gardening has spread, a much closer attention has been paid to the subordinate forms of the Alps and Pyrenees, and many of these, which were before included under the old types, have been published by Boissier, Schott, and others under specific names. We are told that one collection in England now contains 150 different forms in a living state; so that an available summary of what has been written and what is known upon the genus will be widely welcomed. Dr. Engler has had access to many of the best Continental collections, and as the result of his investigation, describes in the present work 166 species, defining under many of them from one to half-a-dozen named varieties, which have usually been published by some one under specific names. His own plan of species-limitation is a middle one, and will be perhaps best understood by our saying that it is about on a par with Grenier and Godron's 'Flore de France,' or Willkomm and Lange's 'Flora Hispanica.' The following is a list of his sections, the number of species under each, and his names for their British representatives.

| | | | | |
|----|---------------|-----------|----|-------------------------------|
| 1 | Cymbalaria | | 5 | None. |
| 2 | Tridactylites | | 3 | tridactylites. |
| 3 | Nephrophyllum | | 19 | granulata, rivularis, cernua. |
| 4 | Peltiphyllum | | 1 | None. |
| 5 | Isomeria | | 5 | None. |
| 6 | Miscopetalum | | 1 | None. |
| 7 | Hirculus | | 11 | Hirculus. |
| 8 | Boraphila | | 23 | stellaris, nivalis. |
| 9 | Diptera | | 4 | None. |
| 10 | Dactyloides | | 36 | decipiens, hypnoides. |
| 11 | Trachyphyllum | | 21 | aizoides. |
| 12 | Robertsonia | | 3 | umbrosa, Geum. |
| 13 | Euaizoonia | | 9 | None. |
| 14 | Kabschia | | 20 | None. |
| 15 | Porphyron. | | 3 | oppositifolia. |

There are good keys of the species given under each of these 15 sections, and the descriptions are very full, and the characters relied upon as distinctive are brought out by means of italics, so that for thoroughness and adaptability for use the work takes its place by the side of the best generic Monographs of late years; and it is a great satisfaction at a time when systematic botany is so little followed on the Continent, and we are losing the old veterans one by one, to see that in Dr. Engler we have a recruit so well qualified to do good work in this department.

The map shows the distribution of the genus at a glance very clearly. Besides its main central north temperate area, six other minor "development-centres" are indicated by lines which encircle them,—a Japanese, Mediterranean, Himalayan, Siberian, and two North American regions; and the concentration of species in different countries is shown by means of varying shades of colour, those tracts which yield upwards of twenty

being coloured the darkest shade of brown, those that yield between 16 and 20 a lighter shade, and so on down to those that yield less than five. The following list by itself will show pretty well what is the geographical range of the genus.

| Species. | | Species. | |
|---------------------------------------|----|--|----|
| Alps from France to Croatia | 42 | Scandinavia | 14 |
| Himalayas and Tibet | 35 | Caucasus | 13 |
| Pyrenees | 30 | France exclusive of Pyrenees | 13 |
| Carpathians | 25 | Mid Spain | 12 |
| Rocky Mountains | 22 | Britain | 12 |
| Apennines | 19 | Altai | 11 |
| East Siberia | 16 | Sudetes | 9 |
| Central Siberia | 16 | Hungary | 9 |
| Mountains of South Spain | 16 | Ural | 8 |
| Roumelia and Greece | 14 | Andes | 5 |

Of course in the wide field of detail which such a book covers, there is plenty of room for differences of opinion and for criticism. We think it quite a mistake to exclude the group *Bergenia*—to which belong the much-cultivated Siberian *crassifolia* and Himalayan *ligulata*—from *Saxifraga*. In the clavis of genera at page 5 Dr. Engler differentiates the two as follows:—

Ovarium basi tantum tubi calycini adnatum flores protogyni.

Bergenia.

Ovarium cum tubo calycino plus minus connatum flores protandri.

Saxifraga.

This is incorrect, for a considerable proportion of *Saxifraga* has the ovary entirely free, and is contradicted by the author himself in his detailed character of the genus at page 72, "Carpidia 2, rarius 3-5, plus minusve in ovarium liberum vel calycis tubo adnatum concreta." In planning out his sections, he relies primarily on the shape of the seed. This is an innovation which we cannot but look upon as the very reverse of an improvement; ovary-adhesion, the presence or absence of large pores at the edge of the leaf, and general habit are all more important and more readily appreciable characters. *Robertsonia*, placed amongst the *Efoveolatae*, has large pores along the edge of the leaf, one in each of the teeth, though not chalk-secreting, as in *Aizoon* and its allies. In some cases Dr. Engler shows a tendency to sink old, widely-used, well-known names under more recent ones. For instance, he reduces *caspitosa* of Linnæus to a variety under *decipiens* of Ehrhart; and for the section *Chondrosea*, fully characterized by Haworth in 1821, and adopted by Jordan and Fourreau as a genus, he uses the name *Euaizoonia*, adopted from Schott's *Analecta*. We are quite sure that no one in England will agree with his disposition of our Dactyloid forms. He does not appear to have seen Haworth's *Dissertation on Saxifraga*, which was published in 1803, and forms one of the treatises in his 'Miscellanea Naturalia'; and he ignores also the beautifully illustrated *Monograph of Chondrosea* in Jordan and Fourreau's *Icones*, tab. 206 to 212. Upon hybrids he adopts the view which has been long held by many continental botanists, that a certain proportion of the wild forms and a number known only in gardens are of hybrid origin. We have no doubt that hybrids do really occur in the genus, but shall need strong evidence to be convinced that they have been produced be-

tween such very dissimilar species as *aizoides* and *mutata* (page 253), or between *granulata* and *cæspitosa* (page 205). We are not prepared to accept his interpretation of *S. Andrewsii*, which he treats as a hybrid between *Geum* and *Aizoon*, "Forma proprius ad Aizoon accedens" (page 252). This seems very unlikely, because in the structure of the flower, *Geum* and *umbrosa* belong to a group with the ovaries entirely superior, and *Aizoon* to one in which the inferior ovary is typically represented, and the flower of *Andrewsii* is precisely that of *umbrosa*, with only a difference in the mere size of the petals, and the leaf-pores and the leaf teeth are just these of *umbrosa*, the former not at all chalk-secreting.

J. G. B.

Introduction to the Study of Palæontological Botany. By J. H. BALFOUR, A.M., M.D., F.R.S. Edinburgh, 1872. (Pp. 118.)

A treatise on Palæontological Botany or Palæophytology has been long a desideratum for the geological student, and this is to some extent supplied in the work before us. Previous to its appearance, there were no manuals specially devoted to the subject, although Professor Balfour has given a chapter on the general facts of fossil botany in his 'Class-book of Botany,' and a short notice on fossil plants will be found in Jussieu's 'Elements of Botany' translated by Wilson, as also some general views of the subject in a useful little volume, 'Chapters on Fossil Botany,' by S. R. Pattison, and notices of fossil plants in the different manuals of Geology. The other works which may be usefully consulted by the student are Unger's 'Genera et Species Plantarum Fossilium,' Brongniart's 'Tableau des Genres des Vegetaux Fossiles,' and Schimper's 'Traité de Paléontologie Végétale.' Not that the subject of fossil vegetation has been neglected, for many large and important works are well known to those whose researches lead them among the evidences of ancient floras.

Among the most important are those by Sternberg, Presl, Gœppert, Ettingshausen, Unger, Corda, Geinitz, Heer, Saporta, Zigno, Gomez, Brongniart and Schimper, on the Continent; Lesquereux and Dawson in America; Oldham in India; Artis, Hooker, and Lindley and Hutton in this country; the work ('Fossil Flora') of the latter authors being now under revision with additions by Mr. W. Carruthers, whose contributions of late years to fossil botany are well known, and whose valuable assistance in more fully perfecting the "Introduction" Professor Balfour gratefully acknowledges.

This manual may be considered as a republication in a separate form of the 5th part, on Palæophytology, of the author's Class Book of Botany, with additional matter and illustrations, and is divided into sections comprising, amongst others, the determination and mode of preservation and methods of examination of fossil plants, the Natural Orders and the successive periods of vegetation. The author adopts the periods of vegetation suggested by A. Brongniart; the reign of Acrogens, Gymnosperms, and Angiosperms; the first including the Palæozoic, the second the Mesozoic, excluding the Cretaceous, and the third the Cretaceous and Tertiary strata, under each of which heads the leading characters of the successive floras are given, together with their chief structural details. Like the fossil faunas, the fossil floras contain no new type, using the word in the most comprehensive sense, that is, as belonging to one or other of the five

or six great divisions into which botanists have divided living plants, but these great divisions are not equally represented in past times. Thus the earlier flora is chiefly acrogenous, as well represented at the coal period, with some Gymnogens; in the secondary flora the latter class increase in numbers, and it is only towards the close of that period, *i.e.*, the Cretaceous, that the angiospermous Dicotyledons appear, a group which constitutes more than three-fourths of the species of existing flowering plants, and which acquired a predominance from the commencement of the Tertiary epoch, and may be therefore considered as characteristic of that period.

Prof. Balfour rightly remarks that the number of species has been needlessly multiplied, any slight variation in form having been reckoned sufficient for specific distinction, so that a naturalist, with little knowledge of the present flora of the globe, ventures sometimes to decide on an isolated fragment. This caution, as also long ago expressed by Dr. Hooker, is essentially necessary in the determination of species of *Lepidodendron*, *Sigillaria* and other plants, where the different portions of the stem or casts of the inner and outer portions of the different layers of the stem of the same species might be, and have been, considered as distinct species; this is well shown by Professor Balfour in pp. 4 to 8, with regard to a specimen of *Araucaria imbricata*. So also may the fronds of the same fern and leaves of the same plant be taken for different genera, while the same form of frond belonging to different genera of ferns might be considered as one genus without the fructification.

Although the work will be a useful addition to geological literature and the student of Geology, yet it is somewhat unsatisfactory; in fact it is to be regretted that it was not entirely rewritten, and some of the rather loose statements removed; the general views are not *general* enough, and the special parts could be much improved. Thus, at p. 38 it is stated, "The total quantity of coal annually raised over the globe appears to be about 100 millions of tons, of which the produce of Great Britain is more than two-thirds," whereas the estimated yield of Great Britain *alone* for last year was *above* 100 millions of tons; again, at p. 80, "There is an absence of true coal-fields in the secondary formations generally," which statement might mislead the student into overlooking the rich coal-field of Virginia, the wealden coal of Hanover, other secondary coals of Europe, and the extensive secondary coal-fields of India; also at pp. 100, 105, that brown coal occurs in the *upper* Tertiary beds," whereas the most extensive deposits of the brown coal of Germany and Austria belong to the Miocene period. Pp. 79-83 require revision as regards the liassic and oolitic floras, and the rearrangement of the names to figs 79, 80, which are misplaced. Again, with regard to including the Cretaceous epoch with the Tertiary as the reign of angiospermous Dicotyledons of Brongniart, although it is broadly true that this epoch does foreshadow the vegetation of the Tertiary era and indicates a transition period, yet as far as the British area is concerned, the Cretaceous rocks contain none of that class of plants which form so marked a feature in Belgium, and still more in the flora of Kansas, Rocky Mountains, which, from the associated characteristic fossils, is referred to the Cretaceous period, although the 50 species (two of them only are identical with European cretaceous) have a strong Miocenic facies; and more interesting still, the primordial character of the flora, taken as a whole, is distinctly that of North West America.

As to the special part, it would have been useful if a fuller account had been given of the structure and character of plants in relation to the fossil forms without the student having to refer to the 'Class Book of Botany;' and also if a synopsis with short descriptions of the families and genera had been given.

The work is illustrated by four plates and 102 woodcuts, and contains notices of the literature of the subject and a useful summary of the chief points of fossil botany. In conclusion we commend to the palæontological student the following judicious remark by the author: "No one can be competent to give a correct decision with regard to fossils unless he has studied thoroughly the present Fauna and Flora of the globe. To give a well-founded opinion in regard to extinct beings, it is essential that the observer should be conversant with the conformation and development of the living ones now on the earth; with their habits, modes of existence and reproduction, the microscopic structure of their tissues, their distribution, and their relation to soil, the temperature, atmosphere and climate."

J. M.

Die Entwicklung des Keimes der Gattung Selaginella. (The Development of the Embryo of the genus Selaginella.) By W. PFEFFER. Bonn: Adolph Marcus. 1871. (Hanstein's 'Botanische Abhandlungen.')

There is perhaps no subject of more interest and importance to the botanist, yet fraught with more difficulties than the sexual reproduction of the Cryptogamia. Year by year difficulties are being overcome and more light thrown on those obscure yet wonderful reproductive processes which characterize the flowerless plants. We know absolutely nothing of the sexual reproduction of Lichens, and but little about these processes in many Fungi and Algæ. As characters derived from the vegetative organs are only of secondary importance, it follows that we are only very gradually approaching a morphological classification of the Cryptogams. Take the classification of Cohn, given at pp. 114, 115 of the Journal of Botany, and you will see in it an attempt to place due importance on characters taken from the reproductive organs. Why should a group called Algæ exist when within that one division most varied and diverse modes of reproduction exist? Conjugation in one series; *trichogyne*, *cystocarp*, and *non-motile* spermatozoids in another; active spermatozoids and an oögonium in a third. Take *Achlya*, by some considered a Fungus, by others an *Alga*. Observe its close relationship to *Permospora*, *Cystopus*, etc., but with a sexual reproduction wonderfully near *Edogonium* and *Fucus*. Then look at the *Conjugatæ*, Diatoms, Desmids, *Spirogyra*, and the like, and then compare the conjugation in the moulds. Taken in this way, Cohn's classification, even although it startles one at first sight, shows evidence of careful thought and much study.

Pfeffer's paper is one which contributes to our knowledge of the reproduction of the Cryptogams. Brotero and Salisbury seem to have been the first observers of the germination of the large spores of *Selaginella*. Spring, on the other hand, was apparently the first to point out a sexual difference in the spores, as he mentions that the large spores only germinate. Hoffmeister worked well at the subject, describing the prothallium with archegonia, etc.; Millardet, one of the most recent observers, fully describing the germination of the microspores and formation of the spermatozoids.

The microspores can be best examined after being treated with chromic acid, which acts on the exosporium and renders it transparent. The chief interest in Pfeffer's observations on the microspores is the confirmation of Millardet's discovery of the rudimentary male prothallium. A single sterile cell remaining; the other cells forming spermatozoids, elongated bodies, thickened at one end and armed with two cilia at the other. By the presence of this rudimentary male prothallium, the resemblance between the small spores of *Selaginella* and the pollen grains of *Thuja*, *Taxus*, and *Cupressus* becomes still more close.

The germination of the large spore, the formation of the prothallium and archegonia are fully described. The division of the archegonial cell, and the various stages in the formation of the embryo are interesting. One cell forms a suspensor, the lower divides and forms the embryo. When the embryo attains some size, it is not placed as Hoffmeister figures it, but lying transversely across the spore. The position of the archegonial opening is marked, and the suspensor indicates its position. The embryo is somewhat curved, with a gibbosity opposite the suspensor. This is the foot (*fuss*), and gives the embryo a very peculiar appearance. Two cotyledons, with ligules, are also seen. The embryo is evidently like that of *Marsilea*, which is provided with a similar foot.

The paper is one of great value, and is illustrated by six admirable plates. To those who take an interest in the germination of Cryptogams we heartily recommend the paper as one well worthy of perusal.

W. R. M'NAB.

Botanical News.

ARTICLES IN JOURNALS FOR JUNE.

Monthly Microscopical Journal.—R. Braithwaite, "On Bog-Mosses, IV.," (with plate).

Geological Magazine.—W. Thiselton Dyer, "On some Fossil Wood from the Lower Eocene" (1 plate) (Dicotyledonous. A cellular structure filling the ducts determined to be tylose).

Botanische Zeitung.—W. Pfeffer, "Effects of the Colours of the Spectrum on the decomposition of Carbonic Acid by Plants."—E. v. Janczewski, "Comparative Inquiry into the Modes of Development of Archegonia" (continued).—F. Hildebrand, "On certain Plant-tissues."—H. Hoffmann, "On the Fruit of *Raphanus*" (tab. 6).—H. G. Reichenbach, *fil.*, "Botanical notes."

Flora.—H. de Vries, "On the effect of Pressure on the Formation of Wood."—W. Nylander, "Animadversiones quædam circa F. Arnold Lich. Fragm. XIV. (Flora, pp. 72-78.)"—F. Schultz, "Observations on the Flora of the Palatinate."—S. Kurz, "*Pinus Latteri*, Mason."—J. M. Norman, "*Cetraria ciliaris*, "Adr. civis floræ Europææ."—H. G. Reichenbach, *fil.*, "New Orchideæ, collected by G. Mann."—S. Kurz, "Three new Plants from Thibet" (*Parrya pumila*, *Gypsophila sedifolia*, *Stellaria tibetica*.)

Hedwigia.—Reprints, Abstracts, etc.

Bulletin de la Soc. Roy. de Botanique de Belgique, tom. x. no. 3. (3 June).—K. Ledeganck, "Histologico-chemical Researches into the Autumnal Fall of the Leaf" (pl. 3) [see p. 173].—A. Thielens, "Notes on some new or rare Plants of the Belgian Flora."—A. Hardy, "Monograph of the Belgian species of *Elatine*." (*E. Alsinastrum*, L. *E. hexandra*, DC.,

E. majuscula, Dum., *E. Hydropiper*, L., *E. siphosperma*, Dum., *E. triandra*, Schk.)—*H. Verheggen*, "Mosses, Hepaticæ, and Lichens of the Environs of Neufchateau."—*J. H. Antoine*, "Note on the Flora of Wisconsin."—*J. Kew*, "Review of the Flora of Courlande (W. Russia)."—*A. De Vos* and *L. Bodson*, Report of the 10th Herborization of the Soc. Roy. Bot. Belg., 1871 (Environs of Verviers, Limbourg, etc.)—*A. Cogniaux*, "Catalogue introductory to a Monograph of the Hepaticæ of Belgium."—*A. De Vos*, Memoir of the late H. Lecoq.—Obituary notice of A. Martinis.

We refrained from making any comment on the unfortunate rupture between the First Commissioner of Works, Mr. Ayrton, and Dr. Hooker, the Director of Kew Gardens, so long as it appeared to be of the character of a private misunderstanding. The whole matter, however, has now been made thoroughly public, and of public interest, by the action taken by some of our most eminent scientific men, in addressing a memorial on the subject to Mr. Gladstone. This has been printed in full in 'Nature' for July 11th; and comments upon it—remarkable for their unanimity, almost uniformity, of sentiment and expression, and one and all warmly taking up the cause of Dr. Hooker against his present official superior—have appeared in most of the daily and weekly newspapers. Where our sympathies are strongly engaged, it is difficult to speak temperately, and all botanists must feel for the Director of Kew, whilst they deeply regret a complication which can scarcely fail to be more or less injurious to their favourite science. No greater calamity to botany could happen than Dr. Hooker's resignation; we may however hope and believe that the urgent request of his fellow-workers, contained in the numerous letters of sympathy addressed to him, will have its due weight. At the same time we do not consider it either just or becoming to indulge in those indignant accusations which come so readily when our feelings and interests are all on one side.

We announce with a satisfaction which will be shared by systematic botanists throughout the world, that a new part of Bentham and Hooker's "Genera Plantarum" is in the printers hands, and expected to be out by the end of October. It will comprise Rubiaceæ, Compositæ, and the intervening Orders.

The first number of a new English monthly Botanical Journal appeared early last month. It bears the title 'Grevillea,' and is devoted entirely to cryptogamic botany, being edited by Mr. M. C. Cooke, well known for his "Handbook of British Fungi" and other good work. This first number is attractively got up, and contains 16 pages of large type and a coloured plate. "The intention of its projectors is to furnish, month by month, descriptions in English of new species discovered in the British Islands, to record the habitats of rare or interesting forms . . . to furnish a record of the literature, and, as far as space permits, descriptions of exotic species," intentions which seem well carried out in the number before us.

There are further transpositions in the Botany professors at the German Universities:—Dr. Reess goes to Erlangen; Dr. Pfeffer to Würzburg; Dr. Sachs to Heidelberg; and Dr. Hegelmaier to Kiel.

Original Articles.

ON A NEW CHINESE BIGNONIAD.

BY H. F. HANCE, PH.D., ETC.

In the month of November, 1866, when journeying from the port of Hoi-hau to the city of Kieng-chau-fu, the capital of the island of Hai-nan, I noticed, growing by the roadside, several trees with pinnate leaves and long pendent woolly capsules. A cursory inspection showed that these belonged to the *Bignoniaceæ*, but as the fruit was not ripe, and there were no flowers, I did not gather specimens. In a visit paid to the same island in the early part of 1868, Mr. Swinhoe met with the same tree; and it appears from a paper of his 'On the Natural History of Hai-nan,' read before the British Association, and printed in the 'Field' newspaper for 1870,* that Mr. J. J. Bennett, then Keeper of the Botanical Department at the British Museum, to whom he showed the fruit, pronounced it to belong to a *Spathodea*, nearly related to *S. stipulata*, Wall. A few ripe fruits, in very indifferent condition, were brought back to Canton by Mr. Swinhoe, and given to Mr. Sampson, who after some time threw some of the seeds into his garden, where, contrary to his expectation, they came up, and have since grown into healthy small trees, which have flowered pretty copiously during the past two years, in the month of December, and on the last occasion set several fruit, one of which ripened and dehisced spontaneously in April. I have thus had an opportunity of examining somewhat in detail the Hai-nan plant, of which I subjoin a description, drawn up from living specimens. I may add that the fresh flowers have a disagreeable smell, much like that of raw shrimps. Mr. Swinhoe called the plant,—not inappropriately,—'Cat's-tail-tree,' from the appearance of its long woolly fruit; and I have thence framed the specific name.

Spathodea (Markhamia) cauda-felina, sp. nov.—Arborea, erecta, foliis oppositis increscenti-impari-pinnatis summis sensim abbreviatis bractei-formibus, petiolo supra canaliculato, foliolis 7-jugis ramulis plerumque abortivis stipulas mentientibus, basi auctis sessilibus membranaceis oblongis basi rotundatis vel subcordatis apice caudato-acuminatis integerrimis $2\frac{1}{2}$ –8 poll. longis 8–10-costulatis atque reticulatis supra lævibus infra nervis reteque prominulis novellis pubescentibus maturis omnino glabris secus costam passim irregulariter glandulosis, racemis terminalibus 20–30-floris, floribus decussatim oppositis pedunculo crasso $1\frac{1}{4}$ -pollicari basi apiceque articulato supra basin bracteis binis ovatis deciduis stipato insidentibus, calyce bipollicari cum rachi pedunculis capsulisque dense fulvido-ferrugineo-pannoso juniore clauso maturo unilabiato supra longitudinaliter fisso obtuso integerrimo apice verrucis nigris 6–8 notato, corolla $3\frac{1}{2}$ pollicari infundibulari glaberrima tubo superne ampliato extus sordide flavide rubro apice glandulis circ. 12–16 verruciformibus obsito limbi sul-

* Reprinted in the 'Pharmaceutical Journal' of 31st December, 1870, p. 529. The "Asclepiadeous tree of an unknown species, with black pods ten inches long hanging downwards all over it," referred to in the same article, is *Wrightia pubescens*, R. Br., as I have ascertained from the examination of specimens gathered by Mr. Sampson and myself.

phurei subbilabiati lobis 4 rotundatis crispulis superiore majore, staminibus 4 didynamis sine quinti rudimento anticis corollæ tubum æquantibus filamentis rubris antherarum luteolarum glabrarum loculis divaricatis, stylo albido staminibus æquilongo stigmatibus rubente bilamellato, capsula 1-2-pedali 10-11 lin. lata pendula ensiformi estipitata basi verrucis 5 magnis nigris depresso-subrotundis cincta rostro brevi conico obtuso glaberrimo terminata subtomento glandulis parvis elevatis conspersa loculicide bivalvi valvis quod ad axin lateralibus basi apiceque cohærentibus planiusculis septo valvis contrario costiformi seminifero utrinque lamella rigida undulata ad suturas usque extensa aucto (unde capsula spurie 4-ocularis), seminibus arcte 5-serialibus transverse oblongis compressissimis lutescentibus inclusis alis pollicem longis alis tenuiter membranaceis extremitate oblique truncatis sublaceris corpore parum brevioribus membrana interna testa multo minore pallide brunnescente embryoni conformi idque arcte involvente cotyledonibus didymis $4\frac{1}{2}$ lin. latis basi apiceque fere æqualiter conspicue emarginatis radícula hilum spectante extra cotyledones vix protrusa.

Spathodea stipulata, Wall., which is apparently the nearest ally of the Hai-nan species, is described* as having 4 to 5 pairs of leaflets downy beneath, the calyx scarcely an inch in length, the corolla downy externally and only $2\frac{1}{2}$ inches long, the capsule shorter and broader, and the seeds twice the length of those of the Chinese plant. *S. adenophylla*, De Cand., in the diagnosis of which, notwithstanding the trivial name, there is no allusion to the presence of glands on the foliage,—so brief and unsatisfactory are the characters of these plants in the ‘Prodrômus,’—would also seem to be closely related; but this is referred by Seemann to *Heterophragma*,† to which De Candolle assigns a three-lobed calyx.‡; whilst *S. stipulata* is the type of Seemann’s genus *Markhamia*.§ Of neither genus as understood by him had my late friend, up to the time of his lamented death, given, so far as I am aware, any character. In his “Revision of the Natural Order Bignoniaceæ,” published in the ‘Annals and Magazine of Natural History,||’ Dr. Seemann instituted a tribe *Jacarandæ*, composed of a number of genera removed from the *Catalpeæ*. To this latter he assigned as a character ‘Capsula loculicida, septum valvis oppositum,’—whilst he distinguished his new group, to which he referred both *Markhamia* and *Heterophragma*, by its ‘Capsula marginicida, septum valvis oppositum.’ I have not succeeded in finding the definition of *marginicidal*, or even the word itself, in any introduction or glossary to which I have referred, but De Candolle himself expressly defines it** as signifying “dehiscencia secus septi margines.” Now, the Chinese plant has the “capsule loculicidal, the dissepiment being contrary to the valves, which separate from it,” the precise words used by Mr. Miers,†† to describe the carpical structure of the tribe *Catalpeæ*. And I see no difference whatever between the structure and dehiscence of the fruit in the plant I have examined and in the typical African *Spathodeæ*, as described and figured by

* De Cand. Prod. ix. 205; Miquel, Ann. Mus. Lugd.-Bat. i. 201.

† Journ. of Bot. VIII. 339.

‡ Prod. ix. 210.

§ Journ. of Bot. I. 225.

|| I cannot give an exact reference to volume and page, my copy being a separately printed one, with manuscript corrections by the author.

** Prod. ix. 143.

†† Contrib. to Bot. ii. 52. See also page 47.

Dr. Seemann himself.* In *Jacaranda*, on the contrary, according to Mr. Miers,† the placentæ are parietal along the middle of each valve, and do not meet in the axis, so that the fruit is one-celled only. It therefore seems to me evident that *Markhamia*, supposing our plant to belong to that group,—of which I have scarcely a doubt,—is a true member of the Pleiostictideous division of the tribe *Catalpeæ*, and much closer to the genuine *Spathodeæ*,—if indeed generically separable,—than to *Jacaranda*. Mr. Bentham has very justly remarked that Seemann must have used the term marginicidal in some peculiar sense, since a septum placed transversely in relation to the valves “is incompatible with a marginicidal dehiscence, in the ordinary acceptation of the term;”‡ and I am obliged to confess that I can see nothing here but a distinction without a difference. The Chinese species is very closely allied both to *Dolichandrone* and *Muenteria*, but differs from both, as well as from the African *Spathodeæ*, by the absence of the rudimentary fifth stamen. A similar difference, however, occurs in *Diplanthera*, where *D. tetraphylla*, R. Br., *D. bancana*, Scheff., *D. sessilifolia*, Vieill., and *D. montana*, Vieill., have four stamens only, *D. speciosa*, Seem., also the rudiment of a fifth;§ and the genus *Nycticalos*, Teijsm. and Binnend., comprises both pentandrous and didynamous species, the latter with a staminodium, so that it is tolerably clear this is a character of but slight importance. I have never made *Bignoniaceæ* a special object of study, nor can I pretend to be well acquainted with the order; but, judging from the characters assigned them, and from figures, some of the recently proposed genera appear to me founded on very trivial distinctions. I have noted the structure of the seed in the Hai-nan plant, for the purpose of showing how closely it agrees with that of *Spathodea lutea* (referred to *Muenteria* by Seemann), as described by Bentham.|| I can confirm Mr. Miers’s observation that the nerve-like lines which radiate from the body of the seed into the wing are apparently due to the creasing or wrinkling of the laminæ of the duplicated testa, here agglutinated without any interposed embryo; but which, as he states, are separable without much difficulty after maceration. The apparent stipules look as if they were merely the lowest dwarfed pair of leaflets, being often apparently attached to the petiole; but, that they are, in reality, undeveloped branchlets, analogous to the pseudo-stipulæ of *Aristolochia*, as interpreted by De Candolle in *S. stipulata*, is proved by breaking off the leaf, when a clean phyllula is left, the false stipules remaining on the branch.

NOTES RESPECTING SOME PLYMOUTH PLANTS.

BY T. R. ARCHER BRIGGS, F.L.S.

Chelidonium majus, L.—Some British botanists seem to be doubtful as to the position this should occupy in their flora, but were the circumstances under which it appears in the neighbourhood of Plymouth to be taken as a test of its indigenous character or otherwise, it would certainly

* Journ. of Bot. III. 332, t. 40.

† Op. cit. 50.

‡ Fl. Austral. iv. 539.

§ I have examined *D. tetraphylla* and Vieillard’s two species myself, without finding any staminode in either. The two latter are evidently congeners of the Australian plant. *D. speciosa* I have not seen.

|| Hooker’s ‘Niger Flora,’ 462.

have to be considered as simply a naturalized species, being never found away from houses, gardens, or orchards; growing most frequently quite close to human habitations, and being moreover ordinarily associated with other species having quite the same character. Its old reputation for curing affections of the eyes has not quite passed away in our rural districts, for I a few years ago heard an old countryman greatly laud its virtue, and speak of the benefit he had himself derived from its use in an eye complaint.

Geranium pyrenaicum, L.—This is plentiful and well established on and about some hedgebanks near an old farm-house at Combe, in the neighbourhood of Saltash, Cornwall.

Lathyrus Nissolia, L.—As a species of the neighbourhood I have found this simply as a “casual,” except at Cattedown, where it occupies a few square feet on an old ballast or rubble heap overgrown with brambles and herbaceous plants, but even here it is not to be found some seasons. I first noticed it in June, 1860, but a specimen from the locality collected by the Rev. W. S. Hore many years before, probably from the very same spot, is in the herbarium of the Plymouth Institution, as stated by Mr. Keys in his ‘Flora of Devon and Cornwall,’ with the remark that the plant would seem to appear at intervals, which is certainly the case; for since 1860 I did not see it at the station until last year, when it made its appearance at the old spot, and there it is again this season (June, 1872). The three summers in which it has appeared have been rather wet ones, or at least not remarkable for great heat, whereas some of the intermediate ones will be long remembered for heat or drought, which facts furnish perhaps a key to the appearance or absence of this pretty *Lathyrus*. Whether these temporary disappearances depend simply on the effect of the weather or its habitat, and so are of a local character, or are a characteristic of the species generally, I leave for those botanists to determine who have the plant commoner in their neighbourhoods than it is in my own.

Lathyrus tuberosus, L.—Five small patches of this conspicuous species might be seen last year on the first embankment from Plymouth by the Eastern road. In some way or other garden plants have been conveyed to this and the adjoining embankment, for, in addition to this *Lathyrus*, I have found on them *Lathyrus latifolius*, *Petroselinum sativum*, *Petasites fragrans* and *Ornithogalum umbellatum*. The first of these, *Lathyrus latifolius*, occurs also on the Saltram Embankment on the opposite side of the Plym Estuary, called here “The Laira,” where it has been mistaken for *Vicia sylvatica*, which species we have not at all about Plymouth, as the plant at the other recorded local station, Boveysand, is *Lathyrus sylvestris*, not the Wood Vetch.

Spiræa Filipendula, L.—I recorded this as if a native from near Landulph, Cornwall, in Journ. Bot. vol. III. p 350, but further search in the locality has revealed *Vinca major* and *Ruscus aculeatus* in a hedge near the spot where it grows, and I have come to the conclusion that the three plants were all originally introduced. I have also seen this *Spiræa* in another spot near Plymouth, situated in the parish of Bickleigh, Devon, where it is undoubtedly a relic of an old garden, together with some bushes of *Symphoricarpus racemosus*.

Epilobium lanceolatum, Seb. The profusion of this in many places in the neighbourhood of Plymouth is one of the most noticeable

features in the botany of the district, yet its distribution is such as to entitle the plant to the character of a local species, even when so comparatively small an area as the tract of country lying within twelve miles of Plymouth is alone taken into account. It ascends to above 500 feet near Roborough Village, but for the most part grows in low, warm situations, considerably less elevated, especially where the soil is of a slaty or shaly nature, apparently showing less partiality for arenaceous ones. On the limestone of our Devonian series it is comparatively rare, but occurs at Cattedown and elsewhere on this rock. It seems to be gradually extending its area. I have found it so far west as Liskeard, beyond which town I have no record of its occurrence. In a northerly direction from Plymouth I have traced it to Tavistock. I collected a specimen near Lustleigh in East Devon some years ago, but have not had much opportunity for ascertaining its range generally in this direction, beyond 12 or 14 miles from Plymouth. Its flowers differ obviously in colour from those of *E. montanum*, being of a rosy or pinkish, not purplish hue; sometimes they open of a pure white, but assume a rosy tint before falling.

Lamium incisum, Willd.—In March last this still grew near Prospect (*vide* Journ. Bot. vol. VI. p. 206). On the 19th of that month I discovered about half-a-dozen plants growing on, or by, a hedgebank between the lane leading to Antony, and the first of the fields through which is the pathway from Trevol to St. John's Village. This is the only spot in East Cornwall where I have ever met with it.

Nepeta Cataria, L.—About a dozen plants in the vicinity of an old mill and farm buildings near Millbrook, Cornwall (1872). Doubtless it was the occurrence of the *Nepeta* in this spot that led Dr. Jacob, seven-and-thirty years ago, to insert in his 'West Devon and Cornwall Flora' the station "near Millbrook, Mr. R. Oliver," under his description of this species, but as no botanist seems to have noticed it there since, until I found it, I consider it worth while to put the station again on record, as the plant is so exceedingly rare in the neighbourhood of Plymouth, where, however, it is not clearly an indigenous species.

Zostera nana, Roth. On the mud of a creek from St. John's "Lake" lying between Torpoint and St. John's Village, Cornwall. The so-called "Lake" is a salt-water inlet from Hamoaze, the name borne by the Tamar Estuary. This species is new to Cornwall, and is as yet unrecorded for Devon.

SERTULUM NAIGUATENSE; NOTES ON A SMALL COLLECTION OF ALPINE PLANTS FROM THE SUMMIT OF NAIGUATÁ, IN THE MOUNTAINS OF CARACAS.

BY A. ERNST, Ph.D., ETC.

At a short distance towards the east from the well-known Silla de Caracas (2670 metres) rises the lofty mass of Naiguatá to the height of about 2800 metres, the most elevated mountain in the Venezuelan coast-chain. Since Mr. Linden's partial ascent some twenty-five years ago no traveller had made the attempt to reach its top, which was generally believed to be next to inaccessible; but this was for the first time successfully achieved on the 23rd of April, 1872, by Mr. James M.

Spence, of Manchester, accompanied by Mr. A. Goering, an ornithological collector and skilful landscape painter, and five other gentlemen (R. Bolet, Hübel, Lisboa, L. Terrero, and Dr. S. Vaamonde). A small collection of alpine plants from the summit, brought down rather as a *souvenir*, was submitted to my examination, and as it contains several interesting forms, I beg leave to publish the following notes. I hope myself to visit Naiguatá in the month of August, and shall then be able to give a complete account of its vegetation.

1. *Usnea ceratina*, Ach. Lich. Univ. 619. On the stems of *Befaria ledifolia*.
2. *Sticta laciniata*, Ach. Nyl. Syn. i. 354. On rocks.
3. *Frullania cylindrica*, Gottsche, Syn. Hepat. 458. A form certainly belonging to this very variable species was found on the stems of *Befaria*.
4. *Macromitrium longifolium*, Hk.; Mitten, Musci Austro-Americani, in Journ. of Linn. Soc. xii. 210.
5. *Funaria hygrometrica*, Hedw.; Mitten, l. c. 246.
6. *Polytrichum aristiflorum*, Mitten, l. c. 620.
7. *Davallia concinna*, Schrad. Hook. Fil. 100. Sterile fronds. It is the form called by Hooker *D. Lindeni*, Spec. Fil. i. 193, t. 56, B.
8. *Blechnum serrulatum*, Rich.; Hook. Syn. Fil. 186, Spec. Fil. iii. 54. A barren frond, but perfectly agreeing with Schkuhr's plate 108.
9. *Lycopodium complanatum*, L., Spec. Pl. ed. Willd. vol. i. 19.
10. *L. clavatum*, L., l. c. vol. i. 16.
11. *L. taxifolium*, L., l. c. 48.
12. *Podosæmum alpestre*, H.B.K. Nov. Gen. et Sp. Pl. i. 131.
13. *Chusquea Spencei*, sp. n. :—

Ch. erecta, 6–12-pedalis et ultra, culmis nodosis glaberrimis *exsudatione ceracea valde glutinosis*; internodiis ad sexpollicaribus, diam. semipollicari; ramis erectis 6–10-pollicaribus, densissime fasciculatis, gracillimis, compressis oligophyllis; vaginis (inferioribus aphyllis) apice bilobis lobis acutis; ligula nulla; foliorum limbo breviter pedunculato, membranaceo, glauco, basi attenuato, lineari-subulato, apicem versus subtilissime spinuloso, 3–4 pollices longo, 3–5 lineas lato, siccitate spiraliter et transverse convoluto; nerviis primariis 5, medio subter prominulo, venulis secundariis numerosis pellucidis, transversis nullis. Reliqua adhuc ignota.

Though at present I can say no more on this plant, I think there is already sufficient evidence of its being a new and distinct species, with well-marked good characters. There are eleven species of *Chusquea* known to me, either from specimens in my herbarium, or from descriptions and plates,* and I think they may easily be distinguished from each other even in the flowerless state, as I endeavour to show in the following tabular arrangement :—

* Gen. Munro, in his monograph of *Bambuseæ* in the 26th volume of the Transactions of the Linn. Soc., describes 30 species of this genus. He reduces two of the species in the above table to varieties, *C. valdivensis*, Desv., to *C. Quila*, and *C. breviglumis*, Phil. to *C. Culeou*.—Ed. JOURN. BOT.

I.—Ligula nulla.

A. Vaginæ ciliato-pilosæ.—*Ch. abietifolia*, Griseb., West Ind. Fl. 529.

B. Vaginæ glabræ.

a. Lobis vaginarum rotundatis, vegetatio scandens, ramis teretibus.—*Ch. scandens*, H.B.K., Nova Gen. et Sp. Pl. i. 201; vii. 154.

b. Lobis vaginarum acutis, vegetatio erecta, ramis compressis.—*Ch. Spencei* sp. n.

II.—Species ligulis præditæ.

A. Ligula ciliato-pilosa.—*Ch. Quila*, Kth. Enum. Pl. ii. suppl. 350.

B. Ligula glabra.

a. Folia inæquilatera.—*Ch. Dombeyana*, Kth. l. c. 351.

b. Folia æquilatera.

a. Ligulæ obtuse bilobæ.—*Ch. Cummingii*, Esenb.; Desv. in Gay, Fl. Chil. vi. 448, tab. 83, fig. 1.

β. Ligulæ integræ.

a.a. Foliis minoribus (13 lin. long., 2½ lin. lat.).—*Ch. andina*, Phil. Linnæa, xxix. 103; Walp. Ann. vii. 1044.

b.b. Foliis majoribus.

a.a. nerviis primariis 7–9.—*Ch. valdiviensis*, Desv.; Gay, Fl. Chil. vii., 446; Walp. Ann. vii. 1044.

β.β. nerviis primariis 5.

* venulis transversis pellucidis:—*Ch. Culeou*, Desv. Gay, op. cit. vi. 450, tab. 83, fig. 2.

** Venulis transversis nullis.

† vaginæ superne ciliatæ.—*Ch. Gaudichaudii*, Kth. Enum. Pl. ii. Suppl. 352.

†† vaginæ glabræ.—*Ch. breviglumis*, Phil. Linnæa, xxix. 103; Walp. Ann. vii. 1043.

The different species of *Chusquea* are called *Carrizo* in Venezuela, a name derived from *Carex*; and places where they grow abundantly, which they always do, are called *carrizales*, the ending *al* having in Spanish the same meaning as *etum* (e.g. *dumetum*) in Latin.

I have named this new species after its discoverer, Mr. James M. Spence, a gentleman who during his stay in the Caracas has given ample proofs of his great interest in botany, by the large and valuable collections of Orchids he has sent from this country to his father, Mr. Peter Spence, of Erlington House, Whalley Range, Manchester.

14. *Peperomia galioides*, H.B.K., Nova Gen. et Sp. i. 71; Cas. De Cand. in Prod. xvi. 1. 463, n. 362, the typical form.

15. *Rhopala ferruginea*, H.B.K. op. cit. ii. 153; Meisn. in De Cand. Prodr. xiv. 426. It is var. β. *minor*.

16. *Phytolacca rivinoides*, Kth.; De Cand. Prodr. xiii. 2. 459. The fruits are manifestly costate; the inflorescences were not preserved complete, I cannot, therefore, say whether they are nodding or erect.

17. *Gardoquia discolor*, H.B.K. op. cit. ii. 312; Benth. in De Cand. Prodr. xii. 238.

18. *Gaylussacia buxifolia*, H.B.K. op. cit. iii. 276, tab. 257. Not in flower.

19. *Vaccinium caracasenum*, H.B.K. op. cit. iii. 266. The specimens are in fruit.

20. *V. Ottonis*, Klotzsch; Walp. Ann. ii. 1100. Likewise in fruit.

21. *Befaria ledifolia*, H.B. Plant. Equin. ii. 124, tab. 120.

22. *Gaultheria rigida*, H.B.K. op. cit. iii. 286.

23. *Siphocampylus microstoma*, Hook.; Walp. Rep. ii. 733. Some specimens were found by Mr. Goering in a place sheltered by an overhanging piece of rock, shortly before reaching the top. They are in fruit. Fructus capsula turbinata, calyce 10-nervio vestita, bilocularis,

loculis apice dehiscentibus, parte superiore dissepimenti tardius fissa in cornicula dua ad margines spectantia, seminibus numerosis ovatis minimis griseis levissime sub lente reticulatis. This plant was hitherto only known from New Granada.

24. *Gnaphalium americanum*, Mill.; De Cand. Prodr. vi. 234.

25. *Gn. incanum*, H.B.K. op. cit. iv. 80; De Cand. Prodr. vi. 228. The specimens have lost their achænia, but the scales of the involucre are well preserved. I did not notice this species on the Silla de Caracas.

26. *Achyrocline vargasiana*, De Cand. Prodr. vi. 220. Growing also in the lower part of the valley of Caracas.

27. *Libanothamnus neriifolius*, Ernst, Vargasia, 185. (*Baillera?* *neriifolia*, H.B.K. op. cit. iv. 289.

28. *Galium* sp. (Sect. *Relbunium?*). Not in flower, so that it is impossible to make out the species. I add the description as far as the material allows: Caulis tetragonus, quadrisulcatus, ad angulos retrorsum pilosus; foliis quaternis sessilibus late ellipticis margine revolutis apice mucronatis, mucrone sursum flexo, utrinque minutissime punctulatis et sparsim pilosis, margine ciliolatis, subopacis, reticulato-trinerviis, nervis lateralibus ad apicem usque ductis; gemmis floralibus ut videtur tribus in axillis verticilli foliorum.—Herbula annua, cæspitosa, subcarnulosa, basi aphylla et terræ immersa, vix decimetralis. Folia siccitate nigra, 4–5 mm. longa, 2–3 lata; mucro millimetralis; internodia inferiora 5 mm., superiora 2–3 mm.

29. *Pseudorhachicallis caracasana*, Karst. Flora Columb. ii. 10—*Hedyotis caracasana*, H.B.K. op. cit. iii. 393. *Rachicallis caracasana*, De Cand. Prodr. iv. 434. I adopt Karsten's views, who proposes the new genus *Pseudorhachicallis* for those species of *Rhachicallis* which have winged seeds, and are therefore true *Cinchoneæ*. Kunth's *Hedyotis caracasana* has certainly a minute seed-wing, and moreover a valvate æstivation, whilst *Rh. rupestris*, DC., is stated to have wingless seeds and an imbricated corolla (Griseb. West Ind. Flora, 330).

De Candolle and Karsten write *Rachicallis*; I prefer with Grisebach *Rhachicallis*; for De Candolle says: "Nomen ex *ραχία* rupes maritima and *κάλλις* pulchritudo, quasi ornamentum rupium maritimarum." I do not know whether *Rh. rupestris*, which I never have seen, deserves such eulogy; but our Caracas plant, with its dense, dark green foliage, covered by numberless sweet-scented little blue flowers, is certainly a rock beauty.

30. *Hypericum caracasenum*, H.B.K. op. cit. v. 186.

31. *Weinmannia hirta*, Sw. Flora Ind. Occid. 691; Engler in Linnæa, 36, 618.

32. (?) *Potentilla Ehrenbergiana*, Schlecht. Linnæa, xiii. 261; Walp. Rep. ii. 31. Though not in flower, my specimens agree so perfectly with Schlechtendal's elaborate description, that they belong most probably to this handsome and interesting species. The type was discovered by Ehrenberg near Real del Monte in Mexico, 2781 metres over the level of the sea (Humboldt, Nouv. Espagne, Paris, 1811, i. 199). It is said to be very abundant on the top of Naiguatá; I did not see it on the Silla.*

* It is an interesting fact that several peculiar Mexican plants belong likewise to the flora of Caracas, without known intermediate stations. Besides the *Potentilla* I may cite *Asagraea officinalis*, Lindl.; *Gymnopsis Schiedeana*, De Cand. (*Aldama dentata*, Less.); *Sclerothrix fasciculata* Presl etc.

WILD NAVEW.

BY T. R. ARCHER BRIGGS, F.L.S.

I have recently met with a Brassica coming under the *B. polymorpha* of Eng. Bot. ed. 3, growing as a weed among potatoes in two fields near Torpoint, Cornwall, which I find some difficulty in assigning to either of its subspecies, on taking into consideration, conjointly with Dr. Syme's descriptions of them, two articles on the Thames-side Brassica, by Mr. H. C. Watson, in Journ. Bot., vol. VII. pp. 346-50; vol. VIII. pp. 369-72.

Before proceeding further, it will be well for me to say that this Brassica is not identical with a plant established on banks in a few spots near Plymouth, which Mr. Watson considers the same as his Thames-side plant, placed by him under *B. campestris*, L., and regarded by him as the wild or semi-wild state of the common Turnip; nor is it quite the same as a truly annual form, very near this other, referred to by him in the latter of his articles as having been found by me in turnip fields in this neighbourhood, inasmuch as it differs from both in not having the earlier root-leaves grass-green in colour, conspicuously unlike the glaucous ones of the flowering stem.

It agrees very well with *B. campestris*, L., as described in Eng. Bot., ed. 3, "leaves all glaucous, the radical ones hispid, the rest glabrous; flowers falling off before the corymb lengthens into a raceme;" but if this name of *campestris* be applied to the Thames-side plant, which, as I have already stated, differs from it in the important character of having grass-green radical leaves, it must manifestly have some other given to it. But it cannot come under *B. Napus*, L., of the same work, since it is not *entirely* glabrous, though sometimes almost so, whilst at others it is decidedly hispid. Neither can it be put under *B. Rapa*, L., inasmuch as it has not grass-green radical leaves. If, however, the form similar to the Thames-side plant could be placed under this last, then might this Torpoint one be assigned to *B. campestris*, L., and the difficulty as to its position would be at an end.

Many of my examples are without the lowest leaves, as these had mostly rotted away before I first noticed it in June last, but some have them sufficiently sound to prove that their colour is not strikingly different from that of the others, showing the affinity of the plant with one of the other forms rather than with the turnip, and furnishing a good mark of distinction between it and the two other plants of the neighbourhood referred to above. In both the fields but few specimens had escaped the labourer's hoe out of the lines of potatoes, and probably the banking up of the earth around the stalks of the crop hastened the decay of the lower leaves.

The fact of its growing with potatoes proves how quickly it must have come into bloom after springing up, especially as the size of the seed-pods on some of the plants in the second week in June showed that they had then been in flower for some time.

I am inclined to think that it is established as a "colonist" in the locality named, since, besides finding it in the two fields, I gathered a single specimen near the village of Antony, between one and two miles distant from them. As regards it and the two other forms of *B. polymorpha* of Syme occurring about Plymouth, it is quite clear that neither

of the three has anything to do with the Swede, of which specimens may often be seen in flower in spring, in fields that have had a crop of the plant drawn from them the preceding autumn or winter. On examination, the flowering stems will be found to arise from poor or injured roots that were not considered worth removal with the bulk of the crop.

I have secured specimens of this Torpoint Brassica for distribution through the Botanical Exchange Club next winter.

SHORT NOTES AND QUERIES.

ARABIS STRICTA.—This rare Bristol plant has been long supposed to be almost, if not entirely, extinct on the Clifton side of the Avon, while the specimens procured from the Somersetshire side have been very few of late years. During the latter part of April Mr. G. C. Churchill and myself obtained a few good plants in Leigh Woods, but while walking a few days afterwards on St. Vincent's Rocks, along with a young botanical student (J. S. W. Chitty), we were all delighted at finding not mere solitary specimens, but even hundreds of the supposed rarity, in bud, flower, and fruit. The warm early spring was no doubt favourable to this unusual abundance. I had never been able to gather a single specimen on St. Vincent's Rocks in previous years, but this spring they might have been seen all along the edge of Durdham Down as far as the Gully. At the Sea Wall I could not find any, though I searched diligently for them. This notice may appear to come rather late, but I have thought it well, for obvious reasons, to say nothing of the "discovery" until fructification was over.—M. J. BARRINGTON-WARD.

RECOVERY OF LITTORELLA LACUSTRIS AS A MIDDLESEX PLANT.—It will be interesting to London botanists to learn that *Littorella lacustris*, L., is not extinct as a Middlesex plant. My friend, the Rev. J. E. Brewer, of Broadwater, Sussex, has shown me several plants gathered on July 11th, at Ruislip Reservoir, one of which I have the pleasure to enclose. It would appear (*vide* 'Flora of Middlesex', p. 230) that the plant was last observed, in the country at Hounslow, in 1805; so that after a period of sixty-seven years, during which it has not been observed, it has again made good its claim to a place in the 'Flora of Middlesex.' May it not be hoped that many other plants supposed to be extinct in the county are not really so; but that either they have not been noticed, or are awaiting the happy combination of circumstances requisite to their reappearance? While my pen is in my hand I may mention that several plants of *Tulipa sylvestris*, L., were found in last May in a meadow at Roxeth by Mrs. Parr, of Harrow.—W. M. HIND.

ARCTIUM.—In his Eng. Bot. (xi. 8) Mr. Syme quotes me as using *Arctium* as a generic name when *Lappa* is older, and gives that as one of his reasons for not using Adanson's name *Mibora* for the plant called *Knappia* by Smith, and *Chamagrostis* by him. Perhaps I may be allowed to quote in my defence a remark which I made in 1856 (Ann. Nat. Hist. ser. 2, xvii. 370):—"It is proper to state here the reasons which have led me to retain the name of *Arctium* for this genus instead of following

De Candolle in employing it for the *A. lanuginosum*, Lam. Linnæus, in his first work (Syst. Nat. published in 1735) gave the name of *Arctium* to the plant called *Lappa* by Tournefort, and characterized it as early as the year 1737 (Gen. Pl. 243). In 1778 Lamarck transferred the name, under the form of *Arction*, to his *A. lanuginosum* without paying the least attention to its previous use by Linnæus, and applied the term *Lappa* to the Linnæan genus. It is doubtless true that the ante-Linnæan botanists did use *Lappa* as a generic name, but it has been well remarked by the Committee of the 'British Association for the Advancement of Science' appointed to consider the nomenclature of zoology, that "Linnæus was the first to attach a definite value to genera, and to give them a systematic character by means of exact definitions; and therefore, although the names used by previous authors may often be applied with propriety to modern genera, yet in such cases they acquire a new meaning and should be quoted on the authority of the first person who used them in this secondary sense" (Report Brit. Assoc. Manchester, 1842, p. 110). Applying this excellent rule, which is just as true in botany as in zoology, [and followed by A. de Candolle in the 'Lois de la Nomenclature Botanique' adopted by the 'Congrès Internationale de Botanique de Paris' in 1867, as the established rule in Botany], to the present case, we find that the Linnæan name has a priority of many years over that which Lamarck adopted from the ante-Linnæan Tournefort. That this was the view taken at the time is shown by the remarks of Villars (Pl. du Dauph. iii. 27) when continuing to use the name of *Berardia*, which he had given in his 'Prospectus' to the *A. lanuginosum* of Lamarck. There does not seem to be any reason for breaking the rule in this instance, for if it should be said that Tournefort's genera are well defined and therefore should not be rejected, then many more of his names ought to have been adopted in preference to those given by Linnæus." In the case of *Mibora* there can be no question of its priority, and but for the prejudice of some of our Linnean botanists against Adanson, it would probably have been adopted long since in place of the ugly compound name *Chamagrostis*, published 32 years afterwards. It seems hard that the excellent work done by Adanson should be neglected, apparently because he was so much in advance of the Linnean botanists of his own and succeeding times. It seems to have been out of their power to see any good in work which was not executed in their own way. Adanson therefore was thrown aside as undeserving of attention, and botanists out of France have scarcely yet learned to acknowledge the value of what he did.

C. C. BABINGTON.

MONSTROUS STATE OF *VICIA CRACCA*.—In the JOURNAL OF BOTANY for 1871, p. 244, I described some flowers of *Cardamine amara* that had been found by Mr. Britten and myself, which were very strangely altered both in form and colour by the presence of a small larva in the interior of the flower. Last month Mr. Britten gathered a considerable number of flowers of *Vicia Cracca* in the neighbourhood of Lindow Moss, Mobberley, Cheshire, which had been attacked in the same manner and presented a somewhat similar appearance. A great many plants were found at wide distances from each other that had thus been attacked. The flowers appeared like bunches of small bladders, and were very loosely attached to the stalk, falling off with the slightest touch. On opening

them I found in each several very small yellow grubs; and in one instance a white one, which appeared to be of the same species, merely varying in colour. They were exceedingly like the grubs which had caused the peculiar development in the *Cardamine*; but whether of the same species I am not sufficient entomologist to determine. The eggs of the insect appeared to have been laid in the buds of the flowers when in a very young state. Those buds in which the eggs had been deposited never expanded, but grew into bladders, at first green, but gradually assuming the usual purple colour of the Vetch, forming a safe nidus for the grubs. The calyx was very little changed in colour, but was rather more inflated than usual, and in consequence rather more membranous. The standard of the flower, which in a normal state turns upwards, became very large and concave, and, turning downwards, confined the wings and the keel; and thus a hollow bag was formed. The grubs within, which varied in number from one to five or six, seem to feed on the juices of the stamens and pistil, and those organs were, in consequence, stunted and abortive. Not every bunch of flowers on a plant, and not every flower in a bunch, was attacked; but these remarkable insect homes were sufficiently numerous to be very conspicuous even at a considerable distance.—
ROBERT HOLLAND.

DIPSACUS STRIGOSUS, Willd.—Two very large plants of this were shown me by Mr. Naylor last July, by the side of a ditch close to the Thames, at Kew; but were mown down with the grass just after they came into flower. *D. strigosus* is a near relation to our *D. pilosus*, with which some botanists unite it, but is a much stouter plant, with heads twice or three times as large, and bracts which greatly exceed the flowers and are made more elongated. It is a native of Persia. The two specimens at Kew were of course mere casuals, and doubtless their occurrence is in some way connected with the gardens.—HENRY TRIMEN.

CALCEOLARIA MEXICANA, H. & B.—In 'Science Gossip' for 1868, p. 19, Mr. J. C. Hudson gives an account of his discovery of '*Calceolaria gracilis*,' at Bradford Abbas, Dorset; and a further note on the subject, by Professor Buckman, appears in the same periodical for December, 1871. I have received specimens from both gentlemen, and identify them with *C. mexicana*, H. & B. The plant being in some measure established, the following particulars of its occurrence, condensed from the notices above referred to, may be of interest. The plant was first observed in September, 1867, occupying a space of about five acres in a barley-field about half a mile from Bradford Abbas, on a light sandy soil. Here it ripened seed, and continued to flower freely during the mild spring of 1868. It was not again observed until October, 1871, when it was found "dotting the side of the slope in the oat stubble" of the same field.—JAMES BRITTEN.

FURTHER NOTES ON CUNDURANGO (p. 107).—I had lately the opportunity of examining specimens of *Cundurango*, and a fruit said to belong to this plant, which had been obtained directly from the Ecuadorean Government, by Dr. Diego Bautista Urbaneja, Minister of the Interior, Venezuela. The leaves are exactly the same as I described formerly. The

petioles are not covered with grey pubescence, as Triana says, but very distinctly hispidulous hairy. The leaves are three-nerved at the base, the second pair originating about one centimetre above the base, and their under side is rufous, and not covered with an ash-grey tomentum. The upper surface I cannot describe as puberulous, as Triana does; it is in all my specimens densely covered with long hispid hairs, and shorter pubescent ones. The fruit I may describe as follows:—Follicle ovate-lanceolate, ventral side incurved, dorsal side straight, one decim. long, three centim. thick in the thickest part, with *seven* wings, placed at equal distances, and from five to six millim. broad, smooth, epidermis finely reticulated between the wings; seeds numerous, black, thin, seven millim. long, four millim. broad at the base, almost triangular, at the base denticulated; coma silky, four to five centim. long. It appears, therefore, very probable that two if not more species of plants are called *Cundurango*: with vernacular names a rather frequent occurrence. The drug is sold at Caracas at twenty reales (eight shillings) a pound, and even the Extract of Cundurango, made by Bliss and Keene, of New York, has lately been advertised by one of our principal druggists. Medical men, however, have no favourable opinion of it.—A. ERNST.

IRISH PLANTS.—*Mentha sylvestris*. This species seems exceedingly rare in Ireland. There is little doubt that the stations hitherto recorded for it belong to *M. rotundifolia* (Cyb. Hib. p. 217). Last year when in the vicinity of Timoleague, I found by a roadside the true *M. sylvestris* very sparingly; and though I admit a less suspicious station would be desirable for so rare a plant, yet it is interesting to place on record the fact of the discovery of this species, probably new to the Irish flora.—*Utricularia intermedia*, Hayne. This species, very rare through a wide extent of Ireland, I found sparingly in a bog near Leap, County Cork, in the July of last year.—*Hieracium murorum*. I send you with this a specimen of this species new to the South of Ireland. I found seven or eight plants of it growing on a bank faced with stone near this town last June. — T. ALLIN.

FRENCH MENTHÆ.—The part just received of the 'Bulletin of the Botanical Society of France' (xvii. 331) contains a paper on French Mints, by M. Pérard, which is well worthy of careful study by those of our readers who are critically interested in the genus. His classification is as follows:—Subgenus 1, *Euraemtha*. Clusters of flowers not axillary, the upper approximated in a terminal leafless spike. Corolla glabrous internally. Calyx hairy or glabrescent, very rarely glabrous. This contains two sections: *Glabratæ*, with glabrous smooth or finely punctate nucules, and stolons usually epigæous, represented by *viridis* and *rotundifolia*; and *Sylvestres*, with verrucose nucules finely bearded at the tip, and stolons hypogæous, represented by *sylvestris* and *pubescens*. Subgenus 2, *Trichomentha*. Clusters of flowers all axillary and leafy, or more rarely axillary and terminal mixed, or not with leaves. Corolla hairy internally. Calyx hispid or pubescent. This contains two sections: 1. *Tubulosæ* or *Tubulocalyx*, represented by *aquatica* and *sativa*; and 2. *Campanulatæ* or *Campanocalyx*, represented by *arvensis*. Subgenus 3. *Menthastrum*.

Clusters of flowers all axillary and leafy. Corolla glabrous internally. Calyx generally glabrous or glabrescent, very rarely pubescent. Represented by *cardiaca*, *rubra*, and *gentilis*. About seventy species are admitted, all of which are characterized by means of analytical keys like those in Boreau's 'Flore du Centre.'

Extracts and Abstracts.

A STUDY OF WOOD HYACINTHS.

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

As is known to many of our readers, Messrs. Barr and Sugden, of Covent Garden, have taken a great deal of pains for many years past to get together as complete a collection as possible of the existing forms of the group of Scillas to which our common wild English wood Hyacinth belongs. This group or sub-genus, which has received no less than four different names from as many different writers—Endymion, Agraphis, Limonanthe, and Hylomenes—differs from *Scilla* proper by having the flower, even when fully expanded, more or less decidedly shaped like a bell, instead of having the divisions spread horizontally from the top of the stalk, like the spokes of a wheel from the axis. The group forms a connecting link between typical *Scilla* and *Hyacinthus*, because it resembles, in the shape of the flower, the cultivated oriental Hyacinth. Linnæus placed the wild wood Hyacinth of western Europe in the same genus, *Hyacinthus*; but later systematists, bearing in mind that the divisions of the perianth are distinct from one another down to the very base, have either placed it in *Scilla*, or regarded it as a genus distinct from both *Scilla* and *Hyacinthus*. Mr. Barr has more than once kindly supplied me with specimens of the principal forms, but I never had the opportunity of paying a visit to his nursery grounds, and seeing them actually growing side by side until recently. As his collection contains not less than 50 different plants, obtained from very various sources, each represented by a considerable number of individuals, it furnishes as good an opportunity as can well be desired for studying the characteristics of the forms, and the nature and amount of the differences between them. No doubt we are now in England at the present time in the possession of far fuller material for the study of the group than that to which the authors who had treated upon it in times past had access. The views which different authors have taken of the relationship of the forms to one another and of their nomenclature is extremely diverse, and not only so but the facts which their study brings out are so interesting in their bearing upon the difficulty which there is in naming and classifying plants in books, gardens, and herbaria, that I am induced to send somewhat copious extracts from my notes on the matter.

First of all, beginning, as one should, with the plants themselves, in order to avoid bias from the statements and ideas of previous writers, I will give my notes on the characters of some of the most striking forms. These notes, I should explain, were all made upon living specimens in Mr.

Barr's collection, and relate to what seemed to me the most distinct forms that were in flower when I visited it during the last week in May, at which date several of the early-flowering forms had passed by, and when all the later-flowering forms had reached their full development.

1. Bulb globose, $1\frac{1}{4}$ inch thick. Leaves half a foot long above the soil, $\frac{1}{2}$ – $\frac{5}{8}$ inch broad, narrowed gradually to the point, firm in texture, sub-erect, recurved at the tip, deeply channelled all down the face; scape as long as the leaves; lower pedicels $1\frac{1}{2}$ –2 inches long; perianth $\frac{5}{8}$ inch long, the divisions 2 lines broad, deep hyacinth-blue, with a distinct deeper coloured keel, permanently connivent in the lower half, widely falcate in the upper half, so that the expanded flower is half an inch broad; sepaline filaments $\frac{3}{8}$ inch long, free only in the upper quarter; petaline filaments $\frac{1}{4}$ inch long, the upper two-thirds free.

2. Bulb globose, $1\frac{1}{4}$ inch thick. Leaves half a foot long above the soil, sub-erect, $\frac{1}{2}$ – $\frac{5}{8}$ inch broad, narrowed to the point; scape rather longer than the leaves; lower pedicels $\frac{1}{2}$ – $\frac{3}{4}$ inch long; perianth $\frac{5}{8}$ – $\frac{3}{4}$ inch long, pale lilac-pink, the segments 2 lines broad, permanently connivent in the lower half, much falcate in the upper half, sepaline filaments nearly half an inch long, free at the top only; petaline filaments $\frac{3}{8}$ inch long, more than half free.

3. Bulb globose, $1\frac{1}{4}$ inch thick. Leaves 8–9 inches long above the soil, $\frac{1}{2}$ – $\frac{3}{4}$ inch broad, weak, flaccid, narrowed to a point, not much channelled down the face; scape quite a foot high; lower pedicels $\frac{1}{2}$ – $\frac{3}{4}$ inch long; perianth $\frac{5}{8}$ inch deep, the divisions $2\frac{1}{2}$ lines broad, deep hyacinth-blue, sub-connivent in the lower half, but not forming so narrow a tube as 1 and 2, decidedly falcate in the upper half; sepaline filaments 4 lines long, nearly the upper half free; petaline filaments $\frac{1}{4}$ inch long, free nearly to the base.

4. Bulb depresso-globose, $1\frac{1}{2}$ inch broad. Leaves half a foot long above the soil, $1\frac{1}{4}$ – $1\frac{1}{2}$ inch broad, firm in texture, sub-erect, blunt; scape robust, twice as long as the leaves; lower pedicels $\frac{1}{2}$ – $\frac{5}{8}$ inch long; perianth, $\frac{5}{8}$ – $\frac{3}{4}$ inch deep, the divisions $2\frac{1}{2}$ –3 lines broad, deep hyacinth-blue, with a deep distinct keel, permanently sub-connivent in the lower half, broadly falcate in the upper half; sepaline filaments nearly half an inch long, free for the upper quarter; petaline filaments, 4 lines long, free for the upper quarter.

5. Bulb globose, above an inch thick. Leaves 9–10 inches long above the soil, firm, sub-erect, narrowed to a point, $\frac{1}{2}$ inch broad, deeply channelled down the face; scape shorter than the leaves; lower pedicels $\frac{1}{2}$ – $\frac{5}{8}$ inch long; perianth half an inch long, spreading when expanded like the top of a funnel from the base, falcate towards the tip, the divisions pale lilac-pink, $\frac{1}{8}$ inch broad; sepaline filaments 4 lines long, free above the middle; petaline filaments about as long, free except near the base.

6. Bulb globose, above an inch thick. Leaves 7–8 inches long above the soil, $\frac{1}{2}$ – $\frac{5}{8}$ inch broad, sub-erect, narrowed to a point; scape a foot high; lower pedicels 1– $1\frac{1}{2}$ inch long; perianth half an inch deep, $\frac{3}{4}$ inch across when fully expanded, spreading like the top of a funnel from near the base, distinctly falcate near the tip; the divisions pale red-lilac, 2 lines broad; sepaloid filaments 4 lines long, free from a little above the middle; petaloid filaments as long, attached at the very base only.

7. Bulb globose, $1\frac{1}{2}$ inch thick. Leaves 8–9 inches long above the soil, $\frac{3}{4}$ –1 inch broad, firm, sub-erect, narrowed suddenly at the tip, deeply channelled down the face; scape shorter than the leaves; lower pedicels $\frac{1}{2}$ – $\frac{5}{8}$ inch long; perianth $\frac{1}{2}$ inch long, deep hyacinth-blue, spreading like the top of a funnel from the base when expanded, $\frac{3}{4}$ inch across, the division falcate near the tip, 2– $2\frac{1}{2}$ lines broad; sepaline filaments $\frac{1}{4}$ inch long, the upper third free; petaline filaments $\frac{1}{4}$ inch long, the upper three-quarters free.

8. Bulb ovoid, under an inch thick. Leaves 5–6 inches long above the soil, weak, flaccid, 5–6 lines broad, narrowed to the point, inconspicuously channelled; scape rather shorter than the leaves; lower pedicels $\frac{3}{4}$ – $\frac{7}{8}$ inch long; perianth barely half an inch long, the divisions more spreading than in 6 and 7, falcate from near the base when expanded, $\frac{1}{8}$ inch broad, pale hyacinth-blue, without a darker keel, the expanded flower $\frac{3}{4}$ inch across; sepaline filaments $\frac{1}{4}$ inch long, free in the upper half; petaline filaments about as long, attached at the base only.

Let us now take stock, organ by organ, of the amount of variation which the series shows.

Bulbs precisely similar in structure, but varying in shape from ovoid through globose to depresso-globose, and in thickness from three-quarters of an inch to an inch and a half.

Leaves varying greatly in size, shape, and texture. In length from half a foot to a foot above the soil; in breadth from half an inch to an inch and a half; the width either gradually reduced through the upper third or almost uniform to within a short distance of the tip, the point blunt or acute; the texture firm, so that the leaf maintains a sub-erect position till the flowering is over, or weak, so that it falls backwards over at an early stage; the face deeply or scarcely at all channelled, and the back conspicuously or hardly at all convex, and in the sub-erect forms the tip sometimes incurved and sometimes recurved.

Scape varying in length from as long as the leaves to twice as long.

Raceme varying much in density, and the pedicels greatly in length and direction.

Colour of flowers.—Three perfectly distinct shades, the commonest hyacinth-blue, the other two a pale lilac-pink and a pure white, these running through the forms clearly without any correlation with other differences.

Shape of the flower.—Varying from the segments permanently connivent in a tube in the lower two-thirds to spreading falcately from very near the base, the length of the flower varying from half to three-quarters of an inch.

Attachment and length of the filaments.—The sepaline filaments always attached distinctly higher than the petaline three. The attachment usually correlative with the shape of the corolla, but not invariably so, the absolute length being increased, and the proportion that is adnate greater the higher and more distinctly the segments are permanently connivent. In the closed-flowered forms the two threes are distinctly different in length, but it is not so when the flower is funnel-shaped. In describing the forms, they are arranged in series according to these two last characters, beginning with the most closed, and ending with the most open flowers.

Next, avoiding mere descriptions as ambiguous, let us compare the published figures with the forms above described. The history of the names used by botanical writers is briefly as follows. Linnæus describes two species, *Hyacinthus nonscriptus* and *cernuus*. A few years later Miller described *Scilla hispanica*; Aiton named *Scilla campanulata*, in the first edition of the 'Hortus Kewensis.' Redouté has three, *Scilla nutans*, *patula*, and *campanulata*. Reichenbach and Kunth admit four species, *nutans*, *cernua*, *patula*, and *campanulata*.

Turning now to the figures, three are drawn in the 'Botanical Magazine.' Plate 127 (but letterpress accidentally numbered 128), called *Scilla campanulata*, agrees with our No. 4, except that the leaves are narrowed to a point. Redouté afterwards expressly says that this is what he means by *patula*. Tab. 1102, also called *S. campanulata*, is most like our No. 3, but with stronger deeply channelled leaves; but there are two separate flowers drawn with it as being the same thing, one of which is white, and the other matches our No. 5. Bertoloni, who admits for Italy one species only, which he calls *patula*, quotes this plate as representing it. Tab. 1461, called *Scilla nonscripta* variety, matches very well our No. 2.

Redouté's plates do not look so natural, and are less easy to pronounce upon. His t. 224, *Scilla nonscripta*, has very short pedicels combined with flowers $\frac{3}{4}$ — $\frac{7}{8}$ inch long, permanently connivent three-quarters of the way up. His t. 225, *Scilla patula*, has still larger flowers, permanently connivent half or two-thirds of the way up, but spreading more at the tip than in the last form. His t. 435, *Scilla campanulata*, has leaves a foot long, an inch broad, and the divisions of the perianth spreading

horizontally from three-quarters of the way down. I strongly suspect that in all the three the size of the flower has been exaggerated, and the shape not carefully rendered.

In 'Icones Floræ Germanicæ' Reichenbach has plates of all the four species so called—1007 called *cernua*; one specimen, leaving foliage out of account, differs from our No. 1 only by its slightly longer flower; another specimen is the same form, but white-flowered. 1008, called *nutans*, represents well our No. 2, but a blue flower by the side of the main figure represents fairly our No. 7. 1009, called *patula*, is like our No. 4, but smaller in size, with much narrower leaves, deeply channelled down the face. 1010, called *campanulata*, agrees well both in the shape of the flower and the filaments with our No. 7. I have no doubt, judging from the descriptions in the author's 'Flora Excursoria' that the names of 1007 and 1008 have been accidentally transposed. Willkomm and Lange, who in their 'Flora of the Spanish Peninsula' admit three out of Kunth's four species, cite Reichenbach's 1007 for *nutans*, 1008 for *cernua*, and 1010 for *campanulata*.

In conclusion, I do not see that it is possible to draw any clear line of distinctness between the different members of the series, or to regard them all as forming more than a single species in a broad scientific sense. Looking at flower characters solely, and disregarding colour, there can be no difficulty in identifying 1 and 2 with the Hyacinth of our English woods. In 20 years' experience of specimens living and dried, I have never seen any Hyacinth wild in Britain that had not this shape of flower, and unequal filaments with a long attachment. With the same certainty, still looking at flower-characters alone, and disregarding colour, 5, 6, and 7 may be identified with the common wild Hyacinth of Spain and Portugal. If we had these two forms alone to consider, we might fairly, according to the usual plan of deciding, admit two distinct species—one, the *Hyacinthus anglicus aut belgicus* of Gerarde, *nonscriptus*, *nutans*, *cernuus* of Linnæus, and his successors, with a long flower permanently connivent in the lower half, and unequal filaments; and the second, to be called *hispanica* or *campanulata*, with a shorter flower, spreading like the top of a funnel from the very base, and equal filaments with a shorter attachment. Probably nine out of ten of the specimens to be seen either wild or cultivated would fall, without much straining, under one of the two types; but then if we do this we must leave leaf characters and an uncertain proportion of intermediate specimens out of account. I have entered into such full detail now because what happens with wood Hyacinths happens not unfrequently when we try to apportion out plants in the fields and gardens amongst the species that are described in books. A gardener who had grown these eight forms could scarcely be considered unreasonable if he expected to have an individual name of some kind provided for him for each of them; for remember in looking at the descriptions they are not taken from single individuals, but from forms represented in each case by a large number of individuals, which forms have been grown from year to year, side by side, under identical conditions of soil and treatment. To deal with *Scilla nonscripta* in the same way in which M. Jordan has lately dealt with *Scilla peruviana*, *Muscari botryoides*, *Ornithogalum umbellatum*, or *Hyacinthus amethystinus*, I have no doubt that it would be practicable by careful study of Mr. Barr's material alone to individualise twice eight forms that have as good a claim to be regarded as distinct species as the

forms of the plants which I have just named, which MM. Jordan and Fourreau have lately described and figured most carefully in their 'Icones Floræ Europææ' under specific names.

Apportioning out the book names amongst our forms, it is evident that No. 1 represents *Hyacinthus nonscriptus* of Linnæus—*Scilla nutans* of Smith, slightly changed by cultivation; that No. 2 represents *Hyacinthus cernuus* of Linnæus, but that this is merely a form of *nonscriptus* with flower changed in colour; that our 5, 6, and 7 are *S. hispanica* of Miller, which is the same as *S. campanulata* of Reichenbach and Willkomm and Lange. About *S. patula* there is considerable doubt, as the name has been applied variously, and the most authoritative figure is badly drawn; but the weight of evidence places it between the other two, like our Nos. 3 and 4, and the two earlier plates of the 'Botanical Magazine.' This disposes of all the published names, and leaves out only our No. 8, which is a more extreme form than *campanulata*, and might be called *campanulata aperta*.—From the *Gardeners' Chronicle*, August 3rd, 1872.

ON THE STRUCTURE OF LILY BULBS.

In general the species included in this geographical division (Lilies of the east side of North America) offer in their subterranean part a mode of development which does not, so far as I know, exist in any of their European or Asiatic congeners. In fact their bulb is attached to a rhizome, and each year a new bulb is formed upon a recent horizontal development of this rhizome. To give an idea of this development, allow me to explain what I have seen in *Lilium canadense*, as examined at the commencement of the month of March, and, in consequence, at a time when only the first indications of the vegetation of the year were observable. At the base of the stem which had flowered the preceding year, and of which there remained only a small portion hidden in the ground, was found the bulb from which that stem had issued forth—a bulb formed of short scales, still fleshy and fresh for the most part, pointed and laxly imbricated, which, taken as a whole, was about twice as broad as deep. Immediately above this bulb was the remainder of the old stem, bearing a ring of root fibres, now dead and dried up. It sent out also similar but less numerous rootlets at a lower level in such a way that these latter had to insinuate themselves between the scales of the bulb to penetrate the soil. Finally, the extreme base of this same old stem was prolonged below the bulb with a diameter nearly double that which it had above it, and after a centimetre or more in length, it ended by a broad truncation. As a whole, the base of the stem which had flowered in the preceding year, traversed the bulb and issued from it both above and below.

It is from this old stem that has flowered in the preceding year, immediately below the old bulb and very likely from the axil of a scale that has fallen, that the horizontal branch is originated, which at its extremity bears the new bulb from which one sees already arise the conical summit of the shoot which will soon develope into the flower-stem of the year. This rhizome does not reach more than two or three centimetres in length;

from its point of origin it descends a little into the soil, then raises itself to become horizontal, and finally rises at its extremity to form the axis of the new bulb and to be finally continued as the new flower-stem. In its underground progress it bears small spiral scales, thick and fleshy, of which the first are slightly spaced, but those at the end of the subterranean branch growing closer and larger and forming thus the new bulb. From the interior portion of this rhizome, especially from the part that bears the lower scales of the young bulb, arise numerous thickish rootlets, upon the healthy action of which the vitality of the new vegetation evidently depends. Later on in the year the old bulb disappears, the horizontal rhizome becoming thus free; then the rhizome dies in the part which does not produce rootlets, and at the same time a new rhizome arises at the base of the bulb of the year, to form in its turn at its extremity another bulb to yield the flower-stem of the year following. There are produced then in these Lilies a succession of subterranean bulbiferous branches, or a series of successive generations, each of which has an annual bulb for its fundamental basis.

It is necessary to bear carefully in mind the essential difference which exists between this mode of development and that which is presented in the generality of Lilies, for example, in the commonest of all, *L. candidum*, which has been well studied in this respect by Irmisch ('Zur Morphologie der monokotylishen Urdlen und Zwiebegewæsche,' p. 82, t. 6, fig. 18-20). Here the bulb is not annual, but lasts through many successive years, sending out each year, near its centre, a new floriferous stem, surrounded at its base by a certain number of new leaves. This regeneration in the interior is accompanied by a correlative destruction at the exterior, so that, in reality, the bulb only preserves each year a determinate number of scales, that is to say, of the bases of modified leaves; the number corresponding to two, three, or four years of vegetation, according to the species. As to the successive production of a series of flower-bearing stems by the same bulb, it occurs that at the moment when the centre of the bulb begins to put forth the stem of the year, one may recognize already at the side of the base of this nascent stem, at the axis of one of the inner leaf-scales, a bud which will remain small all that year, but which in the following spring will develope into a new flower-bearing stem. There is then always in the bulb, by the side of the point from which the above-ground development of the year arises, the germ of the above-ground produce of the year following. It is then easy to understand that the same bulb, renewing itself continually from the inside, may in this way last a number of years."—*Duchartre, 'Observations sur le Genre Lis,' p. 78.*

A DICHOTOMOUS KEY TO THE FRENCH FORMS OF EUPHRASIA.

Group 1.—Glandulosæ. Stem glandular-hairy, at least in the upper part, or leaves glandular-hairy. Calyx always tomentose, usually glandular.

1. Flowers small, the tube of the corolla included in the calyx 2
- Flowers moderately large 3

2. Leaves broadly ovate, densely glandular-pubescent *E. hirtella*, Jord.
 Leaves middle-sized, with obtuse teeth; pubescence short and rough; stem thick subfistulose *E. polyadena*, G. and R.
3. Capsule exceeding the floral leaf *E. campestris*, Jord.
 Capsule not exceeding the floral leaf 4
4. Leaves broad obtuse, all with obtuse teeth; raceme interrupted at the base *E. montana*, Jord.
 Upper leaves with shortly acuminate teeth; raceme not interrupted at the base 5
5. Stem covered with long, soft, abundant glandular hairs *E. officinalis*, L.
 Stem clothed with shorter, less glandular hairs *E. uliginosa*, Duc.
- Group 2.—Eglandulosæ.* Stem more or less pubescent, not glandular; leaves glabrous or glabrescent, rarely hispid, not glandular; calyx glabrous or pubescent, rarely slightly glandular.
1. Corolla white, mixed with blue, lilac, or yellow 3
 Corolla very small, all yellow, or yellow with upper lip lilac, very dwarf 2
2. Upper teeth of leaves acute *E. minima*, Jacq.
 Leaves very small, with all the teeth obtuse *E. minor*, Jord.
3. Capsule exceeding the floral leaf 4
 Capsule not exceeding the floral leaf, usually shorter 7
4. Stem slender; racemes lax; capsule truncate at tip { *E. gracilis*, Fries.
E. nemorosa, Pers.
 Capsules mucronate, emarginate at the tip 5
5. Racemes short thick *E. nitidula*, Reut.
 Dwarf with elongated racemes 6
6. Upper teeth of leaves acute *E. minima*, Jacq.
 Leaves very small, with teeth all obtuse *E. minor*, Jord.
7. Leaves hispid, pubescent *E. puberula*, Jord.
 Leaves glabrous or glabrescent 8
8. Leaves linear, with two acute teeth about their upper third *E. tricuspida*, L.
 Leaves dentate, with many teeth 9
9. Spike 4-angular, leaves thick dentate, upper with terminal tooth always oval *E. tetraquetra*, Arron.
 Raceme close or lax, upper leaves with teeth all acute 10
10. Calyx hairy or subglandular 11
 Calyx glabrous or glabrescent 13
11. Leaves oval-oblong or oblong, flowers middle-sized or small, calyx pubescent 12
 Leaves linear, lanceolate; flowers large, calyx subglandular *E. ramosissima*, Reut.
E. maiialis, Jord.
12. Leaves green, with upper teeth subulate, spreading
 Leaves brownish-green; teeth of upper porrect long cuspidate,—plant brown or blackish *E. cuprea*, Jord.
13. Flowers large, corolla tube much exerted *E. alpina*, Jord.
 Flowers small or middle-sized 14
14. Leaves oval or oblong, with teeth subobtuse or acute 16
 Leaves lanceolate-oblong, or lanceolate with teeth very deep, acuminate, aristate 15
15. Stem simple or branched near the middle; leaves lanceolate *E. salisburgensis*, Tank.
 Stem usually branched from base, leaves lanceolate oblong *E. Layeri*, Timb., Lagrave.
16. Teeth of lower leaves subobtuse, leaves in lax racemes, capsules emarginate-mucronate *E. rigidula*, Jord.
 All the teeth acute; flowers in close racemes, capsule mucronate, rounded at the summit *E. ericetorum*, Jord.

New Publications.

English Local Floras.

The recently issued 'Report of the Bury Natural History Society,' from January, 1868, to December, 1871, contains a list of the plants observed within fifteen miles of Bury, compiled by the President, Mr. Randal H. Alcock. The flowering plants are arranged according to Bentham's 'Handbook,' and, as a consequence, segregates are almost entirely omitted. The Flora of Bury appears to be a singularly uninteresting one, and, if we may take the present list as fairly complete, more remarkable for its absences than for any rarities which occur. Among the genera which do not appear to be represented are *Fumaria*, *Saxifraga*, *Dipsacus*, *Ananthe*, and *Sanicula*; and we note the absence of such species as *Hypericum perforatum*, *Lamium album*, *Urtica urens*, *Malachium aquaticum*, *Stellaria graminea*, etc. Some of these may have been accidentally omitted; and we imagine that a closer search would bring to light more than four *Cyperaceæ* and one *Potamogeton*. Several species which are generally regarded as native appear at Bury only where cotton refuse has been thrown down: such are *Lepidium ruderale*, *Senebiera Coronopus*, *Foeniculum vulgare*, *Solanum nigrum*, *Origanum vulgare*, *Mentha Pulegium*, *Ballota nigra*, *Verbena officinalis*, and *Chenopodium polyspermum*; other introductions from the same source are *Malva verticillata*, *Scorpiurus sulcata*, *Ammi majus*, *Artemisia Abrotanum*, *Lycopersicum esculentum*, and *Phalaris canariensis*. *Saponaria Vaccaria* has occurred at Ainsworth in cornfields, and twice at Hudcar as a garden weed. The *Circea alpina* of the list is probably *C. intermedia*, Ehrh.

A much more interesting Flora is that of Winchester and seven miles round, as given by Mr. F. I. Warner in the 'Report of the Winchester and Hampshire Scientific and Literary Society' for 1870-71. Considerable attention has been given to critical forms, and the plants enumerated amount to nearly seven hundred. These include several introductions, the most interesting of which is *Muscari comosum*, Mill., which was recorded at p. 245 as occurring in Herefordshire. It has been observed for two years past at the side of a cornfield near Weeke, and was probably introduced with foreign seed. *Dabeocia polifolia* has been found growing in waste ground at Bitterne, near Southampton, among other heath plants, and has also been received from Bournemouth. The Rev. C. A. Johns (President) has examined the former locality, but declined to express any opinion as to its being indigenous without further investigation. Now that we have, besides this Society, the Newbury District Field Club, the Winchester College Natural History Society (which has assisted in the compilation of the present list), and the numerous scattered papers upon Hampshire botany which have appeared from time to time, it is surely reasonable to hope that the much-needed Flora of Hampshire will be speedily put in progress.

In the last Report of the Proceedings of the Liverpool Naturalists' Field Club, a *résumé* of the botanical proceedings for 1871 is given,

by Mr. H. S. Fisher, the more interesting plants found in the excursions of the Society having been *Poterium muricatum*, in a wood (?) near Caewrys; *Myosurus minimus*, on the gravel-drive in front of the hall at Vale Royal Gardens; *Polygala calcarea*, at Bala; *Alyssum incanum*, at Rostherne, Cheshire; and *Verbascum Lychnitis*, at Caergwrle. The 'Flora of Liverpool' has just been issued by the Club; we shall give a detailed notice of this work at an early opportunity.

The Rev. T. A. Preston publishes with the 'Report of the Marlborough College Natural History Society,' for the half year ending Midsummer, 1872, a second instalment of his useful 'Flora of Marlborough.' This part contains the *Calycifloræ*, and is made very useful by means of analytical keys to the genera and species, with brief descriptions, which have been very carefully drawn up, and full lists of localities.

Mr. T. B. Flower has issued the fourteenth part of his 'Flora of Wiltshire,' which carries the enumeration and description of species down to *Colchicaceæ*.

We are glad to learn that Mr. J. C. Mansel-Pleydell has his 'Flora of Dorset' nearly ready for the press; and that a new Flora of the neighbourhood of Nottingham, by the Rev. E. Smith and Mr. Irving, is in active preparation, under the auspices of the Literary and Philosophical Society of Nottingham.

J. B.

How Plants Behave: how they Move, Climb, Employ Insects to work for them, etc. By ASA GRAY. New York. Ivison and Co., 1872. (pp. 46.)

This little volume forms a second part of Professor Gray's 'Botany for Young People,' the first part of which, 'How Plants Grow,' was written fourteen years ago. It does not profess to be more than an outline of this department of Botany, which has come into prominence almost wholly since that time; the author expects to treat the subject "with somewhat of scientific and historical fulness in a new edition of a work intended for advanced students."

The three chapters are devoted to movements of plants, the relationship of insects to fertilization, and the capture of insects by certain plants. These subjects are treated briefly and clearly, in a popular, and perhaps rather exaggerated style. The first chapter is, of course, mainly an abstract of Darwin's observations on twining and climbing plants. In the second we have the various arrangements for cross-fertilization in *Dicentra*, *Iris*, *Arethusa* and other Orchids, *Asclepias*, *Berberis*, *Kalmia*, etc., described and illustrated by figures; as well as the phenomena of dichogamy and dimorphism. In *Kalmia*, as is well-known, the ten anthers are lodged in pouches in the corolla. The filaments here are springs which are liberated by a rude touch, the pollen being then shot out with violence from the apical pores of the anther. This is effected by humble-bees; one of these hovering over the flower and thrusting its proboscis round the ovary "receives upon the under side of its body and its legs successive charges of pollen. Flying to another blossom, it brings its pollen-dusted body against the stigma," at the apex of the long style, and so fertilizes the flower.

The third chapter contains notes on pitchers and fly-traps, and some

interesting details of the well-known *Dionæa muscipula*. From several considerations and the experiments of Mr. Canby, Dr. Gray is "forced to conclude that . . . this plant is really carnivorous."

'How Plants Behave' is just the book to put into the hands of a young student of botany, who is weary of the jejune text-book definitions of endless terms; it presents the science to him under an entirely novel and very attractive form, and shows him how much there is to reward the careful observer of plant-life.

H. T.

On some Fossil Ferns in the Ravenhead Collection. By the Rev. H. H. HIGGINS and Mr. F. P. MARRAT. (From the Proceedings of the Liverpool Geol. Soc. 1872.)

It was fortunate that the attention of Mr. Higgins was drawn to the railway cutting at Ravenhead, near Liverpool. A considerable series of highly fossiliferous shales were explored, and from them Mr. Higgins collected a large number of plant remains, a portion of which form the subject of this paper. Mr. Marrat has enumerated 62 species of Ferns, nine of which he considers to be new, and to them he has given "provisional" names. The illustrations are not very satisfactory, and as far as they go they incline us to believe that Mr. Marrat's generalisation as to the species of previous authors is most probably true of his own, "that careful investigation often leads to the unsatisfactory conclusion that three or four pre-supposed (*sic*) species probably constitute various parts of one and the same plant." He figures two fern stems, interesting additions to our carboniferous flora.

W. C.

Proceedings of Societies.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, BRIGHTON, 1872.

SECTION B. CHEMICAL SCIENCE.—*August 16th.*—J. W. Mallet, "On the occurrence in recent Pine timber of Fichtelite, a hydrocarbon hitherto only known in a fossil state."

SECTION C. GEOLOGY.—*August 19th.*—W. Carruthers, F.R.S., "On the Tree-ferns of the Coal Measures, and their Affinities with Existing Forms." Lindley and Hutton describe two species of Tree-ferns from the Coal Measures, both from the Bath Coal-field. I have been able to add eight species hitherto undescribed, chiefly through the assistance of J. M'Murtrie, Esq., of Radstock. These belong to three groups, which are remarkably distinguished by peculiarities in the structure of the stems. Two of the groups belong to living forms, while the third is extinct, being confined to Palæozoic formations. *Caulopteris* and *Tubicaulis* belong to the same type as the living Ferns which possess stems, including under

this term the humble stems (falsely called rhizomes) of many of our British species, as well as the arborescent Ferns of warmer regions; and excluding the rhizomatous forms like *Pteris*, *Polypodium*, and *Hymenophyllum*. In all these stems we have a central medulla, surrounded by a continuous vascular cylinder penetrated regularly by meshes, from the margins of which the vascular bundle or bundles to the fronds are given off, and through which the parenchyma of the medulla is continuous with that of the stipes. In most Tree-ferns the medullary axis is larger, and the bases of the stipes decay down to the circumference of the stem, but in *Osmunda* the persistent bases of the stipes permanently clothe the small vascular cylinder which encloses a slender pith. To this latter form belongs the stipe with a dumb-bell-shaped vascular bundle, separate specimens of which I have obtained from the Coal Measures. These have been described both on the Continent and in this country, under the name of *Zygopteris*, but they belong to Cotta's genus *Tubicaulis*; and they are very closely allied to a group of Fern stems which I have already placed together under the name of *Chelepteris*. The stem structure of the common Tree-fern is represented by the genus *Caulopteris*, of which I have six species of carboniferous age. The third and extinct group is represented by Corda's genus *Stemmatopteris*, only now known to be British, and by *Psaronius*, which is, however, not a separate generic form, but only the internal structure of the stems of which Corda's genus is the external aspect. The chief characters of *Psaronius* have been drawn from the structure of the aerial roots which invest the stem, from which, indeed, the generic designation was derived; while the structure of the stem itself has been overlooked. But this is really of the first importance, as will appear from the following description which I have been able to make from a finely preserved specimen of an undescribed species in the British Museum, and from the figures of Cotta and Corda. The circumference of the stem was composed of a continuous envelope of indurated tissue; within this there were perpendicular tracts of vascular tissue never penetrated by any mesh. Between these tracts the leaves were given off in perpendicular series, the large single leaf bundles coming right out from the central parenchyma, where they existed as well-formed bundles, filling up more or less completely the medullary cavity. In one form (*Zippea*) the leaves are opposite, and the great proportion of the circumference of the stem is made up of the persistent and common vascular tissue: in others (species of *Psaronius*) the permanent elements of the stem consists of three, four, six or more perpendicular tracts. The first two groups are analogous in the arrangement of the parts of their stems to that which exists in the first year's growth of a dicotyledon. In both there is a parenchymatous medulla surrounded by a continuous vascular cylinder, which is perforated in regular manner by meshes for the passage out of the vascular elements of the appendages. The stems of the third group have a structure analogous to that which is found in the stems of monocotyledons, for in both we have the vascular bundles of the appendages existing in the parenchymatous axis, and passing out independently of any closed cylinder. The permanent elements of the circumference of the stems of *Psaronius* are, however, without any analogue in the monocotyledonous stems. There seems then good reason for establishing two groups of Ferns, with differences characteristic of their stems, comparable to those which distinguish the stems of monocotyledons from those of dicotyledons. But the caution I have always

insisted on in dealing only with vegetative organs is specially required here, for I have discovered, I believe, the fruiting fronds of one species of this group of plants. With the Bath specimens of *Stemmatopteris insignis*, Corda, as well as with those found on the Continent, the fronds of *Pecopteris arborescens* are always associated. It is the only Fern found with some of the Bath specimens. It is also to be observed that the base of the stipes correspond with the size of the leaf scars on the stems. These facts are not absolutely sufficient for the correlation of the fronds with the stem, but they are the best evidence for this that we can expect in Fossil botany short of actual organic union. Now the fruit of *Pecopteris arborescens* is so near to that of *Cyathea* that I can find no characters whereby they can be separated. Our classification based on the stems must of course yield to that derived from the organs of fructification, and our group of Ferns instead of being made into a new order, as would be the case by some who publish on Fossil botany, must be grouped with a tribe of recent *Polypodiaceæ*. It may seem that this is a forced and arbitrary grouping together of plants that in some important characters so remarkably differ; and so it is undoubtedly to those who with rash confidence generalize on the systematic position of plants from stem structure alone. But what can such objectors say to the practice of placing in close proximity plants that are beyond question nearly related to each other in all essential characters, though some have caudices while others possess rhizomes, yet these two forms of stems are more widely separated from each other than the extinct palæozoic group is from the recent forms.—Prof. James Hall, “Note on the occurrence of erect bases or trunks of *Psaronius* on the Devonian Rocks of New York, U.S.A.”

SECTION D. BIOLOGY.—*August 16th.*—A. W. Hayne, M.A., “The Botany of Moab.” [We hope to publish this paper *in extenso*.]—M. Moggridge, “On a remarkable Elm in Kensington Gardens.” By the side of the walk N. of the engine house at the Serpentine is a remarkable Elm. The height is about 55 ft., the circumference 8 ft. 7 in. It is flourishing in two places; one on the E., the other on the N. side. The bark is gone and the surface of the wood decayed. In the latter case the damage extends to the ground; and immediately above it at 8 ft. from the base two large roots, now grown into one, descend from the bole of the tree, and soon become divided into eight, which are irregularly interlaced: the circumference of the whole bundle being 2 ft. 3 in., and that of the largest of these roots 8 in. They are not attached to the tree during the 8 ft. passing through the open air for that distance. The tree has a slight “list” to the S., and this may agree with what is suggested as a possible way of accounting for this very abnormal condition, viz., that an older tree grew on the N. side, so near that the Elm of which we are speaking, increasing in size, touched its neighbour; and at eight feet from the ground sent roots into the product of decay in the latter. This suggestion is purely imaginary; and thrown out for want of any better theory.

August 19th.—W. B. Hemsley, “Summary Analysis of the Flora of Sussex.” [This it is our intention to print *in extenso*.] Prof. Lawson in answer to a speaker who had inquired the useful purpose of these investigations into indigenous plants, and who had also lamented the want of adequate knowledge how to keep them in their

place, pointed out that the researches of Messrs. Lawes and Gilbert were likely to lead to practical methods of developing the useful constituents of pasture, and of restraining the growth of the undesirable elements. He was especially struck with the presence of *Centaurea Calcitrapa* about Brighton. This he had generally seen as a ballast plant, and thought almost certainly an introduction. Mr. Roper said that *Phyteuma spicatum* had been recently found in great abundance in Abbot's Wood, Arlington Parish, Hailsham.

Professor Alexander Dickson "On Convergence of Secondary Spirals in Cones of *Pinus Pinaster*." Professor Dickson exhibited a series of cones of *Pinus Pinaster*, showing transitions from one spiral system to another by what is called "convergence of secondary spirals." Such transitions, he pointed out, are due to fusion of two consecutive scales in some one of the secondary spirals. This fusion of two scales does not produce any disturbance in the set of secondary spirals in which it occurs and which he terms *constants*, as running continuously through the two arrangements; but it causes a *definite diminution* in the number of all the other sets of secondary spirals. That the above explanation holds good for all cases of convergence, he considers to be virtually proved—1st, by the fact that in many cases of convergence a distinctly double scale formed by fusion of two consecutive scales in one of the constants occurs at the point of convergence; 2nd, by the occurrence of all degrees of fusion from distinctly double scales to scales differing from single ones only in being, perhaps, somewhat larger than the others; and 3rd, by the resulting spiral being *always* identical with that which, if the system of the lower spiral and the number of the constants be given, would theoretically result from fusion of two consecutive scales in one of the constants. As illustrative of this third point, Dr. Dickson showed that when, in Fir cones, we have a transition from the system 1, 2, 3, 5, 8, 13, etc., if the spirals by 3 are constants, then the resulting system is 1, 3, 4, 7, 11, etc.; if those by 5, then 1, 2, 5, 7, 12, etc.; and if those by 8, then the quadrijugate 4, 4, 8, 12, etc. Now, if we examine a construction of the system 1, 2, 3, 5, 8, 13, etc., and approximate into an intermediate point two consecutive insertions—say in one of the spirals by 3—it will be easily seen that, while these spirals by 3 would remain undisturbed, there would be involved or drawn into the intermediate point *two* spirals by 5; two by 8; *three* by 13; *four* by 21; *six* by 34, and so on: so that, supposing a new system were to emerge from the disturbance, we should have *two* spirals by 5 *converging* into one, leaving 4 over; *two* by 8, leaving 7; *three* by 13, leaving 11; *four* by 21, leaving 18; *six* by 34, leaving 29, and so on: the resulting numbers being thus those of the system 1, 3, 4, 7, 11, 18, 29, etc. Similarly by approximating two consecutive insertions in one of the spirals by 5, we should have *two* spirals by 8 converging into one by 7; *two* by 13, into one by 12; *three* by 21, into one by 19; *four* by 34, into one by 31, and so on: the resulting numbers being those of the system 1, 2, 5, 7, 12, 19, 31, etc. Again, by approximating consecutive insertions in one of the spirals by 8, we should have *two* spirals by 13 converging into one by 12; *two* by 21, into one by 20; *three* by 34 into one by 32, and so on: the resulting numbers being those of the quadrijugate 4, 4, 8, 12, 20, 32, etc. Professor Thiselton Dyer pointed out that Professor Dickson had cleared up an anomaly in the theory of Phyllotaxis. By the examination of cases of fusion of secondary

spirals where the existence of more or less double scales was obvious, he had succeeded in establishing a general explanation applicable to cases where double scales were not present.

SECTION, E. GEOGRAPHY.—*August 19th.*—Dr. Brandis “On the Geographical Distribution of Forests in India.” In all countries the character of forest vegetation mainly depends on soil, climate, and the action of man. In India the greater or less degree of moisture is perhaps the most important element in this respect. Moisture and rainfall are not identical terms. In many parts of India and elsewhere dew and the aqueous vapour, dissolved in the atmosphere, or the water derived from the overflow of rivers and from percolation, are sources of moisture as important for the maintenance of arborescent vegetation as the fall of rain and snow. It would greatly facilitate the labours of the forester, and of the botanist who inquires after the geographical distribution of forest trees, if the amount of atmospheric moisture and the formation of dew during the seasons of the year in different parts of India had been sufficiently studied, but in the present state of our knowledge we must be satisfied with dividing India into regions and zones according to the more or less heavy rainfall during the year. The arid region, with an annual rainfall of less than fifteen inches, occupies a large portion of the North-west corner of India, from the Salt range in the North, to the mouths of the Indus in the South, and from the Suleiman range in the West to the Aravulli Hills in the East. It includes the southern portion of the Punjab, the province of Sindh, the States of Bhawalpoor, Khyrpoor, Bikanir, Jessulmir and the greater part of Marwar. Throughout this vast region, which covers an area equal to that of the kingdom of Prussia, with a population of from twelve to fifteen millions, the rains are not only scanty but most uncertain. It is not a rare occurrence for several years to pass in succession without any showers, and then there is a heavy downpour, generally in winter and occasionally in August or September. There are, however, no regular winter or summer rains. A scanty, thorny scrub on the hills and in the northern part in the plains also gives ample employment to the botanist, for it is here that the representatives of the Arabian and Persian flora mingle with the vegetation which is peculiar to India; but the work of the forester is mainly confined to the belts of low country along the Indus and its great branches. In Sindh, for instance, the area of forest land which is under the exclusive control of the State, covers 350,000 acres, all situated on the fertile alluvial soil on both banks of the Indus, some of which is inundated annually by the summer floods of this large river, the remainder being moistened by percolation. In lower and middle Sindh a large portion of these forests consists of *Acacia arabica*, more or less pure, with a shade so dense that very little grass or herb grows under the trees. In northern Sindh extensive shrub forests of Tamarisk, with standards of *Acacia* and *Populus euphratica*, cover large tracts along the banks on both sides of the river. As the Indus changes its course from time to time, leaving dry last year's bed, and breaking through at another place, forming a new channel, the fresh banks and islands which are thus thrown up are covered at once by a dense growth of self-sown seedlings of Tamarisk with a sprinkling here and there of the *Acacia* and Poplar; and in other places large tracts of old forests are carried away by the encroachments of the river. Outside these forests a little further inland,

but still to a certain extent under the moistening influence of the river, are vast tracts of *Prosopis spicigera*, *Salvadora* and *Capparis aphylla*, and further north, in the Punjab, where the rainfall is more regular, and its annual amount approaches or exceeds ten inches, these dry woodlands, mainly composed of *Prosopis*, *Capparis*, and *Salvadora*, cover a vast extent of country between the rivers of that province. These woodlands are commonly known under the name of Rukhs, and they extend far into the second zone, which I propose calling the dry region of India, and in which the normal rainfall is between fifteen and thirty inches. There are two zones of dry country; one running on the north and east of the arid region in a belt, from one hundred to two hundred and fifty miles wide, leaving the foot of the Himalaya range about Umballa, touching the Ganges at Futtehgurh, and including Agra, Jhansi, Ajmere, and Deesa. This I propose calling the northern dry zone; its natural forest vegetation is scanty, but better than that of the arid region. In some of the States of Rajpootana there are extensive woodlands of *Acacia arabica*, *Prosopis*, and a species of *Anogeissus*, carefully preserved, to furnish cover for game, a regular supply of wood and grass, and in times of drought, pasture for the cattle of the vicinity. And in some parts of the Aravulli hills, where cultivation mainly depends on the water stored up in tanks, the value of preserving the scanty thorny scrub on the hills, in order to regulate the filling of the tanks from rain is recognized by the larger landholders. Nor must we forget that we owe the maintenance of the forests in Sindh and of the rukhs in the Punjab, to the action taken by the former rulers; and that during the first period after the occupation of the country the action of the British Government has not in all cases been favourable to the preservation of the forests and woodlands in the arid and dry regions of India. Great exertions have, however, been made of late years to make up in some measure for past neglect in this respect, and in the Punjab extensive plantations have been established since 1865, which now cover upwards of 12,000 acres, the main object in the formation of these new forests being to provide fuel for the consumption of the railways, and fuel and timber for the large towns in that province. There is a second dry region in the peninsula of India, comprising part of the Deccan, the Maidan or open country of Mysore, and several districts of the Madras Presidency. There are exceptionally moist places within its limits, such as Bangalore, which being situated 3000 feet above the sea, has somewhat more than thirty inches rain, but upon the whole, and excluding hills, which rise considerably above the table-land of South India, this belt, which stretches from Nassick in the north, to Cape Comorin in the south, has a normal rainfall of less than thirty inches. This belt includes Poona, Bellary, and Kurnool in the north, and Madura and Tinnevely in the south. Over a great part of it is found the Sandal wood, *Santalum album*, a small tree with fragrant heart wood, which comes up here and there in bushes and hedges, but does not grow gregariously and does not form pure forests. The moist tracts of country, with a normal rainfall exceeding seventy-five inches, are two. One is a narrow belt on the western coast, extending from Bombay in the north, to Trivandrum in the south, and comprising the whole country below Ghat, and a narrow strip above Ghat, the latter varying in width at different places, but often only a few miles wide, although the fall on the crest of the Ghats is in places as heavy as 250

inches. The other moist region is much larger ; it comprises the outer hills of the Himalaya range from Kangra to Assam, gradually increasing in width from a narrow belt twenty to thirty miles wide in the North-west Himalaya, and includes the whole of eastern Bengal and Burma. The vegetation within these two tracts of moist country is exceedingly luxuriant and varied. The Teak forests (*Tectona grandis*) of Burma, Canara, the Wynaad and the Anamallays, the evergreen forests of Burma, eastern Bengal and the Western Ghats, and the extremely varied forest vegetation of the outer Himalayan ranges, belong to this region. The greater part of Central and a large portion of Northern India belongs to what may be called the intermediate region with a rainfall between thirty and seventy-five inches. The extensive Sal forests (*Shorea robusta*) of the sub-Himalayan tract and of Central India are found in the moister parts of this region. Where the rainfall exceeds forty inches, forest vegetation is fairly luxuriant, but the great drawback in this, as in most parts of India, is the circumstance that the rainfall is not equally distributed over the year, but limited to the rainy season, which varies in length from two to six months. The year thus, in most parts of India, divides itself into two seasons, the dry season and the rainy ; and the dry season is generally the longer of the two. Dews and rare showers keep the grass and leaves in the forest fairly moist until January or February, after that time they dry up rapidly, and by March and April everything is so dry that the smallest spark is sufficient to set it on fire. Hence the jungle fires are an annually occurring institution in a great part of the country, and they do much to keep back forest vegetation. Successful attempts have, however, been made within the last six years to keep out fires in some of the more valuable forests, and the effect on the growth of the forest has been marvellous. In the Himalaya range moisture gradually decreases as we proceed inland, until a country is reached almost without rainfall, and with very little spontaneous arborescent vegetation. In the intermediate country, with a moderate supply of moisture, is the greater part of the Deodar forests (*Cedrus Deodara*), which furnish the North-west of India with timber. Here, as elsewhere, the influence of moisture on the rate of growth is remarkable. In the outer ranges, with a rainfall of sixty to eighty inches, the Deodar attains a diameter of two feet in from sixty to eighty years ; further inland, in the dry region, at the same elevation, from 150 to 200 years are required to form the same quantity of wood.—G. Lemoine, 'Sur les Forêts dans leur rapports avec le Hydrologie.'

Professor Allman, in describing the structure of *Noctiluca*, took occasion to point out the curious analogy that exists between its structure and that of the vegetable cell. Indeed the two are precisely similar except that the exterior in one case consists of cellulose and in the other of chitine. In each case the cell is lined by a protoplasmic layer (primordial utricle) ; this is connected to the nucleus in *Noctiluca* as in vegetable cells by protoplasmic threads in which there is, in the case of *Noctiluca*, a slow granular movement.

August 20.—Professor Lawson "On a species of *Tortula* new to Britain." Specimens of *Tortula inclinata* were exhibited. Professor Lindberg, while staying at Oxford, had detected this species, which was mixed up with specimens of *Tortula tortuosa* collected by Professor Lawson in the old stone pits at Holton about four miles from Oxford, and

confounded by him with that species. It was probable from the geographical distribution that the species would be found elsewhere in Britain. Professor Dickson exhibited a number of large *Stigmaria* obtained by him from the fossiliferous stratum intercalated between beds of various traps (porphyrites, greenstones, etc.) at Auchentorlie, near Bowling, on the River Clyde. These appeared for the most part to occur in mudstones which, doubtless, represents the soil in which these rhizomes were imbedded. The fossils in question had their structure beautifully preserved by infiltration with calcium carbonate. Mr. Carruthers said that it was an interesting fact that paleontologists had learnt to look for their best-preserved specimens among igneous rather than in well-developed coal beds.

C. F. Dennet, "On *Bœhmeria tenacissima* as a textile material." "Ramie" having been introduced from Java into Mexico by Roezl, its cultivation had lately extended to the Southern States of America. The fibre being in considerable demand, and the supply altogether inadequate, its cultivation in America was likely to become important. The author thought that its introduction might be at any rate attempted in Irlande.

SOCIETY OF BIBLICAL ARCHÆOLOGY.—*July 2nd.*—Dr. Birch in the chair. A paper "On the Economic Botany of the Bible," by Mr. J. Collins, was read. He treated this subject under—1, food plants; 2, medicinal; 3, textile, dyeing, and other industrial plants; 4, plants used in perfumery and incense; 5, miscellaneous substances. Under these heads the history of a number of vegetable products was comprised.

LINNEAN SOCIETY.—*June 6th.*—G. Bentham, Esq., President, in the chair. Nothing of botanical interest was brought before the meeting. *June 20th.*—The President in the chair. The following botanical papers were read:—"Extract from a letter dated May 29th, 1872, from Major-General Munro, C.B., to Mr. Bentham, on the Botanical Characteristics of the Island of Jamaica;" "New species of Musci, collected by Mr. Thwaites in Ceylon," by William Mitten, F.L.S.; "On the Fertilization of *Impatiens parviflora*, DC.," by A. W. Bennett, F.L.S.; "On a new Fungus from India," by F. Currey, Esq., F.R.S.

Botanical News.

ARTICLES IN JOURNALS FOR JULY.

Grevillea.—M. C. Cooke and C. H. Peck, "Pezizæ Americanæ."—M. C. Cooke, "British Fungi" (5 new species).—W. A. Leighton, "Lichenological Memorabilia" (*Pilophoron Fibula*, Tuck. Determination of the Lichens collected in Morocco by Dr. Hooker, 19 species, 1 new).—W. Archer, "On a minute *Nostoc* with spores."

American Naturalist.—T. C. Porter, "The Fedias of the Northern United States."—C. C. Parry, "Locality of the new species of *Arceuthobium*" (*A. minutum*, Engelm. MS. Parasitic on *Abies nigra*. Discovered by Mrs. Millington, 10th August, 1871, two miles north of Warrensburg, New York).

Bulletin de la Soc. Bot. de France, tom. xviii. p. 3.—A. Barrandon, "On some plants of the neighbourhood of Montpellier."—J. Duval-Jouve, "On certain tissues of Juncaceæ, Cyperaceæ, and Gramineæ" (Tab. II).—J. B. Martinet, "On the Glands of Labiatae."—A. Brongniart and A. Gris, "Supplement to the Proteaceæ of New Caledonia" (*Beauprea*, gen. nov. *B. gracilis*, *spathulæfolia*, *diversifolia*, *Pancherii*, *Balansæ*).—E. Gaudefroy and E. Mouillefarine, "On the Plants found in the environs of Paris in 1871" (a Flora of the two sieges; list of 190 species, chiefly Algerian; seeds brought with fodder for French army).—Col. Paris, "Vegetation of the neighbourhood of Constantine" (Algeria).—A. Pérard, "Addenda to list of Cryptogams of the Arrondissement Montluçon."—P. van Tieghem, "On the oleiferous Canals of Compositæ."—A. Warion, "Plants of the Department du Nord" (*Wolffia arrhiza* in the ditches of the fortifications of Lille, Valenciennes, and Douai).—E. Mer, "The Physiological Action of freezing on Plants" (continued).—P. Sagot, "On Yams."—E. Timbal-Lagrave, "Examination of the Hieracia of Lapeyrouse" (continued).—A. Pérard, "Addenda to list of Phanerogams of the Arrondissement Montluçon."

Hedwigia.—Extracts and Abstracts.

Flora.—F. Arnold, "Lichenological Fragments xv."—F. Schultz, "Observations on the Flora of the Palatinate" (continued).—S. Kurz, "Note on *Lobelia dopatrioides*."—K. Prantl, "Results of recent Researches on Stomata" (Tab. VI).—A. W. Eichler, "Further Remarks on the Flowers of Cruciferae."—J. H. Schultes, "Note on *Begonia patula*, Fisch. (*B. Fischeri*, Schrk.)"

Botanische Zeitung.—F. W. Klatt, "On the genus *Iris*."—H. G. Reichenbach, f., "Obituary of Berthold Seemann."—A. Ernst, "On the growth and development of the leaves in *Hydrocleis nymphoides*, Buchenau (*Limnocharis Humboldtii*, C. L. Rich)."—H. Hoffmann, "On Variation."—A. Ernst, "List of Plants observed in September, 1871, on the Venezuelan group of islands, Los Roques."—C. Haussknecht, "*Saxifraga decipiens*, Ehrh., and Hybrids between it and *S. granulata*, L."—H. G. Reichenbach, f., "On Cundurango" (defined as a species of *Marsdenia*, *M. Cundurango*, Reichb. f.).

New Books.—Lindley and Hutton, 'Fossil Flora,' vol. i. (re-issue)—J. H. Balfour, 'First Book of Botany.'—W. W. Saunders and others, 'Mycological Illustrations,' part 2 (with 24 plates.)

A general index to the last ten volumes of Regel's 'Gartenflora' has been issued, giving a reference to all the species mentioned, which includes nearly all the garden plants to which attention has been directed since 1862.

We learn that a new and revised edition of Lindley and Moore's useful 'Treasury of Botany' is in active preparation. Besides additions and corrections of the two volumes of which the work at present consists, a supplementary third volume is in contemplation.

The French Academy has elected two foreign correspondents in the section of Botany—M. Planchon in place of M. Lecoq, and M. Weddell in place of Professor Mohl.

We are glad to see from the Bulletin of the Belgian Botanical Society that M. Dumortier, the distinguished president, intends shortly to publish a complete Flora of Belgium. This cannot fail to be a work of very great interest and value, and it is to be hoped will not be long delayed.

At the recent combined First B.A., First B.Sc., and Preliminary Scientific M.B. Examinations of the University of London, Mr. J. C. Saunders, of Downing College, Cambridge, obtained the Exhibition in Botany.

A new handbook of British plants is in preparation by Mr. W. R. Hayward, to be entitled 'The Botanist's Pocket-book.' It will be published by Messrs. Bell and Daldy.

An excellent fasciculus of dried specimens of the mosses of the United States has just been issued by Mr. C. F. Austin, under the title of *Musci Appalachiani*. It contains specimens of 450 species and varieties, gathered for the most part by Mr. Austin himself in the state of New Jersey, the bryology of which from its mountainous character is very rich. Mr. Austin is a thoroughly practised bryologist, and has had the help of Mr. Sullivant in his determinations. The price of the series is 25 dollars; the editor's address is Closter, New Jersey.

Professor Oudemans has published an illustrated paper in the 'Archives Neerlandaises' for 1872, tome vii., on a special kind of tube which exists in the trunk of the Elder, which has hitherto been taken for a fungus (*Rhizomorpha parallela*).

M. Bescherelle has published in the 16th volume of the 'Memoirs of the National Society of the Natural Sciences of Cherbourg,' a monograph of the known mosses of Mexico. He enumerates 400 species, of which 75 per cent. are endemic, and a considerable number here described for the first time. The genera confined to Mexico are eight in number, *Microdus*, *Campylochæcium*, *Symblepharis*, *Micromitrium*, *Acrocryphæa*, *Dendropogon*, *Haplohymenium*, and *Rozea*.

Dr. A. P. Winslow, of Gothenburg, has for disposal a collection of Phanerogams and Ferns, containing between 1200 and 1300 species and varieties from all parts of Norway, Sweden, Lapland, and Finmark. The specimens are well dried and mounted, and the price asked is £20.

Prof. Lawson, of Toronto, has started a popular summer class for Botany with great success. As many as 74 ladies and gentlemen entered the course, which consisted of fifteen lectures and five excursions, during which a number of rare species were collected.

CORRIGENDUM.—Page 251, line 18 from bottom, for "*Robertsonia*," read *Robertsonia*.

Our readers are requested to substitute the leaf inserted in this number for pp. 245 and 246.

Original Articles.

ON THE FLORA OF MOAB.

BY W. AMHERST HAYNE, B.A.

(Read at the Meeting of the British Association, August 16th, 1872).

The specimens on which the following sketch is founded were collected in February and March, and have been allocated to their proper orders and genera in the Herbarium at Oxford, kindly put at the disposal of myself and the Rev. H. E. Fox, by Professor Lawson.

The district referred to as Moab must be understood to consist of a parallelogram, in rough measurement some fifty miles from north to south, by thirty from east to west, bounded on the west by the Dead Sea and the Jordan, on the east by the Pilgrim Road from Damascus to Mecca, and extending from the Oasis of the Sâfieh, on the south, to the gorge which runs down from Elealeh and Heshbon, to the Jordan Valley on the north, and including that portion of the plains of Shittim which lies between that watercourse and the Dead Sea, now known as the Seisiban. Out of this parallelogram eliminate a block at the south east angle, and you have a good idea of the country worked, which might be aptly delineated by a capital P.

Within this area, three climates if not three floras are included; we experienced winter, spring, and summer, in three successive days; one night clad in every available vestment we shivered between our blankets, whilst the water froze into block ice in the basins at our feet, and the thermometer registered 24° F. The next we sat out round a camp fire and enjoyed the open air and the warmth at the same time, and the third I wrote my journal with my coat off, with the thermometer at 76° at midnight. For the sake of convenience, therefore, I shall divide the country into three zones, corresponding to these three seasons, and call them the frigid, temperate and torrid. The high level plateau, three thousand feet above the sea, supplies the first field, the deep ravines which cleave it include the other two. The level of the Mediterranean may be taken as the division between the second and the third.

Out of thirty-seven days we were in the country, twenty were spent in the frigid, eight in the temperate, and nine in the torrid zone. The first yielded twenty plants in flower, the second eighty-three, and the third one hundred and forty-seven; just reversing the ratio of time, and giving one plant a day to the plateau, and sixteen to the shores of the sea and its gullies.

1. The great plateau of Moab is chiefly grass, south of the Arnon and west of Heshbon; the turf is turned over once in some three or four years by the plough, the rest is virgin grazing land. There is fine grass in the western section, but it grows gradually poorer and thinner as you advance eastwards, till it begins to give way to a low scrub of *Artemisia*. This, not yet in flower in March, gave out aromatic scent as it was bruised by our horses' feet, and among it masses of whitened snail shells, and armies of caterpillars betokened the past and formed the present food

of myriads of larks. This wormwood in turn gives way to patches of sandy soil, and a white lichen, as the low range of desert hills which bounds the plain is approached.

No trees, not even any shrubs or bushes exist over the whole of this great plateau, except on the summit of Jebel Attarus. This for some miles is studded with old trees, after the fashion of a scattered park. There were almonds in blossom, and the larger ones seemed terebinths, by guess, but not even leaves were out when I was there.

To deal with this zone slightly more in detail. At Kerak and its neighbourhood, there was absolutely nothing out, my only observations were *Ceterach officinarum* in the walls of the Western Castle, and leafless figs and pomegranates in the valleys below it; olives and oleanders alone kept their grey and sombre foliage. Considering the frosts at nights it was rather marvellous than otherwise that there should be anything in flower beyond a few diminutive Geraniaceæ and Cruciferæ, and *Asperugo procumbens*, among the shelter of the ruins of Khan Zebib and other places. Yet a white *Pancratium* had chosen the richest soil of the plains near Dibon to drive its roots beyond the reach of anything but a spade, and was starring the ground in February. Even near Ziza, where it was the coldest, *Leontice Leontopetalum* was preparing to pave the ground with gold, its spreading yellow spikes and peony-like leaves bursting from among the grass in masses. In the more sheltered hollows of the plain further west was already spread a scarlet carpet of anemones (*A. coronaria*) bordered and patterned with the brilliant blue of the lovely *Veronica syriaca*. It was not, however, until the middle of March, that the dull orange spikes of *Asphodelus luteus* were in full flower among the ruins of Main, and *Geranium tuberosum* out on the ploughed lands of Nebo.

2. Leaving the plateau, and descending to the valleys and slopes trending towards the Dead Sea, we at once reached a rich spring flora. Its chief feature was the immense variety of Leguminous plants; out of thirty-five species of this order, collected in the country, twenty-five were in flower in this division. The upper valleys of the Arnon and the Terka Main, the slopes and nooks of Attarus and Nebo, were the chief fields of this temperate zone. On the southern side of the Arnon Valley the almond tree was in full flower, and the white asphodel (*A. ramosus*) bursting into bloom on the 15th of February, whilst a little golden *Gagea* studded the slopes. Clumps of oleander grew about the stream, not yet showing signs of flower. I saw it in its glory a month later, fringing the shores of Gennesaret.

On the northern and more sunny side of Arnon the flowers were much more numerous. Here we first met with four plants which soon became very familiar friends: *Echium violaceum*, the purple Bugloss of our Channel Islands, which is one of the commonest plants throughout the whole of Palestine, and of which I afterwards saw literally miles covering the basaltic boulders of Galilee on the descent from Tabor to Tiberias; *Astragalus hamosus*, or a species very nearly allied to it; *Salvia Horminum*, with a tuft of bright lilac bracts crowning its spike, and *Lathyrus Cicera*, rather pinker and much larger flowered than our *Lathyrus Nissolia*. Numbers of little crucifers and the diminutive *Ceratocephalus falcatus* grew higher up. Among the crucifers was *Capsella Bursa-pastoris*, as a pendant to which *Draba verna* grew abundantly at Dibon.

So much for Arnon. A fortnight later we dropped down into the

valley of the Terka Main. Grateful to man and beast were the rich rank herbage and abundant water after the cold bare plains. Our old friends of the Arnon Valley reappeared, *Astragalus hamosus*, *Echium violaceum* and *Lathyrus Cicera*; others that were equally conspicuous were a dwarf blue Iris (*Iris Sisyrinchium*) which covered the open ground after twelve o'clock, and which appeared everywhere afterwards from Moab to Lebanon, and the Retem bush of scripture (*Retama Retem*) with its white flowers and purple calyx. Here and there a gorgeous tulip (*Tulipa Gesneriana*) was in flower, and two rock cistuses, *Helianthemum guttatum* and *H. ægyptiacum*.

Leguminosæ, as I said before, were profusely represented; three species of Astragali besides the one already referred to; *Hippocrepis ciliata*, with its bizarre pods already formed, *Vicia lutea*, two kinds of *Lotus*, and several others. It was early for Labiates, which must form a large proportion of the summer flora of this zone of Moab as they do that of the rest of Palestine. A few deliciously scented ones were in flower, a yellow ajuga (*A. Chamæpitys?*) in the crannies of the rocks: *Salvia commutata* and the superb *Eremostachys laciniata*, with its large deeply cut leaves giving out the most refined scent of musk: a month after I walked up to my ears through a bed of it on the borders of the plain of Esdraelon. Another fortnight, and the valley under Nebo by the wells of Moses added a number of leguminous plants and *Rhagadiolus stellatus* to my list of this zone, and the cave under the waterfall at the latter place furnished the finest maidenhair (*Adiantum Capillus-Veneris*) I ever gathered, except the three-foot fronds of Engedi.

3. By far the most interesting of the three fields was of course the Dead Sea basin. Seven years ago Dr. Tristram worked the natural history of the Holy Land during a period of nine months, and Mr. B. T. Lowne accompanied him as botanist of his party. Passing along the whole of the Western shores of the Dead Sea, and round the south end, as far as the Ghror es Sâfieh, he had every opportunity of seeing the flora of the basin on its western side. His collection, kindly put at my disposal by Dr. Tristram, has materially aided me in naming my own, and also in giving me data for a comparison between the flora of the east and west shores of the sea.

This comparison leads me to the conclusion that there is no essential difference between the flora of the two shores. Most of the more conspicuous of Mr. Lowne's species peculiar to the Dead Sea basin, I gathered or observed on the eastern side. A considerable number of his plants are wanting in my list, but they are either not the most typical, or their place is supplied by species allied in character and geographical distribution.

One remarkable fact, however, became patent by our visit, and that is the dependence of the different oases round the shores of the Dead Sea upon the partial rainfalls of the winter. It so happened that we were in the Wady Zweirah, and the Ghror es Sâfieh, situated respectively at the south west and south east corners of the sea, in exactly the same week as Dr. Tristram and Mr. Lowne had been seven years ago. That year everything was in full flower; this, hardly a plant showed even signs of budding. *Ruta tuberculata* and a little *Spergularia* were the only plants I gathered in flower at the Wady Zweirah, whilst Mr. Lowne collected eighty-two. Similarly on the Ghror es Sâfieh, *Ricinus communis*, *Salvadora persica*, *Loranthus Acaciæ*, and *Solanum*

sanctum made up the total of two days' observation. Corn was but just springing. The canebrakes had not begun to shoot, and the ground was hard and dry. The more settled Arabs of the district who till the ground complained of the lateness of the rains, and so explained the phenomena, which had appeared the more curious to us, as at Engedi everything was much further advanced, and a very short distance north of the Sâfieh we came across a spring vegetation the following day.

Mr. Lowne remarks in his paper, (*Journal Linn. Soc.*, vol ix., p. 201, 1865), that the curious asclepiad, *Calotropis procera*, is not nearly so abundant on the Ghror es Sâfieh as at Engedi; had the force of circumstances allowed him to cross the chief Seil or torrent which divides the oasis into two nearly equal halves, he would have found that the district to the north of it consists of a perfect miniature forest of this odd tree, far exceeding anything that Engedi can show.

Thus this oasis of the Sâfieh consists, first, of a park-like district, with thorny trees such as *Zizyphus* and *Acacia Seyal* growing among the corn and grass; second, of a scattered wood of *Calotropis procera*; third, of an open belt studded with rushes running parallel with these two parks on the sea-side; and lastly, of a dense jungle of canebrake, which, growing in water, bars the passage to the edge of the sea, and forms a secure retreat for the wild boar.

Leaving the park and working northwards, flowers covered the ground as we approached the open shore of the Dead Sea near Borg Nméirah; no less than nine species of crucifers were in flower, a dwarf stock (*Matthiola oxyceras*) studded the ground, whilst the Rose of Jericho (*Anastatica hierochuntica*) was in flower and leaf, whereas at the Wady Zweirah, two days before nothing was to be seen of it but the dry contracted bunches of last year. At the Wady Drah we left the tropics.

It was three weeks later when we descended to the remarkable gorge or hot-springs of Kallirrhoë, the lower portion of the Wady now known as the Terka Main. The sides of the gorge were covered on the 1st of March by the summer flowers of the more temperate zone above. *Ranunculus syriacus*, which had already succeeded to *Anemone coronaria*, several *Allia*, and a large *Fœniculum*. *Iris Sisyrinchium* was still in flower, and much more luxuriant than up above. The course of the hot river is marked by a jungle of canebrake and tamarisks, with bushes of *Atriplex Halimus* scattered just above. The oleanders which fringe the cold stream higher up cease as soon as the first hot spring comes in, as do also, if I mistake not, the willows and the watercress. There is a perfect paradise of flowers in the neighbourhood of the hot springs themselves, which although some seven miles east of the Dead Sea, is more nearly allied to the flora of the Wady Zweirah than any locality on the west coast, or in fact than any other yet worked except the shore just north and south of the outfall of its waters.

A very considerable proportion of the conspicuous Asiatic and African plants found by Mr. Lowne, in the Muhawat and Zweirah flats, occur either in the Kallirrhoë gorge near the sulphur springs or among the embouchures of the similar springs at Zara, a mile or two south of its mouth. For example, the curious asclepiad *Dæmia cordata*, with its habit of throttling itself by climbing on the stiff but withering branches of the previous year, was fairly abundant just on the sulphur deposited by the springs. *Cleome trinervia* flourished in the same locality, growing

almost in bushes, and giving out when bruised a nauseous smell resembling the sulphur on which it grew. Bushes of *Zygophyllum album* cling to the rocks. *Fagonia sinaitica*, and another more shrubby and more spiny species with large pink flowers, were there. *Trichodesma africana* and a *Forskahlea* attached themselves to one's clothes by their viscous hairs as one forced one's way alongside the stream. Two heliotropes also occurred, one by the Baths, the other at Zara; and *Statice pruinosa* as well as *S. Thouini* at one or both places, all these or their congeners were found by Mr. Lowne at the Wady Zweirah. The composites too correspond as far as I have been able to identify them, five of the more marked—*Anvillea Garcini*, two *Asterisci* (*pygmæus* and another), *Senecio Decaisnei* and *Pulicaria undulata* occur in both our lists. Mr. Lowne got eleven species from Zweirah, I, twelve from Kallirrhoë and Zara together; of these five have been shown identical, a few belong to the temperate zone, and the remainder are difficult to determine. This order it will be observed was as largely represented in this locality in March as cruciferæ had been three weeks before at Nmeriah, and nearly as largely as leguminosæ was in the more temperate regions; out of twenty-six composites twenty-one come from this zone, and twelve from Zara and Kallirrhoë. Of less abundant orders we have *Ærua javanica*, *Boerhaavia verticillata*, *Atriplex Halimus*, and *Rumex vesicarius*, which belong also either to Zweirah or Engedi, and the same grasses, an *Andropogon* and two *Aristidas* were also found.

The chief additions to Mr. Lowne's Wady Zweirah list as regards plants inhabiting the eastern and southern deserts are—*Helianthemum kahiricum*, a shrubby rock cistus, *Astragalus tumidus*, with its bladder-like calyx, *Acanthodium spicatum*, and the odd *Pteranthus echinatus*, found by others already in the neighbourhood of Jericho, the lovely Geranium (*Erodium hirtum*), the distribution of which is from the deserts of Algeria to those of Palmyra, and which with *Trigonella Pecten* was very abundant just above the baths. Two Orobanches of most gorgeous hue I have been unable to identify; they grow to the height of two or three feet, and even more, the one a deep purple, the other a deep chrome yellow, apparently parasitic on *Atriplex Halimus*; they occurred both at Kallirrhoë on the shore, and in the Seisiban. *Ræmeria orientalis* grew on the Basalt going down to Zara; of other additions *Freirea alsincefolia*, a *Callipeltis*, and an *Epipactis*, the latter from within a yard or two of the water of the Dead Sea, are instances of the commingling of the European with the tropical flora, as also *Notholaena lanuginosa* on a detached basaltic boulder at Zara. *Ceterach officinarum* growing at Kerah, and *Adiantum Capillus-Veneris* wherever it could find a moist place, whether in the mouths of old storewells among the ruined cities of the high level plateau or at the very exit of Kallirrhoë, make up three Moab ferns.

As for the trees in the neighbourhood of the baths, the palm *Phœnix* was by far the largest and most abundant, growing, however, only on clumps just about the sources of the hot streams. The Arabs, either through ignorance or indifference, make no attempt to fructify them; on the contrary, they ruin both their health and their appearance by setting fire to the canebrakes among which they grow, for the sake of burning the tangled thickets and providing a fresh supply of cane shoots, which are a favourite food for their camels at a certain time of the year when they are said to stand in need of purgatives. In consequence of this

the stems of the palms are left blackened and charred, and their lower branches dead and drooping. The ever-accumulating deposit from the sulphur springs is another enemy to the palm tree; some stumps remain not petrified, but if I may be allowed the expression "*sulphurised*," the formation of the wood still quite visible, but soft and grey and crumbling, so that you can cut it out with a pocket knife, in blocks like cheese. The only other tree beside the Tamarisk at the waterside, which hardly deserves the name, was the curious and abnormal *Moringa aptera*, observed both by Mr. Lowne and myself at Engedi.

It only remains for me now to say a few words about the plains of Shittim and the north-east shores of the Dead Sea, between that and the mouth of Kallirrhoë. It was the middle of March by the time we visited these districts, and the grasses were in much greater force than before; a third of the twenty-three Gramina were collected in the Seisiban. This oasis is of much greater extent than any of the others which border on the Dead Sea, the trees are much scattered, but otherwise it resembles the Sâfieh and Jericho. I observed the Osher tree again, but not in great profusion, in which, however, it may well be, as it was impossible to explore the whole district. At the time we were there the place seemed already suffering from lack of rain, and the ripe grasses had quite an autumnal look in March, whilst the Sirocco blowing dried everything to tinder.

Riding from the Seisiban south towards the mouth of Kallirrhoë, the stony shores of the Dead Sea were covered with masses of colour; the winged bracts of *Statice Thouini*, and the large membranous petals of *Rumex vesicarius* alternating in acres of lavender and pink. By far the commonest plant next to these was a little dwarf Campanula (*C. dichotoma*), its deep blue bells dotted among the stones. The borders of the streams which come down from the mountains every few miles, were fringed with deciduous trees, whose bright light green foliage formed a refreshing contrast to the dull olive green line of the more usual shrubs of the country, such as *Atriplex Halimus*, *Zizyphus Lotus*, *Retama Retem*, and *Moringa aptera*. Large bushes of a hawthorn (*Cratægus*) not yet in flower, still more pleasantly reminded one of English verdure; our old friends of Kallirrhoë, *Dæmia cordata* and *Cleome trinervia*, occurred again here not far from the north-east end of the sea, apparently only on a line of mordine detached from some sulphurous vein in the mountains; an asclepiadeous shrub, which I have not been able to identify, was also found: a *Cuscuta* was parasitic on *Rumex vesicarius*, and oleanders (*Nerium Oleander*) reached down the streams nearly to the shore, whilst maiden hair (*Adiantum*) flourished in a waterfall not more than twenty yards from the sea. The most unexpected botanical feature in the landscape, however, was the comparative abundance of the palm close to the water's edge, the trees growing on the cliffs overhanging the water, clinging in the clefts of rocks where a miniature gorge brings down a trickling fall of water, and dotted right up the mountain side in some places as far as one could see.

This feature is one of the most conspicuous in the present differences between the two sides of the sea. On the west not a trace of the palm exists, save on a little clump found by Dr. Tristram in a sequestered nook of Mons Quarantania, the sole remnant of the trees of Jericho, once the city of palms; and at Hazon-Tamar or Engedi, petrified in the rocks

above the stream. On the east it still obtains at the Wady Drah, Kallirrhoë, all along the north east shore and up the Wady Hesban. To draw out further the contrast between the two shores may be worth a few words. Owing partly to a much larger supply of water, partly to the almost entire absence of the marl deposit, which is nearly always absolutely bare of vegetation where it occurs, the whole of the east side is comparatively fertile, and abounds not only in smaller plants, but has a fair allowance of trees and larger shrubs; nowhere is the eye pained by the frightful desolation of the western shore, where a solitary tamarisk or salicornia looks like a signal of distress hung out at a distance of a mile or two from its next neighbours. Even the oases on the west, as Engedi and Zweirah, are sparse, barren, and sandy, compared with Zara and the Sâfieh, to which they exactly correspond in point of position. This well watered and fertile condition, speaking comparatively, of the eastern side, results in a much greater commingling of the flora of more temperate regions with that of the desert, which needs such special conditions of soil and climate as the Dead Sea affords, than occurs on the western side.

The 250 plants found in Moab from the beginning of February to the middle of March, belong to fifty-eight natural orders, of which by far the best represented are Leguminosæ with thirty-five species, Compositæ and Cruciferæ each twenty-six, and Gramina twenty-three. After these follow Liliaceæ twelve, Scrophulariaceæ nine, Caryophyllaceæ, Geraniaceæ, Labiatae, and Boragineæ eight apiece. Umbellifers were remarkably scarce, although I took particular pains to remark them. I only have five in flower, and of these hardly any are in fruit; Ranunculaceæ and Zygophylleæ had also five representatives, but no other order had more than four; Cistineæ, Orobancheæ, Euphorbiaceæ, and Cyperaceæ, having each that number. These statistics bring me to results. I think we have sufficient data to establish three:—

1st. The flora is remarkable for a small average number of species distributed through a large number of orders, an average of four and a half species to each of the fifty-eight orders. This fact was previously remarked by Mr. Lowne, and is not unnatural in a country which forms the border-land of Europe, Asia, and Africa, the more hardy and accommodating plants of each of these geographical divisions holding their own, while those more readily affected by variation of soil or climate disappear.

2nd. The east shore of the Dead Sea differs widely from the west in its general character; yet, notwithstanding the said differences as to soil and water, the flora of the two shores is identical in character and, as far as our experience yet goes, nearly coincident in detail.

3rd. The *desert* flora of the Dead Sea is not confined so exclusively to its southern extremity as an examination of the western shore alone might lead one to conclude; its peculiarities extend nearly to its northern limits, and not only so but also obtain under similar conditions in one spot, six or seven miles removed from the sea, and 1000 feet above it. The hot baths of Kallirrhoë, where the heat locally generated by the outburst of five or ten springs of water at 145° F., and the chemical properties of the soil and water, tend within a limited area to produce a result similar to that of the Dead Sea itself; this result is not produced except in the immediate neighbourhood of the said springs, and does not extend the whole way down the gorge to the sea.

ON DASYLIRION AND BEAUCARNEA.

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

These are two genera of great interest both botanically and horticulturally. A wide diversity of opinion has been expressed upon the relationship to one another of the plants which they include, and on the position in systematic classification which they ought to occupy. Though now many species have been introduced into cultivation, yet several of these, like so many of their neighbours the Agaves and Yuccas, are known only in a flowerless condition; and partly from the bulk of the plants and partly because only flowers of a single sex are produced in perfection upon one and the same individual, they are represented very incompletely in the herbaria; and it becomes needful to study them partly in the conservatory and partly in the herbarium, and to piece the information derived from both these sources together, in order to understand them properly. As in the first place I believe that *Beaucarnea* is a genus that ought to be kept up as distinct from *Dasylyrion* upon a character that has not been clearly pointed out, and which involves placing under *Beaucarnea* several species which have been published under *Dasylyrion*; and as in the second place I have been led to hold a different view of the systematic position of the genera to those which have been previously expressed,—I propose to devote the present paper to a general review of the subject, giving in the first place as full a synopsis as the material I have at command will allow; and then saying a few words on the systematic side of the question.

I. DASYLIRION, *Zuccarini in Otto and Dietr. Allgem. Gartenzeit.* 1838, no. 33, p. 258, *ex parte*; *Endlich. Gen.* no. 1361, *ex parte*; *Kunth. in Otto and Dietr. Allgem. Gartenzeit.* 1841, no. 16, p. 121, tab. 1, *et Enum. Plant.* v. p. 38, *ex parte*. *Roulinia, A. Brong. Ann. Sc. Nat.* ser. 2, vol. xiv. p. 319, *ex parte*. *Yuccæ species, Schiede, Linnæa,* v. 20. —Flores polygamo-dioici: *Masc.* Perianthium corollinum, campanulatum, 6-partitum, albidum, segmentis oblongo-ligulatis imbricatis diutius ascendentibus, æquilongis. Stamina 6, sæpissime exserta, profunde perigyna, uniseriata, profunde perigyna, filamentis filiformibus glabris dense incrassatis, antheris oblongis bilocularibus versatilibus introrsis. Ovarium rudimentare, *Fœm.* Perianthium maris. Stamina abortiva, inclusa. Ovarium uniloculare, triquetrum, sessile, ovulis 6 e basi ascendentibus; stylus brevissimus vel subnullus; stigma capitatum, peltatum, distincte trilobatum, lobis auriculatis crispatis. Capsula membranacea, triquetra, indehiscens (?), angulis late membranaceo-alatis. Semina perfecta non vidi. Caudex lignosus, cylindricus, interdum 4–5-pedalis. Folia ad apicem caulis 100–200, dense rosulata, lineari-ensiformia, coriacea, dura, persistentia, margine spinis falcatis corneis arcuata, inter spinas serrulata. Scapus foliis reductis bractæformibus instructus. Paniculæ thyrsoidæ, bracteis magnis lanceolatis scariosis ramulis sæpe densifloris cylindricis, floribus minutis, pedicellis apice articulatis.

Clavis Specierum.

Paniculæ angustæ, ramulis ultimis densifloris.

Folia apice in fibris tenacibus dissoluta:

Bracteolæ albidæ conspicue serrulatæ

Bracteolæ fuscæ, vix serrulatæ

1. *graminifolium.*2. *acrotrichum.*

Folia apice integra 3. *serratifolium*.
 Paniculæ latæ, ramulis ultimis laxifloris 4. *laxiflorum*.

1. *D. GRAMINIFOLIUM*, *Zuccarini in Otto and Dietr. Allgem. Gartenzeit.* 1838, no. 33, p. 258, and no. 38, p. 303; *Act. Monac.* 3, p. 225, t. 1; *Kunth, Enum.* v. p. 39; *Torrey, Bot. Mex. Bound.* p. 215. *D. texanum*, *Schiede, Linnæa*, 23, p. 140; *Walp. Ann.* iii. 644; foliis planis venis conspicuis exsculptis apice in fibris tenacibus solutis, paniculis anguste thyrsoideis, ramis conspicue bracteatis, ramulis densifloris brevibus, pedicellis solitariis, bracteolis albidis conspicue dentatis, staminibus exsertis.

A native of Northern Mexico and Texas. A well-known plant, first described by Zuccarini in the paper in which the genus was named, and again very fully by Kunth in 1831, from a living plant in the Berlin Botanic Garden. Of collections distributed with numbers, Lindheimer 548 and 549, C. Wright 694, Berlandier 3218, and, according to Torrey, Fendler 70, 212, 419 and 549, belong here. It has been twice figured in Germany, but not in any of our own gardening publications, and I am not aware that it is in cultivation in this country at the present time.

Caudex attaining a height of 4-5 feet. Leaves in a dense rosette of a hundred or more at the top of the caudex, the central ones rigidly ascending, narrow, ensiform, 3-4 feet long, half an inch broad above the suddenly dilated base, narrowed very gradually thence to the apex, where it is broken up into a short tuft or grey stringy fibres, flat on the face throughout, rather rounded on the back towards the base, light green, not glaucous, 20-30 close vertical square ribs very prominent and distinct with narrow spaces between them, the edge margined with a continuous straw-coloured distinctly-toothed horny border, from which issue at intervals of $\frac{1}{8}$ - $\frac{1}{2}$ inch falcate teeth of the same colour and texture a line long, curved usually upwards but casually the reverse way. Scape 12-15 feet high, $\frac{1}{4}$ - $\frac{3}{8}$ inch thick at the top, its leaves much reduced and passing gradually into the bracts. Panicle 2-3 feet long, under half a foot broad, narrow thyrsoid, its branches ascending, subtended by large dry scariose lanceolate bracts, the lower branches 3-4 inches long, copiously paniced. Branchlets like the male catkins of the Hazel, just alike both in the male and female plants, cylindrical, 1-2 inches long, the flowers densely crowded. Pedicels solitary, very short, articulated at the apex, furnished at the base with a couple of distinctly-toothed conspicuous whitish membranous spreading bracteoles $\frac{3}{4}$ -1 inch long. Perianth a line deep, the stamens of the male flowers distinctly exserted. Fruit like that of Elm in texture and habit, but composed of three carpels, oblong, 4 lines long, the unilocular triquetrous centre winged down each angle with a broad tough membranous border. Seed, seen only in an unfertilised undeveloped state, oblong, turgid, narrowed at each end.

2. *D. ACROTRICHUM*, *Zuccarini in Otto and Dietr. Allgem. Gartenzeit.* 1838, no. 33, p. 259; *Kunth, Enum.* v. p. 40; *Hook. Bot. Mag.* t. 5030. *Yucca acrotricha*, *Schiede, Linnæa* iv. p. 230, vi. p. 52. *Roulinia acrotricha*, *Brong. Ann. Sc. Nat.* ser. ii. vol. xiv. p. 320. *D. gracile*, *Zucc. Act. Acad. Monac.* iv. sect. 2, 1845. *R. gracilis*, *Brong. loc. cit.* *Barbacenia gracilis*, *Hort. Bonaparteæ gracilis*, *Hort.*; foliis planis venis conspicuis exsculptis apice in fibris tenacibus solutis, paniculis anguste thyrsoideis ramis conspicue bracteatis, ramulis densifloris, pedicellis solitariis, bracteolis griseis haud dentatis, staminibus exsertis.

A native of Mexico, introduced into cultivation by Schiede about 1830, and now widely distributed. Two well-grown plants, their stiff formidably-armed leaves spreading in more than a hemisphere from the top of the caudex, form one of the most characteristic features of the Cactus-house at Kew, and the plant has been well figured in the 'Botanical Magazine,' and may often be seen in private collections.

Closely allied to the last, with which it quite agrees in general habit. Caudex 4-5 feet high, not swollen at the base, clothed with the dilated bases of the fallen leaves, which remain green for many years. Leaves 100-200 to a rosette, the outer reflexed from near the base, the inner stiffly ascending, 3-4 feet long, half an inch broad above the base, narrowed very gradually to the scariose tip, which breaks up into a very distinct tuft of fibres, flat all through, the horny stramineous border broader than in the last, the large teeth quite similar, but the serrulations between them larger and unequal, the ribs about 30, distinctly raised, with narrow interspaces, the back rather rounded in the lower part, the colour pale green, scarcely at all glaucous. Scape reaching a height of 10-12 feet, exclusive of the panicle. Panicle 3-4 feet long, denser and narrower than in *graminifolium*, the lower branches paniced, their bracts scariose-lanceolate 3-4 inches, long tinged with red, sometimes terminating in a reduced leaf. Branchlets dense, cylindrical, 1-2 inches long, $\frac{1}{2}$ - $\frac{5}{8}$ inch thick. Pedicels solitary, very short, articulated at the apex, furnished at the base with a pair of spreading grey membranous scarcely-toothed bracteoles. Perianth campanulate, above a line deep. Stamens distinctly exerted. Female flower not seen.

3. *D. SERRATIFOLIUM*, Zuccarini in Otto and Dietr. *Allgem. Gartenzeit.* 1838, no. 33, p. 258; Kunth, *Enum.* v. p. 41. *Yucca serratifolia*, Karwinski in Schultes, *Syst.* vii. p. 1716. *Roulinia serratifolia*, A. Brong. *loc. cit.* *D. glaucophyllum*, Hook. *Bot. Mag.* t. 5041; foliis viridibus vel glauco-pruinosis sursum facie canaliculatis apice integris venis inconspicuis, paniculis anguste thyrsoideis, ramis conspicue bracteatis, pedicellis solitariis, bracteolis griseis interdum serrulatis, staminibus exertis.

A native of Mexico, discovered by Karwinski, about 1830; known in cultivation, but not so common as the last. The only account of the flower of the typical plant of which I have knowledge is that given by Kunth, which would apply equally well to the two preceding; but if the plant figured in the 'Botanical Magazine' under the name of *D. glaucophyllum* be more than a form with slightly narrower and more glaucous foliage, their distinctions still remain to be worked out, and my description of the inflorescence applies to the latter.

Caudex cylindrical, not seen more than a foot high, and quite hidden by the drooping outer leaves. Leaves not so stiff as in the two preceding and consequently more falcate, forming a similar dense rosette at the top of the caudex of 100 leaves or more, narrow-ensiform, 3 feet long when full-grown, $\frac{1}{2}$ - $\frac{3}{4}$ inch broad, channelled towards the point, which does not break up into fibres, more or less glaucous, the ribs faint and indistinct, the horny border less distinct than in the two preceding, the large teeth more slender, the denticulations very minute. Scape as long as the dense narrow panicle, which attains 4-5 feet. Bracts as in the two preceding. Branchlets dense, cylindrical, 1-2 inches long, $\frac{1}{2}$ inch thick. Pedicels shorter than the perianth, furnished at the base with two spreading grey membranous bracteoles, which are sometimes distinctly toothed.

Perianth 1 line deep, tinged with purple. Stamens, twice as long as the perianth.

4. *D. LAXIFLORUM*, *Baker, n. sp.*; foliis planis apice integris venis inconspicuis, paniculis ovato-thyrsoideis laxis ebracteatis, ramulis elongatis laxifloris, pedicellis fasciculatis, staminibus inclusis.

Mexico, *Andrieux 68!* My only knowledge of this is from a single herbarium specimen with male flowers. It is evidently an unpublished species, but until the ovary can be examined, it must remain doubtful whether it be a *Dasytirion* or *Beaucarnea*. The character of the leaf is exactly that of the undisputed *Dasytirions*, but the inflorescence very different. Leaf ensiform, 2 feet long, $\frac{5}{8}$ inch broad above the suddenly dilated base, quite rigid in texture, narrowed gradually to the point, the veins fine and indistinct, the stramineous prickles and denticulations quite similar to those of the species already described, but both rather stronger. Panicle ovate-thyrsoid, a foot long by half as broad, the branches very numerous fascicled ebracteate, the lower copiously paniced, the branchlets reaching 3-4 inches long, the flowers in clusters of 3-5 together with distinct spaces between. Bracteoles a line long, wrapped round one another and the pedicels in a highly imbricated mass like those of *Asphodeline*. Pedicels slightly exceeding the bracteoles, $\frac{1}{8}$ inch long, articulated at the apex so decidedly that a large proportion of the flowers in the specimen have fallen away. Perianth campanulate, a line deep. Stamens not exerted.

(*To be continued.*)

SUMMARY ANALYSIS OF THE PHANEROGAMIC AND FERN FLORA OF SUSSEX.

BY W. B. HEMSLEY.

(Read at the Meeting of the British Association, August 19th, 1872).

Limiting ourselves to the standard species of British plants, as described in our books up to about the year 1850, the botany of this county is possibly as well known as that of any district in England, having been thoroughly explored by such men as Borrer, Woods, Jenner, Smith and others. But when we come to the critical forms of later publications, the information is by no means so complete, and, whether these forms be considered as species, sub-species, or varieties, is of little importance from our standpoint, because, whatever rank we may assign to them, their distribution is equally interesting.

Taking Babington's Manual (fifth edition) for our guide, about 1000 indigenous species (including ferns and horsetails) are known to grow in the county. Substituting Hooker's Student's Flora, there would be a reduction of about one hundred from the total number of forms admitted as species. In addition to these probably indigenous species, 59 others occur, which are known to be introductions. This number does not include alien species reported from a single locality and represented by a plant or two only.

The actual vegetation of a district (including critical forms and introduced species), is described in a Flora, consequently the numbers and

percentages given below are deduced from the total number, 1059. Separating this number into the three primary divisions, we have:

| | | | | |
|--------------------------|-----|------------|-------|-----------|
| Dicotyledons | 776 | species or | 73.28 | per cent. |
| Monocotyledons | 250 | ” ” | 23.61 | ” ” |
| Acotyledons | 33 | ” ” | 3.11 | ” ” |

| | |
|------|--------|
| 1059 | 100.00 |
|------|--------|

| | | | | |
|------------------------------|-----|----|-------|-----------|
| Herbaceous species | 937 | or | 88.47 | per cent. |
| Woody species | 122 | ” | 11.53 | ” ” |

| | |
|------|--------|
| 1059 | 100.00 |
|------|--------|

| | | | | |
|-----------------------------|-----|----|-------|-----------|
| Perennial species | 767 | or | 72.42 | per cent. |
| Annual or biennial species | 292 | ” | 27.58 | ” ” |

| | |
|------|--------|
| 1059 | 100.00 |
|------|--------|

The numbers and percentages of twelve of the predominating orders are:

| | | | | |
|--------------------------|-----|------------|-------|-----------|
| Gramineæ | 82 | species or | 7.83 | per cent. |
| Compositæ | 78 | ” ” | 7.36 | ” ” |
| Cyperaceæ | 60 | ” ” | 5.66 | ” ” |
| Rosaceæ | 60 | ” ” | 5.66 | ” ” |
| Leguminosæ | 52 | ” ” | 4.91 | ” ” |
| Umbelliferæ | 43 | ” ” | 4.06 | ” ” |
| Cruciferæ | 40 | ” ” | 3.77 | ” ” |
| Labiatae | 39 | ” ” | 3.68 | ” ” |
| Caryophylleæ | 36 | ” ” | 3.39 | ” ” |
| Scrophularineæ | 35 | ” ” | 3.30 | ” ” |
| Filices, etc. | 27 | ” ” | 2.54 | ” ” |
| Orchidaceæ | 25 | ” ” | 2.36 | ” ” |
| Totals | 577 | ” ” | 54.52 | ” ” |

The only order greatly affected by the difference in views respecting what should constitute a species is the Rosaceæ, which, computed according to Hooker ('Student's Flora'), would include thirty-two instead of sixty species, or 3.02 instead of 5.66 per cent., reducing the total of these orders to 51.88—a little more than half of the species reported as growing in the county.

In proportion to the area (1461 square miles), we have relatively a rich flora, as will be seen on a comparison with those of other districts. For instance, Northumberland and Durham (area 2925 square miles) include 935 species, and Yorkshire (area 5836 square miles), 1127 species.

Making due allowance for the position and climate of these northern counties, we must look for some other cause or causes tending to swell the number of species in this district. These may be sought in the great diversity and fertility of soil, and the nature of the subjacent rocks or strata.

A few of the more interesting features of the flora are:—Number of species to area, species peculiar to different formations, maritime species, and rare species, especially those of the "Atlantic" and "Scottish" types.

To treat of these matters in detail would far exceed the scope of the present paper, and here again we must be content with figures and a few examples:—

| | |
|---|-----|
| Maritime and salt-marsh species | 76 |
| Peculiar to the chalk | 56 |
| Essentially bog-plants | 36 |
| Aquatic and marsh plants | 213 |

The number of maritime species is tolerably high, but many of them are extremely rare and rapidly disappearing. Collectors go out in bodies and strip a place of its rarer plants. *Eryngium maritimum*, *Inula crithmoides*, *Cakile maritima*, *Crithmum maritimum* (formerly abundant), etc., etc., are almost extinct.

The flora of the downs—an area of upwards of 150,000 acres—is very interesting and deserving of special study. There is a considerable difference in the character of the vegetation as we travel westward where the range reaches the centre of the county. Besides the fifty-six species absolutely confined to the chalk, there are many others that flourish better here than elsewhere in the county. Eastwards of Brighton the higher portions are almost bare of woody vegetation with the exception of furze, but in the west there is great abundance of juniper, yew, holly, stunted oaks even, etc., of natural growth. The peculiar species belong chiefly to the Leguminosæ, Gentianaceæ, Compositæ, Campanulaceæ, and Orchidaceæ, with such outliers as *Thesium*, *Spiræa Filipendula*, *Helianthemum vulgare*, *Viola hirta*, and *Clematis Vitalba*. Owing to the rapid strides of agriculture, bog-plants, such as *Drosera*, *Wahlenbergia*, *Vaccinium Oxycoccus*, *Anagallis tenella*, and *Malaxis*, will soon be extirpated. The extent of bog-land in the county is very limited, and what there is, is being gradually reclaimed by draining. Amongst rare water and marsh plants we may mention *Isnardia palustris*, *Limnanthemum nymphæoides*, *Scirpus carinatus*, *Scirpus triqueter*, and *Potamogeton acutifolius*. The weald flora is remarkable for the presence of several plants of the “Atlantic” and “Scottish” types, not found in the surrounding counties, and to these may be added some interesting species of limited distribution in the south of England. Belonging to the Scottish type of Watson were * *Pyrola media*, * *Habenaria albida*, and * *Festuca sylvatica*, with several others, all very rare and local. * *Sibthorpia europæa*, † *Cicendia filiformis*, * *Vicia lutea*, *Bartsia viscosa*, * *Genista pilosa*, and *Melittis Melissophyllum*, may be noted as south-western types, extending to Sussex, though several of them are not found in the adjoining counties. *Alchemilla vulgaris* and *Carex montana* are other instances of isolated species. A prominent feature of the wealdan flora in the elevated sandstone districts of the centre and north in the eastern division, is the wide expanse of forest and heath-lands, though year by year they are decreasing in extent. The heath attains an unusual development, growing to a height of three to four feet, and covers considerable tracts of land.

Upwards of fifty species found in the neighbouring counties have hitherto not been detected in Sussex, though many of them from their geographical range, might be expected to occur. A few conspicuous examples are—*Hypericum montanum*, *Saxifraga granulata*, *Chrysosplenium*

* These species do not occur in the adjoining counties.

† I formerly recorded this as lost to the county (Journ. Bot. vi. p. 264), but it has since been found near the original habitat.

alternifolium, *Pyrola minor*, *Pinguicula vulgaris*, *Buxus sempervirens*, *Cyperus longus*. Several species not of a strictly south-western type are found in Hampshire, but, so far as is known, do not occur in Sussex. By way of illustration I may mention *Parnassia palustris*, *Listera cordata*, *Spiranthes æstivalis*, and *Scilla autumnalis*.

The species peculiar to Sussex are *Phyteuma spicatum*, *Lonicera Xylosteum*, and *Trifolium stellatum*, but none of these are admitted as being indigenous without question. The first is considered to be indigenous by most botanists who have collected it, and Babington, on what authority I know not, says the second is also; the last is believed to have been introduced with ballast.

In concluding this imperfect sketch, I venture to express a hope that the Natural History Societies of Sussex will take steps to ensure the publication, in a collected form, of the scattered papers on Sussex botany, together with other available unpublished data, before the inevitable disappearance of many species which now exist in single localities, and are likely soon to be disturbed.

RECENT RESEARCHES IN THE DIATOMACEÆ.

BY THE REV. EUGENE O'MEARA, A.M.

IV.

Pfizer ranges the *Cymbelleæ* immediately after the *Naviculaceæ*. Some authors, as Smith and Raabenhorst, have placed these families widely apart; while others, as Kützing, Ralfs, Grunow, Heiberg, have treated them as more intimately related, the connecting link between them being found in the common features of a median line and central and terminal nodules. Pfizer places the two families in immediate proximity on account of the genera *Brebissonia* and *Anomoeoneis*, which, while they resemble the *Naviculaceæ* in the symmetrical outline of the valves, are related to the *Cymbelleæ* by the unsymmetrical character of the cell-contents. Comparing the two families together in regard to the latter, the principal difference is that the *Cymbelleæ* have but a single endochrome-plate, while the *Naviculaceæ* have two. The group embraces the following five genera:—1. *Brebissonia*, Grun.; 2. *Anomoeoneis*, Pfitz.; 3. *Cymbella*, Agardh; 4. *Cocconema*, Ehren.; 5. *Encyonema*, Kütz.

1. *Brebissonia*.—This genus was established by Grunow to receive a single species, *B. Boeckii* = *Cocconema Boeckii*, Ehr. and Kütz. and *Doryphora Boeckii*, W. Sm. The author had the rare opportunity of observing this form in a living state, having found it abundantly in the harbour of Pillaw; and describing it, he remarks that in the outline of the valve there is no want of symmetry, so that in this aspect it might be regarded as a stipitate *Navicula*. On account of this symmetry of form it is plainly distinct from *Cocconema*, in which Ehrenberg, Kützing, and Ralfs placed it; as it is also from *Doryphora*, in which it was placed by Smith, by the presence of a central and terminal nodules formed similarly to those of the genus designated *Frustulia* by Pfizer, which has been referred to before. But as the internal structure of *Brebissonia* is unsymmetrical throughout, it stands in more intimate relationship to *Cocconema* than to any other genus. Besides the plasm-sac lying on the

cell-wall, and which is most highly developed at the extremities, we have, in *Brebissonia*, a large central plasm-mass which occurs in all the *Cymbelleæ* and *Naviculeæ*. The mass of thicker plasm interposed between the endochrome-plate and the cell-wall, which is found in *Frustulia*, is present also in *Brebissonia*; in the latter case, as in all the *Cymbelleæ*, only one of these occurs in each frustule, and this lies across the middle of one girdle-band. This structure in *Brebissonia* is large and semi-globose; the single endochrome-plate covers the same girdle-band, folding itself over the valves on both sides till its free edges nearly meet on the opposite girdle-band. Division commences with the separation of the endochrome-plate into similar halves by an incision from the extremities throughout.

As Grunow gives no special characters of the genus *Brebissonia*, the detailed description of its peculiarities by Pfitzer is the more valuable, and exhibits the relationship of this interesting form more clearly than hitherto has been done.

2. *Anomoeoneis*.—The only form which with certainty can be assigned to this genus, according to our author, is *A. sphaerophora* =, as he thinks, *Navicula sphaerophora*, Kütz. It bears a strong resemblance to *Navicula ambigua*; its valves, however, are not furnished with transverse striæ, but with fine puncta arranged in quincunx. On one side of the central nodule the striation fails, so as to leave a smooth space reaching the margin; this smooth space on the under valve lies immediately under and parallel to the corresponding smooth space on the upper. *Anomoeoneis* therefore, like the *Cymbelleæ*, is unsymmetrical, notwithstanding its decidedly symmetrical outline. The internal structure corresponds; a broad central plasm-mass is noticeable on both girdle-bands, but obviously narrower on the side of the girdle-band on which the middle of the single endochrome-plate is situated. Division in this case, as in that of *Brebissonia*, takes place by means of an incision proceeding from the extremities.

The unstriated space on one side of the valve which is characteristic of *Anomoeoneis*, occurs in a similar manner in *Nav. sculpta*, Ehren., and to slighter extent in *Nav. bohémica*, Ehren., so that for this reason the author considers these latter-named species may be included in *Anomoeoneis*.

I have some doubt as to the identity of *Anomoeoneis sphaerophora*, Pfitzer, with *Navicula sphaerophora*, Kütz. The failure of the striation on one side of the central nodule, and extending thence to the margin of the valve, a feature so characteristic of *A. sphaerophora*, does not appear in Kützing's figure of *N. sphaerophora*, nor in that of Smith. Donkin (Brit. Diat. pl. v. fig. 10) does not notice this peculiarity; it is not apparent in the forms so named by Eulenstein (Diat. sp. typ.), nor in those in my possession, which in all respects agree with the figures referred to. I should have supposed Pfitzer had *Navicula sculpta* in view, were it not that he refers to this latter as a distinct form. While differing from the author as regards his opinion that the failure of the striæ on one side of the central nodule removes this species from the symmetrical forms and includes it in the unsymmetrical—in the sense in which Grunow and Heiberg used the terms symmetrical and unsymmetrical,—I cannot fail to express my obligation to him for the new light he has thrown on the relationship of this species, as well as that of *Brebissonia*, by his observations on the unsymmetrical characters of the contents of the frustule.

3. *Cymbella*. 4. *Cocconema*. 5. *Encyonema*.—These three genera correspond in this common feature, that the portions of the valves at the opposite sides of the longitudinal axis are unsymmetrical. One margin is ever more convex than the other, in many forms one margin is concave. The section of the cell is sometimes rectangular, sometimes strongly trapezoid; a longitudinal line and nodules occur as in *Navicula*, *Brebissonia*, and *Anomoeoneis*. The longitudinal line is never straight except in the case of *Encyonema*, and always divides the valves into two very unsimilar segments. The striation is sometimes costate, for instance, in *Cymbella Ehrenbergii*, Kütz.; sometimes moniliform, as in *Cocconema asperum*, Ehrenb., in which case there are depressions arranged in linear order.

The generic distinctions depend on the circumstance that *Cymbella* is free, *Cocconema* stipulate, and the frustules of *Encyonema* are enclosed in tubes. In *Encyonema* the girdle-band lies somewhat obliquely on the frustule, so that the transverse section is slightly rhomboid. The structure of the primordial cell in these three genera is very similar to that of *Brebissonia* and *Anomoeoneis*. In all the forms investigated the single endochrome-plate lies with its middle portion on the more strongly arched broader side, and thence folds itself over the valves, its free margins lying on the concave or less convex, and at the same time smaller side. The division of the endochrome-plate takes place by means of an incision proceeding from the extremities throughout. The single plasm-band described by Ehrenberg, and regarded by him as a spermatic gland, presents itself on the more strongly arched girdle-band, and thence, interposed between the cell-wall and the endochrome-plate, passes over slightly on the valves.

The middle plasm-mass observable on the valves in *Cymbella gastroides*, Kütz., and *Cocconema Cistula*, Hempr., is broader on the convex than on the concave side, and the reverse in *Cymbella cuspidata*, Kütz. In the smaller forms, *Cymbella scotica*, W. Sm. for instance, no distinction in breadth is noticeable. In the last-named species the endochrome-plate is separated into four portions by a roundish lacuna passing from side to side on each valve.

Pfitzer has never had the opportunity of observing the formation of auxospores in the *Cymbelleæ*, but gives an interesting summary of what other observers have recorded as follows:—Thwaites, in 1847, noticed that in *Cocconema lanceolatum* and *Cocconema Cistula*, two mother-cells invested with gelatinous matter produced two auxospores, which lie parallel with the former. Carter, in 1856, confirmed this observation in *Cymbella Pediculus* (*Cocconeis Pediculus*); and Smith, not only in the two species investigated by Thwaites, but also in *Cocconema parvum*, W. Sm., and *Encyonema prostratum*, Ralfs. Lastly Lüders gave a full description of the process in *Cocconema Cistula*. The two cells co-operating in this instance appear generally if not always to issue from the division of a single mother-cell; they separate themselves according to Lüders into two plasm-masses superimposed one on the other, which then conjugate in pairs.

THE NON-OCCURRENCE NEAR MANCHESTER OF CERTAIN
COMMON BRITISH PLANTS.

BY LEO H. GRINDON.

The capital hint given by Mr. T. R. A. Briggs in his papers upon the plants not found near Plymouth, induces me to make some observations upon the Manchester absentees. The flora of any given district usually includes, I believe, about one-half of the entire number of species reckoned indigenous to Great Britain, the constituents varying with the geological conditions, the proximity or otherwise of the sea, the elevation of the surface, and the local climate; while the ordinary vegetation (which, of course, is by no means to be confounded with the flora) usually consists, I believe, of about a fourth, or, in round numbers, of about 370 or 380 species. I get at this arithmetical idea of "species" by striking a middle course between Mr. Bentham's estimate of less than 1300 and Mr. Syme's 1824 figures. The flora of the country round Manchester is rather below the average, chiefly because of the level surface and the unfavourable character of the soil, partly by reason of the ungenial climate. Clay and new red sandstone are almost universal; extensive peat-mosses cover up large areas of the original surface, once covered by birch-trees; and although upon the north and east the ground rises, this adds little to the variety of the plants, the rock being millstone grit, noted for its infertility, while the higher portions are entirely moor-land, desolate, and storm-beaten. Limestone (except a mere thread in one of the suburbs), chalk, oolite, lias, tidal rivers, marshes impregnated by the sea, are near Manchester altogether unknown. So of course they are near Birmingham, Leeds, Sheffield, and plenty of other places, so that our negative condition is by no means unique or exceptional, but it would be interesting to learn whether the Manchester absentees are strangers likewise in the neighbourhood of the towns indicated, and, if so, is there any general cause for it. The fragrant labiates, every labiate, in fact, that yields powerful odour, save *Stachys sylvatica*—are wanting here, the common wild thyme alone excepted, and even this has but a couple of localities, both remote and of very small extent. So with the yellow-flowered Umbelliferæ, the *Clematis Vitalba*, mural ferns, such as *Asplenium Trichomanes*, and *Cotyledon Umbilicus*—plants which, if they make their appearance at all, are palpable introductions. Plants, again, so common in, I believe, most parts of England, as the white dead-nettle, the hound's tongue, *Helianthemum vulgare*, *Galium verum*, the sweet violet, *Plantago media*, scarcely enter our district, or occur very sparingly in but one or two doubtful localities. *Malva sylvestris* and *rotundifolia* are very seldom met with; *Convolvulus arvensis* I have never seen; the cowslip is extremely local; the comfrey is unknown. The crimson of the *Papaver Rhœas* here never brightens the cornfields. Here and there we have a sprinkling of the *Papaver Argemone*, but I cannot call to mind the finding of an example of *Rhœas*. It is worthy of note that we are destitute of some of the grasses I am accustomed to see elsewhere, such as *Hordeum pratense* and *H. murinum*. So again with certain hedgerow shrubs, *Cornus sanguinea*, *Viburnum Lantana*, *Acer campestre*, for example; so again with numerous denizens of the wayside, such as *Arenaria serpylli-*

folia. The want of these forms, so familiar to every botanist in the south of England, makes the flora of Manchester seem poor and dull. Not that we are destitute of striking and brilliant wild-flowers. The foxglove is exceedingly abundant; *Campanula latifolia* and the oriental-looking white water-lily reckon among our common plants; *Senecio Jacobæa* attracts the attention of the most incurious; so, in spring and early summer, do the sheets of innumerable *Anemone nemorosa*, *Scilla nutans*, *Lychnis diurna*, and *Myosotis sylvatica*; but our flora mainly consists of the common, or rather the universal plants of the country in general,—buttercups and daisies, dandelions and thistles, self-heal and ox-eye, bugle and yellow avens, etc.

The flora of Manchester, such as it is, has long since been exactly ascertained. The celebrated "Lancashire naturalists in humble life," who at Eccles, about 1780, founded one of the earliest botanical societies, and their descendants and disciples, up to about the year 1835, thoroughly explored every nook and corner of the district. Scarcely a plant (omitting the microscopic Cryptogamia) has been added to the list since the period named, except the waifs and strays and the few "critical" forms that the present generation has detected or discriminated. I have already said as much in my 'Manchester Flora,' published in 1848, and nothing additional is likely to be met with.

ON A NEW ERRATIC BRITISH PARMELIA.

BY THE REV. J. M. CROMBIE, M.A., F.L.S.

On receiving for the first time, some three years ago, a specimen of *Parmelia tiliacea*, var. *concentrica*, Leight., it at once struck me that I had long before observed something very similar to it in Braemar. No opportunity, however, presented itself of inquiring further into the matter, until two months ago, when I spent a week in that neighbourhood. During a lichenological ramble on Morrone, the only mountain in the district, with the exception of Cairngorm, which the wet weather allowed me to ascend, I accidentally stumbled upon the object which I had in view. At an altitude of some 2300 feet, when crossing a large patch of detritus, covered only here and there with a scanty sward of stunted grass and heather, my eye was attracted by something in the shape of a small ball, rolling before the wind. Suspecting that it was the desiderated plant, I at once secured it, and on examination found, that except in being darker coloured, and not so completely formed on the under side, it exactly resembled in appearance and structure the above var. of *P. tiliacea*.

For a time I was somewhat puzzled as to whence it had come, and to what species it was referable; but on subsequently reaching several large boulders at a considerable distance, my difficulty was at once removed. One of these was covered on the upper surface with *Parmelia omphalodes* f. *panniformis*, on the thallus of which, in close propinquity, two other similar nodules, though smaller and less complete, were visible. This then, or some neighbouring boulder, was evidently the source whence my erratic specimen had proceeded, and whence it had no doubt been driven by stormy wind or melting snow.

The discovery of this peculiar form, which, should a name be desired,

may be termed *Parmelia saxatilis*, var. *omphalodes* f. *subconcentrica*, is on several accounts very interesting. Not only does it show the origin of such erratic Lichens, but it also indicates the manner in which their globular shape is produced. Reasoning from analogy we may infer that, notwithstanding assertions to the contrary (not even in all probability excepting the 'Lichen manna,' *Lecanora esculenta*, and *L. affinis*), they are not free *ab initio*, but have been detached by atmospherical or other causes from the parent thallus, on which, as in the present case, and in that of *P. tiliacea* f. *concentrica*, they had originally appeared in an abnormal and excessively panniform state, in consequence of the natural development of the lobes having been somehow arrested. Again, we may also infer that after detachment, they still continue, for some time at least, to grow, and that their globular shape is caused by repeated involutions of the newly acquired portions of the thallus, as they are tossed about by the wind in bare places, without finding a suitable substratum to which they may become affixed. This is shown by the circumstance that the two specimens of the form under notice, which still adhered to the thallus were only half globular, resembling a ball cut in two, while the one on the ground was nearly three-fourths globular, and was when gathered evidently in a fair way of soon becoming so completely. Unfortunately a heavy and protracted fall of rain prevented me from searching for other specimens, which probably I might have found. On another of the boulders referred to, I met also with a curious state of *P. saxatilis*, apparently hitherto unnoticed, in which the thallus bore a single blackish glomerulus, similar to that of *Ricasolia amplissima*, and which may be termed f. *glomulifera*.

SHORT NOTES AND QUERIES.

THE DEHISCENCE OF THE CAPSULE IN THE GENUS CUPHEA.—In Masters' 'Vegetable Teratology,' p. 210, there are figures, after Morren, of what is referred to as a curious condition in some flowers of *Cuphea miniata*, in which the placenta protruded through an orifice in the ovary, and, losing the horizontal direction, became erect. To this condition the Belgian savant is said to have given the name of "gymnaxy." In 'Science Gossip' for 1871, p. 81, Mr. Holland has described a similar condition in *Cuphea platycentra*, and I have lately had an opportunity of confirming the observation there recorded. Several plants of this species (*C. platycentra*) in my garden have this autumn matured capsules, and in every case the placenta had swollen, become horizontal, and in so doing, ruptured the capsule and the calyx. As this has occurred in every plant, in every case in which the capsule was matured, it seems most probable that this is not an hypertrophied condition of the placenta, but the normal mode of dehiscence of the capsule in this genus.—FRED. I. WARNER.

PHYTEUMA SPICATUM.—In June, 1825, the Rev. Ralph Price found this plant on the estate of the late Mr. Day, at Hudlow (Mayfield). It was growing plentifully near the hedge of a hop-garden. Mr. Price collected many specimens and sent them to one of the botanical societies—I think the Linnean. It was not considered an English plant, and Mr.

Day took great pains to investigate the fact; the result was that he found it widely scattered, and that in one instance a farmer told him that the weed had been the greatest plague to him. The plant was growing in the wood and lane near the field, formerly a hop-garden, last July. I have found it in hedgerows, scattered for miles, near Hudlow.—ANN ELLIOTT BRANWELL.

ALCHEMILLA CONJUNCTA, *Bab.*, IN CUMBERLAND.—Dr. Syme, in his edition of 'English Botany,' expresses a doubt whether this plant has ever been found really occurring wild in Great Britain. I believe that I have got specimens of it, and that Cumberland has the credit of having produced it. The plant from which the specimens sent were taken was found by Mr. Dickinson, of Thorcroft, many years ago, on one of our fells, and preserved in his garden as *A. alpina*,—the older books of botany not distinguishing the present species or variety. Some specimens were sent to me which I discovered to be *A. conjuncta* of Babington's Manual. It has all the characters of the typical plant from the Faroe Islands—lobes of the leaves blunt and combined through one-third or more of their length; teeth not confined to the apex merely; leaves deep green above, and brilliantly silky beneath. The outermost lobes are not *always* contiguous, but in very many instances they are, forming a completely peltate leaf. There seems no doubt that this is the genuine plant, which may be therefore reckoned as an English native.—R. WOOD.

PLANTS OF NOVA ZEMBLA.—In the 'Vidensk.-Selsk. Forhandlinger' for 1872, pp. 13–23, Mr. Axel Blytt has published a list of the plants brought back by Mr. Aagaard in 1871 from Nova Zembla, the adjacent island of Waigatsch and the shores of the strait—Jugor Sharr—separating this from the Asiatic continent. The plants are arranged in one series, and consist of 7 Algæ, all from Nova Zembla, 56 lichens, 37 of which are from the same islands, 24 mosses, 16 from Nova Zembla, and 107 Vasculares. Of these last, 71 were collected in the Nova Zembla islands. In Prof. Trautvetter's list (see pp. 213–219 of this volume), 105 species are enumerated, but several are recorded by Mr. Blytt which are not included in that catalogue. These are *Ranunculus acris*, L. (perhaps the No. 7 of Trautvetter's list), *Draba Wahlenbergii*, Hartm. (probably included under No. 16 in the same list), *Cerastium trigynum*, Vill., *Epilobium* sp., *Pyrola* sp. (*minor* or *rotundifolia*), *Salix lanata*, L., *Luzula spicata*, L., *Alopecurus alpinus*, Sm., *Festuca rubra*, L., and *Equisetum scirpoides*, Mich. The very rare grass *Pleuropogon Sabinii*, R. Br., was also gathered in this its only locality besides Melville Island.

RUMEX SYLVESTRIS, *Wallr.*, IN ENGLAND.—This plant (the *R. Wallrothii* of Nyman) is considered by Professor Fries to be the form distinguished by Linnæus under the name *R. obtusifolius*, and in this opinion he is followed by most of those botanists who have closely studied the Docks.* Professor F. Areschoug, of Lund, in particular, whose excellent paper on Rumex (*Ofvers. af K. Vet. Acad. Förh.*" for 1862) is

* Meisner, however (DC. Prod. xiv. p. 51), retains Wallroth's name for the plant, which he suggests may be a hybrid between *R. Friesii* and *R. conglomeratus*, and restricts the name *R. obtusifolius*, L. to *R. Friesii*, Gren. and Godr., which he places in a different section of the genus.

deserving of careful examination. The common plant of England is, as is well known (Bab. Man. ed 6, p. 292 ; Syme. Eng. Bot. vol. viii. p. 46), the *R. divaricatus* of Fries, (*R. Friesii*, Gren. and Godr.), and *R. sylvestris* has never been recorded for this country. I have this autumn had an opportunity of becoming acquainted with the latter plant in a living state in the neighbourhood of Copenhagen, where it was pointed out to me by Professor Lange, and also near Lund, where I had the great advantage of Professor Areschoug's guidance. I have no hesitation in referring to *R. sylvestris* a dock collected by Mr. Warren near the river Thames between Putney and Hammersmith Bridges, Surrey. This presents the characters in a marked degree, and fits well with the Danish plant, with an authentic specimen from Wallroth himself in the British Museum, and with plants from Dorpat, collected by Gruner, in the same herbarium. In the neighbourhood of Lund none of the specimens collected were characteristic, all making some approach to *R. Friesii*, as is also the case with a plant in the British Museum, labelled *R. obtusifolius*, L., collected by Ahlberg at Upsala. As Koch states, there are probably numerous forms with intermediate characters, but the extremes are well-marked and deserve distinction by British botanists.—HENRY TRIMEN.

MENTHA ALOPECUROIDES, Hull. The accompanying specimen of *Mentha* was collected by Dr. Dowson and myself near Shalford Common, Surrey, during an excursion from Shalford to Guildford a few days ago.—W. W. REEVES. [New to the flora of Surrey. A well-defined mint, which seems to be rare ; it has occurred in Kent and Essex.—ED. JOURN. BOT.]

Extracts and Abstracts.

THE ORIGIN OF THE FLORA OF ATLANTIC NORTH AMERICA.

The following extract is taken from Professor Asa Gray's address to the American Association for the Advancement of Science, held at Dubuque, Iowa, on August 21st. The peg upon which his discourse was hung was the distribution of the Californian trees, the Wellingtonia (*Sequoia gigantea*), and the coast Redwood (*S. sempervirens*), and of their allies the Bald Cypress (*Taxodium*) of the United States, and the *Glyptostrobus* of China. After tracing in some detail the remarkable similarity between the floras of Eastern North America and Eastern North Asia, so familiar to botanists from Professor Gray's and Miquel's well-known essays, he proceeds:—"These singular relations attracted my curiosity early in the course of my botanical studies, when comparatively few of them were known, and my serious attention in later years, when I had numerous and new Japanese plants to study. . . . My speculation was based upon the former glaciation of the northern temperate zone, and the inference of a warmer period preceding (and perhaps following). I considered that our own present vegetation, or its proximate ancestry, must have occupied the arctic and sub-arctic regions in pliocene times, and that it had been gradually pushed southward as the temperature

lowered and the glaciation advanced, even beyond its present habitation; that plants of the same stock and kindred, probably ranging round the arctic zone as the present arctic species do, made their forced migration southward upon widely different longitudes, and receded more or less as the climate grew warmer; that the general difference of climate which marks the eastern and western sides of the continents—the one extreme, the other mean—was doubtless even then established, so that the same species and the same sorts of species would be likely to secure and retain foothold in the similar climates of Japan and the Atlantic United States, but not in intermediate regions of different distribution of heat and moisture; so that different species of the same genus, as in *Torreya*, or different genera of the same group, as Redwood, *Taxodium*, and *Glyptostrobus*, or different associations of forest-trees, might establish themselves each in the region best suited to their particular requirements, while they would fail to do so in any other. These views implied that the sources of our actual vegetation, and the explanation of these peculiarities, were to be sought in, and pre-supposed, an ancestry in pliocene or still earlier times occupying the high northern regions.

“And it was thought that the occurrence of peculiarly North American genera in Europe in the tertiary period (such as *Taxodium*, *Carya*, *Liquidambar*, *Sassafras*, *Negundo*, etc.), might best be explained on the assumption of early interchange and diffusion through North Asia, rather than by that of the fabled Atlantis.

“The hypothesis supposed a gradual modification of species in different directions under altering conditions, at least to the extent of producing varieties, sub-species, and representative species, as they may be variously regarded; likewise the single and local origination of each type, which is now almost universally taken for granted.

“The remarkable facts in regard to the North-East American and North-East Asiatic floras, which these speculations were to explain, have since increased in number, more especially through the admirable collections of Dr. Maximowicz in Japan and adjacent countries, and the critical comparisons he has made and is still engaged upon.

“I am bound to state that, in a recent general work by a distinguished botanist, Professor Grisebach, of Gottingen, these facts have been emptied of all special significance, and the relations between the Japanese and the Atlantic United States floras is said to be no more intimate than might be expected from the situation, climate, and present opportunity of interchange. This extraordinary conclusion is reached by regarding as distinct species all the plants common to both countries between which any differences have been discerned, although such differences would probably count for little if the two grew in the same country, thus transferring many of my list of identical to that of representative species; and then by simply eliminating from consideration the whole array of representative species, *i.e.*, all cases in which the Japanese and the American plants are not exactly alike.

“As if by pronouncing the cabalistic word ‘species’ the question was settled, or, rather, the greater part of it remanded out of the domain of science; as if, while complete identity of forms implied community of origin, anything short of it carried no presumption of the kind—so leaving all these singular duplicates to be wondered at, indeed, but wholly beyond the reach of inquiry!

“Now, the only known cause of such likeness is inheritance, and as all transmissions of likeness is with some difference in individuals, and as changed conditions have resulted, as is well known, in very considerable differences, it seems to me that, if the high antiquity of our actual vegetation could be rendered probable, not to say certain, and the former habitation of any of our species, or of very near relatives of them, in high northern regions could be ascertained, my whole case would be made out.

“The needful facts, of which I was ignorant when my essay was published, have now been for some years made known, thanks mainly to the researches of Heer upon ample collections of arctic fossil plants. These are confirmed and extended by new investigations of Heer and Lesquereux, the results of which have been indicated to me by the latter. The *Taxodium*, which everywhere abounds in the miocene formations in Europe, has been specifically identified—first by Goeppert, then by Heer—with our common Cypress of the Southern States. It has been found, fossil, in Spitzbergen, Greenland, and Alaska—in the latter country along with the remains of another form, distinguishable, but very like the common species; and this has been identified by Lesquereux in the miocene of the Rocky Mountains. So there is one species of tree which has come down essentially unchanged from the tertiary period, which for a long while inhabited both Europe and North America, and also, at some part of the period, the region which geographically connects the two (once doubtless much more closely than now) but survives only in the Atlantic United States and Mexico.

“The same *Sequoia* which abounds in the same miocene formations in north Europe has been now abundantly found in those of Iceland, Spitzbergen, Greenland, Mackenzie River, and Alaska. It is named *S. Langsdorffii*, but is pronounced to be very much like *S. sempervirens*—our living Redwood of the Californian coast, and to be the ancient representative of it. Fossil specimens of a similar if not the same species have recently been detected in the Rocky Mountains by Hayden, and determined by our eminent palæontological botanist, Lesquereux; and he assures me that he has the common Redwood itself, from Oregon, in a deposit of the tertiary age. Another *Sequoia* (*S. Sternbergii*), discovered in the miocene deposits in Greenland, is pronounced to be the representative of *S. gigantea*, the big tree of the California Sierra. If the *Taxodium* of tertiary time in Europe and throughout the arctic regions is the ancestor of our present Bald Cypress, which is assumed in regarding them as specifically identical, then I think we may, with our present light, fairly assume that the two Redwoods of California are the probable descendants of the two ancient species which so closely resemble them.

“The forests of the arctic zone in tertiary times contained at least three other species of *Sequoia*, as determined by their remains, one of which, from Spitzbergen, also much resembles the common Redwood of California. Another, ‘which appears to have been the commonest coniferous tree on Disco,’ was common in England and some other parts of Europe. So the *Sequoias*, now remarkable for their restricted station and numbers, as well as for their extraordinary size, are of an ancient stock; their ancestors and kindred formed a large part of the forests which flourished throughout the polar regions, now desolate and ice-clad, and which extended into low latitudes in Europe. On this continent one species, at

least, had reached to the vicinity of its present habitat before the glaciation of the region. Among the fossil specimens already found in California, and which our trustworthy palæontological botanist has not yet had time to examine, we may expect to find evidence of the early arrival of these two Redwoods upon the ground which they now, after much vicissitude, scantily occupy.

“Differences of climate, or circumstances of migration, or both, must have determined the arrival of *Sequoia* upon the Pacific; and of *Taxodium* upon the Atlantic coast. And still the Redwoods will not stand in the east, nor could our *Taxodium* find a congenial station in California.

“As to the remaining near relative of *Sequoia*, the Chinese *Glyptostrobus*, a species of it, and its veritable representative, was contemporaneous with *Sequoia* and *Taxodium*, not only in temperate Europe, but throughout the arctic regions, from Greenland to Alaska. Very similar would seem to have been the fate of a more familiar Gymnosperous tree, the Ginkgo or *Salisburia*. It is now indigenous to Japan only. Its ancestor, as we may fairly call it, since according to Heer ‘it corresponds so entirely with the living species that it can scarcely be separated from it,’ once inhabited northern Europe and the whole arctic region round to Alaska, and had even a representative further south in our Rocky Mountain district. For some reason, this and *Glyptostrobus* survived only on the shores of eastern Asia.

“*Libocedrus*, on the other hand, appears to have cast in its lot with the *Sequoias*. Two species, according to Heer, were with the ancient ones in Spitzbergen. Of the two now living, one, *L. decurrens*, the incense Cedar, is one of the noblest associates of both the present Redwoods; the other is far south in the Andes of Chili.

“The genealogy of the *Torreya*s is more obscure, yet it is not unlikely that the Yew-like trees, named *Taxites*, which flourished with the *Sequoias* in the tertiary arctic forests, are the remote ancestors of the three species of *Torreya*, now severally in Florida, in California, and in Japan.

“As to the Pines and Firs, these were more numerously associated with the ancient *Sequoias* of the polar forests than with their present representatives, but in different species, apparently more like those of Eastern than of Western North America. They must have encircled the whole polar zone then as they encircle the present temperate zone now.

“I must refrain from all enumeration of the Angiospermous or ordinary deciduous trees and shrubs, which are now known by their fossil remains to have flourished throughout the polar regions when Greenland better deserved its name, and enjoyed the present climate of New England and New Jersey. Then Greenland and the rest of the north abounded with Oaks, representing the several groups of species which now inhabit both our eastern and western forest districts; several Poplars, very like our Balsam Poplar, or Balm of Gilead tree; more Beeches than there are now, a Hornbeam and a Hop Hornbeam, some Birches, a Persimmon, and a Plane tree, near representatives of those of the Old World, at least of Asia, as well as of Atlantic North America, but all wanting in California; one *Juglans*, like the Walnut of the Old World, another like our Black Walnut; two or three Grape Vines, one near our southern Fox Grape or Muscadine, the other near our northern Frost Grape; a *Tilia*, very like our Basswood of the Atlantic States only; a *Liquidambar*; a

Magnolia, which recalls our *M. grandiflora*; a Liriodendron, sole representative of our Tulip Tree; and a Sassafras, very like the living tree.

“Most of these, it will be noticed, have their nearest or their only living representatives in the Atlantic States, and when elsewhere, mainly in Eastern Asia. Several of them, or of species like them, have been detected in our tertiary deposits west of of the Mississippi by Newberry and Lesquereux.

“Herbaceous plants, as it happens, are rarely preserved in a fossil state, else they would probably supply additional testimony to the antiquity of our existing vegetation, its wide diffusion over the northern and more frigid zone, and its enforced migrations under changes of climate.

“Supposing, then, that our existing vegetation, as a whole, is a continuation of that of the tertiary period, may we conclude it absolutely originated then? Evidently not. The preceding cretaceous period has furnished to Carruthers in Europe a fossil fruit like that of the *Sequoia gigantea* of the famous groves, associated with Pines of the same character as those that accompany the present tree; has furnished to Heer, from Greenland, two more *Sequoias*, one of them identical with a tertiary species, and one nearly allied, *Sequoia Langsdorffii*, which in turn is a probable ancestor of the common California Redwood; has furnished to Lesquereux in north America the remains of another ancient *Sequoia*, a *Glyptostrobus*; a *Liquidambar* which well represents our Sweet Gum-tree; Oaks analogous to living ones; leaves of a Plane-tree, which are also in the tertiary, and are scarcely distinguishable from our *Platanus occidentalis*; of a *Magnolia* and Tulip Tree, and of ‘a Sassafras undistinguishable from our living species.’ I need not continue the enumeration. The facts will justify the conclusion which Lesquereux—a very scrupulous investigator—has already announced, ‘That the essential types of our actual flora are marked in the cretaceous period, and have come to us after passing, without notable changes, through the tertiary formations of our continent.’

“According to these views, as regards the plants at least, the adaptation to successive times and changed conditions has been maintained, not by absolute renewals, but by gradual modifications. I, for one, cannot doubt that the present existing species are the lineal successors of those that garnished the earth in the old time before them, and that they were as well adapted to their surroundings then as those which flourish and bloom around us are to their conditions now. Order and exquisite adaptation did not wait for man’s coming, nor were they ever stereotyped. Organic nature—by which I mean the system and totality of living things and their adaptation to each other and to the world—with all its apparent and indeed real stability, should be likened, not to the ocean, which varies by tidal oscillations from a fixed level to which it is ever returning, but rather to a river, so vast that we can neither discern its shores nor reach its sources, whose onward flow is not less actual because too slow to be observed by the ephemeræ which hover over its surface or are borne upon its bosom.”

Review.

The Flora of Liverpool. A List of the Indigenous Flowering Plants and Ferns growing within fifteen miles of the Liverpool Exchange, and two miles of Southport. Published by the Liverpool Naturalists' Field Club. Liverpool. 1872. (Pp. 178.)

We are told that various causes have conspired to delay the appearance of this new 'Flora of Liverpool' in a completed form. The work before us is certainly a great advance upon the Floras of Hall and Dickinson. The district meted out by the Liverpool botanists for their researches comprises an area whose vegetation is replete with interest. Their neighbourhood abounds with critical plants. The Mersey botanical province is to some extent a debatable land, where the southern species of our island are thinning out, and northern types are beginning to appear. *Callitriche autumnalis*, L., *Andromeda polifolia*, L., and *Saxifraga Hirculus*, L. (now extinct) have a decidedly boreal twang about them. All grow or grew round Knutsford. The littoral portion of the Liverpool Flora extends from the environs of the town of Chester northwards across the whole Cheshire peninsula of Wirral. Passing into Lancashire, we ascend the coast to Southport. In this latter portion, over a limited tract, reappears at intervals the true *Erythræa latifolia*, Sm., here only to be met with. The genus *Erythræa* abounds, and its other littoral forms are readily found. *Gentiana campestris*, L., *Parnassia*, and almost miles of the naturalized *Oenothera biennis*, L., clothe the Lancashire sandhills in autumn. The Cheshire coast is here and there as brilliant in its colouring; above Heswall in September the contrast of the *Ulex Gallii*, Planch. and *Gentiana Pneumonanthe* with the heath in flower is very striking. There are also lengths of *Geranium sanguineum*, L., in bloom rather earlier just north of Parkgate. The Cheshire island of Hilbre, a wild desolate spot difficult of access, produces some interesting plants, *Statice occidentalis*, Lloyd (surely hardly *S. Dodartii*, Syme, as this Flora has it), *Sagina ciliata*, Fries, and *Lepigonum rupicola*, Kindb., being of the number. From Parkgate southwards to the northern outskirts of Chester itself, the district has been little explored. The salt flats about Shotwick will certainly repay careful examination. Casual visits rather than systematic exploration have already detected *Blysmus rufus*, L. (a plant, we believe, new to Cheshire) in this district. At Moston, a little north of Chester, *Sagittaria* apparently puts in its first comital appearance. *Carex acuta*, L., *Sison Amomum*, L., *Carduus acanthoides*, L., and *Glyceria aquatica*, L., all begin to crop up here and there; these are plants which a London botanist would scarcely notice, but they become rare and noteworthy within the radius of the Liverpool flora. We must go to the very walls and ways of Chester city itself to find *Hordeum murinum*, L., as we find it about London. You might tramp for years as a botanist over the electoral district of Mid-Cheshire, and never gather a single spike. You will not see any thyme there, and you will not find *Senebiera Coronopus*, Poir., or a vestige of the common teazel; *Malva sylvestris*, L., you will see, but only once or twice. Surely the absences of any given Flora are more curious than the occurrences. As we

approach the coast of Wirral, we get into a more southern vegetation; that is to say, common southern species, which are rare or absent inland, occur, but only as littoral plants. The three weeds above-mentioned become common on the coast, and the teasel turns up here and there. Even *Ballota nigra*, L., thins out into a scarce plant inland in Cheshire. *Erodium cicutarium*, Sm., *Spergula nodosa*, Meyer, *Galium verum*, L., *Torilis nodosa*, Gaert., abundant sandhill plants, are seldom seen at any great distance from coast influence. *Papaver Rhœas*, L., *P. Argemone*, L., *Scandix Pecten*, L., *Arenaria serpyllifolia*, L., and other weeds are also instances of central Cheshire rarities. As a make-weight there are curious and characteristic plants of the inland, which seem to thin out as we approach the shore. *Galeopsis versicolor*, Curt., *Cicuta virosa*, L., *Potamogeton obtusifolius*, M. and K., *Andromeda*, etc., are examples; all frequent and characteristic species inland near Liverpool, but plants which many of our botanists have not even seen growing.

There is little which demands the office of the critic in the new Liverpool Flora. We are told, moreover, that it is contemplated to issue shortly a supplement to the present work. Might we offer a few suggestions towards this same supplement?

We venture to think that rather too much stress is laid upon discussions whether a given species is scarce or frequent. Take, for example, *Myosotis repens*, Don, a plant which, even if it should prove abundant in the Liverpool district, is certainly most liable to be overlooked. Surely one station, at least, should be given, where young botanists may gather and study the species; but this is not done, while much type is expended on the question of its relative frequency or scarceness. Again, passing to *Euphorbia Lathyris*, L., which we find described by a contributor as "a weed in cultivated land." Does this formula mean simply gardens, roadsides near them, or heaps of horticultural refuse, conditions under which most botanists are familiar with the plant,—or are we to infer that somewhere in the Liverpool area, *E. Lathyris* is gaining the position of *E. Helioscopia* in the "cultivated land" of corn crops and potato-fields? The ambiguity is certainly worth clearing up, and the general stations given, "woods and fields," do not seem to fit much the more special Frodsham habitats, while another contributor records the plant in "corn-fields." Once more, we learn that *Carex Oederi*, Ehrh., is prevalent on the sandhills, and that *Carex lepidocarpa*, Tausch., is very rare and has been observed once. Might we suggest to the "Committee" to go into the question, whether after all *C. lepidocarpa*, Tausch., may not prove their common coast form? Of course the distinction between *C. Oederi* and *C. lepidocarpa* is one of some critical nicety. We shall hope for a supplemental note on this point. *Zannechellia eu-palustris*, Syme, is given as "frequent," while *Z. pedicellata* appears as "rare;" in a littoral flora we should expect the exact converse. Two ladies record *Symphytum patens*, Syme. We suspect a purple-flowered plant cultivated in gardens is here meant, and not the plant of Sibthorp. The genera in which this Flora strikes us as not quite up to the mark are *Ranunculus* (in its Batrachian section), *Arctium*, *Potamogeton**, *Rubus*, and *Rumex*. In fact, Liverpool has much to do in its docks (we allude to floral and not to mercantile Liver-

* We are a little surprised to see *Potamogeton filiformis*, Nolte., discovered as a Cheshire plant.

pool). *Rumex viridis*, Sibth., hardly appears, and then as a rarity, which a few miles beyond Liverpool limits it is certainly not. Some one has just observed *R. pratensis*, M. and K., in Mersey, but all the perplexing hybrids are as yet things of the future. Last, with every allowance for country printers, a somewhat copious table of errata might be culled from the latinity of this Flora's concluding half. We rather also miss a map; and it might be an improvement, if the Cheshire and Lancashire sides of the Mersey could each be divided into an inland and littoral district. Four districts would not be too many for the area of the present work, and might bring to light some curious data for estimating coast influence on certain species. We close our notice with these few comments, which, we trust, that our Liverpool friends will accept as hints rather than censure. We find much to approve of in the general execution of their Flora. We wish it all success, and congratulate its compilers upon the completion of their task.

J. L. W.

Proceedings of Societies.

BOTANICAL SOCIETY OF EDINBURGH.—*June 13th.*—Dr. McBain, R.N., in the chair. The following communications were read:—"Report on a Botanical Trip to the Breadalbane Mountains, with Pupils, in July, 1871." By Professor Balfour. "On a Cone of *Flemingites gracilis* attached to its stem, from Grange Quarry, Burntisland." By Charles W. Peach, A.L.S. The author stated that Mr. Carruthers, of the British Museum, had instituted the genus *Flemingites*, from a portion of a cone found in British carboniferous rocks, and named it *Flemingites gracilis*, and had added in 1869 a new species from stems and sporangia from similar rocks in Brazil, and fully described them in the 'Geological Magazine' for April, 1869, as *Flemingites Pedroanus*. At page 152, he says, "In all the specimens of *Flemingites* which I have examined, I have seen no indication of the branch or stem on which they were supported." Thus, in neither cases had he seen a cone attached to a branch. The author then exhibited two cones of *Flemingites gracilis* attached to stems from the Grange Quarry, Burntisland, and from Slateford, showing the organic connection complete. The scars on these branches, he said, agreed with those figured by Mr. Carruthers from Brazil. He next exhibited a series of stems, with the tips crowned with leaves, some with appearances of a cone; as well as sketches of similar crowned stems from the Hugh Miller collection in the Museum of Science and Art. All these, however, differed from the figured cone of Mr. Carruthers, the leaves being much broader and longer and more patent; so different that he believed, but spoke with great caution, that these might be male cones; if so, it would help to clear up the difficulty connected with the single spore only of the cone described by Mr. Carruthers. As well as these, he produced a series of small branches, some forked in the same manner as *Lepidodendron*, and several larger branches, all showing in the centre a narrow striated woody stem; from some the scars have slipped off, in others, they lie up in a ridge-like manner over this woody stem. The scars are all wedge-shaped, and taper to a very fine point at the lowest end, in fact, shaped like a boy's paper kite, agreeing with much larger ones occurring on stems in the same rocks, and thus evidently forming with the others, parts of the same tree, of which we then have the cones, the small supporting stems,

the larger branches, and the main trunk. *Flemingites* is thus restored. That its internal structure was very liable to decay (except the thread-like stem spoken of) was evident in all stages of growth from the manner in which the scales had fallen off, and lay scattered in a pell-mell manner in all directions. This would cause it to have a drooping appearance, if the fossils give the true form of the living tree. He fully described, and entered into his reasons for his speculations, and illustrated his paper with a large series of drawings and specimens. "Remarks on a supposed case of Poisoning of a Cow, by eating the foliage and young twigs of *Populus balsamifera*." By Prof. Thomas Walley. "Note on *Plagianthus spicatus*, Bth." By Dr. Schomburgk, Adelaide, South Australia. Dr. Schomburgk presented specimens for the museum at the Botanic Garden, which had been recently brought to him from Port Lincoln. The plant is stated to be very poisonous to sheep and cattle, who die after eating it in a few hours. The tops of the flower spikes are considered the most poisonous part. After bush-fires the plant springs up in vast abundance. The plant belongs to the Malvaceæ, which contains very few, if any other, poisonous species.

July 11th.—Professor Wyville Thomson, President, in the chair. The following communications were read:—"Obituary notice of the late Dr. Robert Wight." By Dr. Cleghorn. "Is *Hydrocharis* really dicecious?" By Dr. S. O. Lindberg, Professor of Botany, Helsingfors. Dr. Lindberg said, "This question I propose to all those who have opportunity of examining *Hydrocharis* in flower, in order that the true relation of its organs of reproduction may be established. This beautiful plant is described by all authors as dicecious, with abortive pistil in the male flowers. In August, 1852, 1857, and 1865, I examined the plant particularly near Stockholm, where the plant rarely flowers and never ripens its seeds, and I always found it monœcious. The male flowers are usually placed three or five together on a condensed cyme or fasciculus, the middle flower being first developed. The base of the peduncle of each male flower is surrounded by two large membranous and nearly opposite bracts. The female flower is always solitary at the top of an unbranched, robust, and darker peduncle. The common peduncle of the male inflorescence issues rarely from the same articulation with the fertile one; more commonly, so far as I know, from a distinct axis. I have never seen a true male plant. In some specimens the male flowers are but little developed, but they are easily recognized. It is probable that they are sometimes abortive. The compound individual of *Hydrocharis* is so long branched and fragile that, even with the greatest care, we can seldom get a plant out of the water in a completely unbroken state. Probably it may be from this circumstance that the plant has been pronounced dicecious. I would suggest that it is worth while to examine also the allied *Stratiotes* and *Limnobium*, which are likewise said to be dicecious. *Hydrocharis* is not perennial, but propagates by means of buds, just as we see in *Utricularia*, *Myriophyllum*, many *Epilobia*, *Aconitum Cammarum* and *A. Napellus*, all *Orchideæ* having tubers, *Crocus*, many *Liliaceæ*," etc. "Notes on the Flora of the Isle of May, Frith of Forth." By Mr. John Sadler. Mr. Sadler gave some account of an excursion which he had made with the British Association to the Isle of May in August, 1871, and noticed the principal plants met with there. They included:—*Ligusticum scoticum*, *Sagina maritima*, *Mertensia maritima*, *Sedum anglicum*, *Artemisia maritima*, var. *gallica*, *Hyoscyamus niger*, *Cochlearia danica*, *Senebiera Coronopus*, *Asplenium marinum*, etc.

“Notes on the healing of wounds in *Acer Pseudo-platanus*.” By Mr. John Sadler. The author detailed a number of experiments which he had made during 1871-72 on *Acer Pseudo-platanus*, with the view of ascertaining the mode in which wounds on trees were healed, which he believed to be from above downwards. Specimens illustrating the experiments were exhibited. “Notes on some Plants gathered near Mentone.” By Mrs. Wright. “Notice of a Diatomaceous Deposit.” By Professor Dickie. In a small peat bog, in the parish of Methlie, Aberdeenshire, about 400 feet above the sea level Dr. Dickie found in August 1871 a Diatomaceous deposit two or three inches thick, and about two feet from the surface; the total depth of peat below the layer being so far as exposed four feet. The author gave a list of forty species of Diatoms which he had detected in the deposit. “Localities for new and rare Plants near Edinburgh.” By Mr. Isaac Bayley Balfour and Mr. T. B. Clark.

Botanical News.

ARTICLES IN JOURNALS.

Botaniska Notiser.—(No. 2, 2nd April).—J. M. Norman, “Cives novi Lichenææ Arcticæ Norvegiæ.”—S. Berggren, “Bryological Sketches from the Norwegian Coasts.”—“Swedish Botanical Literature for 1870.”

(No. 3, 22nd May).—N. Wulfsberg, “Localities for some Norwegian Mosses.”—N. J. Scheutz, “Contributions to the Flora of Gothland, Smoland, and Blekinge.”—Abstract of Dr. Scheutz’s “Study of the Scandinavian species of *Rosa*.”

Annales des Sciences Naturelles.—(Ser. 5, t. xiv. nos. 5 and 6, June, 1872).—E. Bureau, “Moreæ and Artocarpeæ of New Caledonia” (*contd.*)—A. Trécul, “Remarkable disposition of the Stomata on certain plants, especially on the petioles of Ferns.”—J. Triana and J. E. Planchon, “Prodrômus Floræ Novo-granatensis” (Terebinthaceæ and Rutaceæ).—A. F. Marion, Description of Fossil plants of the “Calcaires Marneux” of Ronzon (Pl. 22, 23).—E. Péligré, “On the relative distribution of Potash and Soda in plants.”—J. C. de Seynes, “Note on *Penicillium bicolor*.”

Bull. de la Soc. Bot. de France, (t. xvii. no. 4. Séances 23rd Dec., 1870, and additions).—D. Cauvet, “Remarks on the presence of the Kernscheide in roots.”—M. Cornu, “On the Germination of Ferns.”—M. Pérard, “Enumeration of the Labiates of the arrondissement Montluçon; with a classification of French Menthæ” (see p. 269).—J. de Seynes, “Observations on the reproductive bodies of Mucorineæ” (Pl. 5.)

Nuovo Giorn. Bot. Italiano (31st July).—G. Passerini, “Fungi Parmensi” (*contd.*) (Two new species, *Hydnum joeoides*, *Tremella Epimyces*).—T. Caruel, “Account of a Rubiaceous plant of the genus *Myrmecodia* (Pl. 1) (brought from Borneo by Beccari).—“Memoir (with portrait) of P. Savi” (by T. Caruel).—P. A. Saccardo, “Florula spontanea Hort. Bot. Patavini.”—Cesati, “Notes on the Synonymy of the Monochlamydeæ adopted in the Comp. della Fl. Italiana.”

AUGUST.

Ann. and Mag. Nat. Hist.—J. E. Gray, “On *Codiophyllum*, a new genus of unicellular Green Algæ from Port Natal” (Pl. ix.)

Grevillea.—C. H. Peck, “New York Fungi” (*contd.*).—M. C. Cooke, British Fungi.—W. Archer, Recent observations on *Collema*, etc.,

briefly considered.—S. O. Lindberg, "Observations on *Splachnobyrum Wrightii*," C. Müll. (see p. 193, and tab. 123).—English translation of A. Grunow's new Diatoms of the "Novara" expedition (Plate ii.)

Botanische Zeitung.—Memoir of H. von Mohl, with a list of his botanical writings.—C. Winkler, "On the anatomy of *Araucaria brasiliensis*" (tab. vii).—A. Ernst, "On the swelling of the submersed stem of *Æschynomene hispidula*, H. B. K."—"Obituary notice of G. Reuter" (by H. G. Reichenbach f.).—A. Famintzin and M. Woronin, *Ceratium hydroides*, Alb. and Schw., and *Polysticta reticulata*, Fr., as two new forms of Myxomycetes.—P. Ascherson, "Short phytographical observations" (*Stachys mollissima* and *S. decumbens*, W.)

Flora.—K. Prantl, "Results of recent researches on the Stomata" (tab. vi).—J. E. Howard, "On *Cinchona tucujensis*," Karst.—S. Kurz, *Gnetum Brunonianum*, Griff.—W. Nylander, "Addenda nova ad Lichenographiam Europæam" *contr.* xiv (42 new European species described, 9 British.)

New Books.—A. Bunge, 'Die Gattung *Acantholimon*, Boiss.' (St. Petersburg, 5s. 3d.)—N. J. Scheutz, 'Studier öfver de Scandinaviska artema af Slägtet *Rosa*.' (Wexio.)—Godron, 'Mélanges de Teratologie Végétale.' (From "Mem. Soc. Nat. Cherb.," vol. xvi.).—Reichenbach, fil. 'Icones Fl. German. et Helvetic.' tom. xxii., dec. 13, 14.—De Marsilly, 'Catalogue des Plantes Vasculaires, indigènes ou généralement cultivées en Corse.' (Paris, 4s.)—J. Lea, 'Rectification of T. A. Conrad's Synopsis of the Family of Naiades of North America.' New edition. (Philadelphia.)—L. Figuier, 'The Vegetable World.' English translation. New edition. (Cassell, 7s. 6d.)

Parts 1 and 2 of the Danish 'Botanisk Tidsskrift' for this year are largely occupied by H. Mortensen's Flora of North-East Zealand, the peninsula on which Copenhagen is situated, and chiefly to the north of that city. The district has been well examined by several generations of botanists, and is very rich in species. In this paper, the Fungi and Algæ are omitted, but 123 Lichens, 63 Hepaticæ, 226 Mosses, and 13 Characeæ are enumerated, whilst the Phanerogams and higher Cryptogams amount to the large number of 1167, for all of which except the commonest species localities are given. The paper is of special interest to English botanists, and is illustrated by an excellent map which clearly shows the range of the characteristic plants of the district. In part 3 of the same journal Professor Lange describes two new Saxifrages of the *S. cuneifolia* section (*S. multicaulis* and *S. Infundibulum*), *Heracleum eminens*, n. sp., and *Lycopersicum racemiforme*, n. sp., all from the Copenhagen garden. Coloured plates of each are given.

The second fascicle of C. J. Lindeberg's "Hieracia Scandinaviæ Exsiccata" is published, containing 50 species, 7 of which are described as new. It can be obtained from Professor J. Lange, of Copenhagen. Price 15 rdr. (17 shillings.)

The Parliament of the Cape of Good Hope has voted a grant of money towards the publication of the continuation of the "Flora Capensis." Professor Thiselton Dyer has undertaken the general editing of the volumes, and several English botanists have promised to contribute the descriptions of different Natural Orders.

A new edition is in preparation by Mr. John Sadler, assisted by various Scotch botanists, of Gardiner's "Flora of Forfarshire." The original

edition has long been out of print; the new one will contain a short memoir of the late William Gardiner, and a coloured map of the country. The price to subscribers is 7s. 6d.

Mr. John E. Robson is preparing a complete series of Botanical Labels for the herbarium, including a separate one for every species and variety of the London Catalogue, and Hooker's and Babington's text-books. Price to subscribers 3s. 6d.; address J. E. Robson, Hartlepool.

A new Quarterly, devoted to Natural Science has appeared at Montpellier, under the title "Revue des Sciences Naturelles." It is edited by MM. Dubrueil and E. Heckel.

Dr. E. Pfitzer has accepted the post of ordinary Professor of Botany in the University of Heidelberg.

Dr. Kerner, of Innsbrück, is appointed Professor of Systematic Botany in the University of Prague.

The vacancy at the Natal Botanical Gardens, caused by Mr. McKen's death, has been filled by Mr. William Keit, of Dublin.

M. Cogniaux is employed in incorporating into a single herbarium at the Botanic Garden of Brussels the collections of Belgian plants formed by Lejeune, Mdlle. Libert, Coemaes, Nyst, etc.

We are requested to state that Professor Caruel, of Pisa, is desirous of exchanging Tuscan plants for extra-European species.

From Dr. Balfour's statistics of his class for 1872, we find that it consisted of 283 students; 62 lectures were given, and 11 excursions made. The number of students who attended the excursions was 207, and the number at each varied from 30 to 127; surely far too many to allow of any satisfactory instruction.

We have to record the death, after a short illness, of Andreas S. Oersted, Professor of Botany in the University of Copenhagen, which occurred on 3rd September. He was born on 21st June, 1816, and his earlier studies were directed to zoology; in 1841 he obtained the gold medal of the university for a thesis on the Danish Annelides. During the years 1846-48 Oersted travelled in Costa Rica, and the botanical results of his expedition have appeared in numerous papers in the Transactions of the Copenhagen Natural History Society, and in a series of memoirs on different Natural Orders, in conjunction with Bentham, Berg, Grisebach, and Planchon. In 1863 was commenced "L'Amérique Centrale" which contains descriptions and figures of new Tropical American plants. Oersted's researches in Fungi were important, especially his demonstration that *Roestelia* is but a dimorphic condition of *Podisoma*, and his investigations into the organs of reproduction in *Agaricus*. He was appointed Professor in 1860.

Dr. Arthur Gris, aide-naturaliste at the Museum of Natural History in Paris, died on 18th August, at the age of 42. He was the author of numerous important papers in the French scientific serials on anatomico-physiological Botany, especially germination. In systematic Botany he worked specially at the Marantaceæ, and conjointly with Brongniart, has published numerous monographs in the Bulletin of the French Botanical Society on the plants of New Caledonia.

The death is also announced of Dr. Christener, of Berne, whose excellent herbarium has, we hear, been acquired by Mr. Shuttleworth; and of the Rev. G. Munford, author of a list of the plants of Western Norfolk (Ann. Nat. Hist., 1841.)

Original Articles.

ON "TYLOSES," THE CELLULAR FILLING UP OF VESSELS.

BY W. T. THISELTON DYER, B.A., B.Sc., F.L.S.

(PLATE CXXVI.)

Some of the most useful books ever published by the Ray Society are the Reports and Papers on Botany. The volume for 1849 contains Mohl's important memoir upon the Palm Stem. On p. 26 the following passage occurs:—"In the porous vessels of the Dicotyledons it is well known that vesicular cells often occur, which Kieser believed to be composed of the same membrane which forms the wall of the porous vessel, whence he assumed (*Phytotomie*, p. 237) that such vesicles could by no means occur in the Monocotyledons. I, however, found, though indeed but seldom, vesicular cells, similar to those of the Dicotyledons, in the large vessels of the Palms, for instance, in *Corypha cerifera*." And he adds in a note:—"I have not traced the development of these cells in the Palms. Doubtless they have the same character as in the Dicotyledons, in regard to which, from recent researches, I think that I am not wrong in assuming that they are produced by a protruding expansion (a kind of *hernia*) of the adjacent cell, which penetrates the pore, and either tears through or causes the absorption of the primary membrane of the vessel."

This description excited my interest at one time very much, the more especially as I am not aware that any English text-book makes the smallest allusion to so curious a point in vegetable minute anatomy. I was, therefore, very pleased to find an illustration of it in a preparation purchased from Professor Van Heurck, of Antwerp, and labelled "*Tyloses dans la Vigne*."

Shortly afterwards, when examining some microscopic sections of fossil wood of eocene age, preserved in the Botanical Department of the British Museum, I recognized the same cellular filling up of the ducts which I was already familiar with in the Vine.

I applied to Professor Van Heurck for some information as to any accessible account of "Tyloses." He kindly referred me to a paper published anonymously (in the '*Botanische Zeitung*' for 1845), but which he attributed to the Baroness Hermine von Reichenbach. In this paper the cells included in the vessels are termed "thyllen," and from this, I presume, "tyloses" is derived, though in what way I do not exactly understand.

These are, no doubt, the recent researches alluded to by Mohl in the passage quoted above. An account of them is given by Link, in the '*Report on Physiological Botany*,' in the same volume of the Ray Society's publications (pp. 237, 238). I quote some passages from it:—"These cells are not generally formed while the plant is young; in the first year's shoots of *Vitis vinifera* and *Sambucus nigra*, as also in the stems of *Cucurbita Pepo*, the vessels were empty in summer; towards the

end of October and at the beginning of November, they only contained a small number of cellules adhering to the walls of the vessels; but a month later he [the authoress] found them copiously furnished with both large and small cells. . . . As regards their being adherent, he makes the remarkable observation, that the small cells are always attached to the side of the vessel when it is surrounded by cells of woody tissue or the parenchyma of the medullary rays, but never to a wall which is bounded by an adjacent vessel."

In the 'Geological Magazine' for June, 1872, I described and figured the eocene fossil wood to which I have already referred, and I also gave figures of the analogous structure in the Vine. I have availed myself of the kind permission of Mr. Woodward to make use of the plate to illustrate these remarks.

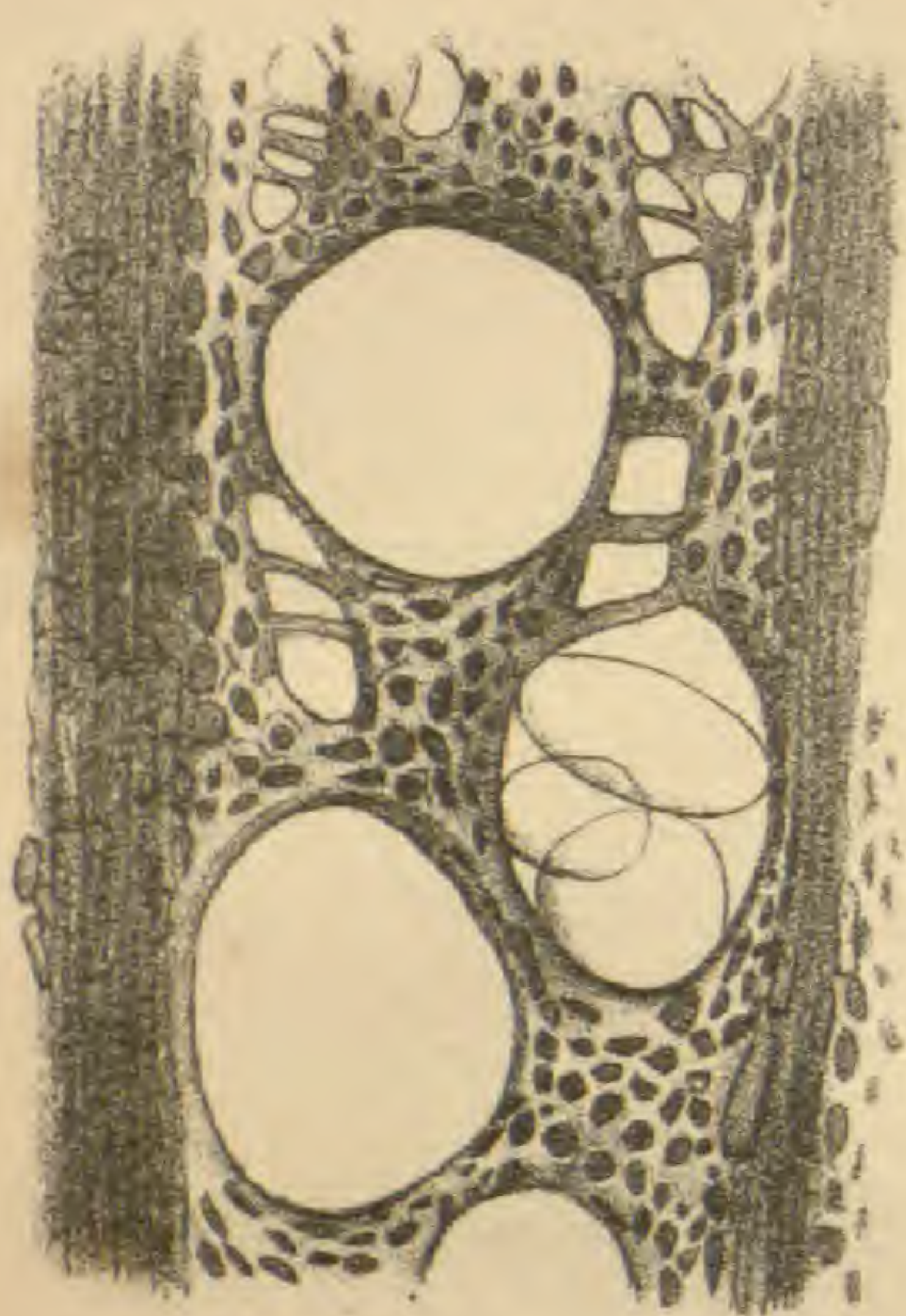
By a curious accident I chanced upon a paper by Dr. Bowerbank, in the first volume of the Transactions of the Microscopical Society of London (pp. 16-18), published in 1844, the year before the appearance of that of the Baroness von Reichenbach, in which the origin of the cellular contents of the ducts in the eocene fossil wood is discussed. The conclusion arrived at with respect to the included vesicles was that, "it appears probable that the whole of them may be attributed to a more than ordinary development of the globules of the circulation, analogous to those observed in *Vallisneria* and other plants."

Dr. Farre, in a subsequent paper in the same volume, thought that they might have originated by a process of "balling" similar to that by which the endochrome of *Nitella*, when it begins to decay, breaks up into globular masses with a brownish investment. An obvious objection to either of these views is that the contents of, at any rate, mature vessels are never comparable to the endochrome of the cells of *Algæ*.

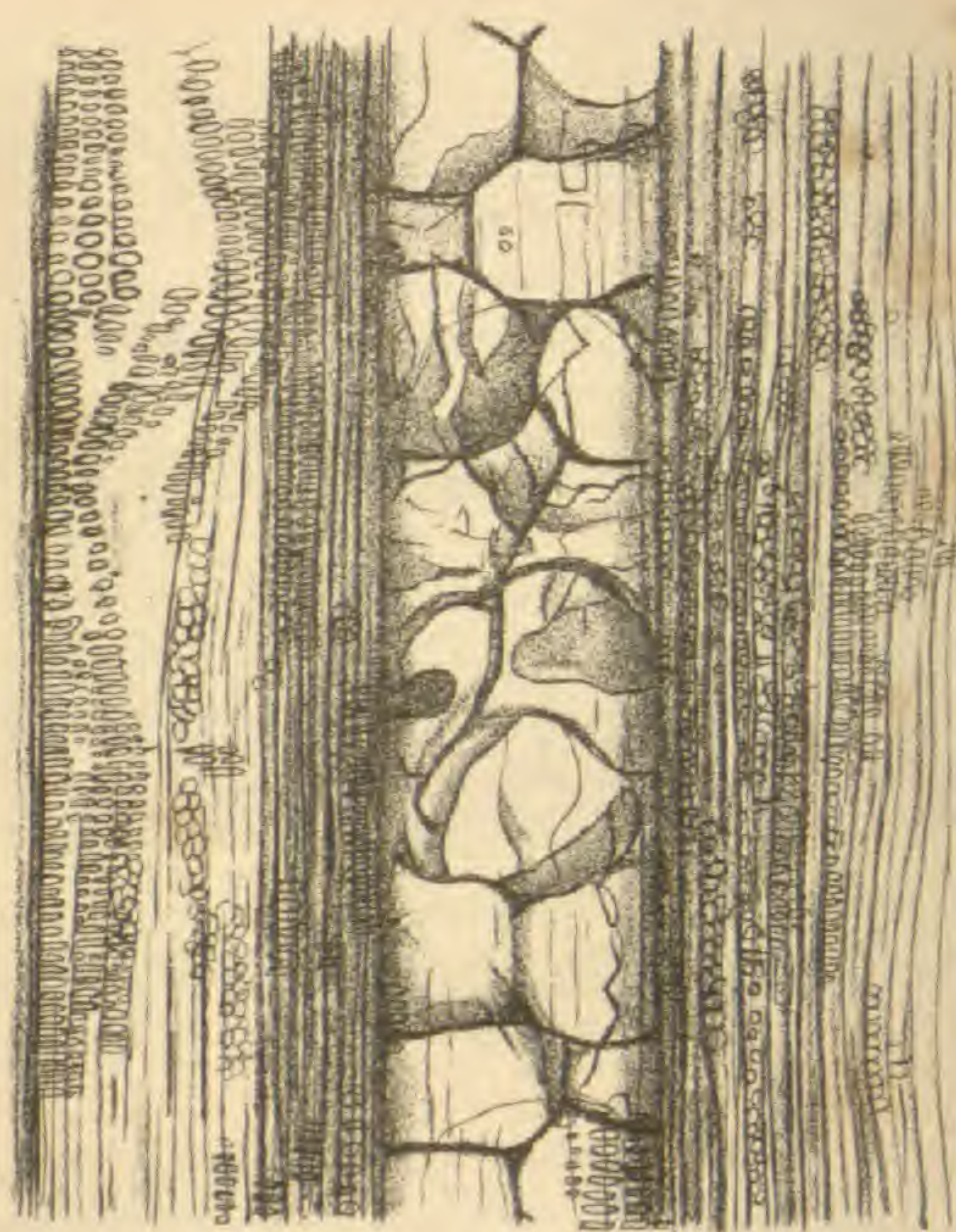
As late as 1865, Lestiboudois has maintained what is practically the same view as that of Drs. Bowerbank and Farre. In a paper in the 'Comptes Rendus' for that year, which is translated in the Annals and Magazine of Natural History, he states (p. 379) that "the wood of certain plants, such as *Ulmus campestris*, *Robinia pseudo-acacia*, and *Quercus Ilex* contains large vessels, the interior of which is occupied by a more or less consistent reticular tissue. This tissue evidently could not have been produced unless the vascular tubes had been filled with a liquid containing organic materials in solution."

For some information about two other papers on the nature of "Thyllen," I am indebted to my friend Mr. Archer, of Dublin; and as I am unable at the present time to examine these papers in detail, I shall take the liberty of using what he has told me about them. The first is by Böhm,* who appears to have held, according to the account of the next-mentioned writer, that the so-called Thyllen do not originate by bulging out of the cells surrounding the ducts, but by accumulation of plasma between the lamellæ of the walls of the vessels whose innermost layers grow out as the membranes of the thyllen cells. These views have been combated by Reess in the 'Botanische Zeitung' for 1868 (pp. 1-11). According to him, "Each young 'thylle' makes its appearance as a bulging of a wood-parenchymatous, or medullary-ray cell forced through a pore in the vessels." Reess's views and figures are quite consonant

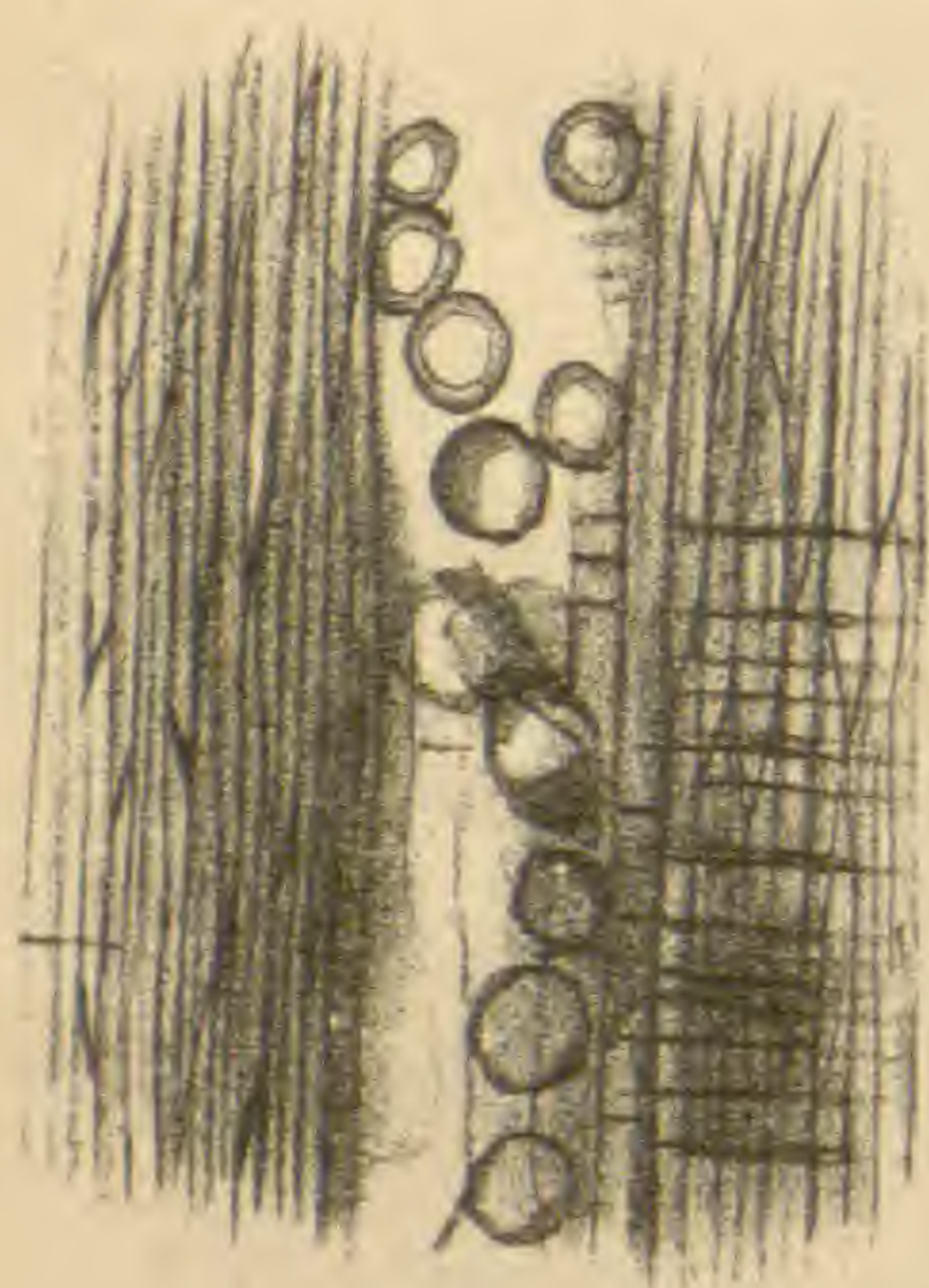
* Sitzungsber., K. K. Akad. d. Wissensch. Vienna, 1867.



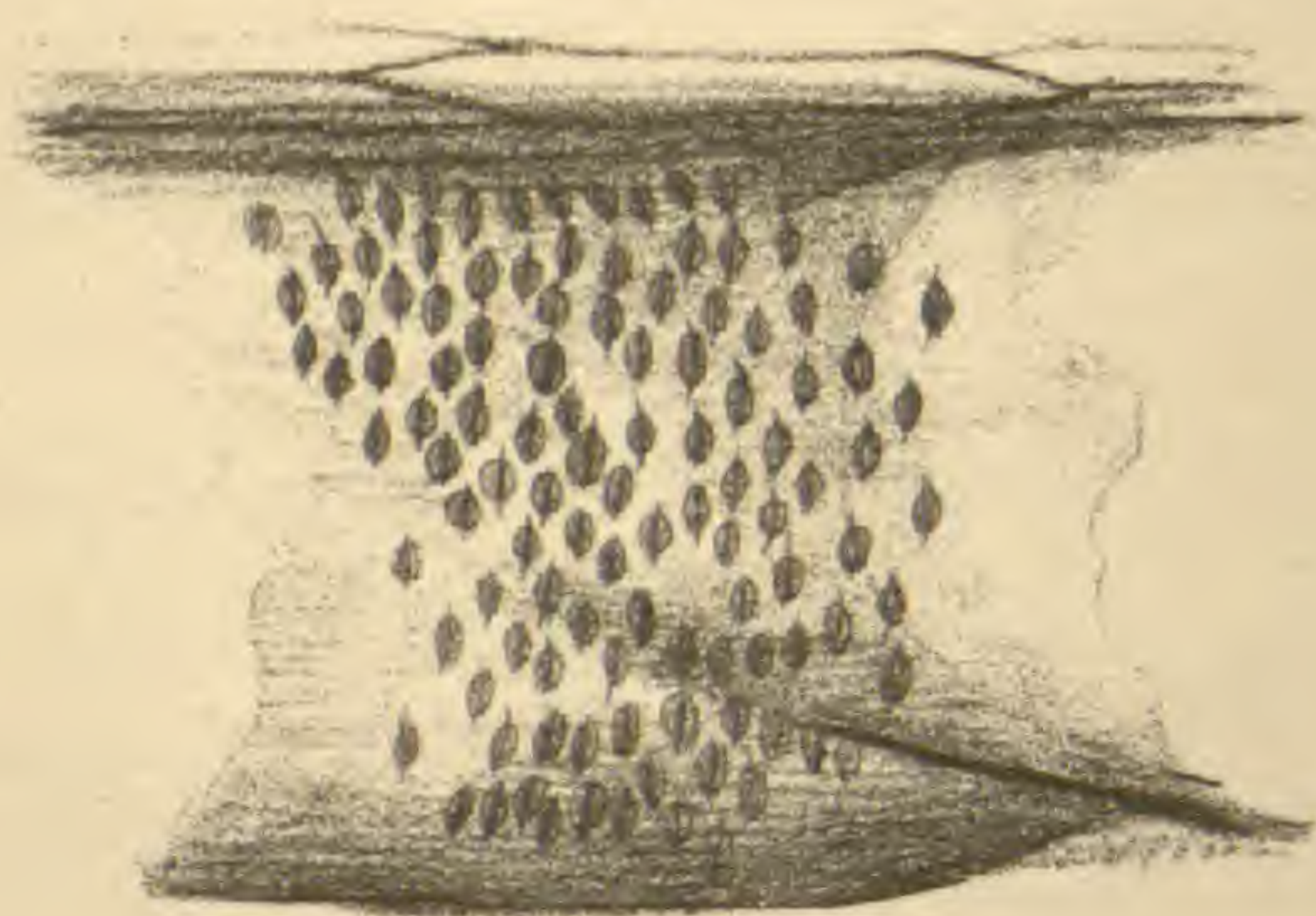
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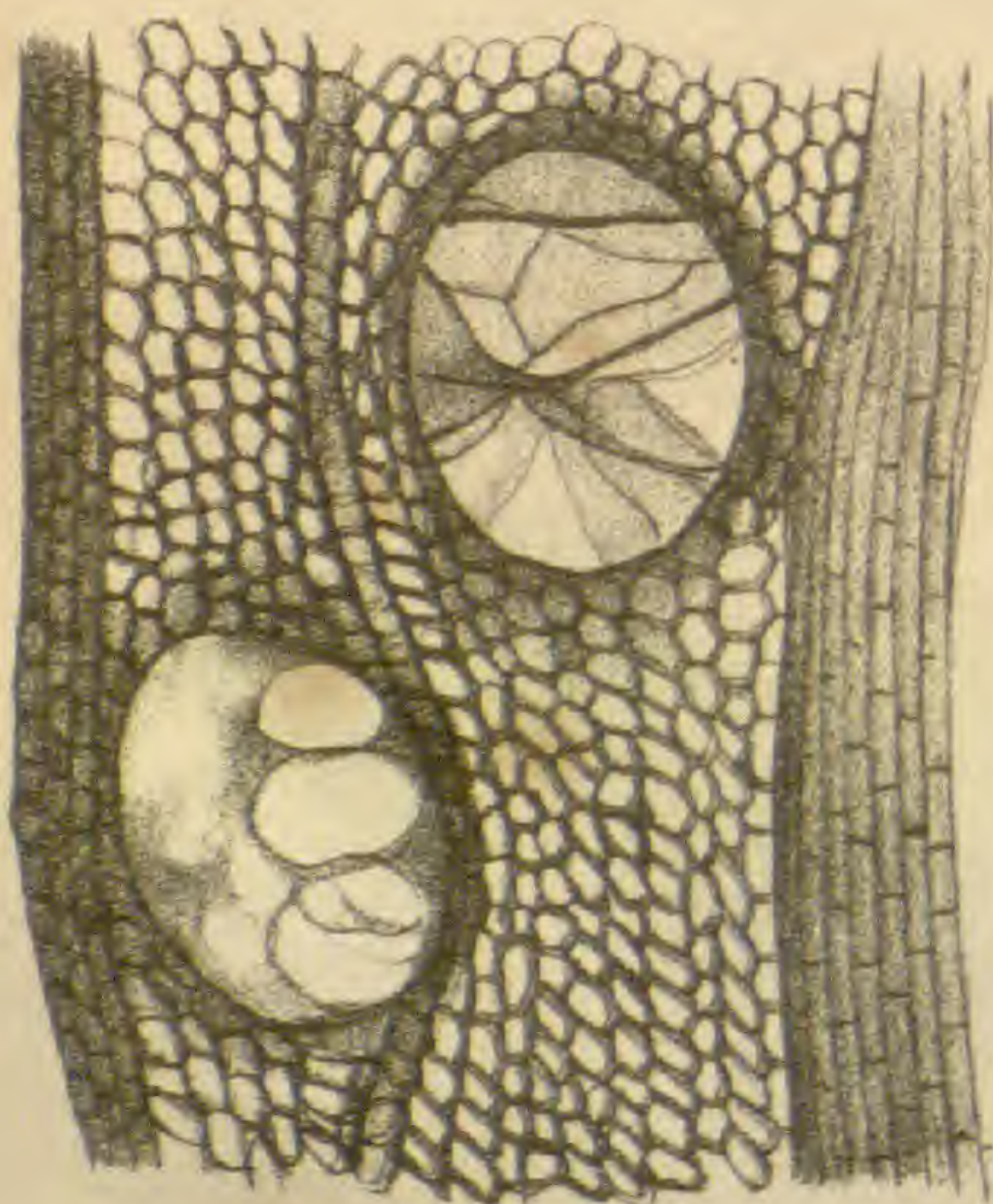
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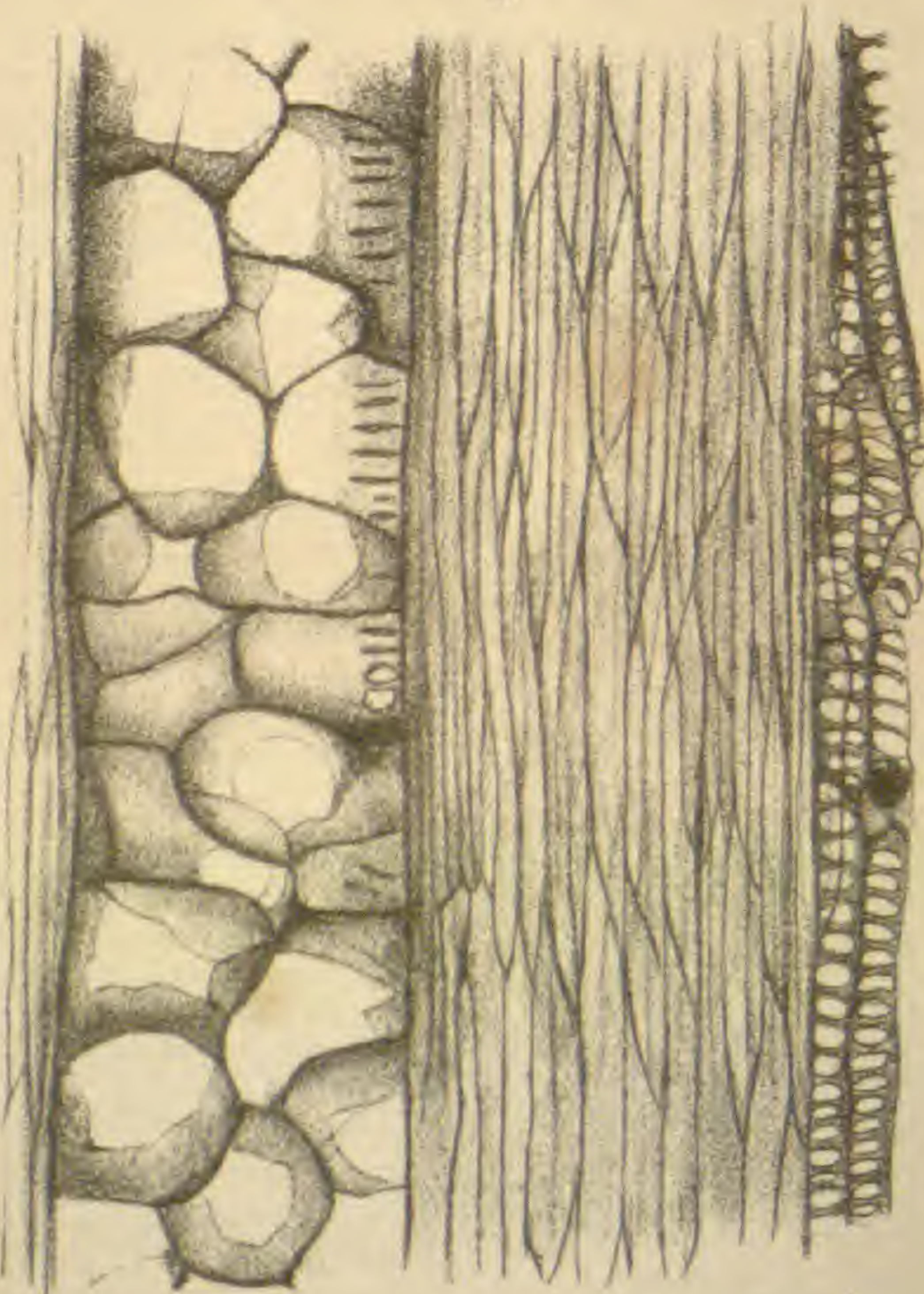
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4.



5.



6.

with what has been stated by Mohl, and described and figured by the Baroness von Reichenbach. According to Reess, the communication between the "thylle" and the mother cell persists for some time, the "thylle" growing considerably, becoming filled from the contents of the mother cell, and not rarely forming a secondary nucleus. The "thyllen" are finally shut off from the mother cells, and Reess supposes their object to be the storing-up of starch, which appears to me a somewhat doubtful hypothesis. Besides the plants already enumerated, "thyllen" have been observed in *Quercus*, *Platanus*, and *Robinia*. The earliest representation of them is given by Malpighi (1686), in his "Anatome Plantarum" (vol. 1, tab. 6), from the oak. His remark about them is "fistulæ frequentæ pulmonares quasi vesiculas trachearum substantia excitatas continent" (p. 9).

Reess enumerates a number of writers who have discussed Tyloses; to these may be added Schacht, *Das Mikroskop.*, p. 129; and Sachs, who (*Lehrb. d. Bot.*, 1870, p. 27), calls them "Tullen."

In the third volume of the Transactions of the Microscopical Society, Mr. Sorby figures a non-gymnospermous exogenous wood from the lias, near Bristol, which, as my friend Mr. Carruthers pointed out to me, shows evident traces of Tyloses. I may take the opportunity of saying, in passing, that this paper of Mr. Sorby's appears to have escaped the attention which it deserves at the hands of students of fossil botany. Presuming the supposed geological horizon to be beyond dispute, this is unquestionably the oldest known fragment of an angiospermous Phanerogam.

I have prefixed the term Tyloses to this article. Professor Van Heurck defines them to be "cells formed by wood parenchyma or by medullary rays which penetrate into the vessels through the punctations ('Le Microscope,' 2nd. ed. 1869, p. 157). In the 'Geological Magazine,' misled by a false analogy to words like "cellulose," I used the term erroneously in a collective sense, in the singular form, and it appears so consequently upon the plate.

EXPLANATION OF PLATE CXXVI.

(Kindly lent by Mr. H. Woodward from the 'Geological Magazine.')

FIG. 1. Transverse and Fig. 2, perpendicular section of a wedge of the fossil eocene wood from the Isle of Thanet, showing ducts containing tyloses, and surrounded by porous wood-parenchyma. Fig. 3. Another specimen of the same wood with smaller vesicles. Fig. 4. Portion of the wall of a duct from the eocene wood to show arrangement and character of pores. Fig. 5. Transverse and Fig. 6, perpendicular section of the wood of the vine showing ducts filled with tyloses; porous wood-parenchyma is shown on the right of Fig. 6.

ON DASYLIRION AND BEAUCARNEA.

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

(Continued from page 299.)

II. BEAUCARNEA, *Lemaire, Ill. Hort.* tome viii. *Misc.* p. 59 *cum icone*. *Pincenictitia vel Pincenitia, Hortorum.* *Roulinia, A. Brong. loc. cit. ex parte.* *Dasytirion, Zucc. et. Kunth, ex parte.* *Yuccæ sp., Karwinski, etc.* *Cordylinis sp., H.B.K. et Benth.*—Flores polygamo-dioici: *Masc.* *Perian-*

thium corollinum, campanulatum, 6-partitum, albidum, segmentis oblongo-ligulatis imbricatis flore expanso sæpissime falcato-reflexis. Stamina 6, inclusa vel exserta, filamentis filiformibus rectis glabris, antheris oblongis introrsis versatilibus bilocularibus. Ovarium rudimentare. *Fœm.* Perianthium maris. Stamina abortiva, inclusa. Ovarium triquetrum, sessile triloculare, ovulis in loculo 2 prope basin axis collateraliter insertis; stylus brevissimus; stigma peltatum, trilobatum. Capsula membranacea, triquetra, loculicide trivalvis, angulis late alatis, seminibus in loculo solitariis oblongis vel globosis duris turgidis ascendentibus. Testa membranacea, obscure brunnea vel straminea. Embryo centralis, in axi albuminis cornei ex apice ad basin seminis egrediens. Frutices caudice lignoso elongato basi tuberoso vel hemisphærico, foliis angustis duris serrulatis haud spinoso-marginatis, paniculis amplis thyrsoides, ramulis densifloris vel laxifloris, bracteolis membranaceis persistentibus, pedicellis articulatis, floribus parvis inconspicuis.

Clavis Specierum.

Leaves flat, $\frac{1}{2}$ –1 inch broad, not bordered, minutely serrulate, much recurved.

Leaves green, an inch broad.

Panicle lanceolate. Veins prominent 1. *longifolia*.

Panicle lanceolate. Veins obscure 2. *recurvata*.

Leaves glaucous, half an inch broad 3. *stricta*.

Leaves flat, an inch broad, not serrulate, bordered with a thin red line and dehiscent thread 4. *Bigelovii*.

Leaves narrow $\frac{1}{4}$ – $\frac{1}{2}$ inch broad, usually channelled down the face, serrulate, not bordered.

Caudex a low hemispherical mass, bearing numerous rosettes 5. *Hookeri*.

Caudex an elongated trunk, bearing a solitary rosette, rarely forked

Leaves splitting into a tuft of fibres at the apex 6. *erumpens*.

Leaves entire at the apex.

Leaves stiff, channelled down the face. Scape very short. Panicle dense 7. *Hartwegiana*.

Leaves flat, recurved. Scape as long as the lax panicle 8. *Lindheimeriana*.

1. *B. LONGIFOLIA*, *Baker*. *Yucca longifolia*, *Karwinski in Schult. Syst. Veg.* vii. 1715. *Dasyilirion longifolium*, *Zuccarini in Otto and Dietr. Allgem. Gartenzeit.* 1838, no. 33, p. 258; *Kunth, Enum.* v. 41; *Morren Belg. Hort.* xv. p. 321, t. 20–1. *Roulinia Karwinskiana*, *A. Brong. Ann. Sc. Nat.* ser. 2, vol. xiv. p. 319; caudice elongato basi tuberoso, foliis lineari-ensiformibus planis 4–5 pedes longis, supra basin 9–15 lin. latis recurvatis viridibus immarginatis venis exsculptis apice integris, floribus in paniculam lanceolato-thyrsoideam dispositis, ramulis superne densifloris, pedicellis elongatis, staminibus exsertis.

A native of Mexico, first brought into notice by Karwinski forty years ago, and now spread widely in gardens. Several specimens may be seen in the Cactus-house at Kew, and in the collection of Mr. Wilson Saunders. I am not aware that it has ever been flowered in this country, but the capsule is described by Zuccarini, and there is a full description by Prof. Morren, with a figure of the male panicle, in the 'Belgique Horticole,' from a specimen culti-

vated at Ghent. Trunk reaching a height of 4-5 feet, and a thickness of half a foot upwards, dilated suddenly to a foot at the base. Leaves in a dense rosette of 100-200 or more at the summit of the caudex, 4-5 feet long, 9-15 lines broad above the dilated base, similar to those of *Yucca recurvifolia* in texture, so pliable that the outer ones curve over from the base and the innermost from halfway up, so that the trunk is quite hidden from view, flat to the very point, narrowed from the base to the tip very gradually, not at all glaucous, furnished with 30-40 deep distinct veins, the edge minutely but distinctly serrulate, not otherwise bordered. Flowers in a short-stalked thyrsoid panicle 4-5 feet long by a foot broad. Lower branches copiously paniced, erecto-patent, nearly a foot long, subtended by long linear leaf-like bracts. Branchlets with the flowers crowded in the upper part, naked near the base; pedicels reaching $\frac{1}{4}$ inch long, which is twice the perianth. Bracteoles lanceolate, nearly as long as the pedicels.

2. *B. RECURVATA*, Lemaire, *Ill. Hort.* viii. *Misc.* p. 61, *cum icone*. Gard. Chron. 1870, p. 1445, *cum icone*; *Flore des Serres*, xviii. *Misc.* p. 26, *cum icone*. *Pincinctitia recurvata*, *tuberculata*, *intermedia*, *rubra*, *Hortorum*; caudice elongato basi tuberoso, foliis lineari-ensiformibus planis 4-5 pedes longis supra basin 9-12 lin. latis recurvatis viridibus immarginatis venis haud exsculptis apice integris, floribus in paniculam deltoideo-thyrsoideam dispositis, ramulis sublaxifloris, pedicellis brevibus, staminibus exsertis.

A native of Mexico, gathered first by Galeotti, and introduced into cultivation in 1845 by Van der Maelen, of Brussels, and soon spread widely by Messrs. Verschaffelt and others. The original specimens sent to Europe were labelled "*Freycinetia*," and it was through the miscopying of this by a gardener that the name "*Pincinctetia*," which will be found spread widely in conservatories and trade catalogues, originated. Several forms may at the present time be studied in a living state in the Cactus-house at Kew, and in the collection of Mr. Wilson Saunders. This is the original plant on which the genus was constituted by Lemaire, but he was acquainted only with the male panicle. Whether I am justified in uniting together the four garden synonyms just given may be a subject of doubt, but after studying all four upon living barren specimens, I cannot find anything tangible to separate them; and if there be any character in the inflorescence, it still remains to be stated.

General habit just like that of the last species. Trunk reaching a height of six feet, 2-3 inches thick upwards, dilated to a foot at the tuberos base. Leaves 100 or more in a very dense rosette, recurved from the very base, 3-5 feet long, $\frac{3}{4}$ -1 inch broad above the deltoid base, narrowed gradually to a long subulate entire point, the colour green, not at all glaucous, the nervation not so distinct as in the last, and the marginal teeth visible only under a lense. Scape very short. Panicle 3-4 feet long by half as broad; the lower branches copiously paniced. Flowers spread more laxly on the branches than in *longifolia*. Pedicels at most as long as the perianth, $\frac{1}{8}$ inch. Bracteoles lanceolate, sometimes exceeding the pedicels. Var. *intermedia*, differs from the type by its shorter, rather narrower and less drooping leaves; var. *rubra* is a form with the leaves suffused with red at and near the dilated deltoid base.

3. *B. STRICTA*, Lemaire, *Ill. Hort.* viii., *Misc.* p. 61. *Pincinctitia glauca*, *Hort.*; caudice elongato, basi tuberoso, foliis anguste linearibus planis glaucis recurvatis immarginatis 3 pedes longis, supra basin 5-6 lin. latis, apice integris, venis exsculptis, floribus ignotis.

A native of Mexico, introduced at the same time as the preceding and now widely spread in cultivation. It is grown at the present time both at Kew and Hillfield. So far as I am aware, it has never flowered. The general habit is just that of the two preceding. From the narrow-leaved forms of the last it may be known by its still narrower leaves, with deeper veins, decidedly glaucous colour, and more distinct marginal serration. In the finest specimen I have seen the trunk was 3 feet high, a foot thick at the base, 3 inches thick at the middle. The ribs are about twenty in number and very conspicuous. *Stricta* is a misleading name, as all but the central leaves hang over from near the base.

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4. B. BIGELOVII, *Baker*. *Dasytirion Bigelovii*, *Torrey Bot. Whipple*, p. 95; *Bot. Mex. Bound.* p. 216; caudice elongato, foliis lineari-ensiformibus planis 3-5 pedes longis, supra basin 10-12 lin. latis, glaucoviridibus anguste rubro-marginatis parce filiferis venis exsculptis floribus in paniculam deltoideo-thyrsoideam dispositis, ramulis subdensifloris, pedicellis, brevissimis, floribus masculis ignotis.

Gathered by Dr. Bigelow in 1853-4, in the exploration under Lieutenant Whipple for the survey of the route for the Pacific railway, on mountain sides along the Williams river, California, and by Schott in Sonora. A very distinct species, not yet introduced into cultivation, known to me only from the published descriptions and a single specimen in the Kew herbarium in fruit.

Trunk 6 feet high, 2-3 feet in diameter. Leaves 3-5 feet long, reaching an inch broad above the deltoid base, rigidly coriaceous in texture, thicker than in the three preceding, glaucous-green, narrowed gradually upwards, the point not seen, the veins 40-50 in the lower part, very close and deep, the edge bordered by a fine distinct red line, with a thin grey thread beyond it, which breaks away slightly like the border of *Yucca filamentosa*, entirely without serrulation. Scape 6-8 feet high. Panicle 1-1½ feet long, a foot broad at the base, the lower branches copiously paniced, deltoid, their branchlets numerous, rigidly erecto-patent, moderately closely flowered from base to apex. Pedicels very short, solitary or rarely geminate, exceeding the deltoid membranous bracteoles, articulated at the apex. Perianth and stamens not seen. Fruit roundish, $\frac{3}{8}$ inch long, membranous, deeply cordate at base.

5. B. ERUMPENS, *Baker*. *Dasytirion erumpens*, *Torrey, Bot. Mex. Bound.* p. 216; caudice ignoto, foliis anguste linearibus 2½-3-pedalibus, supra basin 6-7 lin. latis, facie canaliculatis, venis exsculptis, apice in fibris tenacibus dissolutis, floribus thyrsoideo-paniculatis ramulis laxifloris, pedicellis brevissimis, staminibus inclusis.

A native of hills and gravelly places in New Mexico and Western Texas, gathered by Mr. C. Wright in 1851-2, and distributed as No. 1918; not known in cultivation.

Caudex not known. Leaves thick, rigidly coriaceous in texture, 2½-3 feet long, $\frac{1}{2}$ - $\frac{5}{8}$ inch broad above the deltoid base, which reaches an inch, narrowed gradually to the point, where it is split into a tuft of fibres like those of *Dasytirion acrotrichum* in our solitary herbarium specimen, channelled all down the face, the veins close and deeply impressed, rounded on the back with the central nerve more prominent than the rest, the edge scabrous with minute teeth. Lower branches of the panicle deltoid, half a foot long, with numerous rigidly erecto-patent branchlets; the lowest

sometimes again compound. Flowers placed all down the branchlets with spaces between them. Pedicels at most a line long. Bracteoles a line long, roundish, white, serrulate, on the outer border. Perianth $\frac{1}{8}$ inch deep. Stamens not exerted. "Angles of the capsule acute, but not winged."

6. *B. HOOKERI*, *Baker*. *Dasyllirion Hookeri*, *Lemaire*, *MSS. teste Morren*, *Belg. Hort.* xv. p. 324. *D. Hartwegianum*, *Hook. Bot. Mag.* t. 5099, *non Zucc.*; caudice depresso fruticoso hemisphærico rosulis numerosis instructo, foliis anguste linearibus recurvatis 2-3-pedalibus, supra basin circiter 3 lin. latis, glaucis venis exsculptis apice integris, floribus in paniculam deltoideam dispositis, ramulis per totam longitudinem densifloris, pedicellis brevissimis, staminibus exsertis.

A native of Mexico, in the neighbourhood of Real de Monte, sent to Kew in 1846 by Mr. Repper. It flowered in 1859, and was figured in the 'Botanical Magazine,' and there are two fine plants at the present time in the Cactus-house. I am informed by Prof. Thiselton Dyer that it was flowered this year by Dr. Kellock.

Extremely different to all the preceding in general habit, as the caudex forms a hard hemispherical woody mass, which in the Kew specimens is about two feet broad by a foot high, divided out into irregular rhomboidal raised portions with linear depressions between them, bearing all over hard round knots an inch thick, from which the rosettes of leaves spring. Leaves about fifty to each rosette, bending over from near the base, the outer ones 3-3 $\frac{1}{2}$ feet long, a quarter of an inch broad near the base, narrowed gradually to the entire point, rounded on the back, slightly channelled down the face, glaucous, the veins about a dozen, distinctly raised, the serrulations of the border distinctly visible to the naked eye. Panicle on a short scape, 12-18 inches long, subdeltoid, the upper branches simple, the lower slightly branched; branchlets cylindrical, densely flowered down to the base, reaching three inches long by half an inch thick. Pedicels very short, articulated at the apex. Bracteoles minute, ovate. Perianth $\frac{1}{8}$ inch deep, tinged with purple. Stamens exerted.

7. *B. HARTWEGIANA*, *Baker*. *Dasyllirion Hartwegianum*, *Zucc. in Act. Acad. Monac.* iv. sect. 2, 1845; *Kunth, Enum.* p. 41, *non Hook. Bot. Mag.* t. 5099. *D. junceum*, *Zucc. et Kunth, loc. cit.* *Cordyline longifolia*, *Benth. Pl. Hartweg.*, p. 53. *Roulinia longifolia*, *A. Brong. loc. cit.* *Beaucarnea gracilis*, *Lemaire, Ill. Hort.* viii. *Misc.* p. 61; caudice elongato basi tuberoso, foliis viridibus strictis anguste linearibus, 2-3 pedes longis, supra basin 2-3 lin. latis, facie canaliculatis apice integris, scapo brevissimo, floribus in paniculam densam oblongam dispositis, ramulis sublaxifloris, pedicellis perianthio subæquilongis, staminibus inclusis.

Dried specimens seen from Mexico, plains near Zacatecas, Hartweg, 406; and Texas, Lindheimer, 550, 712, and C. Wright, 692. The garden plants described from barren specimens by Zuccarini and Lemaire may possibly prove, when fully known, to be distinct from that of Bentham, but so far as present information goes, there is really absolutely nothing to justify their separation. Does this exist anywhere in English gardens at the present time? I have not been able to meet with it.

Trunk said to be similar to those of *recurvata* and *glauca*, but less elevated. Leaves very different, "absolutely spreading, very rigid," 2-3 feet long, 2-3 lines broad above the base, narrowed gradually to a long entire subulate point, channelled down the face, the back hemispherical, with often a distinct keel, the veins of the lower part not more than 6-8,

distinctly elevated, the edge scabrous, with minute denticulation. Scape none, or very short. Flowers in a close, oblong panicle, 9–12 inches long, by about half as broad, with very numerous ascending branches, subtended by reduced leaves, sometimes longer than themselves, dilated into a flat scarious lanceolate base; lower branchlets copiously paniced; the flowers moderately close. Pedicels sometimes as long as the perianth, $\frac{1}{8}$ inch. Bracteoles hyaline lanceolate, as long as the pedicels. Stamens not exerted. Capsule 2 lines deep, nearly $\frac{1}{4}$ inch broad, emarginate at the base and apex, very membranous, breaking away and leaving the usually solitary globose pea-like seed exposed.

8. *B. LINDHEIMERIANA*, Baker. *Dasyilirion Lindheimerianum*, Scheele, *Linnaea*, xxv. p. 262; Torrey, *Bot. Mex. Bound.* p. 216. *D. tenuifolium*, Torrey, *Bot. Mex. Bound.* p. 215; caudice elongato, foliis anguste-linearibus 2–3 pedes longis, 3–4 lin. latis planis venis exsculptis apice integris, scapo elongato, floribus in paniculam laxam oblongam dispositis, ramulus laxifloris, pedicellis perianthio subæquilongis, staminibus inclusis.

A native of Texas, gathered by Lindheimer, 213, 297, 551! 552! and C. Wright, 693; in New Mexico by Bigelow, and in Sonora by Schott. Not now in cultivation. Trunk reaching a height of 4–5 feet. Leaves like those of *B. Hartwegiana* in shape, size, and veining, 2–3 feet long, 3–4 lines broad above the dilated base, the blade not so thick and rigid in texture and nearly flat on both sides, narrowed to an entire point, the edge distinctly serrulate, the lower part with 10–12 distinct veins. Scape 1–2 feet long, bracteated with 3–4 ascending reduced leaves. Panicle $1\frac{1}{2}$ feet long by half as broad, the branches much fewer and more distant than in the last, spreading or ascending, even the lowest nearly or quite simple. Flowers laxly placed on the branches, their pedicels about as long as the perianth, which is not more than a line deep. Bracteoles white, membranous, broad acuminate, lacerated, usually shorter than the pedicels. Capsule 4 lines each way, emarginate at both ends, thin and membranous, the angles conspicuously winged. Fruit pedicels cernuous, $\frac{1}{4}$ inch long.

Imperfectly known species.

9. *B. PARVIFLORA*, Baker. *Cordyline parviflora*, H.B.K. *Nov. Gen.* i. p. 268, t. 674. *Dracæna parviflora*, Willd. *Herb.* no. 6701; Schult. *Syst.* vii. p. 348. *Dasyilirion Humboldtii*, Kunth, *Enum.* v. p. 42. *Roulinia Humboldtiana*, A. Brong. *loc. cit.* A native of the high plain of Mexico, gathered by Humboldt, known only from the description and figure in the 'Nova Genera.'

Trunk once or twice the height of a man. Leaves lanceolate, ensiform (those of the rosette not known?). Flowers in a dense oblong panicle 1–2 feet long, the very compound branches bracteated by reduced leaves half a foot long. Flowers in spaced clusters, subtended by linear acuminate bracteoles $\frac{1}{4}$ inch long. Perianth the size of the flower of *Sambucus nigra*.

The views expressed upon the systematic position of these plants have been very various. Zuccarini at first placed *Dasyilirion* in *Juncaceæ* with *Xerotes* and *Kingia*, and afterwards removed it to *Asparagaceæ*, in which he has been followed by Brongniart, Kunth, and many others. Torrey in *Bot. Whipple* places it in *Amaryllidaceæ*; Meisner and Lindley put it

in Bromeliaceæ, to which one of Zuccarini's original species (*Hechtia glomerata*, Klotzsch) evidently belongs. In constituting *Beaucarnea*, Lemaire proposes to regard the two genera as a subtribe of Asparagaceæ, or "a small family near Asparagaceæ and Melanthiaceæ, to be called Dasyliaceæ." For my own part, I have no hesitation in placing *Beaucarnea* in Capsular Liliaceæ, and in saying that there is nothing in either flower or fruit to prevent it taking rank with the typical polyphyllous capsular genera, such as *Scilla*, *Ornithogalum*, *Allium* and *Anthericum*. It is a good and well-marked genus, but that is all. Without going beyond the bounds of Liliaceæ, all its characters taken separately can be nearly matched in other genera. The perianth is just that of *Nolina* or *Bulbinella*; the polygamous flowers recall *Asparagus* and *Chrysobactron*; the arborescent habit *Yucca* and *Aloe*; the large inflated membranous capsule that of *Massonia*, which, however, wants the three wings; whilst the articulated pedicels point to an affinity with *Anthericeæ*. If we take this view, we can scarcely do otherwise than look upon *Dasylium* as Liliaceous, abnormal by its unilocular ovary; and it is a matter of much interest to note that we have two genera separated by a character which, taking the whole set of allied plants into consideration, is of great importance, and yet in other respects connected so closely.

NOTES ON SOME SCANDINAVIAN PLANTS.

BY HENRY TRIMEN, M.B., F.L.S.

The various forms allied to those of our own country, which occur in neighbouring lands are always worthy of attention. Though, in special cases, opinions will always vary as to the value which should be attached to any particular difference, these differences exist, and it is very interesting to the English botanist to observe the place of some familiar British plant occupied precisely by a closely allied, but clearly distinguishable form. Usually such plants bear different specific names from their allies here, and uncertain records of the occurrence in England of many of their number make them specially interesting. For many reasons it is worth urging strongly on critical students of our native flora, when they find themselves among the novel vegetation of other countries, to devote themselves to examining British species and their congeners in preference to collecting new species which have no near allies in this country.

The following notes refer to a few species, of interest from various causes to English botanists, observed, in company with Mr. F. J. Hanbury, in Scandinavia during the past August.

Nymphaea alba, L., var. γ . *rosea*, Hartman (Scand. Flora, ed. 10, 1870, p. 86). Professor F. Areschoug showed me this very ornamental plant in flower in a pond in the new botanical garden at Lund. It has been found wild only in a single locality in central Sweden, and differs from the well-known white water-lily only in its beautiful rose-coloured flowers.

Pyrus (Sorbus) hybrida, L. fil., of Hartman's Flora; *S. fennica*, Fries.

From trees on an island in the Christiania Fjord, evidently wild. This seems to be precisely the plant figured in E. B. 2331,* and agrees with the original specimens in Sowerby's herbarium. Dr. Boswell Syme thinks this figure represents a cultivated species (Eng. Bot. ed. 3, vol. iii. p. 261); the specimens, however, were collected in Arran by Mackay, in 1797. I cannot distinguish the Christiania specimens from the tree commonly cultivated in the neighbourhood of London. The lowest pinnæ of the leaf are frequently quite separate from the rest. The fruit was dry and shrivelled, and I could not, therefore, test Fries's character of acidity, by which he distinguishes his *S. fennica* from *S. scandica*, var. *pinnatifida*. (See Journ. Bot. vol. VIII. p. 260.)

Epilobium collinum, Gmel. This appeared to be common in the neighbourhood of Christiania, growing in wet places among the *débris* of the rocks. It is referred by Koch to *E. montanum*, as var. γ . Crépin, from his experience in cultivating Luxemburg examples, believes it a distinct species (see his 'Notes' fasc. II. p. 44). It is readily to be distinguished from *E. montanum* by the smaller size of all its parts, especially its leaves, which are very distinctly stalked, and its peculiar much-branched habit, which suggests *E. tetragonum*. Dr. Boswell Syme, in 'English Botany,' says he has not seen British examples. Small forms of ordinary *E. montanum* are often called *E. collinum*; the real plant, however, may be expected to occur in the mountainous districts of the north.

Artemisia vulgaris, L., var. Close to the town of Åbo, in Finland, I gathered a form of this common species remarkable for its large distant heads arranged in long wand-like spikes. It exactly agrees with a garden plant in the Banksian Herbarium, with the MS. name of *A. grandiflora*, originally from Siberia. The interest to me of this form lay in its being a somewhat connecting link between ordinary *A. vulgaris* and a very striking plant which I gathered, in 1869, on the banks of the Rhine at Arnhem, Holland. In this, of which I am unable to find any description, the heads are nearly $\frac{1}{4}$ inch long and borne upon stalks at least as long as themselves; they are solitary and drooping, arranged in long lax unilateral racemes, collectively forming a very elongated leafy panicle. The leaves subtending the branches of the panicle are broadly lanceolate, and the flowers purple. The var. *macrocephala* of Schur's Enum. Plant. Transylv. p. 323, may perhaps be this plant, which, however, further study will not improbably show to be a distinct species.

Bidens radiata, Thuill. This is a plant to be searched for in England. Though recognized in the neighbourhood of Paris so long ago as 1799, and described by Thuillier in the second edition of his Flora (p. 422), it was generally passed over even by French botanists till observed by M. Michalet in the Jura in 1854, and published by him under the name *B. fastigiata*. Prof. Lange pointed it out to me in the turf-pits at Klampenborg, near Copenhagen, in which neighbourhood it was first detected by the late Prof. Oersted, and described under the name of *B. platycephala* in 1859. In 1860, Schweinfurth collected it at Nishni-Novgorod, in Russia, and published a very complete history of the plant in the Transactions of the Brandenburg Botanical Society (part ii. p. 142), illustrated with two

* This number should not have been quoted on Dr. Syme's new plate cccclxxxv. which is different, and must have been drawn expressly for his new edition.

excellent plates. Specimens collected near S. Petersburg are in Meinhäusen's Herb. Fl. Ingricæ, n. 308 B. It has also been recorded from Sweden (Nyman, Sylloge, Supp. p. 1.), and is given in Hartman's Flora as *B. frondosa*, Retz. (non Linn). Reference must also be made to an elaborate paper on the same plant by Ascherson in the 'Botanische Zeitung' for 1870 (pp. 97, 113), where are to be found several German localities and references to other writers.

Where I gathered this interesting species it was growing in company with *B. tripartita* and *B. cernua*, but intermingled with the former, from which, notwithstanding a general similarity, it could be readily recognized even at some distance by its flat heads. The name *radiata* refers to the outer green foliaceous leaves of the involucre, which are numerous and much longer than the inner true involucreal scales, projecting beyond the circumference of the head in a star-like manner.* The habit of the plant is different from that of *B. tripartita*, the branches being stiff and upright, and the heads collectively rather closely corymbose or fastigate in arrangement; the segments of the tripartite leaves are narrower than in the above species. The most important characters are, however, found in the inflorescence; the scales of the receptacle are narrowly linear, the flowers are more numerous but not more than half the size of those of *B. tripartita*, and the achenia which are also but half or two-thirds the size of those in the latter plant, are much more attenuated at the base, and have two (very rarely three) slender bristles. There is no doubt that the characters taken together are sufficient to constitute specific difference. The plant is well figured in Schweinfurth's paper above referred to; and though the centre of its distribution is doubtless far east (probably in Russia), it has been found over so extensive an area where searched for, that it is quite likely to be growing hitherto undetected in Britain.

Carduus oleraceus, L. This common European species is said to have been gathered wild between Market Deeping and Croyland, Lincolnshire, about 1823 (see 'Phytologist,' vol. ii. p. 115). It is exceedingly abundant in wet meadows in Denmark, and extends into southern Sweden. As dried specimens, alleged to be from the Lincolnshire locality, exist, and the district has been little examined by botanists—though from its position very likely to yield "Germanic" species—it may be worth while to call attention to the plant, which is readily distinguished from all other species by its yellowish or greenish flowers, and heads surrounded with large bracts. It is not likely to be introduced either accidentally or intentionally. A hybrid between *C. acaulis* and this species is not seldom produced (= *C. decoloratum*, Koch); I gathered it near Copenhagen.

Arctium tomentosum, Schk. I have certainly never seen anything like this very distinct plant in England. The *A. tomentosum* of former editions of Babington's 'Manual' was determined by the author to be only *A. majus*.† In Denmark and in central and southern Sweden and Finland it is very common, indeed by far the most abundant *Arctium*. An excellent place to see it in perfection is in the fortifications round

* There is a form of *B. cernua* with some of the marginal florets ligulate to which the varietal name *radiata* has been applied in its proper signification.

† The scrap figured in Eng. Bot. 2478, (not reproduced in Syme's new edition) which was quoted as *A. tomentosum* by Babington, was made from a specimen collected at Beccles; it certainly does not represent that plant. The original specimen is, however, wanting in Sowerby's Herbarium.

Copenhagen, where in places difficult of access it forms neat handsome bushes, very characteristic from their great corymbs of rather small crowded heads, the involucre white with the dense cobweb-like tomentum which covers them. There are plenty of good characters for this species besides those of the general inflorescence and the dense tomentum; the corolla affords the best in its large rounded glandulose swelling at the upper part, and its dilated base which becomes accrescent with the fruit. If this really grows in England, it is doubtless very rare, for it is too striking a plant to be passed by the least observant botanist. I possess a specimen of the true plant from the Oxford Botanic Garden, and it is stated on good authority (see Watson's 'Compendium,' p. 530), that the late Mr. Baxter brought it there from Bagley Wood in the neighbourhood. Mr. Hemsley has also recorded it from Winchelsea, and (Herb. Borrer) Newhaven Bridge, in Sussex (Journ. Bot. vol. VI. p. 263), but he informs me that he has no specimen, and now forgets to what special plant his note referred. The plant from Newhaven Bridge in Herb. Borrer is, Mr. Baker tells me, only *eu-minus*. There may be said to be, therefore, no evidence of this species having been found in this country. The distribution out of England is also against its occurrence here. It is decidedly rare in Belgium and central France, and probably runs out westward rapidly in the latter country. If it turns up in this country, it will probably be in the eastern or northern counties.

About Copenhagen grew also *A. majus*, *A. intermedium*, Lange!, and a form of *A. minus* with large heads. A plant found very sparingly (at Charlottenlund) with *A. majus* and *A. tomentosum*, with glabrous heads but in other respects near the latter, may have been a hybrid.

Verbascum thapsiforme, Schrad. This has been anonymously recorded as found near Ashford, Kent ('Phytologist,' n. s. ii. p. 365). Dr. Boswell Syme has satisfactorily shown that the Kentish *V. thapsoides* of Hudson is the hybrid *Thapso-lychnitis*, (Eng. Bot. vol. vi. pp. 117, 187), and whether anything other than that has occurred in the county must remain at present doubtful. The specimens of *V. thapsiforme* collected near Copenhagen grew in a fallow field, and were much less in height than *V. Thapsus*, from which it is easily known by its very much larger flowers.

Rumex. At p. 308 I have already put on record the discovery of *R. sylvestris*, Wallr. in England, by Mr. Warren, a determination we were able to make by the help of my Danish and Swedish specimens. I may add here that the examination of numerous fresh living specimens from the Surrey locality has confirmed the distinct character of the plant,* which is carefully figured in Hayne's "Darst. und Beschreib. der Arzneigewächse," v. I. t. 13. Meisner has hinted that *R. sylvestris* may be a hybrid between *R. Friesii* and *R. conglomeratus*. It may be perhaps considered as lending some probability to that view, that a similar suggestion was made by Mr. Warren; indeed the first-sight resemblance to *R. conglomeratus*, along with which it grows at Putney, is very striking.

* It is satisfactory to have the corroborative testimony on this point of Dr. Boswell Syme, to whom Mr. Warren sent specimens, and who says that he has no doubt they are the *R. obtusifolius* of Swedish botanists, being precisely similar to a plant from Upsala in Ahlberg's collection, which is growing in the garden at Balmuto, raised from the seed of the dried specimen. I have already alluded (p. 309) to Ahlberg's Upsala plant, which seems to me less typical *sylvestris* than the Surrey specimens. Its growth from seed is certainly against the view of hybridity alluded to above.

In the neighbourhood of Lund I had the opportunity of examining several other forms of this difficult genus, of which the most interesting is *R. propinquus* (J. E. Areschoug) a plant very like *R. crispus*, which was considered by the authority for the name to be a hybrid between that species and *R. obtusifolius*. Professor F. Areschoug, who guided me to the plant, with more probability makes it a hybrid between *crispus* and *domesticus*, both of which species accompanied it where we found it, and between which it is intermediate. The leaves are crisped, dark green, and the racemes very dense-flowered; the mature enlarged petals are much broader than in *R. crispus*, markedly cordate and somewhat prolonged at the apex, whilst they differ from those of *R. domesticus* in their thicker texture, denticulate or crenulated margin, and the presence of one or more calli. The only English specimens I have seen at all like this are from Lewes, collected by Mr. Warren; the enlarged petals, however, are not cordate in this plant. *R. propinquus*, indeed, could not be expected to grow at Lewes, since it is most unlikely that the northern *R. domesticus*, one of its supposed parents, should occur there. In the north of Britain, however, it will very likely be found. It approaches very closely *R. conspersus* of Hartman, which we also collected—by many botanists considered to be a hybrid between *R. obtusifolius* (*Friesii*) and *R. domesticus*, and which occurs in Scotland. It is not very accurately figured in 'English Botany,' ed. 3. t. MCCXVII, and differs from *R. propinquus* in its leaves which are not crisped, and the greater denticulation and broader apex of the ripe enlarged petals.

Glyceria distans, Sm., var. γ . *pulvinata* (of Hartman's and Lange's Floras). This curious little form occurs abundantly with *Sagina procumbens* in the courtyard of the old palace at Copenhagen, growing between the stones. The stems form tufts not above 4 in. in height, and the stiff habit is very different from that of the species, the panicle-branches are also stiff and short, not flexuose, and never deflexed, even in the most advanced condition. I have not met with it in England, but its peculiarities may be perhaps due to its singular situation. For a discussion on the affinities of this plant, however, reference must be made to Professor Crépin's nearly exhaustive memoir on the group contained in the 5th fascicle of his 'Notes' (p. 231–234), where some curious points are raised. I hope to make a further study of the plant.

Bromus ramosus, Huds. (*B. asper*, Murr.) The two forms included under this name have been more than once alluded to in this Journal (VI. 71; VII. 191, 376; IX. 238, 270, 336). In Denmark both occur, but, as in this country, *B. serotinus* of Beneken is far the more common. Professor Lange has carefully studied these plants, and in the last published (48th) part of 'Flora Danica,' (Pl. 2826) he has given a careful figure of the restricted *B. asper* (of Beneken's paper) with the name *Schedonorus Benekeni*, Lge. Unfortunately we were unable to find the plant in one of its stations which we visited, where, however, *B. serotinus*, Benek., was abundant; but from specimens in the Copenhagen Herbarium, there is no doubt that it is quite the same as the Kensington Gardens plant described by me at p. 270 of the last volume, except in the parts of the inflorescence being uniformly a little larger in Danish specimens. In addition to the characters there given, Lange has pointed out another, derived from the little scale which supports the ramifications of the inflorescence; in *B. Benekeni* this has smooth edges and slopes away to

the two ends from the median line insensibly, whilst in *B. serotinus* its margins are furnished with long hairs and it slopes away to its extremities abruptly, descending for a short distance down the stem. He considers all the characters together to constitute a distinct species, which he has named after its first describer; cultivation may perhaps decide this point.

Additional facts tend to show that *B. Benekeni* is in its range a plant primarily of Eastern Europe. It is common in parts of Germany, and I saw specimens in Trinius' Herbarium at S. Petersburg from the Crimea and from Poland. In Western Europe *B. serotinus* seems everywhere to be much the commoner plant, *B. Benekeni* occurring only in small quantity in a few localities, often with its congener. From specimens kindly given me by Mr. Blytt it appears that both plants occur in South Norway, though they are both confined to a very few isolated stations recently discovered. The plant from Bergsfjeld is certainly *B. Benekeni*; a specimen from Lier, however, is, I believe, *B. serotinus*, but is too young for certain identification.

THE INFLUENCE OF INSECT-AGENCY ON THE DISTRIBUTION OF PLANTS.

BY ALFRED W. BENNETT, M.A., B.Sc., F.L.S.

The very suggestive papers by Mr. Briggs and Mr. Grindon, on the non-occurrence of certain common plants in the neighbourhood of Plymouth and Manchester will, I hope, set the example to other botanists to follow them up by others of a similar character with respect to their own districts. We shall thus have an accumulation of facts of at least as great value and interest as that contained in local lists of species. The point to which I especially wish to call the attention of those readers of the 'Journal of Botany' who may send contributions of this nature, is the observation of the part played by insects in the fertilization of our common plants. Notwithstanding the interest which has been thrown round this subject by the writings of Mr. Darwin, the study of physiological botany is, unfortunately, so neglected in this country that I know of very few English botanists who have paid the least attention to it, though I would like to refer, as an exception, to the exceedingly interesting paper in 'Nature,' of October 10th and 17th, on the Fertilization of Leguminosæ, by Mr. T. H. Farrer. I cannot conceive a more valuable contribution that the Journal could render to the advance of physiological botany than a list of the insects that have been observed to be active in the fertilization of our common wild flowers. No such list, as far as I know, has ever been published. I cannot help thinking that the reason of the otherwise inexplicable absence of species from certain localities will be found to be the absence of the insects which are necessary to effect their fertilization. I was particularly led to this conclusion by Mr. Grindon's remarks of the non-occurrence in the neighbourhood of Manchester of all "the fragrant Labiates, every Labiate, in fact, that yields powerful odour, except *Stachys sylvatica*;" this is very suggestive of the absence of those insects which are attracted by the labiate odours. It is difficult to believe that any climatic reasons can account for the absence of *Convolvulus arvensis*, *Lamium album*, and *Papaver Rhœas*, from Lancashire; or of *Solanum nigrum* and *Plantago media*, from Devonshire.

By way of illustrating what is being done abroad in this subject, I may be allowed to give the following extracts from papers by Professor Delpino, of Florence, on the Relationship of the Distribution of Plants and Animals. Not being, unfortunately, versed in Italian, I have had recourse to Professor Hildebrand's abstract of the papers in the 'Botanische Zeitung' for November 19th and 26th, 1869:—

“Every one must have observed that the flowers of most tropical plants, in contradistinction to those of our species of unusual size, are endowed with very bright handsome colours. Especially is scarlet, which, in the flowers of our latitudes, appears so rarely, or only of a pale hue, very abundant in the tropics, and of extraordinary vividness, *e.g.*, in those plants to which botanists have given the specific names *fulgens* and *splendens*, as *Lobelia fulgens* and *splendens*, and *Salvia fulgens* and *splendens*. Now, it has been indubitably proved that in the case of our indigenous plants, the true function of the coloured parts of the flowers is to allure the animals necessary for the pollination, and the very vivid scarlet would appear to be especially attractive to the Trochilidæ (humming-birds), while the same colour seems to inspire hymenopterous insects with aversion. And, in fact, in scarlet tropical flowers we find, almost without exception, those peculiarities combined, which show that they must necessarily be pollinized by humming-birds, viz., large dimensions, a bag-like form, a uniform horizontal position, and, which is of the greatest importance, a very powerful secretion of nectar. This last circumstance, in fact, excludes hymenopterous insects as pollinizers, since they would not find their proper nourishment in this very abundant but very thin honey.

“In general the dimensions of flowers correspond to the size of the pollenizing animals. For instance, the pollinizers possessed of the largest stature in Europe are the sphinxes (*Deilephila*), and certain *Cetoniæ*; and if we throw a hasty glance over the three or four largest flowers of Europe, the first that occur to the mind are the Peonies, *Panocratium maritimum* and *Convolvulus sepium*; and, according to Delpino's observations, the two last are actually fertilized by *Deilephila* (*Sphinx*) *Convolvuli* and Peonies by *Cetoniæ*.

“If we turn from the tropics to northern latitudes, a gradual decrease may be observed of many plants, corresponding to the decrease of their corresponding pollinizers; in passing into the temperate zone, we see a great number of families, genera, and species of plants disappear, and especially those which are exclusively fertilized by Trochilidæ. *Pæonia* and roses must cease where *Cetoniæ* are no longer found; the greater number of *Sileneæ*, and especially the species of *Silene* and *Lychnis* which bloom in the night, must necessarily disappear, where nocturnal lepidoptera fail. In the arctic zone those flowers only survive which are fertilized by hymenoptera, diptera, or the wind.”

Delpino then gives a very interesting list of the flowering plants of Spitzbergen and Nova Zembla with reference to their special fertilizers in those northern regions.

This most interesting and valuable study is one from which dwellers in towns are almost entirely shut out, but I hope that some of our country friends will take it up, and give us the result of a little close and careful work.

NOTES RESPECTING SOME BIRMINGHAM PLANTS.

BY JAMES BAGNALL.

Mr. Leo. H. Grindon in his paper (p. 305) intimated a desire for information as to whether certain plants which are absent from the Manchester flora, are also wanting in the floras of other large inland towns. As I have paid some attention to the botany of Birmingham, and have at various times visited nearly every lane round the town, I will here give the result of my observations on the plants he mentions.

I should state that what I call the Birmingham district is a ten-mile radius from the centre of the town, and within this radius, the drift, the Keuper marls, the lower new red sandstone, the Permian, the carboniferous formation, and nearly the whole of the upper silurian are, I believe, represented, the Keuper marls and Bunter sandstones prevailing. Limestone appears at the surface in one or two places, as around Walsall, and near Dudley and Sedgeley. The flora of the limestone soil about Walsall does not differ specially from that of the sandstone soils of our district, but at Sedgeley and Dudley I find a few limestone plants, such as *Atropa Belladonna* (at one time very abundant here), *Carduus eriophorus*, *Picris hieracioides*, and *Inula Conyza*. These plants have all been abundant in these localities, but mining and other industrial operations are causing their rapid disappearance. Although the *Lamiaceæ* are very fairly represented in our district, the fragrant species are somewhat few; of these I find *Nepeta Glechoma*, *Mentha hirsuta*, *Stachys sylvatica*, and *Thymus Serpyllum* very frequent, and usually abundant; *Mentha sativa* thinly spread from north-east to south of the town; *Ballota nigra* abundant north-east and east. Of the yellow flowered Umbelliferæ, I only find an occasional plant of *Silaus pratensis*. I have only once seen *Conium maculatum* within our radius. *Clematis Vitalba* does not occur wild in the district. *Cotyledon Umbilicus* I find abundant on the old ruins of a priory near Coleshill (recorded here in 1818). The mural Ferns are rare, *Asplenium Trichomanes* occurring only in isolated tufts at wide intervals, and suspiciously near large gardens in every case. Although on the lias soils of south Warwick *Helianthemum vulgare* is frequent and *Cynoglossum officinale* occasional, with us in the northern part of the shire they never occur. *Plantago media*, however, crops up in one limited area, very sparsely represented. In South Warwick it is more abundant than *P. lanceolata*.

Lamium album is common all round our town, and in several places *Viola odorata* abounds, and that too, far away from habitations or from gardens; on some banks it grows so abundantly as to overrun all other vegetation, and very often in such cases the conspicuous flowers are rare; the apetalous ones are, however, always abundant. *Galium verum* is local, but where found is usually abundant. *Malva sylvestris* and *M. moschata* are both well represented; but *M. rotundifolia* is remarkably rare. In some of our old roads and in wild lanes, *Convolvulus arvensis* is very abundant. On marly soils we get *Primula vulgaris* very plentiful, and many of the meadows are yellow over with *Primula veris*; *Symphytum officinale*, however, is very local, and seems to be dying out.

Papaver Argemone is only occasional, and never abundant; but *P.*

Rhæas is very abundant in some of our cornfields. *P. dubium* is, however, our prevailing Poppy. Almost all the commoner grasses occur in this district, but *Hordeum pratense* is very rare. I have only seen it in one meadow some six miles east of the town. *H. murinum* appears only thinly and at wide intervals on the sandstone soils, but near Sedgeley, where we get limestone, it is the prevailing grass.

Cornus sanguinea is rare, but abundant in one station, forming almost the entire hedgerow for some distance, *Viburnum Lantana* only occurs as an introduced plant. *Acer campestre* is not unfrequent; but in many localities rarely flowers. Wayside flowers, such as *Arenaria serpyllifolia*, *A. trinervis* and *Sagina procumbens* are very frequent. *Nymphæa alba*, *Campanula latifolia*, and *Myosotis sylvatica* are rare, and occur only at very wide intervals.

SHORT NOTES AND QUERIES.

JUNCUS CAPITATUS, *Weigel*, IN ENGLAND.—During a visit to Cornwall last June I was so fortunate as to discover this plant in two places. I first saw it near the Land's End on an extensive peat moor near the sea. Here it was in profusion, being by far the most abundant plant on the moor, which was very barren, producing no other plants that I remember, except *Sagina subulata*, *Montia minor*, and *Salix repens*. In the second station I only saw it growing rather sparingly in a damp hollow on the top of the downs near Kynance, in the Lizard district. The fact of my having accidentally seen this plant in two places, thirty miles apart, gives some reason to suppose that it may be distributed over much of the county. The habitat in this country seems to differ from those of the Channel Islands, for in both the above stations it was growing far above the sea-level, whereas it is described as growing in Jersey and Guernsey on sands inundated in winter.—W. H. BEEBY.

ANOTHER NEW BRITISH JUNCUS. Along with the specimens of *J. capitatus* above mentioned, Mr. Beeby sent another little rush collected at the same time "in a damp hollow on the top of the downs near Kynance Cove," growing with *J. capitatus*, *J. supinus*, and *Littorella lacustris*. It was found pretty thickly in this spot of about 12 or 15 feet square, but was not observed elsewhere. A careful examination of the specimens sent and a comparison with continental and authentic examples leaves no doubt in my mind that Mr. Beeby has been so fortunate as to detect another species of *Juncus* new to our flora—*J. pygmæus* of Richard (in Thuillier's *Flore des Env. de Paris*, ed. 2, p. 178). This species has been much confounded with its allies; on the one hand with the variety of *J. bufonius* called *J. fasciculatus* by Bertoloni in 1839,* which has a very extensive range, and is common enough on the seacoast of England; and on the other, with the *J. fasciculatus* of Schousboe, only known from North Africa, to which it is certainly nearly allied. From all states of *J. bufonius*, the new rush, *J. pygmæus*, is well distinguished by its outer and

* If this is to be retained as a species, *J. insulanus*, R. & S., *Syst. Veg.* 7, pt. 1, p. 227 (1829-30) must take the place of Bertoloni's later name, which was besides already preoccupied. *J. hybridus*, Brot., is a synonym of *J. pygmæus* (see p. 135).

inner perianth-segments being equal in length, all linear-lanceolate, and very gradually narrowed to their points, which have no sharp awn-like apiculus, by its acute capsule, and by its seeds, which are pear-shaped in form and strongly ribbed longitudinally. There are many other characters of less value. The number of stamens, 3 or 6, is variable in the Cornish specimens. Mr. Beeby's discovery is a most interesting one: *J. pygmæus* is another of those Atlantic species of which Cornwall possesses so many; its head-quarters are the western parts of France and Portugal. I hope to give a full description with a figure in a future number.—HENRY TRIMEN.

NEW LOCALITIES.—*Gentiana nivalis*. Mr. Isaac Balfour has recently gathered this near Killin, Perthshire. This is the third station for the plant in Britain.—The 'Gardeners' Chronicle' for October 12th records the discovery of *Epipactis palustris* "in the county of Surrey, and in the parish of Mortlake, Kew, or Barnes," by the Rev. Mr. Norwood, of Chelsea. A specimen is in Mr. A. Irvine's herbarium. Only a single locality is given in Brewer's 'Flora of Surrey.'—*Ophioglossum vulgatum* is recorded by Mr. J. Donald, in the same paper, from a meadow almost adjoining the late Dr. Lindley's garden at Acton, where it was first observed in 1841. It is a rather common Middlesex species.

CASUAL PLANTS.—*Polygonum alpestre*, C. A. Meyer, one of the *Aviculare* section, has been noticed abundantly by Mr. Naylor for the last two years in the meadow near Kew Bridge, so often referred to as a locality for introduced species. It is a native of Syria and other parts of the East.—*Rumex Patientia*, L., may be added to the list of plants found on the site of the Exhibition of 1862 at South Kensington. Specimens from that spot were brought to the British Museum by Mr. Warren, collected this autumn.

SEEDLING WILLOWS (see vol. IX. pp. 225, 303).—I have this year succeeded in raising some seedlings from *Salix tenuifolia* (five plants) and *S. Weigeliana* (four plants). As I only possess the female of both, from Mr. Borrer, these must be natural hybrids, and if I can keep them I shall feel much interested in studying them next year. The seeds were sown on the 3rd June, and were long coming up, but they are now 6 inches high, with leaves 2 or 2½ inches long.—J. E. LEEFE.

ADDITIONAL NOTE RESPECTING THE SUBSTANCE KNOWN AS AUSTRALIAN CAOUTCHOUC.—A correspondent, in a letter to Dr. Hooker, mentions that one of his friends had again visited the spot where the so-called coorongite was found, and had brought away some more of that material, as well as some specimens of another, which was lying in detached fragments or lumps on the sandy soil of the desert in the lower hollows or flats. The new substance is highly carbonaceous and burns with smoke and a bright flame. A film of oil is also stated to have been found covering the surface of the water in a pit which had been dug at the depth of eight feet, and also in another spot at two feet. A considerable tract of land over which the coorongite is found has been secured, and it is proposed to bore for oil upon it. A fragment of the new substance which came into my hands was friable, but with a kind of

cheesy consistence, it was also brown in colour, and evidently contained fragments of plant tissues. It burnt with tolerable readiness, and could be ignited in the flame of a candle. A copious coherent ash was left, and this proved on examination to be largely composed of diatomaceous frustules, a *Cymbella* being very frequent. Diatoms had already been detected in the coorongite itself; and if I am right in thinking that it was the residue of oily matter which originally floated on the surface of water, the new substance would seem to be a kind of *débris* deposited from the water at the bottom, and with a certain admixture of oily matter. I submitted a specimen to the Rev. E. O'Meara, who has been so kind as to examine it with a view of determining the Diatoms. He finds that they form a large percentage of the substance, and include as the result of a cursory examination the following species:—

| | |
|--------------------------------------|--------------------------------|
| Denticula tenuis, abundant. | Epithemia gibba, frequent. |
| Cymbella helvetica, frequent. | „ rupestris, occasionally. |
| „ maculata, very frequent. | Nitzschia palea, frequent. |
| Tabellaria flocculosa, occasionally. | Amphora minutissima, frequent. |
| Mastogloia Smithii, frequent. | Navicula rhomboides, rarely. |
| Synedra capitata, few fragments. | „ gibberula, rarely. |

All these, he remarks, are fresh-water forms, identical with those found plentifully in a living state in our own country. I may mention that a fragment of a substance exactly similar, as far as one can judge from appearance, to coorongite has been given to me by my friend Dr. Flight, who informs me that it was found at Iquiqui, in Peru.—W. T. THISELTON DYER.

Extracts and Abstracts.

ON SOME SOUTHERN PLANTS OBSERVED IN THE ENVIRONS OF PARIS IN 1871.

In a recently published part of the French Botanical Society's 'Bulletin' (vol. xviii. pp. 246–252), MM. Eugene Gaudefroy and Edmond Mouillefarine, writing in behalf of an association of botanists of which they are members, have given the results of their labours around Paris in that year. All had known the ground for ten years previously. The sad events of the war and subsequent absorbing occupations seemed likely to relegate their work to quieter times, but the accidental discovery of *Medicago Soleirolii* amidst the ruins of the Park of Neuilly by one of their number, and of *Lathyrus Ochrus* in the Bois de Meudon by a second, awakened their attention; other observations rapidly multiplied, and they set about preparing a flora of the two sieges—a *Florula Obsidionalis*, being a list of the plants introduced into Paris and its immediate environs by the besieged and besieging armies.

Their researches were most successful on the left bank of the Seine, though several introductions were found at Neuilly, the Bois de Boulogne, and Ranelagh, on the right. Beyond the line of investment, at the points occupied by the Germans, there was little of interest, only three plants being noted, *Vicia villosa*, of which there was a single specimen gathered at Villiers-le-Bel; *Stenactis annua*, a possible garden escape, at

Bièvre, and *Lepidium perfoliatum*, in the Bois de Boulogne, on ground where the Germans had encamped for some days. The plants named in the list are mainly Algerian, very exceptionally Italian or Sicilian. All those introduced by the French army were observed in Lombardy by M. Aug. Gras, after the campaign of 1860. Nearly the whole of them belong to families employed for forage and other commissariat purposes. Of the 190, of which the following list is composed, Leguminosæ count for 58, Compositæ 34, Gramineæ 32, whilst of the other orders taken together there are but 66,

For facility of reference the localities explored are grouped as far as practicable geographically and indicated by numbers, as follows:—

1. Old Park of Neuilly; 2. Bois de Boulogne, Ranelagh, Point-du-Jour; 3. Champ-de-Mars; 4. The road of the *ronde intérieur*, comprised between bastions 70 and 84, especially about the forage granary at Villafranca; 5. Fontenay-aux-Roses, Clamart, the redoubt of Chatillon; 5 *bis*. Mont-rouge; 6. Redoubts of Hautes-Bruyères and Moulin-Saquet; 7. Petit-Bicêtre, Bièvre, Moulin-Fidèle near Aulnay; 8. Bois de Meudon, particularly the plateau of the Bruyères-de-Sèvres, and its environs; 9. Plateau de la Bergerie and park of Buzenval; 10. To the NNE. of Mont Valérien, Rond point des Bergères, that of Courbevoie, the sides of the road uniting them and adjacent places.

The following is the list:—

1. *Ranunculus trilobus*, *Desf.* 7, 8, 10.
2. „ *muricatus*, *L.* 10.
3. *Nigella damascena*, *L.* 5.
4. *Hirschfeldia adpressa*, *Mönch.* 7, 10.
5. *Eruca vesicaria*, *Cav.* 10.
6. *Berteroa incana*, *DC.* 5, 6, 8, 10.
7. *Lepidium perfoliatum*, *L.* Bois de Boulogne, between the Jardin d'Acclimatation and Madrid, and on the bank of the river.
8. *Camelina foetida*, *Fries.* 1, 7, 8, 10.
9. *Rapistrum Linnæanum*, *B. & R.* 8, 10.
10. „ *rugosum*, *All.* 10.
11. *Bunias Erucago*, *L.* 7, 10.
12. *Diploxys erucoides*, *DC.* 8, 10.
13. *Helianthemum salicifolium*, *Pers.* 10.
14. *Reseda alba*, *L.*
15. *Astrocarpus Clusii*, *J. Gay.*—In a sandy *friche* between Malabry and Moulin-Fidèle, only indicated on the confines of the Parisian flora.
16. *Silene Armeria*, *L.* 2, 7.
17. „ *rubella*, *L.* 10.
18. „ *quinquevulnera*, *L.* 7, 8, 10.
19. „ *lusitanica*, *L.* 1, 8, 10.
20. „ *noctiflora*, *L.* 1.
21. „ *fuscata*, *Link.* 7, 9.
22. *Lychnis Cœli-rosa*, *Desr.* 7, 10.
23. *Spergula maxima*, *Weihe.* 1, 6, 8, 10.
24. *Arenaria media*, *L.* 8.
25. *Mænchia mantica*, *Fenzl.* 7.
26. *Linum perenne*, *Lois.* 4, 7, 8, 10.
27. *Malva mauritiana*, *L.* Moulin-Saquet.
28. „ *nicæensis*, *All.* 1, 7, 8, 10.

29. *Malva parviflora*, *L.* 1, 7, 8, 10.
 30. *Lavatera trimestris*, *L.* 7, 8.
 31. *Erodium laciniatum*, *Cav.* 10.
 32. „ *ciconium*, *W.* 10.
 33. „ *moschatum*, *W.* 7, 10.
 34. „ *chium*, *W.* 7, 8.
 35. „ *malacoides*, *W.* 1, 4, 6, 7, 8, 10.
 36. „ *Salzmanni*, *Delile.* 6.
 37. *Lupinus albus*, *L.* Moulin-Fidèle.
 38. *Medicago scutellata*, *All.* 7.
 39. „ *orbicularis*, *All.* 8.
 40. „ *radiata*, *L.* 7.
 41. „ *Soleirolii*, *Dub.* 7, 8.
 42. „ *pentacycla*, *DC.* Everywhere.
 43. „ *ciliaris*, *W.* 4, 7, 8, 10.
 44. „ *Echinus*, *DC.* 4, 7, 8, 9, 10.
 45. „ *disciformis*, *DC.* 8.
 46. „ *tribuloides*, *Lamk.* 7, 8, 10.
 47. „ *turbinata*, *W.* 4, 7, 8, 10.
 48. „ *sphærocarpa*, *Bertol.* Everywhere.
 49. *Trigonella corniculata*, *L.* 7, 8, 10.
 50. *Melilotus parviflora*, *Desf.* 8, 10.
 51. „ *neapolitana*, *Tenore.* 7.
 52. „ *messanensis*, *Desf.* 4, 7, 8, 10.
 53. „ *sulcata*, *Desf.* In all.*
 54. *Trifolium stellatum*, *L.* 4, 7, 8.
 55. „ *angustifolium*, *L.* 7, 8, 10.
 56. „ *flavescens*, *Tineo.* 7, 8, 10.
 57. „ *maritimum*, *Huds.* 7, 8.
 58. „ *panormitanum*, *Presl.* All.
 59. „ *lappaceum*, *L.* 7, 8, 10.
 60. „ *phleoides*, *Pourr.* 5, 7, 8, 10.
 61. „ *sphærocephalum*, *Desf.* 7.
 62. „ *resupinatum*, *L.* All.
 63. „ *tomentosum*, *L.* 1, 5, 7, 8.
 64. „ *spumosum*, *L.* 8, 9.
 65. „ *glomeratum*, *L.* 7, 10.
 66. „ *lævigatum*, *Desf.* 7.
 67. „ *elegans*, *Savi.* 2, 7, 8.
 68. „ *nigrescens*, *Viv.* 1, 7, 8, 10.
 69. „ *isthmocarpum*, *Bert.* 4, 5 bis, 7, 8, 10.
 70. „ *hybridum*, *L.* 3, 7, 11.
 71. *Tetragonolobus purpureus*, *Mænch.* 5, 7, 8.
 72. „ *biflorus*, *Seringe* 8.
 73. „ *conjugatus*, *Seringe.* 7, 8, 10.
 74. *Lotus ornithopodioides*, *L.* 8, 10.
 75. *Astragalus hamosus*, *L.* 8, 10.

* One of the most frequent species. More commonly than the type, a more robust form with broader leaves and larger flowers, and which was at first taken for *M. infesta*, but the doubt was set at rest by comparison with specimens from the neighbourhood of Palermo, in the herbarium of M. Pérard, communicated by M. Todaro.

76. *Vicia lutea*, *L.* 5, 8. Form with reddish flowers never observed in the environs of Paris; abundant in Algeria.
77. *Vicia narbonensis*, *L.* 7, 8, 10.
78. „ *bithynica*, *L.* 7, 8, 10.
79. „ *villosa*, *Roth.* Villiers-le-Bel.
80. „ *dasycarpa*, *Ten.* 10.
81. „ *varia*, *Host.* 7, 8, 10.
82. „ *Pseudo-Cracca*, *Bert.* 10.
83. *Lathyrus Clymenum*, *L.* 7, 8.
84. „ *var. tenuifolius*, *Desf.* 8.
85. „ *Ochrus*, *DC.* 7, 8.
86. *Orobus atropurpureus*, *Desf.* 7, 8.
87. *Scorpiurus subvillosa*, *L.* 5, 7, 8.
88. „ *sulcata*, *Desf.* 2, 3, 7, 8, 10.
89. „ *vermiculata*, *L.* 8.
90. *Arthrolobium scorpioides*, *DC.* 8, 10.
91. *Ornithopus compressus*, *L.* 7, 10.
92. *Hedysarum flexuosum*, *Desf.* 4, 5, 7.
93. „ *coronarium*, *L.* 8, 10.
94. „ *capitatum*, *Desf.* 8. One specimen.
95. *Lythrum Græfferi*, *Ten.* 1, 10.
96. *Pharnaceum Cerviana*, *L.* 7.
97. *Daucus setulosus*, *Guss.* 7.
98. *Coriandrum sativum*, *L.* 7.
99. *Ammi majus*, *L.* 7, 8.
100. *Galium murale*, *All.* 10.
101. *Fedia Cornucopiæ*, *Gærtn.* 7, 8.
102. *Valerianella discoidea*, *Lois.* 7.
103. *Scabiosa maritima*, *L.* 1, 5 *bis.*
104. *Stenactis annua*, *Nees.* Bièvre.
105. *Bellis annua*, *L.* All.
106. *Anthemis tinctoria*, *L.* 6.
107. „ *fuscata*, *Brot.* 3, 6, 7, 8, 10.
108. *Ormenis aurea*, *Dur.* 3, 7, 8, 10.
109. *Anacyclus clavatus*, *Pers.* 7, 8, 10.
110. „ *valentinus*, *L.* 2, 6, 7.
111. *Matricaria discoidea*, *DC.* 7.
112. *Pyrethrum Myconis*, *Mænch.* 7, 8, 10. In the last-named locality, a variety with ligulate flowers pale yellow mingled with the typical.
113. *Pyrethrum arvense*, *Salzm.* 7, 10.
114. *Chrysanthemum coronarium*, *Less.* 5, 7.
115. *Senecio crassifolius*, *W.* 7, 10.
116. „ *humilis*, *Desf.* 1, 3, 7, 8, 10.
117. *Calendula stellata*, *Cav.* 7, 8, 10.
118. „ *gracilis*, *D.* 6, 7.
119. „ *Crista-galli*, *Viv.* 7.
120. *Carlina racemosa*, *L.* 6, 7, 10.
121. *Centaurea pullata*, *L.* 7, 8.
122. „ *napifolia*, *L.* 7, 8, 10.
123. *Silybum Marianum*, *Gærtn.* 8.
124. *Galactites tomentosa*, *Mænch.* 7, 8.

125. *Scolymus maculatus*, *L.* 5.
 126. *Hyoseris radiata*, *L.* 7, 10.
 127. *Hedypnois polymorpha*, *v. erecta*, *G.* 7, 8, 10.
 128. „ *v. diffusa*, *G. & G.* 7, 8, 10.
 129. *Catananche lutea*, *L.* 7, 8.
 130. *Cichorium glabratum*, *Presl.* 10.
 131. *Seriola ætnensis*, *L.* 1, 7, 8, 10.
 132. *Thrinchia hispida*, *Roth.* 7, 8.
 133. *Kalbfussia Salzmanni*, *Schultz.* 7, 8, 10.
 134. *Urospermum picroides*, *Desf.* 8, 10.
 135. *Barkhausia taraxacifolia*, *L.* (Algerine form). 8, 10.
 136. „ *amplexicaulis*, *Coss & DR.* 8.
 137. *Picridium vulgare*, *Desf.* Moulin-Fidèle.
 138. *Xanthium spinosum*, *L.* 4, 5, *bis.*
 139. „ *Strumarium*, *L.* (or *X. frutescens*, *Jord.*). 5, 10.
 140. *Campanula dichotoma*, *L.* 7.
 141. *Convolvulus tricolor*, *L.* All.
 142. *Cerinthe gymnandra*, *Gasp.* 3, 7, 8, 10. Buc, near Versailles.
 143. *Echium plantagineum*, *L.* 4, 7, 8.
 144. *Linaria reflexa*, *Desf.* 10.
 145. *Veronica anagalloides*, *Guss.* 10 (mixed with *V. Anagallis.*)
 146. *Trixago apula*, *Stev.* 7, 8.
 147. *Eufragia viscosa*, *Bth.* 7, 8.
 148. *Stachys marrubiifolia*, *Viv.* 7.
 149. „ *hirta*, *L.* 8.
 150. *Plantago Lagopus*, *L.* 7, 8, 9, 10.
 151. „ *Psyllium*, *L.* 1, 7, 8, 9, 10.
 152. *Chenopodium ambrosioides*, *L.* 10. A single plant, not in
 flower.
 153. *Sueda maritima*, *Dum.* 10. Single, not in flower.
 154. *Amaranthus chlorostachys*, *W.* 8, 10.
 155. „ *albus*, *L.* 10.
 156. *Albersia prostrata*, *Kunth.* 10.
 157. *Rumex bucephalophorus*, *L.* All.
 158. *Euphorbia segetalis*, *L.* 10.
 159. *Anthoxanthum Puelii*, *Sey.* 7, 8, 10.
 160. *Alopecurus utriculatus*, *Pers.* 10.
 161. *Phalaris canariensis*, *L.* 5
 162. „ *brachystachys*, *Link.* 3, 5.
 163. „ *minor*, *Retz.* 7.
 164. „ *paradoxa*, *L.* 7, 8.
 165. „ *cærulescens*, *Desf.* 1, 3, 5, 7, 8.
 166. *Panicum miliaceum*, *L.* 3, 7, 8, 10.
 167. *Lagurus ovatus*, *L.* 7, 10.
 168. *Agrostis pallida*, *DC.* 1, 3, 8, 10.
 169. *Polypogon maritimus*, *W.* 7, 8, 10.
 170. „ *subspathaceus*, *Reg.* 4, 8.
 171. *Gaudinia fragilis*, *L.* All.
 172. *Avena sterilis*, *L.* 6, 7, 8, 10.
 173. *Trisetum neglectum*, *Ræm & Sch.* 7, 8, 10.
 174. *Köleria phleoides*, *Pers.* 7, 10.
 175. *Cynosurus polybracteatus*, *Poir.* 9, 10.

176. *Cynosurus echinatus*, *L.* Moulin-Fidèle.
 177. *Glyceria distans*, *Wahl.* 6, 7.
 178. *Briza maxima* *L.* 6, 7, 8.
 179. „ *minor*, *L.* 7, 8.
 180. *Eragrostis pilosa*, *P. de B.* 10.
 181. *Bromus maximus*, *Desf.* 7, 8, 9, 10.
 182. „ *rubens*, *L.* 7, 10.
 183. „ *macrostachys*, *Desf.* 6, 7, 8, 9.
 184. *Vulpia ligustica*, *Bertol.* 1, 3, 7, 8, 9, 10.
 185. „ *geniculata*, *Link.* 7, 10.
 186. *Brachypodium distachyon*, *R. and S.* 7, 8, 10.
 187. *Hordeum maritimum*, *With.* 1, 3, 5, 7, 8, 10.
 188. „ *leporinum*, *Link.* 8.
 189. *Ægilops ventricosa*, *Tausch.* 8.
 190. „ *ovata*, *L.* 3, 7, 8.

The following species, previously recorded in the environs of Paris, were in exceptional abundance among southern plants, and appeared to have come along with them:—

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| <i>Lepidium sativum.</i> Puteaux, Fort d'Issy. | <i>Potentilla supina.</i> Bois de Boulogne. |
| <i>Conringia perfoliata.</i> | <i>Portulaca oleracea.</i> |
| <i>Agrostemma Githago</i> (a dwarf form). | <i>Centaurea solstitialis.</i> |
| <i>Linum usitatissimum</i> | <i>Helminthia echioides.</i> |
| <i>Arenaria rubra.</i> | <i>Anagallis cærulea</i> (well-developed form). |
| <i>Trifolium pratense</i> (form with large flowers). | <i>Echinosperrum Lappula.</i> |
| <i>Medicago falcata.</i> | <i>Avena sativa.</i> |
| „ <i>apiculata.</i> | „ <i>orientalis.</i> |
| „ <i>denticulata.</i> | <i>Panicum Crus-galli.</i> |
| | <i>Setaria glauca.</i> |
| | „ <i>viridis.</i> |

The importation of plants in the train of armies is not unknown to science. *Corispermum Marschalii* was brought into the Grand Duchy of Baden, and *Bunias orientalis* to the Bois de Boulogne by the Russians in 1815. Will these recent introductions have a definite influence on the Paris flora? *Bunias orientalis* has maintained its ground up to the present time; will the war of 1871 leave similar traces? It might be supposed so, seeing the numbers introduced. But most of these adventitious plants are annual, the rare exceptions noted being *Hedysarum coronarium*, which bloomed but sparingly, and *Echium plantagineum*, of which there was a solitary flowering specimen. Will biennials and perennials appear next year? Will the annuals seed themselves? This remains to be seen. Already, November 1871, the first frost had done its work, and the Melilots and Medicagos were sensibly affected. *Bellis annua*, notwithstanding its more delicate appearance, stood its ground better.

CINCHONA CULTIVATION IN BENGAL.

We extract the following from Dr. King's report for the year ending 31st March, 1872, on the Government Cinchona plantations in British

Sikkim. These are situated in the Rungbee Valley, which is about four miles wide and sixteen long, running east and west, and shut in at its western end by a ridge of mountains more than 6000 feet high. Its climate is peculiar; being "completely shut in upon all sides, it is protected in a striking degree from wind, and up to the higher limits of the Cinchona belt, the air is rarely stirred by even the gentlest breeze—a state of things in striking contrast to that obtaining in the Nilgiris, where, in exposed places, great and permanent injury is done to the Cinchona plants by the high winds. At the lower levels frost is completely unknown, and the climate is indeed sub-tropical, while, on the higher southern and western slopes frost, and even snow, are the order of the day during the cold season. Occasionally heavy hailstorms pass over the valley, tearing to pieces the thin broad leaves of the red-bark trees; the mischief thus done is, however, rapidly recovered from. The rainfall is heavy, but not equally so in all parts of the valley . . . At the Rishap plantation hut (2000 feet above the sea), where a rain-gauge has been kept for some years, the average is shown to be about 120 inches; and as the mouth of the valley and the Teesta are approached, the climate becomes very much drier. . . . It is in these drier parts that the extension of the plantation made during the past year has been carried on.

"*Condition of the Plantation.*—The trees of red-bark Cinchona (*C. succirubra*), of which the plantation mainly consists, are, in my opinion, in a state of health which, on the whole, may be considered as satisfactory. Many of the older trees are indeed extremely healthy and vigorous. Originally planted six feet apart, alternate lines of these have, in some places, been thinned out, and yet, standing at a distance, one is unable to detect where the thinning has taken place, so completely do the leafy heads of the trees hide the soil. Experience has shown that for the first year or two the plants grow slowly, but that as soon as their heads are large enough to meet and to give shade to the soil, they start away with great vigour. The reason of this lies in the tendency the plant has to throw out fine superficial rootlets, which ramify close to the surface of the ground, and for the very life of which protection from the sun's rays is necessary.

"*Cinchona officinalis.*—The species yielding the crown bark of commerce has not answered well in any part of Sikkim; and so sickly were the plants at Rungbee during their visit in February, 1871, that the Commission appointed to report on the plantation recommended the abandonment of crown-bark cultivation. A large proportion of the plants of this species have died out, and over almost the whole area of permanent *officinalis* plantation, *succirubra* has been substituted. I am not without hope, however, that in drier spots than have hitherto been tried the species may yet be got to grow. Only 100,000 plants of *officinalis* are now returned as in permanent plantation.

"*Cinchona Calisaya.*—The plant yielding the yellow bark of commerce and a sort second to none in value, promises to do well in Sikkim. From the difficulty of propagating this species artificially, the progress made has hitherto been slow. A few trees have, however, now begun to yield seed. This is scrupulously saved for sowing, and every effort is being made to extend the cultivation of this most valuable species, which, with *succirubra*, must be our stand-by in Sikkim. There are now about 50 acres of *Calisaya* planted out, but I hope before next year greatly to enlarge the

area. It is interesting to note that whereas *officinalis* has done well in the Nilgiris, *Calisaya* has hitherto thriven badly there, and is, indeed, now little cultivated.

“ Grey bark, though rich in the other alkaloids, is found to be poor in quinine. The cultivation of the species yielding it (*C. micrantha*, *nitida*, and *peruviana*) has, therefore, been practically abandoned for some years. The 29,000 old trees in permanent plantation look well, and are growing rapidly. . . .

“ *Summary of the year's work.*—During the past year 166,285 plants of *Cinchona succirubra* and 44,500 of *C. Calisaya* have been added to the permanent plantation. Propagation has been carried on vigorously, and the seed and nursery beds at present contain 600,000 young plants of the former, and 147,500 of the latter species. The whole of the plantation has been carefully gone over, and every sickly plant has been vigorously cut down, while the healthy ones have been pruned and thinned. This has taken a great deal of time and labour, but I am convinced they have not been ill-bestowed. A considerable extent of new land has been cleared and prepared for planting, and will be covered with *Cinchona* as soon as the weather is favourable. . . .

“ *Yield of Bark.*—Nearly 116,000 lb. of green bark (equal to about 39,000 lb. of dry bark) have been collected from the prunings and thinnings above mentioned, not a single tree having been cut merely for the sake of its bark. In accordance with the recommendation of the *Cinchona* Commission, a quantity of the best of this bark has been packed for transmission to England. The smaller bark, which it is considered more profitable to utilize in the manufacture of alkaloid, has conformably to the instruction of Government been stored up, pending the appointment of a quinologist.

“ *Expenditure and Revenue.*—The budget allotment for the past year for all purposes was Rs. 63,621, and the expenditure Rs. 50,463-13-5, showing a saving of Rs. 13,157-2-7. The present is the first year in which revenue has been received for the sale of bark. During the year 7016 lb. were sold by auction in the London market. The bark was very varied in quality, a large proportion of it consisting of small quills of little value. The average price realized per lb. was about 1s. 5d., and the total amount received was equivalent to Rs. 5068-1-2. When the mixed quality of the bark is considered, I think the result of this, the first sale, may be looked upon as favourable. . . .

“ The production in India of *Cinchona* bark, as a crop cannot, I think, fairly be considered as yet beyond the condition of an experiment. It has indeed been demonstrated that *Cinchona* trees can be grown successfully up to about the age of ten years, and that their bark is quite as rich in alkaloids as that obtained from the South American forests, but whether they will reach maturity remains to be seen. . . . It is, however, a matter of satisfaction that substantial progress has been made towards the realization of the great object which Government had in view in undertaking this experiment, namely, ‘to secure for the fever-stricken millions of India the inestimable blessing of an abundant and cheap supply of the only specific for the most deadly of all Indian diseases.’ ”

Review.

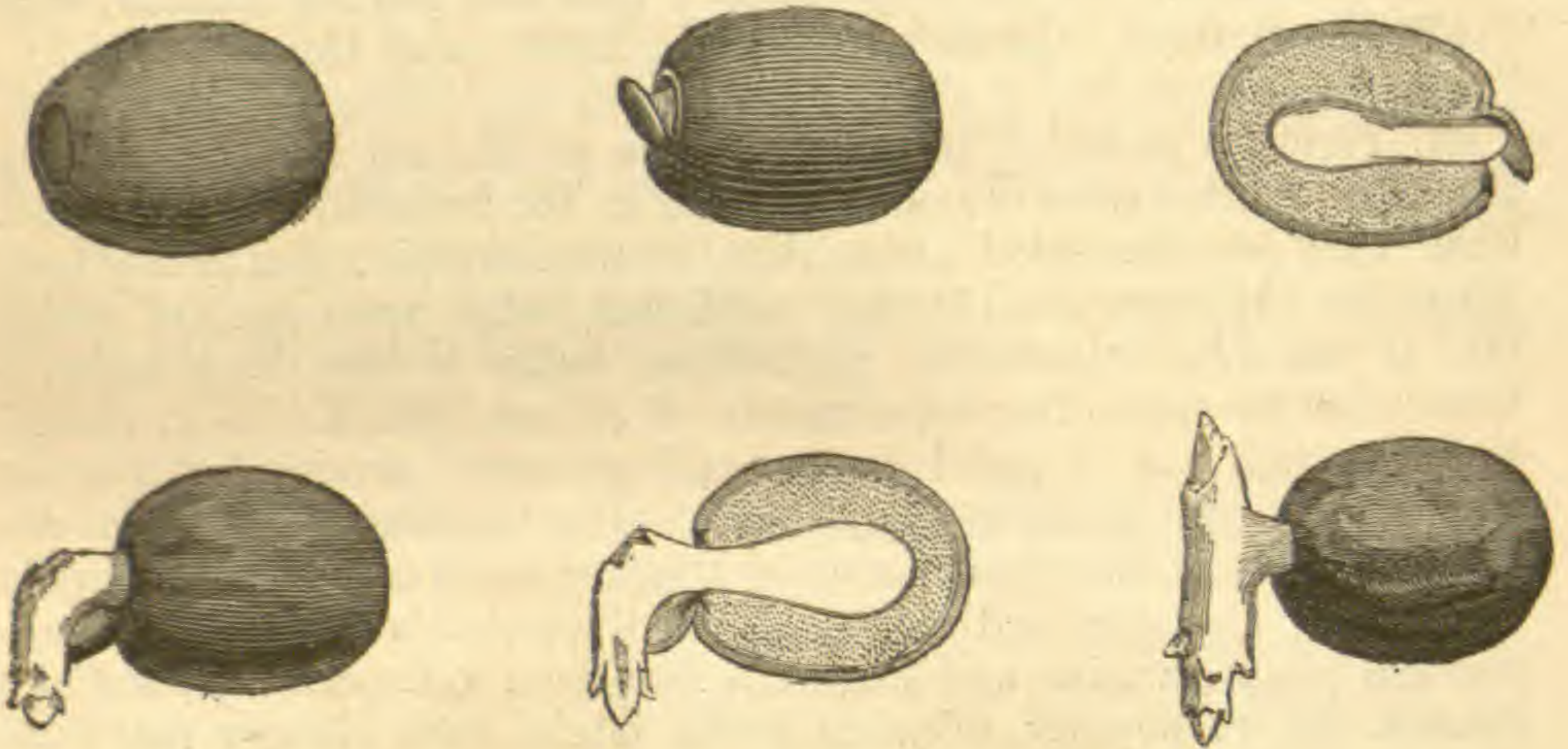
The Vegetable World: being a History of Plants, with their Structure and Peculiar Properties. Adapted from the work of Louis Figuier. With a Glossary of botanical terms. New and Revised Edition, with 473 illustrations. London: Cassell, Petter and Galpin. [1872.] (pp. 588.)

M. Figuier's series of popular treatises on Natural History probably owe their reproduction in our language to the beautiful woodcuts with which they are illustrated rather than to the intrinsic value of the text. Yet in his 'Histoire des Plantes,' published seven years ago, of which this is mainly a translation, the author seems to have been more at home than in some other departments of science, and his book, though a compilation, was a judicious one and possessed several features not usually presented by such publications. The introduction of more detailed accounts of the reproduction of Cryptogams was a step thoroughly in the right direction, and the sketch of 'Geographical Botany' was concise and comprehensive and singularly free from blunders. Indeed the greatest foe to popular scientific books might have allowed that little erroneous information was likely to be spread by means of the elegantly printed volume, with its almost faultless illustrations, and which contained an amount of well-selected, if rather badly put together, material.

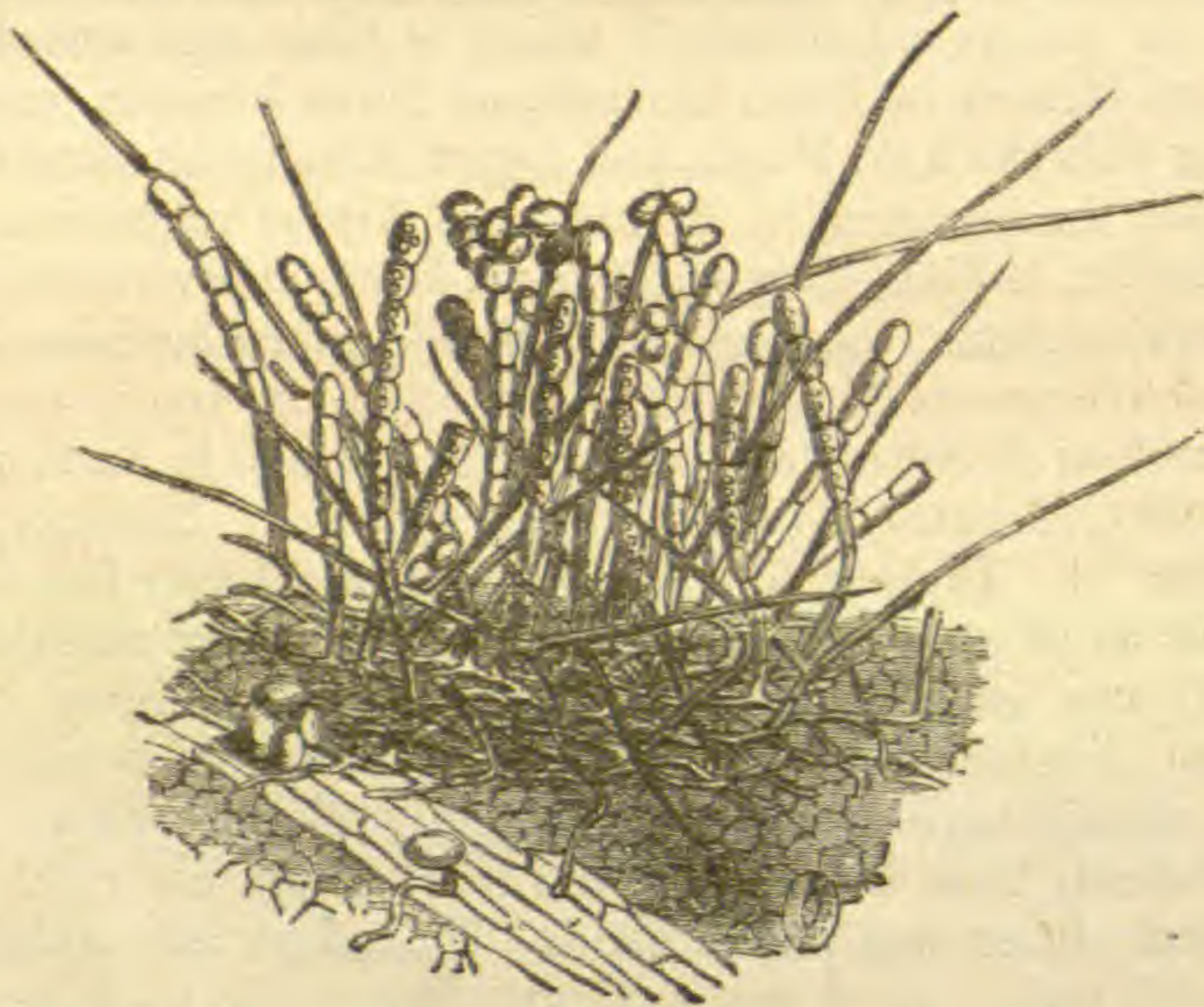
Of the first English edition (1868) one can scarcely speak too severely. Such a volume is seldom allowed to escape from the press. It possessed certainly the French woodcuts, but the text presented the very worst features of the bad "popular science" style. Misprints of the most glaring kind disfigured nearly every page. It professed to be "in some respects a translation;" but what is to be said of such translations as these, taken from two consecutive pages? In the original we have, in a description of the vegetation near Drontheim (p. 462), "des bouquets d'Aunes, de Bouleaux, et de Sapins, entremêlés de Frênes, d'Érables, de Trembles, de Cerisiers à grappe, de Noisetiers, de Genévriers, et de Saules, couronnent les points culminants," which is thus reproduced (p. 524), "bouquets are formed of Elder blossom, of Birch blossom, and Fir-tops, intermingling with the Ash, Maple, and Aspen; Cherry-blossom, Hazels, and Junipers crown the pyramid." Examples of Alpine vegetation, "le Cornouiller de Suède, le *Vaccinium Vitis-Idæa*, la renouée vivipare, le Poa des Alpes," (p. 463) become "the Dogberry of Sweden, the *Vaccinium Vitis-Idæa*, the renowned viviparous Alpine Pea"! (p. 525). So too in another place, in an enumeration of cultivated plants, "le Sorgho, le Sarrasin" is rendered "*Sorghum saracina*," whilst "plantes grasses" becomes in English "grassy plants"! There is a boldness about these very free translations so remarkable as to place their author quite beyond the reach of ordinary criticism. It can only be regarded as an extraordinary coincidence that a person singularly ignorant of the two subjects necessary for the undertaking should have translated a French work on botany.

It may probably have been suspected that all was not right before the present revised edition was put in hand. The editor was certainly not to be envied in his task. As it was evidently impossible to bring back into

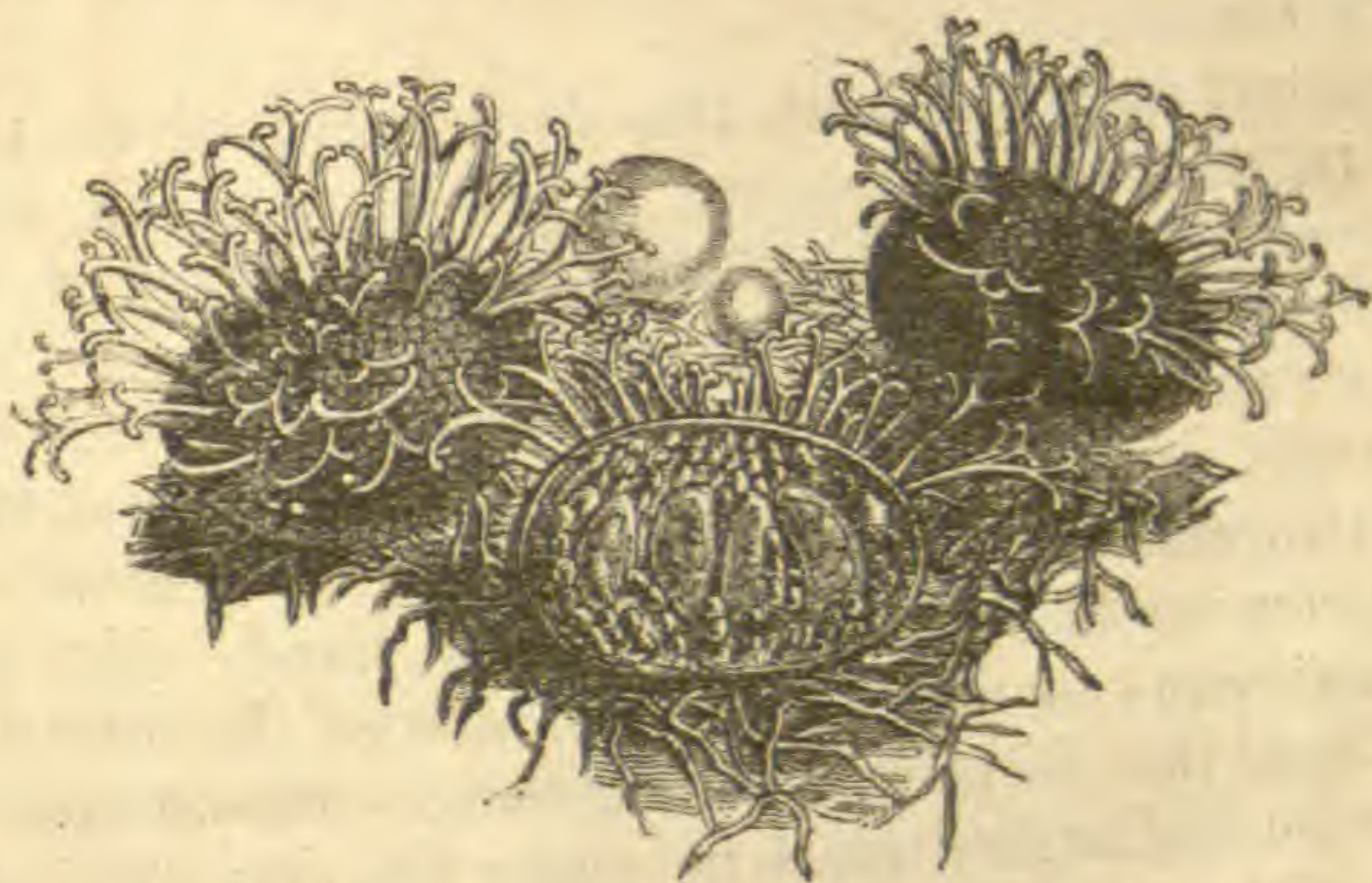
the right way the perverse renderings of the first "translation," he seems to have generally gone to the French original; but there are not wanting examples of a misplaced confidence in the former version,—as when little pieces of the original, which it was beyond the ingenuity of the first translator to travesty into English, are omitted. On the whole, however, the book is a fair reproduction in our language of M. Figuier's, with some additions and improvements.



The first 200 pages are devoted to the organs and functions of plants briefly and plainly described; the second part gives us a short account of the principles of classification, with notices of some leading botanists; and the third consists of a sort of abstract of Dr. Lindley's 'Vegetable Kingdom,' which was substituted for the 45 selected Natural Orders of the original. A good deal of information on the economic uses of plants is here incorporated. The modern researches of Cohn, Pringshein, and De Bary on the modes of reproduction in Thallogens are well illustrated by the original figures. In the concluding part we find the summary of Geographical Botany, to which a favourable allusion has been already made. A careful glossary occupying thirty closely printed columns has been added to this edition.



In calling attention to a few errors, it is proper to also allude to the innumerable ones of the previous edition which have been corrected in this. Those that remain are not of any very great importance. Lichens cannot be said to have "an evanescent and short existence" (p. 237); Mosses are not Thallogens; nor Juncaceæ, Glumales (p. 295). The sheaths of Cyperaceæ are said (p. 295) to be "nerve-slit," which is, perhaps, a misprint for never. *Ricinus communis* can scarcely be called a tree (p. 162, etc.). We should know little of the flora of Spitzbergen, alluded to at pp. 299 and 574, if it were true (p. 274) that 70° was "the nearest point to the pole" yet reached. "*Textis*" (p. 517) ought surely, to be *lectis*, and "espèces rustiques" is not very happily Englished "rustic species" (p. 527). A few dates are also faulty. Humboldt lived in the present century, not "the commencement of the eighteenth" (p. 511); the binominal nomenclature was not introduced by Linnæus till 1753 (p. 213); Tournefort's cannot be allowed to be "the first known system" when Cæsalpinus published his just a century before. Other slight oversights of this kind might be pointed out.



It is the illustrations that make the book. If they have lost some of their original delicacy they are still admirable. A few of the large ones in the original French edition are wanting, but many are added from other sources. By the kind permission of the publishers some specimens of these excellent woodcuts accompany this notice.

H. T.

Botanical News.

We are glad to be able to state that the whole question between the Director of Kew Gardens and the First Commissioner of Works has been practically settled on the basis of the Treasury Minute of July 24th, printed at the end of the Official Blue-book, of which the following is the most essential part. It is, however, proper to point out, with reference to this Minute, that the decision of the Treasury with regard to the so-called nursery and pleasure grounds is evidently founded on inadequate information. This piece of ground was given over by the Crown for the purpose of forming a complete arboretum and fruticetum, and is as much devoted to botanical purposes as any other portion of the establishment; in fact, the great Temperate House is contained in its limits.

“The Department of Botany, the First Commissioner states to be ‘under the immediate direction and control of the Director of Kew Gardens;’ the Department of Horticulture to be ‘under the immediate cultivation of the Curator, subject to the orders and control of the Director, as the responsible head.’ The Works are carried on by an officer of the Office of Works. My Lords consider this statement to represent with sufficient accuracy the proper arrangement for the establishment, and that, if fairly carried into execution in the friendly and conciliatory spirit which ought to prevail amongst the different members of all public departments, no difficulty will occur. It is essential to maintain the superior authority in all respects of the First Commissioner, but the nature of the case makes it evident that this authority should of course be exercised with due regard to the feelings and position of the officers under him.

“The Botanical Department has been formed by the exertions of Sir W. Hooker and of his son, Dr. Hooker. It stands high in the estimation of men of science, both here and abroad, and both these eminent men are entitled to the gratitude of the country for their services in this department of science.

“In all matters connected with this department of the establishment, whether as regards the hothouses, buildings, or the cultivation of shrubs and plants for botanical purposes, the opinion of Dr. Hooker should be followed, subject only to the consideration of expense. It is for him to represent to the First Commissioner what he considers necessary for the advancement of botanical science, and it is then for the First Commissioner and the Treasury to determine whether the expense necessary for the purpose shall be incurred. No alterations in existing arrangements in the scientific branch of the department should be made without the Director’s concurrence. The actual execution of the works to be undertaken must be under the direction of the proper officer of the Office of Works, but the opinion of the Director of the Gardens should be taken as to the efficiency of what it is proposed to do, and any requisition of his for work or repairs necessary for the preservation of the valuable plants in the houses should on all occasions receive prompt attention. With regard to those parts of the grounds which are not used for the purpose of botanical science, but as nursery grounds or pleasure-grounds, it will be the office of the First Commissioner to give such directions as he may think advisable. My Lords, however, think it desirable that even on these points he should communicate with the Director of the Gardens, through whom, as head of the establishment, all orders to the Curator and to other subordinate officers should, in regular course, be conveyed. My Lords gather from the memorandum of the First Commissioner that, speaking generally, the business connected with Kew Gardens has been conducted in accordance with the views thus entertained by their lordships. My Lords do not consider it would be conducive either to the public advantage or to the maintenance of that good and friendly feeling which they are anxious to see prevailing in every public department, if, in closing this correspondence, they were to go in detail into the cases where any disagreement has taken place between the First Commissioner and the Director. But advertng to the facts contained in the memorandum of the First Commissioner, they are not surprised that in various cases Dr. Hooker

should have thought that he had just cause of complaint, though this may have grown in some instances out of arrangements for which the First Commissioner was not responsible, and in others they learn from the memorandum of the First Commissioner that the cause of complaint has been removed. My Lords see no reason why, under these conditions there should be any serious difficulty in discharging the respective duties of the First Commissioner and of the Director of the Gardens in a manner satisfactory to both, whoever may be the occupants of those offices, maintaining the proper authority of the First Commissioner, with due regard to the position and character of the Director of the Gardens."

ARTICLES IN JOURNALS.

Quarterly Journal of Microscopical Science (July).—E. O'Meara, 'Peculiar forms of *Navicula* from the Sulu Archipelago' (1 plate).

Monthly Microscopical Journal (July).—R. Braithwaite, "On *Sphagnum rubellum*," Wilson (1 plate).

Lens (July).—S. T. Olney, "Algæ Rhodiaceæ" (Rhode Island).—H. L. Smith, "Conspectus of Families and Genera of Diatoms" (*contd.*)

SEPTEMBER.

Grevillea.—M. J. Berkeley, "Notices of North American Fungi."—M. C. Cooke, "British Fungi."—Grunow's new Diatoms of the "Novara" expedition (*contd.*).—W. Archer, "The genus *Tetrapedia*, Reinsch" (Plate iii). (Two new species from Ireland, *T. Reinschiana* and *T. setigera*, described and figured.)

Botaniska Notiser (16th September).—P. J. Hellbom, "Lichenological excursions in Lule Lappmark in the summer of 1871."—H. Mortensen, "A botanical excursion to Dovre."—E. Warming, "Danish botanical Literature in 1871."

Flora.—J. Klein, "Further Remarks on the Anatomy of young Coniferous Roots."—A. Besnard, "Alphabetical review of the special literature of the genus *Hieracium*, L."—Döbner, "A knotted stem of *Abies excelsa* described."—M. Konrad, "Precursory note on the Decomposition of Chlorophyll colouring matter."—S. Kurz, "Notes on *Inodaphnis*, Miq., and on a few species of Indian Oaks."—Ibid, "A new species of *Schrebera* from Central India" (*S. pubescens*).—F. Schmitz, "The Morphological Structure of *Verhuellia*, Miq." (Tab. VII. and VIII).—W. Nylander, "Observata lichenologica in Pyrenceis orientalibus."

Botanische Zeitung.—W. Velten, "On the Diffusion of Protoplasm-movements in Plants."—A. Braun, "On *Marsilea Marioni*, a fossil species of Tertiary age."—J. Reinke, "On the History of our Knowledge of the Development of the Root-point."—M. Woronin, "Researches on the Development of *Puccinia Helianthi* causing the disease of *Helianthus annuus*."—P. Ascherson, "Further observations on the Pollenation of *Juncus bufonius*, L."

The newly-published part (vol. xxviii. part 2) of the 'Transactions of the Linnean Society' consists of two important memoirs: "On the Spermogones and Pycnides of crustaceous Lichens," by Dr. Lauder Lindsay, illustrated by eight plates; and Mr. Miers' Monograph of the

South American species of Hippocrateaceæ. The author's views of the structure and affinities of this group have been already given in these pages (vol. IX. p. 220); in the present paper, 118 species, 47 of which were previously undescribed, are grouped under 17 genera—12 of which are new—arranged in four tribes. The memoir is illustrated with 14 plates from the author's own hand, full of careful and detailed analyses.

Baron von Mueller, Director of the Melbourne Botanic Gardens, has printed, under the title of "Select Plants readily Eligible for Victorian Industrial Culture," a very full list, in alphabetical order, of economic species suitable for cultivation in warm temperate climates. The timber-trees are omitted, having already formed the subject of a similar enumeration published in the Report of the Victorian Acclimation Society for 1870-71. Under each species are indications of its native country, properties, and uses; briefly treated in the majority of cases, but, in the case of these more especially desirable for cultivation in Australia, extending into articles of greater length. A great amount of scattered information is brought together in this useful catalogue.

A Flora of Portugal is announced to be in preparation by Senor Baroo de Castello de Paiva. It will include all the additions made since 1804, the date of Brotero's excellent "Flora Lusitana."

The two annual Fungus exhibitions at Hereford and South Kensington have passed off with their usual success. Humorous accounts from the pen of "W. G. S.," illustrated by his practised pencil, appear in the 'Gardeners' Chronicle' of October 5th and 19th.

Dr. Eichler has been appointed to be Professor of Botany at Kiel with care of the botanic garden there, and will proceed thither at Easter, 1873.

The silver medal offered by the Pharmaceutical Society of London for the best herbarium of British Plants, has been awarded to Mr. Fred. J. Hanbury, whose collection, made during a single year, consisted of upwards of 700 species from many parts of England and Ireland. As we have had an opportunity of seeing this herbarium, we can speak in the highest terms of the selection and nomenclature of the specimens.

With the greatest sorrow we record the death of Dr. Friedrich Welwitsch, the great African botanist and traveller. He died at his residence, in London, on October 20th, æt. 65. We shall give an extended obituary next month.

The death is recorded, on 16th October, of the widow of the late Sir W. J. Hooker, of Kew, at the age of 75 years. She was the daughter of Dawson Turner, of Yarmouth, the well-known botanist and antiquary.

The collections of the late Dr. Hill, of Basingstoke, an excellent botanist, who died during the past summer, have been purchased for the Winchester Museum; they are especially rich in Lichens and Mosses.

A presentation copy of Mougeot and Nestler's "*Stirpes Cryptogamicæ Vogeso Rhenanæ*" (14 volumes 4to), with the Lichens taken out, is offered for sale at £12, by its present possessor, whose address may be procured of Mr. J. G. Baker.

CORRIGENDUM.—P. 307, line 10 from bottom, *for* "horizontal" *read* "erect."

Original Articles.

PSAMMA BALTICA, R. & S., AS A BRITISH PLANT.

BY HENRY TRIMEN, M.B., F.L.S.

(PLATE CXXVII.)

In a note appended to the record (at p. 21) of Mr. Richardson's discovery of this grass, I advised a further examination of the plant *in situ* before venturing to enter it as an English species. The season which has since passed has not been allowed to go by without a careful re-investigation of the locality by Mr. Richardson in company with Dr. Maclagan, of Berwick. The result of this has been to strengthen the view all along held by the discoverer, that the species has not been, at all events recently introduced. In 1871 it was observed for only 300 or 400 yards along the edge of the sand-bank, but it is now known to extend in patches, at intervals very abundant, along the coast for about three miles. The Rev. J. E. Leefe, who has also visited the station, and to whom I am indebted for additional specimens, found the grass in two localities half a mile or a mile apart; he does not venture to say more than that it looks wild. Mr. Baker, however,—whose opinion from his familiarity with the district, though he has not seen the plant growing, carries great weight,—thinks it very unlikely to have been introduced with ballast; indeed it appears from the nature of the shore that ballast could not possibly be discharged at the part in question. I have not been able to visit the spot myself; the result, however, of the above testimony seems sufficient to warrant the publication of the plant as British. Even should it have been in any way brought by vessels from the Elbe or the Baltic, it has doubtless got a firm footing, and will in all likelihood spread.

Psamma baltica grows, at intervals, all round the peninsula upon which Ross stands, occurring both on its north and south sides; it has also been found on the detached island or peninsula between Ross Links and Holy Island, and further investigation may show it to occur in other spots on the same coast. The common British species, *P. arenaria*, is abundant; and the rarer one, which is less gregarious, is easily seen amongst it by its greater height and long lax inflorescence, with an almost nodding point. The ordinary seaside vegetation, *Senecio Jacobæa*, thistles, *Cynoglossum*, *Lycopsis*, *Sedum acre*, etc., are also found in abundance.

The exotic range of this rare grass is remarkable and peculiarly restricted. All its known localities are on the shores of the Baltic or the North Sea. It has been found in the following places:—*Norway*, a single station on an island (Sandösund) in the Christiania Fjord!; *Sweden*, two or three stations in the extreme south, very rarely, Ystad! Käseberga and Sandhammar; *Russia*, two or three isolated localities in Livonia and Lithuania; *Germany*, in many localities along the coast of Prussia, Pomerania, and Mecklenburg, from Königsberg! to Warnemünde!, Lubeck and Holstein; the island of *Bornholm*; *Denmark*, numerous localities on both E. and W. coasts, given in Lange's Handbook; nearly all the islands off the coast of *East Friesland*, where it seems to be abundant;

Holland, enumerated by Miquel in his list of Dutch plants. Its distribution out of England is thus seen to decidedly favour its claims to be a native here, the Northumberland locality being its most western station.

The following description is made entirely from a large number of Northumberland specimens.

Psamma baltica, R. & S.—*Rhizome* creeping, with a few barren leafy branches; roots numerous, long, fibrous, given off from the nodes. *Flowering stem*, 4 ft. to 5 ft. high, erect, hollow, glabrous, with three or four leaves; uppermost knot a little below the middle of the stem, reckoning in the panicle. *Leaves*, sheath striate, smooth, blade 1–2 ft. or more long, strongly involute when dry, very gradually drawn out into a long, sharp but weak point, $\frac{1}{4}$ in. wide at broadest part when unrolled, upper surface occupied by closely-set projecting ribs, the alternate ones more prominent, slightly rough, not hairy, under (outer) surface plane smooth; ligule $\frac{3}{4}$ in. long when complete, lacerated. *Panicle* slightly topping the uppermost leaf, 8–12 in. long, by about 1 in. broad at widest, cylindrical, attenuated at both ends, lobed, composed of tufts of branches of various lengths some again branched, adpressed to the main rachis; all parts of rachis and branches very rough with forward teeth. *Spikelets* nearly $\frac{1}{2}$ in. long. *Glumes* papery, a little longer than the pales, linear-lanceolate, strongly apiculate, nearly equal, the upper very slightly longer, purplish towards the apex, 1-veined, vein green, laterally compressed, keeled, keel rough especially of the lower glume. *Flower* single, very shortly stalked, surrounded with white hairs arising from the stalk about half or a little more than half the length of the flower, club-shaped rudiment of second flower clothed with similar hairs. *Pales* very nearly equal, thin, papery; the *lower* faintly 5-veined, with two short projecting teeth at the apex, and a sharp, short awn between them slightly exceeding the teeth; the *upper* 4-veined, terminated by two sharp teeth. *Lodicules* linear, attenuated, more than half the length of the stigmas. *Stamens* three (rarely two?), anthers $\frac{1}{8}$ in. long, narrow, bright yellow. *Stigmas* two, slightly united below, feathery.

The awn of the lower pale might be readily overlooked without a careful examination. Short as it is, however, it is a true awn and really occupies a dorsal position. In all the English specimens I have examined its length is as described above, but in foreign examples it has been observed to be more than twice as long as the teeth between which it projects.

The aspect of *P. baltica* is so different from that of *P. arenaria*, that it is not very likely to be passed over as the common species. The long, lobed panicle, which has a strong purplish tinge when fresh, and the greater size of the spikelets are obvious characters; and the more minute differences in the form of the glumes and lodicules, and the much longer hairs beneath the flower, together constitute a good specific diagnosis. There is, however, another grass to which *P. baltica* bears a good deal of resemblance, especially in the form and colour of the panicle—*Calamagrostis Epigeios*. This, however, has very much smaller flowers, a long awn to the lower pale, hairs which greatly exceed the pales in length, and no rudiment of a second flower, besides differences in the vegetative parts. It is, however, to be observed that—with the exception of its greater size—all the points in which *P. baltica* diverges from *P. arenaria*, approach *C. Epigeios*; and indeed our grass might as fairly be placed under



Psamma baltica, R. & S.

the latter genus as the former. *Psamma* is in fact a very weak genus, and is rendered much weaker if *P. baltica* be included; in a revision of these grasses it must be incorporated in *Calamagrostis*, as was done indeed by several of the older authors (Adanson, Roth, and De Candolle), and more recently by Fries and Andersson. I have, however, thought it better not to disturb the universal nomenclature of English text-books.*

There is, however, another explanation of the intermediate characters found in the grass before us, that it is a hybrid between *P. arenaria* and *C. Epigeios*. This view is held by Röper, Boll, and several other North German botanists. A question of this kind is one very difficult of solution, and I have no material to help me in the present case; those who care to follow it up are referred to Röper's & Boll's Floras of Mecklenburg, Meyer's 'Flora of Hanoverana excursoria' and Nöldeke's Flora of E. Friesland in the Bremen Transactions for 1872.

Mr. Leefe, in answer to questions, tells me that he saw no *C. Epigeios* at Ross, and cannot imagine a more unlikely place for it. This grass is very scarce in Northumberland. I have occasionally, in other districts, seen it on the shore, but only in places where woods or bushy places come down to the water's edge, localities where *P. arenaria* (the other alleged parent) could not occur; the matter, however, is one worth investigation by those on the spot who have leisure and patience.

This species was first noticed by Timm, at Warnemünde, in Mecklenburg, who alludes to it in a paper in Siemssen's 'Magazin für die Naturkunde' in 1795 (Bd. II. p. 237). Flügge, however, in Schrader's 'Flora Germanica' (1806) first described it under the name of *Arundo baltica* (vol. i. p. 223), and also gave accurate figures of the flowers.

The synonymy is as follows:—

Arundo baltica, Flügge in Schrad. Fl. Germ., i. 223.

Psamma baltica, Rœm. and Sch. Syst. Veg., ii. 55 (1817).

Ammophila baltica, Link, Hort. Berol., i. 105 (1827).

Calamagrostis baltica, Fries, Summa Veget. 79. Andersson, Gram. Scandinaviæ, p. 81.

Arundo maritima, Agardh, *vide* Hartman.

Figures will be found in Schrader's Fl. Germ., t. V. f. 3; Flora Danica, t. 1684 (not good); Reichenbach, Ic. Flor. Germ., I. f. 1455; Andersson, Gram. Scandin. t. VIII. f. 93, and specimens have been issued in Fries' Herbarium normale fasc. I., n. 74 and Reichenb. Exsicc., n. 116.

EXPLANATION OF PLATE CXXVII.

Psamma baltica, R. & S., from specimens collected at Ross Links, Northumberland in 1872 by W. Richardson. — 1. Plant reduced, scale 1 in. to 1 ft. 2. Portion of leaf to show ligule, natural size. 3. Panicle, natural size. 4. Spikelet. 5. Glume. 6. Open flower, with surrounding hairs. 7. Lower pale. 8. Upper pale, all $\times 2$. 9. Lodicules and pistil, $\times 10$.

* *Psamma* was founded on the common sea-marram, by Palisot de Beauvois, in 1812 (Agrostogr. p. 143). Host, in 1809, had already (Gram. Aust. iv. t. 41) constituted the same grass a genus under the name *Ammophila*, but this name, having been previously, in 1794, used by Kirby for a genus of *Hymenoptera*, has been generally abandoned, in accordance with a rule which should be, though it is not, universally followed. *Psamma* is, moreover, very incorrectly characterized by Beauvois—and by Rœmer and Schultes and others, who must have copied him—as having three stigmas, and is so figured on Beauvois' plate (t. VI. f. 1).

NOTES ON THE LICHENS IN SOWERBY'S HERBARIUM.

BY THE REV. J. M. CROMBIE, M.A., F.L.S., AND G.S.

No. II. *Stictina*—*Gyrophora*.

With one or two exceptions, all the specimens of *Stictici* which are drawn in E. B. occur in herb. Sowerby in a more or less perfect condition. They all, whether complete or fragmentary, sufficiently correspond with the figures, so that there are no corrections to be made upon any individual species. A few general notes, however, upon one or two of the specimens, may not be unacceptable to the Lichenologist.—*Lichen sylvaticus*, E. B. t. 2298. Of this there is only a small specimen in the herb., and that figured is probably exotic, the smaller fig. with the apothecia being evidently copied from Hffm. Pl. Lich. t. 4, f. 2. The shields, said to have been found in Scotland by Dr. Burgess, are here, as by the older writers, represented as being marginal and vertical, instead of being scattered over the thallus.—*Lichen auratus*, E. B. t. 2359. The specimen figured, which does not occur in herb. Sowerby, is said to have been communicated from the remains of Hudson's herb., but judging from its size and colouring, as compared with authentic British specimens, it was in all probability exotic, and not gathered in Devonshire, as supposed. In herb. Sowerby there also occurs a fragment of *St. Thouarsii* from Dartmoor, along with *St. crocata* from Scotland, both originally upon the same card.

1. *Lichen perforatus*, E. B. t. 2423, = *Parmelia perlata*, var. *ciliata*, DC.—The true *Parmelia perforata* (Wulf.), = *P. reticulata*, Tayl. is in a barren state well distinguished from other allied species by having the thallus minutely reticulato-rimose, and by the reaction of the medulla with K., viz., yellow and then red, both of which characters are wanting in the specimen figured in E. B. It is extremely rare in Britain, having apparently been gathered only at Dunkerron (Taylor), Dolgelly (Ralfs), and Appin (Crombie). From the first of these localities a fruited specimen occurs in herb. Brit. Mus., though only with young apothecia, which are consequently without the perforations which are so characteristic of this species elsewhere. Specimens from the other localities given in Leight. Lich. Fl., viz., Jersey and Guernsey, in herb. Brit. Mus., are referable only to the above var. of *P. perlata*, which is not uncommon in the south of England, especially in Sussex, where in E. B. *Lichen perforatus* is said to be common.

2. *Lichen physodes*, E. B. t. 126, = *Parmelia physodes*, and var. *labrosa*, Ach.—The figure, as indeed might be readily inferred apart from the specimen preserved in herb. Sowerby, is a composite one, made up of *P. physodes* typical on the right, and its var. *labrosa* on the left. This variety is also more distinctly delineated in fig. 5; while fig. 3 is referable to var. *recurva*, Leight. Lich. Fl. p. 126, which, however, is only a mere state of *labrosa* and occurs with it in the same specimens. Such I have gathered on an old shady wall at Park, Aberdeenshire, where with the type it is very abundant, though sterile. The var. *vittata*, Ach., which is very common on heaths in the Scotch Highlands, often in a

diffract condition, also occurs in herb. Sowerby, *sub. nom.* *Lichen multipunctus*, and seems to be referred to in the description in E. B., where it is said that the plant is "composed of two membranes, the undermost black, the upper white, with a considerable cavity between them."

3. *Lichen incurvus*, E. B. t. 1375, = *Parmelia Mougeotii* (Schær.).—The specimen figured, which in the description is said to have been gathered by Harriman in Teesdale, but in note appended to the original drawing, in Grassmere, Westmoreland, is not *P. incurva* (Pers.), as hitherto believed, and as certain expressions in the description, which is evidently borrowed, might lead us to suppose. It is entirely *P. Mougeotii* as above, and a very characteristic specimen of the larger form of this plant, connecting it closely with *P. conspersa*. This determination is further confirmed by Borrer's statement, E. B., S. t. 2796 descrip. (note), that *P. ambigua* in its appressed mode of growth, and in the divisions of its segments, is similar to *P. incurva*, which is correct, if we understand this latter as denoting *P. Mougeotii*. A much smaller state of this species (*Mougeotii*) with discrete laciniae referable to *f. discreta*, Nyl. pro p. occurs in Glen Dee, Braemar, ex. herb. Cromb., but infertile. True *P. incurva* we have seen only from Dunkerron, Ireland, in herb. Sir T. Gage, and from Braemar, in herb. Crombie, on several of the mountains of which it is abundant, though the apothecia are not seen well developed. It is also the *Lichen multifidus*, Dicks. Crypt. III. p. 16, t. 9, f. 7, from Scotland, according to specimen in his own herb.

4. *Lichen encaustus*, E. B. t. 2049, = *Parmelia alpicola*, Th. Frs.—The specimen drawn was gathered, as stated in the description, by Dr. Stuart on Ben Nevis. Both the colouring of the figure and the language employed—'this dirty, ill-looking Scotch plant' point to *P. alpicola* as the species denoted, apart altogether from the specimen preserved in herb. Sowerby. This is further confirmed by the fact that while *P. alpicola* is found on Ben Nevis, *P. encausta* does not occur there at all, and apparently has not been gathered in Britain but by myself, towards the summit of Cairntoul in Braemar. In colour, at all events, the plant before us certainly presents a marked contrast to *P. encausta*, Sm., so well figured and described in Linn. Trans. I. p. 83, t. 4, f. 6, whether it is to be regarded as a distinct species or not. In litt. from Borrer to Sowerby, he says, 'I believe I have it from the coast of Cornwall,' evidently confounding it with *Physcia aquila*, to dark-coloured specimens of which it bears considerable resemblance.

5. *Parmelia ambigua*, E. B. S. t. 2796, = *P. ambigua* (Ach.), and *P. aleurites*, Ach., Nyl.—The specimens represented in the two lower figs., of which the barren one (British) is spoken of as "the yellow variety gathered in the ascent of Larig Grue, under Cairngorm," (Borrer, 1808), are entirely *P. ambigua*, Ach., Nyl. Those represented in the two upper figs., of which the barren one (British) is spoken of as "the white variety, gathered in the neighbouring Forest of Rothiemurchus," (Borrer, 1808), is *P. aleurites*, Ach., Nyl., = *P. hyperopta*, Ach. Syn. p. 208. This latter species, since gathered by me in Glen Dee, is no doubt elsewhere to be met with on the trunks of old firs, towards their bases, in our Highland Forests. For the correct synonymy, *vid.* Nylander, *Animad. circa F. Arnold*, in Flora, 1872. In the Acharian collection previously referred to as in the possession of the Linnean Society of London, several specimens of the present species occur *sub. nom.* *P. aleurites*, intermixed with two of *Platysma diffusum* (Web.).

6. *Lichen ciliaris*, E. B. t. 1352, = *Physcia ciliaris* (Linn.), typical, and *f. actinota*, Ach.—The specimen drawn from Bedfordshire (Mr. Abbot) will on reference to the fig. be seen to have some of the apothecia with the margin smooth, and others with it proliferous. To this latter Acharius gave the name of *actinota*, but as the margin thus varies in one and the same specimen, as is usually the case in Britain, it is evident that a separate name is not at all necessary, and that the plant should be described as having the margin of the apothecia either entire or laciniato-fimbriated. In herb. Sowerby, there also occurs a small specimen of the so-called var. *verrucosa*, Ach., which is simply the type in a substerile condition, with numerous elevated spermogones.

7. *Lichen pulverulentus*, E. B. t. 2063, = *Physcia pulverulenta*, var. *laciniolata*, mihi.—The figure has been referred by Nylander in Syn. p. 421, as also by Leighton in Lich. Fl. p. 147, to var. *venusta* (Ach.). The specimen drawn, however, from Cambridge (Relhan), does not altogether correspond with the characters of the above var. Not only has it the margin of the apothecia crowned with the short horizontal laciniolæ, which are the distinguishing characteristic of *venusta*, but it has these also scattered over the thallus, as is well shown in the middle fig., where they are also somewhat ascending. They are evidently young leaflets in an undeveloped state, such as are occasionally seen in luxuriant conditions of some other foliaceous Lichens. We may, therefore, consider *venusta* as a form of this, in which the laciniolate growths are confined to the margins of the apothecia—a state described by Dill. in Ray. Syn. p. 75, and by With. Arr. IV. p. 31, as var. 3 of *Physcia stellaris*.

8. *Lichen stellaris*, E. B. t. 1697, = *Physcia stellaris* (?).—As observed by Smith, *sub Ph. pulverulenta*, the specimen figured was by mistake coloured green instead of glaucous-white. It is otherwise not very typical, inasmuch as the laciniæ are somewhat discrete, but unfortunately the specimen drawn does not exist in herb. Sowerby. Hence it is doubtful whether it belongs to true *stellaris* “with convex laciniæ and reaction K.±,” or to *Ph. aipolia* “with plane laciniæ and reaction K.‡.” Judging from the fig., it may belong to the latter species, and is probably an intermediate condition between the type and var. *anthelina*, which seems very rare in Britain. The var. *tenella* (Scop.) of *Ph. stellaris* is represented in E. B. t. 1351, although the upper fig. is not very characteristic, but seems a transition state between this and var. *leptalea*, Ach., which also occurs *sub. nom. tenella* in herb. Sowerby. In fact the older authors do not seem to have made any distinction between these two vars. which have again been recently united by Th. Frs. in Lich. Scand. pp. 140–1, s. n. *Ph. stellaris*, β . *ascendens*, Frs.

9. *Parmelia erosa*, E. B. S. t. 2807, = *Physcia erosa* (Borr.), Leight.—This is a well-marked and sufficiently distinct species, and was rightly separated by Borrer from *Ph. stellaris*, var. *tribacia*, Ach., with which it has frequently been confounded. The specimen spoken of in the description as having been sent to Sir J. E. Smith, and as having been vainly sought for in his collection after his death, is no doubt the one which occurs in herb. Sowerby, and is figured in E. B., from Hurtspierpoint, Sussex, *manu* Smith.

10. *Lichen virellus*, E. B. t. 1696, = *Physcia obscura*, vars. *virella* (Ach.), and *ulothrix* (Ach.).—Of these, the former is represented in the two upper figs., and the latter in the lower fig., as rightly observed in Leight.

Lich. Fl. pp. 148-9. The so-called var. *ulothrix*, however, would appear, from various specimens I have seen, to be nothing sufficiently distinct from other states of the type. Thus it may belong, as in the case before us, to var. *virella* as in most other instances, or it may belong to vars. *cloantha* and *sciastra*, such as I have gathered it (saxicole) in Blair Athole. In herb. Mudd (not his Exs.), there occurs a specimen *sub nom.* *virella*, which, judging from the yellow colour of the soredia and the thallus within, as also from the reaction K+, may belong to *Physcia endococcina* (Krb.), a species which I have not yet seen. *Lichen cyclo-selis*, E. B. t. 1942, is *Ph. obscura* (Ehrh.), sufficiently typical.

11. *Lichen elæinus*, E. B. t. 2158, = *Physcia adglutinata* (Flk).—The specimen drawn, from the bark of trees, Sussex (Borrer), clearly shows that this is not *Pannaria elæina* (Whlbn.); a boreal species which has not yet been detected in Britain, and must therefore be deleted from Leight. Lich. Fl. p. 165. It is entirely *Physcia adglutinata*, as correctly observed by Borrer, E. B. S. t. 2796, *descript.* This, which more recent authors regarded as a var. of *Ph. obscura*, is a very distinct species, as in my Enum. p. 40. From all states of the latter it is distinguished by the long acicular spermatia, which in *obscura* are very minute, oblong; *vid.* Nyl. in Flora, 1862, p. 355.

12. *Lichen candelarius*, E. B. t. 1794, = *Physcia lychnea* (Ach.).—The specimen figured does not occur in herb. Sowerby, but small portions of it are appended to the original drawing from which, as well as from the character of the fig. itself, it appears that it is entirely as above. It is probable, however, as may be inferred from some parts of the description in E. B., which seems made up partly of the characters of *lychnea* and partly of those of *candelaria*, that Smith may have had the latter plant before him, though he did not distinguish between them. The *Lichen candelarius*, Linn. Sp. Pl. 1141, seems also to be a composite species, and it is very doubtful whether it includes true *candelaria* (Ach.) Nyl. From all states of *lychnea* this may be readily distinguished, even in an infertile state by the reaction K—.

13. *Lichen proboscideus*, E. B. t. 522, = *Gyrophora cylindrica*, L., and var. *denticulata* (Ach.).—Of these, the type is represented in the two upper figs., and the var. in the two lower, as rightly stated by Mudd and Leighton. The confounding of these two species, as observed by Smith, *sub. Lichen proboscideus*, E. B. t. 2484 (the true plant) was owing to specimens of *cylindrica* being so named in the Linnean Herbarium. This, however, was no doubt by accident, as they were sufficiently distinguished by him in Sp. Pl., *L. cylindricus*, at p. 1144, and *L. proboscideus*, at p. 1150. Both species occur in herb. Sowerby, *sub. nom. proboscideus*; and the mistake was, no doubt, propagated amongst the older authors, from Linnæus having quoted Dill. Musc. t. 29, f. 116, which is entirely *cylindrica* (as observed by Lightfoot), as referable to his *proboscidea*. The name *crinitus*, given by Lightft. Fl. Scot. II. 860, to *cylindrica*, is very appropriate, though it must give place to the older one of Linnæus.

14. *Lichen pellitus*, E. B. t. 931, = *Gyrophora polyrrhiza* (Linn).—The specimen figured, which appears in herb. Sowerby, is sufficiently characteristic of the plant in its normal condition, though it is far too brightly coloured. Along with it is a small specimen of the polyphyllous var. *luxurians*, Ach., which is the usual form met with in the Highlands of Scotland.

15. *Lichen deustus*, E. B. t. 2483, = *Gyrophora flocculosa*, Hffn.—Of this there are three specimens in herb. Sowerby, though the fruited specimen from Dr. Swartz is absent, having no doubt been returned to Smith. Under the same name there appears from Scotland a specimen of *G. proboscidea*, which is evidently the *Lichen deustus* of Lightft. Fl. Scot. II., p. 861. Of *Gyrophora arctica* there is no specimen, nor is this at all likely ever to have been gathered in Devonshire, as conjectured by Smith. Also of *Gyrophora grisea* = *Lichen murinus*, E. B. t. 2486, there is no specimen preserved in herb. Sowerby, though it occurs as British in herb. Pulteney.

RECENT RESEARCHES IN THE DIATOMACEÆ.

BY THE REV. EUGENE O'MEARA, A.M.

V.

Nearly related to the *Cymbelleæ* are the *Amphoreæ*, in which are included the two genera *Amphora* and *Epithemia*. These agree with one another, as also with the *Cymbelleæ*, in the lunate and decidedly unsymmetrical form of the valves, and in the usually trapezoid transverse section of the cell. *Amphora* possesses on each valve three distinct nodules, connected together by two longitudinal lines which divide the strongly arched valves into two parts, so unsimilar that the smaller portion is sometimes scarcely apparent, although it possesses striæ precisely the same as the broader section. An *Amphora* may thus be regarded as a *Cymbella* with one portion of the unsymmetrically divided valve nearly obsolete.

In *Epithemia* the nodules and mediar-line are absent, or but slightly observable. The two forms agree in this feature, namely, that the single endochrome-plate passes over the mediar-line without suffering any interruption similar to what occurs in *Cymbella*. In other respects the conditions of the endochrome-plate are the same as in the group last referred to, except that in *Amphora* and *Epithemia* the middle of the endochrome-plate does not lie on the broader but on the narrower girdle-band. Further, the plasm-bands situated on the cell-wall in this case fail altogether, while the central mass is distinctly observable. It appears necessary, therefore, to unite *Amphora* and *Epithemia* in a distinct group; the more so because they correspond in a remarkable feature of their mode of growth; namely this, that they both usually attach themselves by the smaller girdle-band to larger Algæ or other water-plants. Kützing, Grunow, and Pritchard place *Epithemia* with the *Eunotiæ*, which latter, Pfitzer observes, as respects the cell-contents, are very differently constructed, as will be seen hereafter. *Amphora* was by Kützing wrongly referred to the *Naviculaceæ*. It stands near the *Cymbelleæ* to which the two other observers named referred it; but is still more intimately related to *Epithemia*, for the form and position of the endochrome-plate, and the absence of the plasm-band, is a characteristic of greater importance in the estimation of the author than the more or less distinct development of the nodules and mediar line, the presence of which has nothing to correspond with it in the internal structure.

Amphora.—In this genus the single endochrome-plate is only slightly scalloped. It separates at its middle portion by an incision springing from the ends throughout. This in *Amphora ovalis*, Ehren., is very wide; on the contrary in *A. Selina*, W. Sm., it is very narrow. The valves are altogether brown. On the broad more strongly arched girdle-band, each edge of the plate exhibits at the middle a deep indentation, which is noticeable when the valve is seen in profile. Two symmetrically-situated oil-globules are found in the central portion of the frustule. A cell-kernel is also distinct, which separates into two considerably before the process of cell-division commences.

The newly-formed valves in *Amphora* are at first flat. In consequence of the peculiar structure of the *Amphora*, the line along which the two corresponding points of the valves move away from one another, in the process of division, is not straight but curvilinear, and nearly parallel to the convex side of the girdle-band. When the *Amphoræ* after division do not separate from one another, the daughter-cells do not form filaments but ellipsoids, in which the individual frustules stand as the sections of a melon.

Epithemia.—The *Epithemiæ* as respects their inner structure distinguish themselves from the *Amphoræ* by the fact of their endochrome-plate being much scalloped, so that the valves exhibit an alternative of light and brown transverse bands. This is especially the case on the side of the broad girdle-band, only that here the scallops of the endochrome-plate appear to be shorter. The division of the endochrome-plate takes place through an incision proceeding from the ends.

In the middle plasm-mass no cell-kernel was noticed in any of the forms examined—*Epithemia gibba*, (Ehren.) Kütz., *E. ventricosa*, Kütz., *E. turgida*, (Ehren.) W. Sm., *E. Zebra*, (Ehren.) Kütz., *E. Sorex*, Kütz. But invariably one, usually two, more highly refractive corpuscles were found of a spherical shape, which treatment with perosmic acid proved not to be oil-globules, but plasmatic structures. Four and even more of these were sometimes met with in each cell; and as no single cell-kernel was present, there is reason to suppose that these structures should be regarded as cell-kernels. They increase in number by division, growing longer and stringing themselves to a direction parallel to the longitudinal axis of the cell, but unfrequently in a direction slightly inclined to it.

The daughter-cells of *E. gibba* and *E. turgida*, while still remaining attached, possess each two such bodies, while in other cases there is only one long after separation. Probably these structures, as the author thinks, are analogous to the plasm-bands of *Anomoeoneis*, *Cymbella*, etc., with which they correspond in this feature that they do not lie free in the granular plasm-mass, but on the plane of the convex girdle-band. The strong costæ which the valves of all *Epithemiæ* exhibit are not, the author informs us, canaliculi or tubes as Smith supposed, but, as Pritchard correctly observed, solid strips projecting inwards.

The mode of development of the auxospores supplies a strong reason for uniting *Epithemia* and *Amphora* in a group distinct from the *Cymbelleæ* and *Eunotiæ*. According to the observations of Carter in *Amphora ovalis*, of Thwaites in *Epithemia turgida* and *E. gibba*, of Smith in *E. ventricosa*, *E. gibba*, *E. Sorex*, and *E. Zebra*, of Lüders in *E. turgida* and *E. Zebra*, of Itzigsohn in *E. Goepfertiana*, Rab., as well as those of the author in *E. gibba*, from two mother-cells always

originate two auxospores, which do not lie parallel with the former, but at right angles to them. They grow also in a direction different from the *Cymbelleæ*. In the case of the *Eunotiæ* only a single spore is usually formed.

The distinction between the *Cymbelleæ* and *Amphoræ*, founded on the relative position of the auxospores, would be untenable if the statement of Itzigsohn, in conflict with the observations above referred to, be confirmed, namely, that in many *Epithemiæ* the mother-cells and auxospores lie parallel.

The process of spore-formation, according to Thwaites and Smith, is as follows:—Each primordial mother-cell throws out two protuberances, which increase towards one another until they finally join, and ultimately unite between the parted valves of the mother-cells. According to Lüders, the parting of the valves of the mother-cells precedes the copulation.

ON A NEW ASPLENIUM FROM CAPE COLONY.

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

In the 'Synopsis Filicum Africæ Australis,' of Pappe and Rawson *Asplenium Ruta-muraria* is given as a native of the colony on the faith of a couple of specimens gathered by the Hon. R. W. Rawson, one of the authors, now the Governor of Barbadoes, in the crevices of rocks at the summit of the Muzenberg Mountain, in March, 1857. This is a considerable extension of the known geographic range of the plant, which otherwise would be restricted to the north temperate zone. When dealing with the *Aspleniums* in 'Synopsis Filicum,' I had not access to a specimen, and so of course accepted the plant as the true *A. Ruta-muraria*, as has been done by Moore, Kuhn, and others. Now, thanks to the kindness of Sir Henry and Lady Barkly, I have had the opportunity of studying type specimens of a large number of the doubtful plants of the above-mentioned work, and I have no hesitation in regarding the plant as distinct specifically from anything that I have seen before or can find recorded, and take, therefore, the present opportunity of placing its characters on record.

A. RAWSONI, Baker, n. sp. (section *Euasplenium*); caudice erecto, paleis minutis linearibus, stipitibus nudis nitide castaneis, frondibus subcoriaceis parvis glabris deltoideis bipinnatis, pinnis oppositis vel alternis infimis maximis deltoideis, pinnulis 3-5 contiguis obverse deltoideis instructis, extrorsum distincte inciso-crenatis, venis flabellatis exsculptis, soris linearibus, demum confluentibus faciem totam pinnularum marginibus exceptis occupantibus. *A. Ruta-muraria*, Pappe & Rawson, *Syn. Fil. Afr. Austr.* p. 20, non Linn. Station as above stated. Caudex erect, densely tufted, sending out copious wiry rootlets, clothed with brown tomentum. Scales lanceolate, dull grey brown, very minute, confined to the caudex, not extending to the stipes. Stipes 4-5 inches long, slender, flexuose, quite destitute of pubescence or scales, bright chestnut-brown, passing into greenish at the very top. Lamina 2-3 inches long, subdeltoid, subcoriaceous in texture, quite glabrous on both sides, bipinnate

or bipinnatifid. Pinnæ growing regularly smaller from the bottom of the frond to the top; the lower with a distinct space between them; the upper subcontiguous, the lowest with a distinct stock at most $\frac{1}{8}$ inch long; deltoid in general outline, unequal at the base, sometimes more produced on the posterior, sometimes on the anterior side, cut down into 3-5 obversely deltoid contiguous lobes $\frac{1}{8}$ - $\frac{1}{4}$ inch broad, reaching down sometimes to the rachis, sometimes falling short of it, which are rounded and irregularly toothed along the outer border. Central pinnæ deltoid, three-lobed; uppermost obversely deltoid, simple, united to one another at the base, so as to form a pinnatifid general apex to the frond. General rachis greenish, not castaneous like the stipes, naked, deeply channelled down the back. Veining flabellate and deeply impressed like that of *furcatum* and *splendens*. Sori copious, irregular, not reaching quite to the edge of the divisions in any direction, finally forming an oblong, roundish, or irregularly shaped mass, filling up the whole under face, except the edge. Involucre moderately firm in texture, greenish, entire.

Differs from *A. Ruta-muraria* by its longer stipes, castaneous to the apex, larger, less compound, more coriaceous frond, contiguous, broader, fewer pinnules conspicuously toothed along the outer edge, and distinctly impressed venation. It closely resembles *A. splendens*, Kze., on a smaller scale, coinciding in texture and venation, but differing conspicuously in size and cutting, by its closer sori soon confluent into a uniform mass and by its castaneous stipe.

THE MOSSES OF OXFORDSHIRE AND THE NEIGHBOURHOOD OF OXFORD.

By HENRY BOSWELL.

The county of Oxford is not of large extent, its surface nowhere rises to any great elevation, nor is there much variety in its soil. It has neither coast nor mountains; neither heaths nor bogs of any extent; but an undulated surface, chiefly of oolitic limestone in the northern, and of chalk in the southern half; while except by the side of Thames and his tributaries, both earth and atmosphere are dry during eight or nine months out of the twelve. A small district lying immediately around the city, part of which appertains to Berkshire, divides the northern from the southern part, and is itself cut by the Thames into two halves, of which Shotover on the one side and Bagley on the other, are the most elevated and representative points. Here is a little more variety, from the introduction upon the scene of gravel and clay; and so obvious is the similarity of soil and vegetation on the two sides of the valley, that the most careless observer cannot help noticing it, and perceiving that at one time they were probably undivided.

The three sections thus indicated vary considerably in their flora: all are productive, perhaps beyond the average, in phænogamous plants, notwithstanding that in all of them cultivation is carried on to a very high pitch. But the dryness of the atmosphere two-thirds of the year, and the absence generally of sites favourable to the growth of mosses, make the region by no means one that a bryologist would be favourably in-

clined to at first sight. Any persons accustomed to more westerly counties, or to those near the sea-coast, would be apt to despise our contracted list of considerably less than 200 species. Sussex can boast of 300; Yorkshire and Lancashire would laugh at us. Nevertheless, the number of species found is not the only point of importance—perhaps it is sometimes too much dwelt on—and we have a few very interesting ones, both rare and common; although in summer the seeker will find few or none, a winter or spring ramble will afford plenty of mosses to charm the eye and occupy the microscope of the student of this highly interesting tribe of plants; while a diligent search in nooks and corners may at any time be rewarded by the discovery of something rare or new. The absence of some species that might have been expected to occur may seem quite as notable as the presence of others. But the almost total want of wall ferns is not less striking; and botanists from some districts would be equally surprised at not finding an *Erica* in the county.

It seems now to be universally thought that some changes of the genera, as laid down in 'Bryologia Britannica' should be made; and I have always thought it to be regretted that Mr. Wilson refrained from adopting some which he indicated as desirable, in order to follow closely Bruch and Schimper's magnificent work: yet as anything like too much deference is not very usual now-a-days, this error may be more easily forgiven. A mere local list is not the place for introducing changes of nomenclature or arrangement; but I have ventured to incorporate the very artificial genera *Phascum* and *Gymnostomum*, with their natural allies, and have united *Anacalypta* to *Pottia*; because I think this plan is approved by all, while many, regretting the too great multiplication of genera are disposed to go further. For the rest I have followed Schimper's 'Synopsis' (1860), which does not materially differ from the 'Bryologia Britannica.'

ACROCARPI.

Bruchidæ.

1. *Pleuridium nitidum*, Hedw., Br. & Sch.; damp ride in Bagley Wood: 1861, 1866. Winter.
2. *P. subulatum*, L.; sandy and gravelly banks; Shotover, Wheatley, Nuneham, Wychwood Forest, Bagley Wood. April.
3. *P. alternifolium*, Br. & Sch.; hedgebanks, between Shotover and Cuddesden, Wychwood Forest, Bagley; near the last but not with it. April.

Weissidæ.

4. *Systegium crispum* (*Phascum*, Bryol. Brit.); roadside between Weston-on-the-Green and Gosford; one small tuft only was found by Mr. W. Holliday.
5. *S. multicapsulare*, Sm.; a few plants apparently appertaining to this, found on a grassy slope near Chiswell Farm, Berks.
6. *Weissia tenuis* (*Gymnostomum*); stones in the canal bank, in several places, near Oxford, Kidlington, Heyford, and Banbury; old stone-pit in Blenheim Park. June, July.
7. *W. microstoma* (*Gymnostomum*, Schrad.); between Shotover and Cuddesden, with *Pleurid. alternifolium*; Bullingdon Green, Bagley Wood. April.

8. *W. viridula*, Brid. (*controversa*, Hedw.); hedgebanks, etc. Shotover; near Bayswater Mill; near Islip; Wychwood Forest; Caversham Warren (on the chalk), and other places. April.
9. *Dicranella cerviculata*, Hedw.; Bullingdon, rare: 1861, 1872. July.
10. *D. varia*, Hedw.; damp banks of the Windrush, near Witney, Sandford Lasher Pool, Shotover, Bullingdon, etc. October, November.
11. *D. heteromalla*, Hedw.; sandy banks in woods, etc. Shotover Stow Wood, Wychwood Forest, near Goring, etc. November, December.
12. *Dicranum scoparium*, L., Hedw.; woods, etc., frequent; fruit rare. July, August.
13. *D. majus*, Turn.; woods near Stokenchurch, barren.
14. *D. palustre*, Hedw.; shady woods, etc. Shotover, Wychwood Forest, Bagley Wood, and Wootton Heath; barren.
15. *Campylopus flexuosus*, Brid.; Wychwood Forest, and at Bagley Wood, and Powder Hill, Berks, with next; rare. April.
16. *C. torfaceus*, Br. & Sch.; gravelly and sandy ground amongst bushes; Shotover, Headington Wick, Wychwood Forest; Bagley Wood, and Powder Hill, Berks. April.

Leucobryidæ.

17. *Leucobryum glaucum*, Hedw.; woods near Nettlebed, in some plenty: 1859, 1861. Powder Hill, Berks, with the two last; very rare. No fruit.

Fissidentidæ.

18. *Fissidens exilis*, Hedw.; shady banks on clayey soil; copse, near Watereaton; border of Bagley Wood, Berks. Winter.
19. *F. incurvus*, Schw.; Watereaton, Wychwood Forest; also Bagley Wood, Cumnor, and Buckland, in Berkshire. This, like the last, seems to grow on clay and sand. February.
20. *F. crassipes*, Wils.; on stones in water; Sandford Lasher, Botley Road, side of the canal, near Kidlington; sluice in the Windrush, near Witney. September, October, November.
21. *F. bryoides*, Hedw.; banks in woods, Shotover, Wychwood, etc.; always somewhat rare. January, February.
22. *F. taxifolius*, Hedw.; clayey banks; Shotover, Headington Wick, Wychwood Forest, Grave-hill Wood near Bicester, etc. January, February.
23. *F. adiantoides*, Hedw.; bog at Headington Wick; Wychwood Forest, Weston-on-the-Green, etc. November.

Pottidæ.

24. *Ephemerum serratum*, Schimp. (*Phascum*, Bryol. Brit.); Shotover Hill; Bagley Wood, Berks; rare. February.
25. *Phascum Flœrkeanum*, Web. & Mohr; fallow ground; potato-garden, side of Wood-stock Road, four miles from Oxford. November.
26. *P. muticum*, Schreb.; Shotover, near the Windmills; Chilswell Hill, Berks. November.

27. *P. cuspidatum*, Schreb.; fallow fields, roadsides, etc.; frequent.
February.
28. *P. bryoides*, Dicks; rare; field near Headington Wick; mud-wall;
at Iffley. February.
29. *Pottia minutula*, Br. & Sch.; banks and fallow fields; near Hampton
Poyle; near Witney, etc.; abundant on the *new made bank*
of the river, near Godstow, in 1861.
October, November, February.
30. *P. truncata*, Br. & Sch.; newly turned soil, in moist shady places,
occasionally; not very common. February.
31. *P. intermedia* (*Gymnost. Turn.*); old walls, Garsington, Hincksey,
(*P. truncata*, β . *major*, Bryol. Brit.) February.
32. *P. lanceolata* (*Anacalypta* Roehl.); turfy old walls and banks; Shot-
over, Noke, Stanton St. John, Kirtlington, Wychwood Forest;
fine plants. February.
33. *Didymodon flexifolius*, H. & T.; gravelly heathy spots in woods;
Bagley Wood and Powder Hill, Berks. February, March.
34. *Eucladium verticillatum*, Sch. (*Weissia*, Bryol. Brit.); sluices and
dripping places in limestone: Wychwood Forest; by the Wind-
rush, near Witney; canal bank, near Kidlington; no fruit.
35. *Ceratodon purpureus*, L., Hedw.; sandy and gravelly banks at
Shotover, Wychwood, etc.; also frequent on old thatched roofs
and on walls. Found in North and South America, India,
and Australasia. April.
36. *Leptotrichum flexicaule*, Hampe; dry limestone banks; Wychwood
Forest; Holton, near Wheatley; barren.
37. *Trichostomum rubellum* (*Didymodon*, Bryol. Brit.); shady old walls,
banks and stones; Rose Hill, Stanton St. John's, Headington
Wick Copse, Wychwood Forest, etc.; sometimes on thatch
with *Bryum capillare*. October, November.
38. *T. tophaceum*, Brid.; wet and muddy places; rare. Canal bank;
Bullingdon Bog; near Witney. November.
39. *Tortula cavifolia*, (*Pottia cavifolia*, Ehrh., Bryol. Brit.); this is one
of the most notable Oxfordshire mosses, from the abundance
in which it grows on the limestone mud, wherewith the walls
are capped, often covering yards of surface with its bright
brown capsules, and attracting admiration from even the non-
bryological passer-by. It is often accompanied by the three
succeeding species. November, December, January.
40. *T. lamellata*, Lindb. (*P. cavifolia*, δ . *gracilis*, Bryol. Brit.). In similar
situations, but rather less frequent. October, December.
41. *T. rigida*, Schultz; and
42. *T. ambigua*, Br. & Sch. These two occur in similar situations to the
last, and like them are seldom found in quantity two successive
years in the same place; like other annuals, they seem to require
soil quite fresh. *T. ambigua* is usually larger, and known by
its exactly cylindrical capsule. November, January.
43. *T. aloides*, Koch, Br. & Sch.; old turfy walls; rare here; Shotover,
Rose Hill, Islip and Noke, Hincksey; sometimes barren tufts
are found, closely compacted; it may then be known from *T.*
rigida and *ambigua* by the acute and much longer leaves.
November, December.

44. *T. unguiculata*, Hedw.; gravelly banks, old walls; frequent: var. *obtusifolia*, canal bank. November, December.
45. *T. fallax*, Hedw.; rare; ditch bank, Iffley road (now built over); sides of drains at Stow-Wood, Bagley. November.
46. *T. vinealis*, Brid.; dry calcareous walls, frequent and sometimes in abundance; fruit rare; Headington and Cumnor. April.
(*T. insulana* seems not to occur.)
47. *T. Hornschuchiana*, Schultz; rare; wall near Noke, in moderate plenty, 1860. Hincksey, Berks; scarce, 1872. April.
A much more delicate plant than the next, known by the acute leaves and the tufts easily parting.
48. *T. revoluta*, Schwaeg.; walls; near Shotover Hill, Forest Hill; Holton; Wychwood Forest, etc. April.
49. *T. convoluta*, Hedw.; walls; Shotover, Noke, Kirtlington, Cumnor, etc. April.
Known by its lemon yellow fruitstalk, in colour like that of *Didymodon flexifolius*.
50. *T. marginata*, Br. & Sch.; damp walls, rare; by the churches at Sunningwell, and at South Hincksey, Berks; first found by Mr. W. Holliday. May, June.
51. *T. muralis*, Timm.; walls, etc., either brick or stone; abundant. April.
52. *T. subulata*, Hedw.; rare about here; Shotover, Headington Wick, Wychwood Forest; formerly abundant in Shotover Plantations, growing with *Anacalypta lanceolata*, but nearly extinct now through clearing for cultivation. April.
53. *T. latifolia*, Br. & Sch.; on one or two willows by the Cherwell, rare; no fruit.
54. *T. laevipila*, Brid.; trees by the Cherwell and Thames, occasionally; Wychwood Forest; near Witney, etc.; scarce. April.
55. *T. intermedia*, Brid.; dry walls; Kirtlington, Islip, Noke, Cumnor, etc.; sometimes barren. April.
More than once received from correspondents as "*T. laevipila* on stone walls."
56. *T. ruralis*, Schwaeg.; old thatched roofs, frequently fruiting. April.
A moss gathered at Holton recently, by Professor Lawson, was pronounced by Professor Lindberg to be *Tortula inclinata*;* it seems to be open to a grain of doubt, being starved and without fruit; but better specimens may be obtained by-and-by. If it prove correct, the discovery is a very interesting one, as the species is new to Britain, and will be worthy of further comment another day. Meanwhile, it may, perhaps occur in other places, on dry limestone rocks or banks. It is much smaller than *T. tortuosa*, or even *T. squarrosa*, with leaves slightly twisted when dry, and an inclined subcernuous capsule.

* Since the above was written I have, in company with Prof. Lawson, visited the place in search of *T. inclinata*. After diligent examination of the spot we succeeded in finding only a few scraps, but I have no doubt they are the right thing, and perhaps more may be met with in the spring. The notice at page 285 of this volume is rather ambiguously expressed, but was *not* meant to say that *T. tortuosa* had also been found.

Grimmiidæ.

57. *Cinclidotus fontinaloides* Beauv.; Rivers: Cherwell, near Islip; Thames, near Godstow; Sandford Lasher, etc. April.
58. *Grimmia apocarpa* Hedw.; walls and stones, occasionally. March April.
59. *G. pulvinata*, Smith; walls and stones; common. April.
60. *G. orbicularis*, Br. & Sch.; walls at Cumnor and Buckland, Berks. February.

(*Racomitrium canescens*; "Shotover," Sibthorp. This seems long ago exterminated.)

61. *Zygodon viridissimus*, Brid.; rare: on a willow by the Cherwell; Wychwood Forest; near Witney; near Woodstock; rather plentiful in Pusey Wood, Berks; no fruit.
62. *Ulota Bruchii*, Brid.; Wychwood Forest, Stokenchurch Woods; Bagley Wood; since, nearly, or quite destroyed. September.
63. *U. crispa*, Hedw.; Bagley Wood, with the last. August.
64. *Orthotrichum saxatile*, Brid. (*O. anomalum*, H. & T.); limestone walls, etc.; Shotover, Islip and Noke; near Witney, etc. Fr. April.

The true *anomalum* of Bryol. Europ. has sixteen ribs instead of eight, and is found on igneous rocks, apparently only.

65. *O. cupulatum*, Hoffm.; limestone walls, rocks, and roofs: Littlemore, Forest Hill, Witney, near the church. Var. γ *nudum* (*riparium*, Bryol. Europ.) Sparsey Bridge, canal bank. April.
66. *O. tenellum*, Bruch; willow trees, by the Cherwell and Thames above Oxford, in a few places; rare. May.
67. *O. affine*, Schrad.; trees, chiefly near streams; frequent. June.
68. *O. diaphanum*, Schard; trees, especially old willows by streams, and on stone walls occasionally. March, April.
69. *O. leiocarpum*, Br. & Sch.; trees, rare and always sparingly; Bullingdon, Stokenchurch, Wychwood Forest, Bladon Woods; Bagley Wood, Berks. February, etc.
70. *O. Lyellii*, H. & F.; frequent on oaks, in woods, but fruit rare; Nuneham Wood; Hell Copse, Stanton St. John; Wychwood Forest; Bagley; fine at Aldermaston, Berks. July.
71. *Tetraphis pellucida*, Hedw.; seems very rare here. Shotover Hill, on one old stump, no capsules, but numerous cyathuli or cups filled with gemmæ. These are interesting to the microscopist, who should remember the remark of Schimper, "nullam affinitatem morphologicam habent cum capitulis pseudopodiorum Aulacomnii quæ e foliis abortivis efformantur, dum cyathuli laudati e foliis perigonalibus hypertrophis æque antheridiis deformatis originem ducunt."
72. *Encalypta vulgaris*, Hedw.; stone walls, etc.; Shotover, Bayswater, near Witney, Chipping Norton, Woodstock, Hinksey, etc. March.
73. *E. streptocarpa*, Hedw.; dry limestone bank in an old quarry, at Wychwood; Holton, near Wheatley; starved and barren, and hence somewhat doubtful. Asthally, in Wychwood Forest.

Splachnidæ.

74. *Splachnum ampullaceum*, Hedw.; Headington Wick, about 1780,

Sibth. 'Flora Oxon.' Buckland, Berks, 1860, Mrs. Milne. I have never met with it.

Funaridæ.

75. *Physcomitrium pyriforme*, Brid. ; wet places, not very common : came up in great abundance about Port Meadow, in 1861, on mud left by an inundation. April.
76. *Funaria hygrometrica*, Hedw. ; walls, banks, etc. : common. April.
" *Omnium muscorum vulgatissimum.*"

Bryoidæ.

- 76, *bis.* *Bryum pyriforme*, Hedw., (*Leptobryum*) ; this comes up in greenhouse pots occasionally, but does not seem indigenous.
77. *B. nutans*, Schreb. ; sandy ground among bushes : rare ; Shotover, Wychwood Forest ; Cumnor, Mr. Holliday ; Buckland, Berks, Mrs. Milne. April, May.
78. *B. carneum*, L. ; moist banks, Shotover Plantations, Bullingdon, Sandford, near Witney, etc. The male flowers sometimes conspicuous in autumn. Fr. March, April.
79. *B. uliginosum*, Br. & Sch. ; field by the Cherwell, near Park Town, 1860 ; near Cumnor, Berks, 1861, Mr. Holliday. July.
80. *B. pendulum*, Hornsch. ; (*cernuum*, Bryol. Brit. and Bryol. Europ.) ; banks of the canal and Cherwell, in a few places, growing among stones and turf. April, May.
81. *B. inclinatum*, Swartz ; bank between Gosford and Weston ; side of the canal ; decaying willow, near Sparsey Bridge. April, May.
82. *B. intermedium*, W. & M. ; rare : shady old wall at Rose Hill, with *B. capillare* and *Trichost. rubellum*, 1860. Autumn.
83. *B. bimum*, Schreb. ; bogs at Bullingdon, Headington Wick, and Stow Wood : small form on old timber in the Cherwell. May.
84. *B. torquescens*, Br. & Sch. ; bridges over the canal, near Wolvercote and Kirtlington ; rare. May, June.
85. *B. murale*, Wils. MS. (*B. erythrocarpum*, var. *murorum*, Sch. ?) ; side of the canal between Oxford and Kirtlington : 1863, 1866. June, July.
86. *B. atropurpureum*, Br. & Sch. ; walls by roadsides near Noke and Islip, Wychwood Forest, etc. ; near Witney, F. Westell, Esq. ; Bessilsleigh and Cumnor, Berks. April.
87. *B. cæspiticium*, Dill ; frequent : sometimes takes total possession of a length of wall, and then its thousands of bright red fruitstalks and green capsules are a fine sight, even more striking than *Tortula* ; very fine this year at Noke. April.
Curious varieties sometimes occur, in aspect more resembling other species than the ordinary state of *B. cæspiticium*.
88. *B. argenteum*, L. ; frequent on stones, walls, roofs, gravel walks, etc. Var. β . *majus*, in an old rain-spout in Friar's Entry. Winter.

The *B. julaceum* of Dillenius, found "on the walks of the Oxford Botanic Garden," was most likely a state of this vide 'English Botany,' under *B. julaceum*.

89. *B. capillare*, Dill. ; L. ; walls and trunks of trees, frequent, and also on thatch, where it grows sometimes to a large size. May, June.

90. *B. pseudo-triquetrum*, Schwaeg.; bogs under Bullingdon, Stow Wood, and Headington Wick; near Weston, Mr. Holliday. These plants have male flowers only as far as I could discover.
91. *B. turbinatum*, Schwaeg.; bog under Bullingdon Green; near the rifle butts at South Hincksey; rare. June, July.
92. *B. roseum*, Dill.; Schreb.; Shotover Hill, near Stow Wood, Headington Wick; Wychwood Forest, F. Westell, Esq.; Bagley Wood, Berks; barren. November, December.
93. *Mnium affine*, Bland.; bogs under Bullingdon and Headington Wick, stream in Wychwood Forest, with abundant male flowers: moist places occasionally, but no fruit. Summer.
94. *M. cuspidatum*, Hedw.; Buckland, Berks, 1860, 1862. May.
95. *M. rostratum*, Schwaeg.; Shotover Plantations, near Watereaton. (Perhaps *M. cuspidatum*, Sibth., should be referred to this). April.
96. *M. hornum*, Dill.; L.; woods and shady banks, Shotover, Wychwood Forest, Bagley Wood, etc., not common; fruit rare. April.
97. *M. undulatum*, Dill.; Hedw.; woods and grassy banks; frequent, fruit rare. Shotover Plantations; near Watereaton. April.
98. *M. punctatum*, Hedw.; wet banks on clay, Headington Wick, Shotover; Bagley Wood and Wytham, Berks; no fruit. February.
99. *Aulacomnion palustre*, L.; Schw.; boggy and grassy spots, Wychwood Forest, near Bagley Wood; barren and scanty.
100. *Bartramia fontana*, Brid.; south side of Shotover Hill; Bagley Wood, Berks; fruit rare. May, June.
101. *B. calcarea*, Br. & Sch.; springs in limestone districts, especially newly cut watercourses; Bullingdon, with very numerous perigonia and one capsule, 1861. Stream in Wychwood Forest, with *Mnium affine*; perigonia very abundant, no fruit; sluice near Yarnton barren. May, June.
102. *B. pomiformis*, L.; Hedw.; dry sandy banks; rare. Bagley Wood. April.

Polytrichidæ.

103. *Atrichum undulatum*, Beauv.; sandy banks and moist thickets; Shotover, Wychwood, Bagley, etc. November, December.
104. *Pogonatum nanum*, Dill.; Shotover Hill, Wychwood, Bagley; on sand and gravel. October, November.
105. *P. aloides*, Hedw.; Shotover, Wychwood, near Henley, Bagley Wood. Var. β . *minus*, near Bagley Wood, and north side of Shotover; rare. November, December.
106. *Polytrichum formosum*, Hedw.; woods and copses; Shotover; Wychwood; Coombe Wood, near Cuddesden; near Goring and Henley; Bagley and Buckland, Berks. May, June.
107. *P. juniperinum*, Hedw.; Shotover; Wychwood; Bagley Wood and Wootton Heath, Berks. April, May.
108. *P. piliferum*, Schreb.; Wychwood Forest; Wootton Heath. April, May.
109. *P. commune*, L.; Hedw.; formerly fine at Shotover, but now destroyed by drainage; Wychwood Forest. May, June.

PLEUROCARPI.

Fontinalidæ.

110. *Fontinalis antipyretica*, L. ; frequent in Thames, etc. ; sometimes attaining great size, but no fruit. Spring.

Neckeradæ.

111. *Neckera pumila*, Hedw. ; trees, rare ; Wychwood Forest ; near Henley ; Bagley Wood ; orchard, near Witney, F. Westell, Esq. ; no fruit.
112. *N. crispa*, Hedw. ; woods near Goring and Stokenchurch ; barren.
113. *N. complanata*, L. ; & B. & S. ; Headington Wick ; Stanton St. John's ; Wychwood Forest ; between Witney and Bampton ; barren.
114. *Homalia trichomanoides*, Br. & Sch. ; woods, etc. ; Wychwood Forest ; copses near Godstow, near Elsfield, and Headington Wick ; Grave Hill Wood, near Bicester ; Bagley Wood, etc. October, December.
115. *Leucodon sciuroides*, Schwaeg. trees. ; not unfrequent, but barren. : rarely on stone walls.
116. *Antitrichia curtipendula*, Brid. ; Bagley Wood, one or two trees ; scarce, and without fruit.

Leskeadæ.

117. *Leskea polycarpa*, Ehrh. ; trees by the Thames, Cherwell, and Windrush, in several places ; etc. June, July.
118. *Anomodon titiculosus*, H. & T. ; about trees ; in hedges and stone walls ; in woods ; but fruit rare. November, December.
119. *Thuidium tamariscinum*, (*Hypnum*, Hedw.) ; woods abundant, fruit not common : Headington Wick ; near Watereaton ; Stockley Wood ; in Wychwood Forest ; near Henley. November, February.
120. *T. hystricosum*, Mitt. (*H. abietinum*, Bryol. Brit.). Limestone bank, Holton, near Wheatley ; scarce. I long sought unsuccessfully for this. Dillenius records it "*in collibus pone Hincksey*," not saying whether North or South Hincksey ; but if, as there is no reason to doubt, his were the true plant, it is probably long extirpated by cultivation. Yet as these hills are extensive it may still occur in some bye corner. Hincksey is west of Oxford, and in Berkshire. Holton is five or six miles to the east of the city.

We seem not to have the *abietinum* of Bryol. Europ. in England, if this be really different ; but ours agrees with Dillenius' plant.

Hypnidæ.

121. *Climacium dendroides*, Dill. ; W. & M. ; Bullingdon and Stow Wood : barren.
122. *Isothecium myurum*, Brid. ; Headington Wick Copse, Stanton St. John's, Grave Hill Wood, Wychwood Forest, Bagley Wood. October, November.
123. *Homalothecium sericeum*, L. ; Schpr. ; trees, walls, stones ; abundant : fruit not very common. November, December.
124. *Camptothecium lutescens*, Huds. ; dry banks and stony places ; fruit rare ; near Stokenchurch, near Stow Wood, near Witney. November, December.
125. *Brachythecium salebrosum*, Hoffm. ; near Kirtlington, Mr. Holliday. November, December.

126. *B. glareosum*, Br. & Sch.; grassy banks, woods, etc., near Headington Wick; Wychwood; Bagley Wood and Pewsey, Berks; etc.; barren.
127. *B. albicans*, Neck.; thatch at Botley, Eynsham, Asthally, Headington, etc.; fruit rare; also sandy banks at Cumnor and Buckland, Berks. November, December.
128. *B. rutabulum*, Linn.; walls, trees, etc.; common; var. *longisetum*, Schimp.; Bullingdon, Bagley Wood. November, December.
129. *B. velutinum*, Dill.; Hedw.; woods and copses, about old stumps, not very frequent.
130. *B. populeum*, Hedw.; one tree only in Wytham Wood, 1859. November.
131. *Eurhynchium myosuroides*, (*Isothecium*, Bryol. Brit.); Wychwood Forest; Cogg's Wood, Witney, F. Westell, Esq. October, November.
132. *E. striatum*, Schreb.; woods, etc.; fruit not common; Headington Wick, Wychwood Forest, Grave Hill Wood; Cumnor Hill and Pewsey Wood, Berks. November, December.
133. *E. crassinervium*, Tayl.; on one or two stones near Sandford Lasher; barren.
134. *E. piliferum*, Schreb.; grassy woods, etc., near Watereaton, Headington Wick, Wychwood Forest, etc.; barren.
135. *E. speciosum*, Brid.; Wils. trees and stones by river sides; Ch. Ch. meadow; Iffley; Sandford; canal bank, five miles from Oxford; bank of the Windrush, near Witney; rare. October, December.
136. *E. prælongum*, (*Hypnum*, Dill. xxxv., 15!) *E. Stokesii*, Bryol. Europ.! woods; not common in fruit. November, December.
137. *E. Swartzii*, Turn.; grassy banks, etc., especially on clay; frequent; fruit rare. November, December.
138. *E. pumilum*, Wils.; near Cuddesden; Bagley Wood. November, December.
139. *Rhynchostegium tenellum*, Dicks.; stones and walls; near Binsey; Sandford; near Woodstock, Mr. Holliday. November, December.
140. *R. Teesdalii*, Smith.; Bayswater Mill; near Sandford Lasher. October, November.
141. *R. confertum*, Dicks.; stones and trunks of trees; not unfrequent. November, December.
142. *R. murale*, Hedw.; stones and walls; Iffley, Headington, near Witney, etc. November, December.
143. *R. rusciforme*, Dill.; B. & S.; stones in water, occasionally; fine at Bayswater Mill. November, December.
144. *Thamnium alopecurum*, L.; Hedw.; woods, etc.: fruit not common. November, December.
145. *Plagiothecium denticulatum*, Dill.; woods, etc.: not unfrequent. May, June.
146. *P. undulatum*, L.; Buckland, Berks. I have not found it nearer.
147. *Amblystegium serpens*, L.; trees, etc.: common. April, May.
148. *A. radicale*, Beauv.; Shotover Plantations: very rare. April, May.
149. *A. irriguum*, Wilson; with young fruit on a stone, near Sandford Lasher. April.

150. *A. riparium*, L.; trees, by streams liable to floods: frequent.
April, May.
151. *Hypnum Sommerfelti*, (*H. polymorphum*, Bryol. Brit.); rare: stone wall, Asthally, Wychwood Forest, 1869. May.
152. *H. chrysophyllum*, Brid.; grassy, stony places: Blenheim Park, Wychwood Forest, Holton, and Shotover; barren.
153. *H. stellatum*, Schreb.; bogs and wet grassy places: Bullingdon, Wychwood Forest, Weston-on-the-Green; fruit rare. May.
154. *H. aduncum*, Hedw; Bullingdon Green, Marston, Weston-on-the-Green, etc., var. β . *major*, (*H. Kneiffii*, Bryol. Eur. and Bryol. Brit.); pond at Bagley Wood, Bullingdon, near Witney; no fruit, but a few flowers, both male and female.
The small state of *H. Kneiffii* is the true *aduncum* of Hedwig, so much disputed. In wet seasons it becomes *H. Kneiffii*. I gathered plants a yard long in one pond, in 1860, the water being then a yard deep; in 1861, a dry year, the pond was empty, and the plants less than six inches in length.
155. *H. fluitans*, Dill.; Hedw.; between Gosford and Bicester; near Watereaton; in several places near Woodstock, Mr. Holliday; no fruit.
156. *H. filicinum*, L.; wet places, springs, etc.; fruit rare. April.
157. *H. commutatum*, Hedw.; bogs; Headington Wick, near Stow Wood, and in Wychwood Forest, but without fruit. April.
The *H. crista-castrensis* of Sibth. is probably this; there is a degree of resemblance. The real *H. crista-castrensis* is a plant of alpine fir-forests, unlikely to occur here.
158. *H. Sendtneri*, Schimp.; (*H. falcatum*, Brid. perhaps); bogs at Bullingdon, Stow Wood, Headington Wick, and Wychwood Forest; fruit rare. May, June.
159. *H. cupressiforme*, Dill.; L.; woods, etc., frequent and varying much. October, December.
Var. *filiforme*, woods; var. *compressum*, Wootton Heath; var. *lacunosum* (or *tectorum*), on the ground; Headington Wick, Wychwood, Goring, etc., these rarely fruit.
160. *H. resupinatum*, Wils.; about trees, with the last and other species; fruit rare; Grave Hill Wood, near Bicester; Bagley Wood. November, December.
161. *H. molluscum*, Hedw.; stones and walls; abundant in Wychwood Forest, but fruit rare. October, November.
162. *H. palustre*, L.; wet stones, banks of the canal; stone drain near the church at Ducklington, F. Westell, Esq. April, May.
163. *H. cordifolium*, Hedw.; rare; between Shotover and Headington Quarry, 1863; in a pond near Bagley Wood, 1866. April, May.
164. *H. cuspidatum*, L.; fruit at Bullingdon, Wychwood Forest, and Bagley Wood, but not common; in a barren state, very common in wet places. April, May.
165. *H. Schreberi*, Willd.; Shotover Hill, Coombe Wood, Wychwood Forest; Bagley Wood, Berks; no fruit.
166. *H. purum*, L.; very common, fruit rare; Coombe Wood, etc. October.
167. *Hylocomium splendens*, Dill.; Hedw.; Shotover, Stow Wood, Wychwood, etc.; no fruit.

168. *H. brevirostre*, Ehrh. ; woods near Stokenchurch and Henley ; rare.
November.
169. *H. squarrosum*, L. ; common ; fruit rare ; Coombe Wood, Wychwood Forest ; Bagley Wood, Berks. November.
170. *H. triquetrum*, L. ; abundant in woods : fruit rare ; Headington Wick Copse, Grave Hill Wood, Wychwood Forest.
November, December.
171. *H. loreum*, Dill. ; woods near Henley, Watlington and Stokenchurch ; barren.

Sphagnidæ.

172. *Sphagnum acutifolium*, Ehrh. ; Powder Hill Copse, amongst grass under shade of bushes.
173. *S. recurvum*, Beauv ; (*S. Mougeotii*, Schimp.) ; Wychwood, near Ramsden ; bog near Wootton, Berks, with *S. cymbifolium* and *Polytr. commune*.
174. *S. cymbifolium*, Dill., Ehrh. ; Wychwood Forest (starved) ; bog near Wootton, and Bagley Wood, Berks.

These three are nearly destroyed ; the few plants that remain being merely the sad survivors of a state of things passed away.

SHORT NOTES AND QUERIES.

SOWERBY'S "ENGLISH BOTANY."—In the biographies attached by the Secretaries to the Anniversary Address delivered by the President of the Linnean Society on the 24th of May, 1872, occurs the following observation :—"James Sowerby, the father, was the author of the 'English Botany,' upon which great work almost all the Sowerbys have laboured, but none more assiduously than the subject of this memoir (J. de C. Sowerby), who took it up in his own name on the death of his father in 1822. It is no injustice to the several eminent botanists who, from Sir J. Smith downwards, have been associated with the Sowerbys in the 'English Botany' in furnishing the literary descriptions of the plant, to say that the great and enduring scientific merit of the work consists in the figures." In February, 1822, I was proposed as a Fellow of the Linnean Society. My certificate was signed by A. H. Haworth, N. A. Vigors, J. F. Stephens, Joseph Goodall (Provost of Eton College), Richard Latham, Edward Griffith, and R. A. Salisbury, and on 16th February, 1822, there was an extra large meeting, and I was rejected by a very large majority. If the slightest hint had been given to any of my proposers I should have immediately withdrawn, as I could ill afford the subscription. Only a few of the proposers were present, they made so sure of my election ; the rejection of a candidate being a very rare event. I only recollect one besides myself. The list of proposers—all persons doing their uttermost to improve Zoology and Botany—may have frightened the regular "Linnæans," of whom Dr. Shaw may be considered the type, and who proposed putting his heel on all shells not in the 12th edition of the 'Systema Naturæ : ' "Things not in Linnæus ought not to exist." It was, however, too bad to inflict

their wrath on the grandson of the Mr. Gray, who translated the 'Philosophia Botanica' of Linnæus for his friend Mr Lee, whose book first introduced the Swedish Botanist's scientific writings to English readers. Mr. Haworth, who was present, was so displeased at what he called an unjust and underhand combination to crush a young naturalist, that he made a codicil to his will desiring that his collection of British Lepidoptera, arranged after and being the types of his 'Lepidoptera Britannica,' which he had previously left to the Society, should be sold with his other collections. It stirred up my spirit of resistance, and I determined to leave the medical profession and devote myself to the study of natural science, and I have no cause to regret the determination or its cause. The cause assigned was that in the "Natural Arrangement of the British Plants," published under the name of my father (as I was very young, and only occupied on the synoptic part of it), we had quoted the work as "Sowerby's English Botany," and in so doing had insulted the President, which I may declare was perfectly unconscious and unintentional on my part. The text of the earlier numbers of the 'English Botany' was furnished gratuitously by my predecessor—Dr. George Shaw. As Mr. Sowerby foresaw that the work was likely to be successful, he arranged with Dr. Smith to give him a guinea for the description of each plate. Dr. Smith made a condition that he was to receive the money with the proofs of the descriptions. At the same time Dr. Smith published the botanical articles to Rees' Encyclopædia, a kind of 'Species Plantarum,' written according to the name of the genus as it occurred in the alphabet. I suppose, considering the price that was paid for the articles in Rees' Encyclopædia, and that paid for the text of the 'English Botany,' they must be considered as the best paid botanical writings known. Indeed, what with the money Dr. Smith got for these works, the 'English Flora' and other scientific works, and the eventual purchase of the Linnean Collection by the Linnean Society at his death, the acquiring of that collection must have been an excellent investment. Dr. Smith seems never to have forgiven me; for when engaged on the "Monograph of the *Cypræadæ*" I wrote to him asking if I might be allowed to see two or three specimens in the Linnean Collection. He did not reply to me, but on my asking Mr. Sowerby to make the same request for me, he replied that the Linnean shells were not arranged, but any of Mr. Sowerby's friends might see them except Mr. Gray.—J. E. GRAY.

ON THE GENDER OF "PANAX."—In my Supplement to the 'Flora Hongkongensis,' printed in the 13th volume of the Linnean Society's Journal, I observed,—with reference to a statement of Baron Ferd. von Mueller, that *Panax* was masculine in Pliny,—that, unless I was mistaken, the name occurs nowhere in his writings in such a connection as to show its gender. To this remark of mine the following note is appended:—" *Panax* is feminine in Pliny: 'Aliqui et hanc panacem heracleon, alii sideritim, et apud nos millefolium vocant,' etc. Hist. Nat. xxv. cap. v. s. 19.—Sec. L.S." The passage in question was perfectly familiar to me when I penned my remark, and the annotator is unquestionably mistaken in his construing, and, as a consequence, in the conclusion he draws. The entire section commences thus:—"Invenit et Achilles discipulus Chironis qua mederetur, quæ ob id Achilleos vocatur.

Hac sanasse Telephum dicitur. . . . Aliqui et hanc panacem heracleon, alii sideritin, etc." (uti supra). Now, it is manifest that the four words I have italicised, all refer equally to the substantive *planta* (subaudita); whereas the annotator erroneously conceives *hanc* to agree with *panacem*. The construction, in a word, is not—"This Panax is called by some Heracleon, by others Sideritis;" but—"Some call this plant Panax (or Panaces?) heracleon, others Sideritis." Were this not self-evident, it would be proved by the words of Theophrastus: "Πολλὰ δὲ ἐστὶ καὶ τὰ πανάκη καὶ οἱ τιθύμαλλοι καὶ ἕτερ' ἄττα. Πάνακες γὰρ καλοῦσι πρῶτον μὲν τὸ ἐν Συρία περὶ οὗ μικρῶ πρότερον εἴρηται. Ἄλλα δὲ τὰ τρία, τὸ μὲν χειρώνειον καλούμενον τὸ δ' ἀσκληπίειον τὸ δ' ἠράκλειον." (Hist. Plant. ix. 11. ed. Wimmer.) And I may add that one of the most able of recent editors of Pliny, M. Littré, translates as I have done. I still believe, subject to correction, that the gender of *Panax* cannot be determined from Pliny.—H. F. HANCE.

IRISH PLANTS.—*Sinapis nigra*, L. I do not know why the authors of *Cyb. Hibernica* have thrown some doubt on this species being truly native on our southern coasts. I have for some years been interested in the botany of this county (Cork), and I am not aware of any reason why hesitation should exist on the subject.—*Elatine hexandra*, DC. The sole authority hitherto for the occurrence of *Elatine* in the south of Ireland has been a list of the late Mr. J. Drummond. In this, he gives *E. Hydropiper* as found in a small lake near Bantry. This has been conjectured to have been *E. hexandra*, and I think truly, for during this past summer I found that species abundantly in some ponds near Durrus, in the same district as Bantry. *Elatine Hydropiper* is only known in northern Ireland, and is very rare there.—Near the station for *Elatine*, *Utricularia intermedia*, Hayne, was found by me in considerable abundance. This is, apparently, hardly so rare as was believed in this county. It has probably been frequently confounded with *U. minor*, L.—*Raphanus maritimus*, Sm. This interesting species, which is new to southern Ireland, I found last August on an island in the Bay of Schull (Castle Island). It grows only in one spot, on a gravelly beach facing towards the entrance of the bay.—*Juncus acutus*, L. Some doubt has been felt as to the occurrence of this plant in Drummond's station at Timoleague (co. Cork), as no recent botanist has found it there. This summer, however, I saw it at Flaxfort, a few miles from Timoleague. It grows abundantly there, and on sands at Rosscarberry, where I found it last year.—T. ALLIN.

MANCHESTER PLANTS.—Amongst the plants named by Mr. Grindon as absent from the Manchester district, I was rather surprised to find *Convolvulus arvensis*, as the species is common with us at Newton-le-Willows, distant only some fifteen miles from the centre of that city. The circumstance would hardly be worth record were it not that Mr. Bennett, in the last number of the 'Journal,' after referring to Mr. Grindon's paper, speaks of "the absence of *Convolvulus arvensis*, *Lamium album*, and *Papaver Rhœas*, from Lancashire." This great extension of Mr. Grindon's original statement renders it, perhaps, desirable to point out that, although the plants named do not occur in the immediate neighbourhood of Manchester, they are, at no great dis-

tance from it, to be met with in South Lancashire. *Convolvulus arvensis* is common at Newton; and I have also observed it at Keuyon, some two or three miles nearer Manchester; but whether it is equally abundant at the latter place, or extends further in the direction of Manchester, I cannot speak with certainty. *Lamium album*, *Papaver Rhœas*, and *P. Lamottei* occur at Newton, but only sparingly; as also *Arenaria serpyllifolia*. Of the scented Labiatae we have besides *Thymus serpyllum* and *Stachys sylvatica*, *S. palustris* and *Mentha arvensis*. *Ballota nigra* I have not seen.—THOMAS COMBER.

RANUNCULUS CHÆROPHYLOS, L.—I went this afternoon (Nov. 6th) to the S. Aubin's habitat to collect a few plants with their first leaves, three of which I send you. You will be glad to hear that I saw an abundance of the plants.—M. M. BULL. [The plants sent enable me to complete the description of the Jersey plant, by furnishing us with the true root-leaves, which are found in the late autumn. Each plant possesses five or six of these, passing gradually from flabellate with a few large teeth (in form somewhat like those of the plantlets figured in plate 125, but much larger), through rotund with more numerous and irregular incisions, to leaves ovate in general outline, with an evident indication of three deeply cut divisions. The sixth or seventh leaf is truly trifoliate. The leaves described and figured in my paper, at pp. 225–8, are, as there stated, only those of the flowering plant.—[ED. JOURN. BOT.]

TYLOSES.—These are described by German writers under the names Fuellzellen, Thyllen, and Tuellen. I presume the last two are merely different modes of spelling the same word. Tuellen is the plural of the word Tuelle, meaning a socket or nozzle, and the application of the word is evident, as it is well applied to the nozzle-like projections found in the vessel. Sachs mentions them as being well seen in old roots of *Cucurbita* and in the wood of *Robinia pseudacacia*. Dippel (Das. Mikroskop ii. p. 245) figures them in *Vitis vinifera*, one large vessel having several Tuellen, another occupied by a single Tuelle, which at first sight looks like a transverse porous wall to the vessel. Dippel mentions that he has seen them in *Urostigma*, *Nerium*, *Cucurbita*, *Vitis*, *Robinia*, etc. Tyloses does not look a very objectionable word—but what does it mean?—W. R. McNAB.

MISTLETOE ON THE OAK.—At a meeting of the Worcestershire Naturalists' Club, held on Oct. 22nd, Mr. J. Twinberrow announced the discovery of a second mistletoe oak in the county, at Lindridge, near the Shropshire boundary. This makes the fourteenth known example in England.

Extracts and Abstracts.

IPECACUANHA CULTIVATION IN BENGAL.

FROM the Report of the Royal Botanic Gardens, at Calcutta, dated 14th May, 1872, we take the following:—

“At the beginning of the year the total stock of Ipecacuanha amounted to five plants in Sikkim, and seven in this garden. These represented the only surviving offspring of a single plant received from Dr. Hooker, of the Royal Gardens, Kew, in 1866. The five plants in Sikkim were, early in the current year, submitted by Messrs. Gammie, Biermann, and Jaffrey, of the Cinchona plantation, to a most successful experiment in artificial propagation, by which about four hundred cuttings were obtained, the greater proportion of which have formed good roots, and are now fine healthy little plants. At the request of the Right Honourable the Secretary of State for India attention has for some years past been given in Edinburgh to the propagation of Ipecacuanha plants for this country; and during the past year the supplies raised there began to arrive. Five wardian cases, containing about 100 plants, were received from Dr. Balfour, of the Royal Botanical Garden; and three cases, containing 150 plants, from Messrs. Lawson, the eminent nurserymen. In accordance with the orders of the Government of India, based on the results of the experience of the late Dr. Anderson, these plants were forwarded to Sikkim as soon as practicable after their arrival here. The Calcutta climate having proved totally unsuitable to this plant, all attempts to propagate it in this garden have been abandoned, and the cultivation of Ipecacuanha has been accepted, like that of Cinchona, as an experiment which must form an outlaying charge. The plants are at present under the immediate care of the European gardeners of the Cinchona plantation, and propagation is being carried on chiefly in one of the hot, deep valleys of the Rungbee reserve. From what we have been able to learn from observation, Ipecacuanha will apparently thrive best under deep shade, and in a hot, steamy, equable climate. These conditions are supplied most fully in the valleys on the outer slopes of the Sikkim Himalaya which open towards the terai. A fine small valley near Sookna, at the point of entrance into the hills of the cart-road from Silligoree to Darjeeling, has accordingly been taken up as an Ipecacuanha reserve; and, as soon as plants can be spared, small experimental patches will be planted out at various spots, so that the conditions of successful cultivation may be discovered as soon as possible. The recently-acquired Ipecacuanha reserve is within easy distance of Rungbee, and by a very small expenditure on a road, will be readily accessible from the Cinchona plantation. As the experiment proceeds, it will be necessary to put a gardener specially in charge of it, who will have to live at Sookna. In the meantime, it is not of sufficient magnitude to occupy the entire energy of a man, and I would take this opportunity of very respectfully urging that the Right Honourable Her Majesty's Secretary for India be moved to have the Ipecacuanha plants still remaining at Edinburgh sent out as early as practicable; for an increase in our stock plants *now* would multiply indefinitely our capabilities for propagation during the next few years. Hitherto, the plant has not perfected seed in this country, although flowers have frequently been produced; we must therefore look to increase by cuttings and other artificial methods.”

ON THE ORIGIN AND CHARACTERS OF OFFICINAL RHUBARB.

BY H. BAILLON.

Linnæus was acquainted with five species of *Rheum*: *R. Ribes*, *R. rhaponticum*, *R. compactum*, *R. palmatum*, and *R. Rhabarbarum*, which he named afterwards *R. undulatum*. Since the year 1762, *R. palmatum* has been generally considered the source of officinal rhubarb. It was, however, known that during his Asiatic travels, Pallas showed the Bourbaskis the leaves of *R. palmatum*, and that they declared that the leaves were unknown to them, and that those of the true rhubarb were round and with numerous incisions at their edges. Guibourt, nevertheless, believed that this species was the source of the true Asiatic rhubarb of commerce, from the fact that amongst the kinds cultivated by him at Paris, the root of *R. palmatum* had exactly the odour and taste of Chinese rhubarb, although it did not crepitate under the teeth. Planchon, on the other hand, having studied histologically the fragments in the Guibourt Collection upon which this determination had been based, observed that they exhibited none of the distinctive anatomical characters of Chinese rhubarb. The root-structure of *R. Emodi* and other Northern Indian species were known to agree no better. The medicinal product is derived therefore from a species with leaves lobed and palmately nerved, as in *R. hybridum* and *R. palmatum*; but the last has, as described by Linnæus, acuminate and palmate—not orbicular leaves. We may remark, however, that the true rhubarb of China and Russia does not grow as Linnæus supposed “ad murum Chinæ,” but much more to the West; and that, according to the *Punt-San* of the Chinese, its axis resembles that of the Chinese Yam; it is moist, contains a deep yellow substance, and is covered with dark bark. The leaves are also green in the first month (while those of *R. palmatum* are completely bleached), and well developed, the size of a fan, and resembling the leaves of *Ricinus*. This completely proves that the plant producing the true rhubarb was still unknown, which is probable enough when the difficulties are considered in the way of penetrating into the kind of Thibetian sanctuary where the lamas jealously cultivate their semi-sacred plant of which they keep to themselves the production and the profit. Like Boerhaave and Pallas, the most recent European travellers, including those of the Mékong Expedition, have only learnt by report of the portion of Thibet, protected by inaccessible and piled-up rocks, whence caravans brought the drug to China, with the information that it grows towards the west—far from the frontiers of the Celestial Empire. It was only in 1867 that M. Dabry was able to procure plants of the best Thibetian rhubarb; a few buds were alone saved, thanks to the skill of M. Neumann, amongst the mass received by the Société d’Acclimation in the worst possible condition. One of these was planted in the garden of the Faculty of Medicine, where it has succeeded admirably; another was cultivated by M. Giraudeau, in the valley of Montmorency. There the plant soon assumed a magnificent development. It has already produced several times large inflorescences more than 6 feet in height, tapering to a point and covered with white flowers, each with a deeply-hollowed receptacle doubled in size by a green grandular disk. The leaves are of large size,

attaining a length of 5 feet; they have a semi-orbicular limb deeply 5-lobed, light-green in colour, and covered with a fine pubescence. In all these characters they only approach one of the known species—*R. dentatum*, a plant entirely glabrous and referred as a variety to *R. hybridum*. The plant, therefore, hitherto undescribed, deserves the name of *R. officinale*. It might be cultivated without difficulty with us; it supported last winter a severe degree of cold without appearing to suffer the least, and it has already produced an abundant supply of a rhubarb which has all the physical characters of the best Asiatic kind. These characters are the colour, taste, and peculiar odour—the fine, white, and lozenge-like network of the cleaned surface, and the presence in the substance of the fragments of star-like spots described in all the authorities, and which have the structure of a dicotyledonous root. There was no reason to suppose that it would be otherwise, or that any difficulty will be experienced in propagating the plant by means of the innumerable buds which it produces. The aerial portion, conical in form and thick as one's thigh, which furnishes the drug, and which, after the Thibetian manner, has been cleaned, split, and cut into fragments, is nothing more than an aerial stem. The supposed black bark consists of the bases of the leaves and the ocreæ; in the axil of every leaf there is a bud which is available for propagating the plant. Numerous adventitious roots springing from this axis, and having their bases prolonged into the interior of the parenchyma, produce the stellate marks characteristic of the Chinese drug. The roots of the true rhubarb contain, without doubt, in their cellular, cortical, and medullary tissue, and in that of their medullary rays, the active and colouring principle; but these organs are scarcely developed and are represented by the slender cylindrical pieces sometimes sent to Europe; frequently they are speedily decayed through a great part of their length, whilst in other species of *Rheum*, those which furnish the so-called indigenous rhubarbs, it is the root which is especially developed and which is employed. In the true Thibetian kind it is almost entirely the stem, and it is not surprising that it should be characterized by a special structure, which will be, without doubt, a practical and ready means of recognizing and distinguishing the products of inferior quality with which the world is inundated.—[Translated from the Report in the 'Revue Scientifique' of Sept. 1872, p. 279, of the Meeting of the Association Française, at Bordeaux.—W. T. T. D.]

Proceedings of Societies.

SCOTTISH BOTANICAL ALPINE CLUB.—On 2nd August, at the Ogilvy Arms Hotel, Clova, in Forfarshire, a business meeting was held, when the following office-bearers for 1872–73 were appointed:—President, Professor Balfour; Vice-President, Professor A. Dickson; Secretary and Treasurer, Mr. Sadler. On Saturday (3rd), the party visited Glen Dole, and examined particularly the rocks on the left side of the glen, where they collected the rare *Astragalus alpinus*, confined to a single rock, *Mulgedium alpinum*, *Linnæa borealis*, *Pyrola secunda*, *P. rotundifolia*, *P. media*, *Dryas octopetala*, *Erigeron alpinum*, *Malaxis paludosa*, *Carex rupestris*, *Pseudathyrium alpestre*, and many other alpine species. On Monday (5th), they went to

Glen Fee, and explored the rocks on the right side, where they met with *Oxytropis campestris* in considerable plenty, but confined to a single rock, the only spot for it in Britain. Near the same place were collected *Woodsia hyperborea*, *Saxifraga nivalis*, *Salix lapponum*, *Veronica alpina*, *V. saxatilis*, etc. On Tuesday (6th), Jock's Road, White Water, and Little Kilrannoch were visited. Among the plants gathered were *Lychnis alpina* on Little Kilrannoch, about 2900 feet above the level of the sea, the only locality for the plant in Scotland, *Alopecurus alpinus*, *Phleum alpinum*, *Cerastium triviale*, var. *alpinum*, *Cornus suecica*, *Cherleria sedoides*, *Carex rariflora*, *Armeria alpina*, *Juncus castaneus*, *Splachnum vasculosum*, *S. sphaericum*, *S. mnioides*. During the excursion several specimens of diseased grouse were observed, and from one a fine example of the tapeworm was obtained. On Wednesday (7th), a large corrie on the left of Glen Fee was examined. *Carex Grahmi* was found in abundance in a spot about 2000 feet above the level of the sea, according to the aneroid. The plant has only been met with in one other locality in the world. *Carex Vahlia*, another rare sedge, *C. vaginata*, *Sibbaldia procumbens*, *Hieracium alpinum*, *Salix Myrsinites*, *Cochlearia alpina*, were also met with abundantly in the corrie. On Thursday (8th), Loch Brandy and Loch Wharral were visited, and the mountains which surround them. In the lochs were found *Isoetes lacustris*, *Subularia aquatica*, and *Lobelia Dortmanna*, and on the mountains *Potentilla maculata*, *Cerastium alpinum*, *Saussurea alpina*, *Azalea procumbens*, *Sagina saxatilis*, etc. At the top of the mountain called the Snub, immediately above Loch Brandy, there is a tremendous rent which has been for some years gradually increasing in width, so that ere long one half of the mountain will be hurled into the loch below. On Friday (9th), the party broke up.

Botanical News.

ARTICLES IN JOURNALS.

Bulletin de la Soc. Bot. de France, tom. xviii. n. 4 (Séances Dec. 8th and 22nd, 1871).—P. Sagot, "On Cassava."—Col. Paris, "Additions to the Flora of Algeria and Notes on some of the Species."—Miégeville, "Attempt at a revision of the Alpine species of *Artemisia* of the French Pyrenees." (*A. oligantha*, sp. nov.).—A. Posada-Arango, "Note on some Starch-yielding Plants."—Garronte, "Note on *Epipogon aphyllus* near Luchon."—C. E. Bertrand, "Note on the genus *Abies*" (stomata and resiniferous canals of leaves).—A. Pérard, "Supplement of localities of Species in Arrondissement of Montluçon."—P. van Tieghem, "On the oleiferous Canals of Compositæ."—C. Martins, "On the Glacial Origin of the Peat-bogs of the Neuchatel Jura, and of their characteristic Vegetation."*—A. Pérard, "Anatomical Study of *Agropyrum cæsius*, Presl." (Pl. 3.).—A. Posada-Arango, "Note on the *Bejuco de Agua*" (*Tynanthus*, sp. ?)—M. Gandoger, "Revision of the genus *Cratægus*" (*C. oxyacanthoides*,

* An abstract of this is given in *Journ. Bot.*, vol. IX. pp. 338-341.

Thuill., divided into 4, and *C. Oxyacantha*, L. into 15 Jordanic species).

Linnæa (July, 1872).—P. Rohrbach, "Contributions to a knowledge of the Caryophyllineæ" (continued).—W. Vatke, "Labiatae Abyssinicae collectionis nuperrime Schimperianæ enumeratae."—C. De Candolle, "Piperaceæ novæ."

OCTOBER.

Flora.—L. Celakovsky, "Remarks on *Cruciferae*."—S. Kurz, "A new species of *Gironniera* from Australia" (*Sponia* (*Galumpita*) *ilicifolia*, sp. nov.; also *S. (Gironniera) subserrata*, sp. nov. from Sikkim Himalaya).—A. Engler, "On monstrous flowers of *Barbarea vulgaris*, Br." (Tab. IX.).—E. Warming, "Review of Danish Botanical Literature" (continued from *Flora*, 1870).—J. Muller, "Lichenum species et varietates novæ."

Botanische Zeitung.—A. W. Eichler, "Another new genus of Balanophoreæ" (*Bdallophyton*: *B. ceratantherum* (Ewendberg n. 101), and *B. Andrieuxii* (Andrieux n. 40), both from Mexico. (Tab. VIII.).—Vatke, "Notulæ de stirpibus quibusdam novis vel minus cognitis" (*Scutellaria russeliaefolia*, n. sp. (Manila), *S. siphocampyloides*, n. sp. (California, Bridges, n. 226), *Viburnum delicatulum*, n. sp., (Montenegro).—E. v. Freyhold, "On a Peloria-condition in *Tropæolum aduncum*, Sm." (Tab. IX.).—E. Strasburger, "On knowledge of the Root of Gymnosperms."

Hedwigia.—G. Winter, "Pyrenomycetes novi austriaci."—Ibid. "Diagnoses of new Fungi."

Grevillea.—M. J. Berkeley, "Notices of N. American Fungi" (continued).—M. C. Cooke, "British Fungi" (continued).—W. A. Leighton, "Lichenological Memorabilia, No. 2. Lichens of Bettws-y-Coed."

Monthly Microscopical Journal.—R. Braithwaite, "On *Sphagnum neglectum*, Angstrom" (Tab. XXX.).—W. Carruthers, "On the History, Histological Structure, and Affinities of *Nematophycus Logani*, Carr; (*Prototaxites Logani*, Dawson), an Alga of Devonian Age." (Tab. XXXI., XXXII.).

Journ. Quekelt Microscop. Soc.—M. C. Cooke, "Old Nettle-stems and their Micro-Fungi."—C. H. Peck, "Notes on the 'Black Knot'" (a disease of Plum- and Cherry-trees produced by *Sphæria morbosus*, Schw.).

New Books.—Lindstedt, 'Synopsis der Saprolegniaceen,' 8vo, with plates (4s.)—Rehmann, 'Notizen über die Vegetation am Schwarzen Meer,' 8vo (3s. 6d.)—Crépin, 'Materiaux pour servir à l'Histoire des Roses, 2me. fasc.,' 8vo (Ghent).—Baillon, 'Natural History of Plants,' translated by M. M. Hartog, vol. ii. (Reeve and Co., 25s.)—Tuckerman, 'Genera Lichenum, an arrangement of the North American Lichens,' 8vo (Amherst, U.S.A.)—W. Ulrich, 'Internationales Wörterbuch der Pflanzennamen,' 8vo (Leipzig, 5s. 6d.)

The last part (pt. iv., completing the vol. for 1872) of the Copenhagen 'Botanisk Tidsskrift' contains Prof. Lange's 'Review of the new or rare Species of the Danish Flora found in Denmark in the years 1869-71,' a continuation of two previous papers for former periods.

We understand that an English translation of Sach's 'Lehrbuch der Botanik' is in preparation, which is certainly very much wanted.

A third edition of Crépin's useful 'Flore de Belgique' is being prepared by its author.

H.M.S. 'Challenger,' corvette of 2306 tons, Commander G. S. Nares, is about to be despatched by the Admiralty on a circumnavigation of the globe, for the purpose of dredging, sounding, and otherwise scientifically investigating the deep sea. The scientific staff consists of Prof. Wyville Thompson, Director; Mr. J. J. Wild, of Zurich, artist and private secretary; Mr. J. Y. Buchanan, chemist; Mr. H. N. Moseley, Mr. John Murray, and Dr. von Willemoes Suhm, of Munich, naturalists. The expedition is expected to leave in the first or second week of December, and to return in April, 1876. They will visit Madeira, Canaries, Porto Rico, New York, Azores, Cape de Verdes, Fernando de Noronha, Bahia, Cape of Good Hope, Prince Edward's Isle, Crozets, Kerguelen's Land, Melbourne, and possibly sail round New Zealand, thence round N. Australia, follow Wallace's line up to the Phillipines, touch New Guinea, Japan, Kamschatka, Behring's Straits, Vancouver's Island to Valparaiso; thence through the Straits of Magelhaens to Rio, and so home. Though no botanist is attached to the staff, it is understood that Mr. Moseley will collect plants on every possible occasion.

A manifestation in honour of M. B. Du Mortier was held by the botanists of Belgium at the Botanic Gardens, Brussels, on the 13th of October, the 50th anniversary of the publication of his first work, 'Commentationes Botanicae.' M. E. Morren presented to the venerable statesman and botanist, now in his 76th year, a magnificently decorated album, containing the portraits and signatures of the donors, and pronounced a congratulatory address.

The following note has appeared in several of the scientific papers:—
"Much anxiety is felt at Berlin about the fate of Dr. Pritzel, archivist of the Royal Academy and director of that of Sciences, who has entirely disappeared since the first of this month. The belief is that he has been murdered."

Mr. Edward Whymper has arrived at Copenhagen from his second exploration of W. Greenland. He brings with him rich collections of curiosities, and some singular specimens of fossil wood.

The chair of Botany in the University of Copenhagen, vacant by Prof. Oersted's death (his valuable and extensive library was sold by auction on November 9th and following days) is likely to be contested by several Danish botanists. It is, however, anticipated that Dr. Eugene Warming will obtain it. At the time of his death, Prof. Oersted was intending to publish a memoir on the fossil species of oak, and to trace the connection between the living and extinct races in the manner of Unger, but nothing on the subject fit for publication was discovered among his papers.

"The Government of Colombia," says the 'Athenæum,' "has extended the grant to Mr. J. Triana for five years in order that he may be enabled to publish the 'Flora Colombiana' and the 'Botanical Geography of Colombia' in London in the Spanish language."

A letter from Dr. Maximowicz, of S. Petersburg, to Dr. Hooker, states:—"We have received a part of Capt. Pozewalsky's collections in S. W. Mongolia. The most interesting *trouvaille* of his is, no doubt, *Pugonium cornutum*, and a new species of the same distinguished by rose (not white) blossoms and acinaciform processes of the silicle. This

summer he is gone further south towards Thibet, intending either to go down the Brahmapootra, or if not possible to come out to Russian Turkestan, both adventurous journeys. Trautvetter will probably give an enumeration of his plants."

The West Riding of Yorkshire has lost the patriarch of its workingmen botanists in John Bohler, who died at Sheffield, on the 23rd of September, aged 75. He attended specially to Lichens, and about thirty years ago published a fasciculus of specimens, which is duly quoted in Leighton's Handbook. In mosses, he was a correspondent of Wilson and Nowell. He had an excellent practical knowledge of both the flowering and cryptogamic plants of West Yorkshire and Derbyshire, and during many years spent a great amount of time in collecting and making up sets of specimens for sale. He occasionally gave popular botanical lectures and private lessons, and at one time undertook the sessional course at the Sheffield School of Medicine. It is a great pity that his extensive stock of local information was never written out and placed on record.

A plant of the officinal rhubarb, described at pp. 379, 380, has been received from the Société d'Acclimation, at Kew Gardens, and it is hoped that it will flower next year.

ERRATA AND CORRIGENDA.

P. 31, l. 27, *for* "diagrams" *read* diagnoses.

P. 85, l. 29, *for* "fusion" *read* torsion.

—— l. 29 and 30 *for* "adopting the foliage of" *read* adapting the foliage to.

P. 154, l. 21, *for* "Echum" *read* *Echium*.

P. 157, l. 33, *for* "Scheuzeria" *read* *Scheuchzeria*.

—— 37, *for* "Hellreich" *read* Neilreich.

—— 38, *for* "Nieracia" *read* Hieracia.

P. 158, l. 5, *for* "gallata" *read* galeata.

—— 29, *for* "17" *read* 5.

P. 172, l. 36, *for* "Tunbridge Wells" *read* Bath.

P. 179, last line, *for* "Van Heurck of Antwerp" *read* Morren of Liège.

P. 212, l. 36, *for* "ORCHIS" *read* OPHRYS.

P. 218, l. 33, *insert* *Poa* before "alpina."

P. 226, l. 16, *after* "base" *insert* bright golden yellow.

P. 236, l. 36, *for* "L." *read* Desf.

P. 248, l. 42, *for* "Labium" *read* Lamium.

P. 250, l. 34, *for* "Bobertsonia" *read* *Robertsonia*.

P. 266, l. 31, *for* "country" *read* county,

P. 286, l. 18, *for* "Irlande" *read* Ireland.

Pp. 290, 91, 92 *for* "Terka" *read* Zerka.

P. 294, l. 37, *for* "mordine" *read* moraine.

P. 315, l. 43, *for* "Zannechellia" *read* *Zannichellia*.

P. 307, l. 38, *for* "horizontal" *read* erect.

P. 352, l. 20, *for* "Baroo" *read* Barao.

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