Grevillea,
A MONTHLY RECORD OF
CRYPTOGAMIC BOTANY
AND ITS LITERATURE.

EDITED BY M. C. COOKE, M.A.
Author of "Handbook of British Fungi," "Rust, Smut, Mildew, and Mould," &c., &c.

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WILLIAMS AND NORGATE,
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The completion of the first volume of an English Journal, specially devoted to Cryptogamic Botany, enables us to congratulate our readers and ourselves upon the achievement of a task which many friends believed to be impossible. It is, nevertheless, an accomplished fact that "Grevillea" has reached its twelfth number, and its promoters are preparing for another year's campaign. If our subscribers and supporters will but continue their aid, this also we hope to accomplish. The complaint which some have urged, that the Journal is too scientific, will, we hope, be speedily removed, not so much by any considerable alteration in the character of the Journal, as by the assiduity of its readers themselves, whereby increased knowledge and experience will bring to its perusal minds more receptive, because better prepared. A popular journal was never intended, but one which should become valuable—nay, indispensable—to students and adepts in the branches of Botany to which it is devoted. That it has hitherto been too exclusively devoted to Fungi and Lichens is scarcely the fault of the Journal, but results from the fact that these have been less studied than the higher Cryptogamia, and more was necessary to be done to keep pace with the discovery of new species, or the better illustration of old ones. Now that the additions to British Fungi, discovered since the appearance of the "Handbook of British Fungi," have been recorded, and the descriptions furnished, there will be more of our very limited space left free for Bryologists and Algalogists to describe their additions, and also for communications less connected with systematic than physiological Botany. It could scarcely be expected that we should secure the co-operation of all Cryptogamists...
PREFACE.

within the short period of twelve months. Many very reasonable excuses can be made for those who may not be ready at a brief notice to espouse a new cause, or support a new venture; but we hope that when we have demonstrated to them that our Journal has become established, having entered upon its second year, these excuses will vanish. To all who have assisted us so liberally and freely in the past, our thanks are due, not forgetting those who, by subscribing their names, gave us encouragement to venture upon an undertaking which seemed to promise only great losses and no profits. Finally, we commend ourselves and our work to all British Botanists, and urge them, for the sake of so small an annual sum, not to hesitate in giving us their support. It will be an honour to them if they enable us to continue, and even to enlarge and improve a journal of this character, and prove that Britain as well as Germany can sustain a Cryptogamic Journal. Increased support alone will enable us to augment the number of pages, and continue coloured illustrations as hitherto. Our success has been great, and we rely upon the good fellowship of our Botanical and Microscopical friends to make it greater still. The best road to improvement will lie through an augmented list of subscribers.
O the memory of one of the most worthy of British Cryptogamists is dedicated this little monthly record of Cryptogamic Botany. With some diffidence it has been commenced; but with the united support of all students in the different orders its career may be a successful and useful one. What it shall become depends chiefly on the amount of support it may receive. The intention of its projectors is to furnish, month by month, descriptions in English of new species discovered in the British Islands, and to record the habitats of rare or interesting forms, for which purpose communications are solicited; to furnish a record of the literature; and, as far as space permits, descriptions of Exotic species, especially those of the British Colonies and dependencies, and the United States of America, or wherever the English language is spoken. Although the space is limited, it is hoped that structural and physiological subjects will receive attention, and a space will be devoted to the Queries of Correspondents and announcements of desiderata and exchanges. Illustrations will depend, both in quality and quantity, upon the number of subscribers; but it is hoped that at least one plate, sometimes coloured, will accompany each number. It can scarce be expected that such a work will at once assume the character it is desired. Some few months must be expected to elapse before all those who may be interested in Diatomaceæ, Desmids, Lichens, Mosses, or multicellular Algae will find, as well as those interested in Fungi, that each of these branches are intended to be equally cared for, and illustrated. With patience on the part of subscribers, and perseverance on the part of the Editor, it is hoped that, though small and unpretending, "Grevillea" will at least be useful, and not unworthy of the name it bears.
Agaricus (Mycena) subincarnatus. *Peck.*—Gregarious. Pileus hemispherical, convex or expanded, striatulate, of a pale yellow, or flesh-coloured hue, becoming whitish; gills subincarnate, uncinate, decurrent-toothed; stem slender, hollow, white—villous at the base.

—*Report*, p. 83.

Under pine trees. Center and Sandlake. October. Height 1-1 1/2 in.; breadth of pileus 3-6 lines.

Agaricus (Omphalia) oculus. *Peck.*—Pileus thin, convex, umbilicate, generally with a small umbo, or papilla in the umbilicus, minutely squamulose, dingy white, umbilicus blackish-brown; gills white, narrow, close, subarcuate; stem whitish, minutely squamulose, or furfuraceous, hollow, often curved, easily splitting.—*Report*, p. 84.

On prostrate trunks in woods. Adirondack Mts. August. Height 1-2 in.; breadth of pileus 1/2-1 in.; stem 1 line thick.

Agaricus (Omphalia) chryseus. *Peck.*—Pileus thin, convex, at length plane, or slightly depressed, umbilicate, striatulate, minutely squamulose; gills not crowded, rather narrow, yellow; stem nearly smooth, stuffed or hollow, sometimes curved.—*Report*, p. 85.

Old logs in woods. Adirondack Mts. August. Height 1-1 1/2 in.; breadth of pileus 3/4-1 in.; stem 1 line thick. The whole plant is yellow.

Agaricus (Omphalia) scabriusculus. *Peck.*—Pileus thin, broadly convex or expanded, striate, yellow; gills distant, broad, subtriangular, connected by numerous veins, white or pale yellow; stem firm, yellow, minutely squamulose, stuffed or solid.—*Report*, p. 85.

Mossy prostrate trunks in woods. Adirondack Mts. August. Height 1 1/2-2 in.; breadth of pileus 1/2-1 in. The numerous connecting veins between the gills give a wrinkled appearance to the margin of the pileus.

Agaricus (Pleurotus) sulfureoides. *Peck.*—Pileus rather thin, fleshy, convex, umbonate, subsquamulose or smooth, sulphur-yellow; gills moderately close, rather broad, rounded or slightly emarginate at the inner extremity, easily separating from the stem, pale yellow; stem firm, equal, slightly fibrillose, stuffed or hollow, generally curved and eccentric, rarely central, a little mealy—tomentose at the top.—*Report*, p. 86.

On old logs in woods. Catskill Mts. October. Height 1-1 1/2 in.; breadth of pileus 1-2 inches; stem 2-3 lines thick. Becomes paler in drying. The minute scales are brown, but often wanting.
PEZIZÆ AMERICANÆ.

By M. C. Cooke and C. H. Peck.

Peziza (Macropodes) hesperidea.  C. & P.—Stipitate, subsolitary. Cups fleshy, subglobose then patelliform, bright orange within, paler without, smooth, even, \(\frac{1}{2}-1\) in. broad; margin even, smooth; stem slender, straight or flexuose, 1-1\(\frac{1}{2}\) in. long, clad with white down, especially towards the base, scarcely exceeding 1 line thick, equal, sometimes ending in slightly marked veins at the base of the cup. Asci cylindrical, sporidia narrowly elliptic \(0.0009 \times 0.0005\) in. \((0.0225 \times 0.0125\) m.m.\)

Amongst leaves. Goat Island, near Niagara Falls, U.S. (Peck, no. 216.)

More slender and graceful than \(P. coccinea\), and belonging to a different section, since the cup is smooth. We have no knowledge of \(P. occidentalis\), Schw., the cup of which is described as submentose. \([\text{Pl. 1, f. i, nat. size.}]\)

Peziza (Sarcoscypha) floccosa.  Schw. North Amer. Fungi, pp. 172, no. 782.—Asci long, cylindrical, sporidia elliptic \(0.0007-0.0008\) in. long \((0.0175-0.02\) m.m.) \([\text{Pl. i, f. 2, nat. size.}]\)

Peziza (Dasyscypha) Agassizii.  B. & C.—Fasciculate, stipitate, erumpent; cups at length open and infundibuliform, externally clothed with a whitish tomentum; disc flattened, orange; stem rather long. Asci subcylindrical, sporidia elliptic or oval, about two-thirds as broad as long.

On bark of Abies. Allied to \(P. calycina\), sporidia \(0.0025-0.0003\) in. \((0.0065-0.0075\) m.m.) long.

Peziza (Sarcoscypha) pellita.  C. & P.—Sessile, subglobose then expanded, at length splitting in a radiate manner into four or five irregular lobes; externally brown, densely woolly with septate brown flexuous hairs; disk flesh-coloured, with a rufous tinge. Asci cylindrical; sporidia elliptic; paraphyses slightly clavate at the tips.

On soil covering rocks, Adirondack Mts. U. S. \((C. H. P. no. 92.)\)

Cup scarcely an inch broad. Sporidia \(0.0007-001\) in. \((0.018-0.025\) m.m.) long, \(0.0005\) in. \((0.0125\) m.m.) wide. Allied to \(P. lanuginosa\) and \(P. geaster.\) \([\text{Pl. i, f. 3, a nat. size, d hairs magnified.}]\)

Peziza (Dasyscypha) pulverulenta.  Libert.—Somewhat crowded, at first globose, then slightly flattened, whitish, externally villose, hairs pulverulent, with glandular orange tips, stem short, thick; asci clavate; sporidia linear, obtuse.—Libert. exs. no. 125. Rhab. Fung. Eur. no. 514.

On fallen leaves of \(P. rigida.\) New Scotland, N. Y. June. \((\text{Peck. no. 277.})\)

Sporidia \(0.0004\) in. \((0.01\) m.m.) long. Two species are confounded
by authors under this name, *Helotium pulverulentum*, Awd. Rabh. Fung. Eur. no. 1221, differing considerably from the specimens published by Madame Libert, and F. E. 514.

**Peziza (Dasyscypha) subochracea.** *C. § P.*—Sessile, scattered, subglobose, then expanded, margin incurved, cream-coloured, tomentose; disc darker or bright ochraceous yellow, even; asci cylindrical; sporidia narrowly fusiform or subcylindrical.

On stems of *Rubus odoratus*. Adirondack Mts. July. *(Peck. no. 93.)*

Sporidia '0005 in. (‘0125 m.m.) long. [Pl. i, f. 4, a nat. size, b magnified.]

**Peziza (Calloria) assimilis.** *C. § P.*—Gregarious, erumpent, subtremellose, small, dull orange, cups shallow, margin slightly elevated, connivent and retracted when dry; asci subcylindrical, sporidia narrowly elliptic, about one-third as broad as long.

On stems of *Aster punicea*. West Albany. May. *(Peck. no. 278.)*

Allied to *P. fusarioides*. B. & Br. Sporidia '00035 in. (‘009 m.m.) long. [Pl. i, f. 6, a nat. size, b magnified.]

**Peziza (Tapesia) pruinata.** *Schw. Fr. S. M. ii.* 109.—We have failed in all attempts to discover the fruit in this species, and should be glad to learn of better success being achieved by some of our American correspondents.

**Peziza (Mollisia) vincta.** *C. § P.*—Gregarious, sessile, between soft and waxy, irregular, at first subglobose, then expanded, smooth, even, very dark brown, nearly black; disc even, cinereous, very irregular in form and size, attached beneath by delicate brownish hairs, which form a thin arachnoid subiculum, only the margin being free and incurved. Asci subcylindrical, sporidia cylindrical, obtuse, straight or curved.

On old wood. Sandlake, N. Y. Oct. *(Peck. no. 217.)*

Sporidia '0005 in. (‘0125 m.m.) long.

**Peziza (Mollisia) crocitincta.** *B. § C.*—Sessile, scattered, soft, globose, then expanded, saffron-yellow, disc paler, externally smooth, slightly channelled. Asci cylindrical. Sporidia very minute, sausage-shaped, with a yellowish tint. *Rav. no. 1730.*

On wood. [Pl. i, f. 5, a nat. size, b magnified.]

**Peziza (Mollisia) lacerata.** *C. & P.*—Gregarious, globose, then expanded, dark brown, margin coarsely lacerated into subtriangular, irregular teeth, disc cinereous, becoming blackish when dry. Asci subcylindrical, sporidia cylindrico-clavate.

On *Rubus odoratus*. Adirondack Mts. July. *(Peck. no. 94.)*

Similar to *P. escharodes*, B. & Br., except that it is larger, never hairy, and the margin different, sporidia '0005 in. (‘0125 m.m.) long.

Flor. no. 2635.—Sporidia narrowly fusiform, straight or curved, often quadriguttulate, 0.008 in. (0.02 m.m.) long.


BRITISH FUNGI.

By M. C. Cooke.

Since the publication of the "Handbook of British Fungi" a considerable number of additions have been made. Some of these have already been enumerated or described by Messrs. Berkeley and Broome in the "Annals of Natural History;" others we purpose, from time to time, to describe and illustrate, as far as possible, in this Journal. The following belong to the Order Coniothyceae:—

Perithecia simple, fleshy, white; nucleus white; spores oblong, semi-pellucid, white; tendrils greyish-white, sub-diaphanous, short.


In leaves of Menyanthes trifoliata.

Protomyces Ari. n. s. "Arum Protomyces."
Spores aggregated in elongated patches in the substance of the leaves and petioles, always covered, globose, simple, brown, endochrome granular, epispore smooth.

In leaves and petioles of Arum maculatum, Chichester. May, 1872. (Dr. Paxton.)

Hypophyllous. Spots subrotund or confluent and irregular, purple; peridia in subrotund circinate clusters, sometimes irregularly disposed on the nerves and petioles, urceolate; margin lacerated, white; spores orange.—Desm. exs. no. 132. Cooke exs. no. 444.

LICHENOLOGICAL MEMORABILIA.—No. 1.

By the Rev. W. A. Leighton, B.A., F.L.S., F.B.S. Ed.

Pilophoron fibula. Tuck.

This very interesting lichen, which until lately was supposed to be confined to the White Mountains in North America, has been constantly confounded with Stereocaulon condensatum, Ach.; but is readily distinguished by the differences in the spores, those of the former being ellipsoid and simple, and those of the latter fusiform, 3-7-septate. I have myself repeatedly gathered it throughout the Snowdonian district, Nant Francon, the Glyders, Avan Mowddy, and in other parts of North Wales, where it occurs in some abundance; but requires careful observation to detect it, from its close growing habit and the minuteness of its fructification. Dr. Nylander, in the appendix to his "Lichenes Lapponicae Orientalis," mentions it as found by M. Th. Simming at Dianovagora, near Lake Onega. And in looking over some lichens in the herbarium of Mr. Horatio Piggot, of Tunbridge Wells, I detected a remarkably fine specimen with magnificently developed fructification, under the name of St. cereolinum, which he had collected near the Cuchullin Hills, near Sligachan, Isle of Skye, Scotland. If carefully searched for it may be, no doubt, detected in Alpine and sub-Alpine regions throughout the world. Most of English and Scotch localities given for St. condensatum and cereolinum will, on more careful research, prove referable to Pilophoron fibula. See Leight. Lich. Fl., 2nd ed., pp. 469 and 470.

Morocco Lichens.

Dr. Hooker, of Kew, placed in my hands for examination and determination the lichens which he collected in his expedition to Morocco and the Atlas Mountains, in May, 1871. Though few in number they are very interesting, especially from the locality from whence gathered.

They are as follows:—

Cladonia endiviæfolia, Fr. Tangier and Tetuan, North Morocco.
Ramalina calicaris, Fr. Tangier and Tetuan, and Ain-el-Hadjar, North Morocco.
Ramalina evernioides, Nyl. Ain-el-Hadjar, near Mogadore, North Morocco.


Physcia intricata, Desf. On Argan trees, Djebel Hadid, South Morocco, and near Mogadore.

Physcia villosa, Dub. Safi, South Morocco.


Umbilicaria deusta, L.; var. mesenteriformis, Wulf. Mount Tezi (10,000 feet), South Morocco, Greater Atlas.

Squamaria lentigera, Web. Amsmiz (5-6,000 feet), Greater Atlas, South Morocco.

Squamaria cartilaginea, Westr. Amsmiz, Mount Tezi (10,000 feet).

This lichen is found on our shores, near Barmouth, perhaps under 1,000 feet. It has, therefore, a remarkable range in altitude, which is applicable also to several others of these lichens.

Squamaria melanophthalma, Ram. Mount Tezi.

Placodium murorum, Hffm. Mount Tezi.

Placodium aureum, Schler. Beni Hosmar.

Lecanora chlorophana, Ach. Mount Tezi.

Urceolaria ocellata, D.C. Djebel Hadid, South Morocco, near Mogadore.

Dirina repanda, Fr. South Morocco.

Endocarpon Muhlenbergii, Ach. (Syn. 101), Revaia (7-11,000 feet), Great Atlas, South Morocco.

BRYOLOGY.

By Robert Braithwaite, M.D., F.L.S., etc.

The commencement of an English Journal devoted to Cryptogamic Botany must surely engage the attention of all workers in the wide field embraced within the scheme of its operations; and as our opening contribution to the department of Bryology, we offer the latest arrangement of mosses. The well-known merit of the author, and the high character of most of the papers brought before the Society, require no apology for presenting it to the readers of "Grevillea," many of whom might not otherwise have an opportunity of becoming acquainted with it, and we purpose, on a future occasion, to review it more in detail.

This "Moss Picture" will be found in the "Verhandl. Zool. Botan. Gesels. in Wien," vol. xxi., p. 375 (1871).
Das Moosbild. auctore Dr. Ernst Hampe.

SECT. A. SACCOMITRIA.
Archidiaceæ.
Sphagnaceæ.
Andreaæaceæ.

SECT. B. STEGOMITRIA.
1. ACROCARPI.
   A. Cleistocarpi.
       Phascaceæ.
   B. Stegocarpi.
       Funariaææ.
       Splachnaceæ.
       Pottiaceæ.
       Calymperææ.
       Leucobryaceæ.
Weisiaceæ.
   a. Euweisiaceæ.
   b. Seligeriaceæ.
   c. Angstramiaceæ.
   d. Blindiaceæ.
Bartramiaceæ.
   a. Meesiaceæ.
   b. Eubartramiaceæ.
Grimmiaceæ.
   a. Eugrimmiaceæ.
   b. Glyphomitriaceæ.
   c. Orthotrichiaceæ.

Bryaceææ.
   a. Eumniaceæ.
   b. Polytrichaceæ.
   c. Busbaumiaceæ.

2. CLADOCARPI.
   Fontinalaceæ.
   Cryphaceææ.

3. PLEUROCARPI.
   A. Brachycarpi.
       a. Leucodonteæ.
       b. Phyllogonieæ.
       c. Neckeraææ.
   B. Orthocarpi.
       a. Fabroniaceæ.
       b. Pterogoniaceæ.
       c. Pseudo-Neckeraceæ.
       d. Euleskeæææææ.
       e. Daltoniaceæ.
   C. CAMPTOCARPI.
       a. Hookeriaceæ.
       b. Hypnaceæ.

4. AMPHICARPI.
   Gamophylleæ.
   Heterophylleæ.
   Hypophylleæ.

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ON A MINUTE NOSTOC WITH SPORES.

By William Archer.

The appearance of a highly interesting and noteworthy communication from Professor Max Reess conveying a description of certain novel experiments instituted by him on the growth of a Collema from the spores, and giving his views as to the bearing thereof as regards Nostoc,* which I have only just seen, recalls to my recollection a seemingly remarkable, though isolated example of a not uncommon minute aquatic Nostoc brought forward by me at a recent meeting of our Microscopical Club, but not publicly exhibited, from want of time, and since then somehow overlooked to be recorded. I will not attempt on this occasion to give any account of Reess' views, or those of Schwendener, but will reserve my observations thereon for a future communication to this Journal.

Professor Rees' is an abstract of the views already propounded by Professor Schwendener as regards the nature of Lichens, who, in his turn, seems possibly to have had suggested to him the working out of some such idea as he has arrived at, by the alternative conclusion put forward by Professor de Bary as one or other being a necessary outcome or result deducible from the existent knowledge of the gelatinous Lichens (Gallertflechten) or the Collemaceae and allies, and seemingly embracing also Ephebe in his generalisation, which is thus enunciated—"Either the Lichens in question are perfectly developed states of plants whose imperfectly developed forms have hitherto stood amongst the Algae as the Nostocaceae and Chroococcaceae; or the Nostocaceae and Chroococcaceae are typical Algae; they assume the form of Collema, Ephebe, and so forth through certain parasitic Ascomycetes penetrating into them, spreading their mycelium into the continuously growing thallus, and frequently attached to their phycochrome containing cells."* The former of these hypotheses, as is well known, has many supporters, and, seemingly, a considerable amount—at least, in certain instances—of evidence in its favour. The latter hypothesis, on the other hand, has found, if fewer, even more staunch adherents, most prominent amongst whom are Schwendener and Rees, and is in fact that alluded to as being recently put forward by him, relinquishing the views supported by him in the earlier portion of his elaborate memoir on the Lichen thallus.

The little Nostoc to which I have already alluded, and to which I am desirous of directing attention, is a very minute one, though the dimensions of the subglobose or elliptic fronds vary much. It is rather common in moor and certain bog pools. On account of its small size, therefore, readily capable of compression, and its pellucid character, the elegant arrangement of its tortuously twisted rather large moniliform filaments, is often nicely seen, and this causes it to be a very pretty and favourable illustrative example of its type for examination in its entirety under the higher powers of the microscope. Its minute size calls to mind Nostoc minimum (Currey),† but in it the cells are described as quadrat with a sinus at each side, lending a crenate outline to the filaments, and the heterocysts are large, whilst here the cells are orbicular or for a time slightly flattened at the junctions, and the heterocysts are but slightly wider, though longer than the ordinary cells. This plant is probably identical with Nostoc paludosum (Kütz.), though as regards anything to be deduced from the heterocysts Kützing is silent. But the interesting point connected with it is a single example of it having presented indubitable "spores," and precisely similar nature to those in Sphærozyga, &c., but with the peculiarity of

these being always placed singly between two heterocysts. The pairs of heterocysts with the intervening spore occurred at just about the same intervals as in ordinary examples occur the isolated heterocysts; the spores large, broadly elliptic, about one-third longer than broad; their diameter more than twice the diameter of the heterocysts, about thrice the diameter of the ordinary cells; the "bright points" of the heterocysts not very conspicuous.

I would explicitly deprecate any supposition that the observation was founded on any mere isolated filament, met with in the same material as the rest of the ordinary examples of this Nostoc around, and assumed by me to have emanated from some of them, and, therefore, possibly that of some other genus.

The filaments were not isolated, but contorted about in quite the ordinary way, were still involved in the parent matrix, which was bounded by the distinct pellicle, or "periderm," generically characteristic, and in all respects, save the remarkable speciality described, this example was absolutely the same as the others in the same gathering; in fact, the little Nostoc was intact. It might be said, possibly, this little plant was rather a Monormia, but the definite periderm to the rounded fronds places a bar to the assumption, and I do not think any observer would see it and pronounce it other than a Nostoc.

In making a drawing for illustration it is of course unnecessary to present more than one spore, with its adjacent heterocysts and a few cells of the filament. To give the total frond and its long, tortuously looped and curved filaments, with their numerous spores and heterocysts, and to convey an idea of the matrix, with the bounding periderm, would have been an unnecessary labour and expense, and to carry it out on the scale of some 400 diameters would have occupied a very considerable space.

The interest which attaches to this example of a spore-bearing Nostoc will be more apparent after reading my observations on Recess' views, which will follow, and which are necessarily excluded here on account of the limited space at my disposal.

**Australian Fungi.**—Mycologists will be glad to learn that the last number of "The Journal of the Linnean Society" (No. 67, for May), contains a valuable communication by the Rev. M. J. Berkeley, on Australian Fungi. In addition, we may observe that the same number contains a communication by Dr. Dickie on the Marine Algae of the Island of Saint Helena, and two communications by Dr. S. O. Lindberg on *Mesotus* (Mitten) and *Zoopsis* (Hook and Thom.).
CHICAGO HYDRANT WATER.

From a communication on this subject, by H. H. Babcock, in the second number of "The Lens" (Chicago, U. S.), we extract the following observations:

"Some species of diatoms, as Tabellaria fenestrata and Fragilaria Crotonensis, produced in abundance all along the shore of the Lake, are always to be found in the hydrant water. Surirella splendida, Cymatopleura solea, Stephanodiscus Niagare, Asterionella formosa, and a Cymbella, which one may sometimes observe in a shore gathering, are occasionally present. A Melosira, identical with that found in small streams flowing into the lake at Glencoe, is often seen; Pleurosigma attenuatum more rarely; while Pleurosigma Spencerii, Amphipora ornata, and a Rhizosolenia are the rarest species.

"In a word, we receive through the hydrants many of the free, unattached forms, known to be produced along the lake shore, and on streams entering the lake to the north of the city, as well as a few species whose origin has not been determined; while the stipitate or otherwise attached forms, as Gomphonema and Synedra, though growing in abundance in the vicinity, are seldom represented.

"I am led to believe that the streams of Northern Illinois, Wisconsin, and even Northern Michigan, are the source whence we obtain some of the diatoms most rarely observed in the hydrant water; and that these forms, coming within the influence of the southerly current of the lake, are brought as far as the crib which stands within the current, but near its easterly edge. In a gathering made at the mouth of the Carp river, a stream of Northern Michigan, nearly opposite the island of Mackinac, I have found an abundance of Pleurosigma attenuatum and Spencerii, Surirella splendida, and Amphipora ornata. It is probable that other streams in the vicinity, and to the southward of that named, produce the same species, which, specifically light, are borne by the current as far as Chicago, and that the reversal of the course of Chicago river has caused the lake current opposite the city to swerve slightly towards the west, and admitted to the crib the pure water from the deeper, undisturbed part of the lake.

"Whether the river or lake current, or, as I am inclined to believe, both combined, are the source of these organisms, there seems to be no doubt that so long as there is kept up in the river a moderately rapid current from the lake, the city will be provided with water more nearly approaching in purity that at Mackinac and Lake Superior, which is remarkable for its transparency."
RHIZOSOLENIA ERIENSIS.

Rhizosolenia Eriensis. H. L. Smith.—Frustules small, compressed, somewhat flattened; not rigidly siliceous, 6-12 times as long as broad; length .003-.006 in. Annuli on the dry frustules conspicuous, apparently interrupted in the middle, and alternate; obscure in fluid or balsam. Frustules finely striated. Bristles nearly as long as the frustules, and, with the calyptra, excentric, lying nearly in a line with one margin of the frustule when the flat side is in view.

Chicago (U.S.) water-supply; very abundant at certain seasons, and very rare at others. Originally noted in Lake Erie, at Cleveland, O.—S. A. Briggs in “the Lens,” for Jan., 1872.

NEW AMERICAN POLYSIPHONIA.

The following species is described as new, by C. H. Peck, in his Report for 1869, just issued.

Polysiphonia subcontorta. Peck.—Tufts rigid, 2-3 in. high, loosely entangled, dark red; filaments slender, naked below, alternately, and sub-distantly branched above; branches short, subequal, naked at the base, much branched above, and expanded into a rigid subsquarrose bushy tuft of ramuli, which are subfusiform and more or less curved or contorted; tubes four, surrounding a small central one; articulations of the leading filaments 6-10 times, of the branches 2-4 times their breadth, those of the ramuli shorter than broad; tetraspores in the swollen part of the ramuli.—Report, p. 51.


The filaments are about as thick as hogs’ bristles, nearly equal in thickness throughout, constituting a leading stem, with its articulations distinct and very long towards the base, and giving out its branches, which are four or five lines long at intervals of 3-4 lines. The plant becomes blackish in drying, and does not adhere closely to paper. In size, consistency, and coloration this species resembles P. fastigiata; but in ramification, number of tubes, length of articulations, etc., it is far removed from that species.

American Desmids.—The seven new species of Desmids described by Dr. Wood in the “Proceedings of the Academy of Natural Sciences,” at Philadelphia, are named by him,—Euastrum multilobatum. Euastrum ornatum, Arthrodesmus quadridens, Staurastrum minutum, Staurastrum Lewisii, Cosmarium suborbiculare and Pleurotaenium breve. Descriptions in Latin, with measurements, will be found in Hedwigia for 1872, No. 1, p. 3.
New Hepaticæ.—The following new species of North American Hepaticæ are described by C. F. A. Austin in the Bulletin of the Torrey Botanical Club, for March, 1872:—Sarcoscyphus Bolanderi, Sarcoscyphus Baecki, Scapania Oakesii, Jungermannia crenuliformis, Jungermannia Wattiana, Jungermannia Sullivantii, Jungermannia Gillmani, Sphagnoecetis Macounii, Madotheca Bolanderi, Madotheca Sullivantii, Lejeunia Sullivantii, Frullania Wrightii, Frullania Sullivantii, Frullania pendula, and Fimbriaria violacea. We regret to see that the "complimentary fever" is raging so strong across the Atlantic; here are eighteen new species, of which no less than twelve have "complimentary" names, the same individual being four times immortalized.

Dimorphic Diatoms.—Last October (1871) I collected in the salt water at Helle Gat, North end of Norfolk Island, a Melosira, which was in part M. nummuloides and part M. Borreri, as Smith defines and figures. I have for some time expected that these two forms were only one species. In September (1871) I collected in a small stream on Union Hill, N. J., Gomphonema constrictum, capitatum, acuminatum, and cristatum, all on the same stalk. Also sporangia (?) of Melosira varians, different from any I have ever seen before, they are like little "dumb-bells," consisting of two globes united by a short isthmus. Hydrodictyon utriculatum is very common around New York.—Arthur M. Edwards, M.D., Newark, N.J.

Alphonse de Brebisson.—The death of this veteran cryptogamist took place at Falaise on the 26th April last, at the advanced age of 74 years. It is with regret that we shall be deprived of his promised assistance, that we make this announcement. Another of the contemporaries of Smith, Greville, and Walker Arnott has finished his course. A large and valuable collection of some thousands of slides of Diatomaceæ, the accumulation of an active life, is to be disposed of by his son, M. René de Brebisson. It is to be hoped that some Microscopical Society, or public institution like the British Museum, will secure the collection in its entirety.

Dr. M. A. Curtis.—The death of the Rev. Dr. M. A. Curtis, of Hillsborough, North Carolina, U.S., leaves a blank in the short list of North American mycologists which we fear will not soon be so efficiently filled up.

CRYPTOGAMIC LITERATURE.

Mycologische Berichte, by Dr. Hermann Hoffman, Professor of Botany at Giessen. Part iii., for 1871, contains abstracts of contributions to Mycological Literature, during the year 1871.


Podisoma. A communication on the supposed Fungus on Coleus leaves, and notes on Podisoma, by Henry J. Slack, F.G.S., is published in the “Monthly Microscopical Journal,” No. 41, for May, 1872.

Mycologia Europæa, by Gunnermann and Rabenhorst. Parts 8 and 9 contain plates of the Agaricini.


Journal of the Linnean Society, No. 66, contains “Bryological Notes,” by S. O. Lindberg, M.D., with descriptions and synonymy of Hypnum Teesdalei (Sm.), Hypnum curvisetum (Brid.). The synonyms of Clasmatodon parvulus (Sull.), Clasmatodon perpusillus (Lindb.), and Clasmatodon Bertramii (Lindb.); and also descriptions of Fabronia Schimperi (De N.), and Fabronia pusilla (De N.).

† Contribution to the Biology and History of the Development of the Ustilagineæ, by Dr. Fischer von Waldheim, translated for the “Transactions of the New York State Agricultural Society,” for 1870, and just published at Albany, N. Y. It is a translation of the memoir published in Pringsheim's "Jahrbucher," for 1869.


No. 2. [August, 1872.

Grevillea,
A MONTHLY RECORD OF CRYPTOGAMIC BOTANY, AND ITS LITERATURE.

NEW-YORK FUNGI.
Described by Charles H. Peck.

The following are in continuation from page 4.

Agaricus (Pleurotus) serotinoides. Peck.—Pileus fleshy, thick, firm, convex above, minutely punctate-tomentose, slightly viscid when young or moist, the margin usually incurved; gills close, determinately ceasing, some of them forked, white or yellowish; stem lateral, short, thick, scarcely distinct when viewed from above, yellow and tomentose beneath.—Report, p. 86.


Caespitose, imbricating, or solitary, 1-2 in. broad, grayish brown, variously modified with yellow and greenish or olivaceous hues; edge of the gills sometimes discoloured and slightly floccose.

Agaricus (Entoloma) strictior. Peck.—Pileus thin, submembranaceous, broadly convex or expanded, umbonate, smooth, shining, hygrophanous, striatulate, grayish-brown; gills rather broad, rounded or deeply emarginate at the stem, pale, flesh-coloured; stem straight, equal, or very slightly tapering upward, nearly smooth, hollow, with a dense white mycelium at the base.—Report, p. 88, t. ii., f. 6-9.


Height 2-4 in., breadth of pileus 1-2 in., stem 1-2 lines thick.

Agaricus (Clitopilus) Noveboracensis. Peck.—Pileus fleshy, thin convex, then expanded or slightly depressed, with the margin recurved, dingy white, cracking into areas, or concentrically rivulose, sometimes obscurely zonate; gills close, narrow, long decurrent, some of them forked, white, at length dingy, tinged with yellow or flesh-colour; stem concolorous with the pileus, equal, solid, smooth, with white mycelium, and brittle branching white rootlets.—Report, p. 89.


Agaricus (Pholiota) temnophyllus. Peck.—Pileus fleshy, hemispherical, then convex, smooth, dull yellow; gills very broad, attached, obliquely truncate at the inner extremity, brownish-ferrugi-
nous; stem equal, smooth, white, hollow, annulate; ring membranaceous, white, dusted with the brownish-ferruginous spores.—Report, p. 90.

Grassy ground by road sides. Sandlake. June.
Height 2-4 in.; breadth 1½-2 in.; stem 3-4 lines thick.

Agaricus (Flammula) Hallianus. Peek.—Pileus thin, hemispherical or convex, smooth, hygrophanous, watery cinnamon, with the margin obscurely striatulate when moist, dull yellow when dry; gills close subarenate, slightly decurrent, tapering to a narrow point at the outer extremity, and ceasing before the margin, cinnamon colour; stem equal, slightly fibrillose, hollow, with a slight ring, reddish-brown.—Report, p. 90.

Height 2-3 in.; breadth 1-2 in.; stem 2-3 lines thick. Taste a little bitter.

Agaricus (Naucoria) vernalis. Peek.—Pileus thin, fleshy, convex, then a little depressed, with a deflexed margin, umbonate, hygrophanous, dull yellow, darker when moist; gills narrow, attached, cinnamon colour; stem long, flexuous, striato-sulcate, hollow, tapering downwards, white-villous at the base, brownish.—Report, p. 91.

Height 2 in.; breadth 8 lines 1 in.; stem 1 line thick.

Agaricus (Naucoria) lignicola. Peek.—Pileus thin, convex, umbonate, smooth or slightly fibrillose, hygrophanous, watery cinnamon, and the margin striatulate when moist, dull yellow when dry; gills narrow, close, attached, cinnamon colour; stem slender, equal, hollow, slightly fibrillose, firm, mostly curved, reddish-brown.—Report, p. 92.

Height 1-2 in.; breadth ½-1 in.

Agaricus (Naucoria) fulvus. Peek.—Pileus thin, convex, then expanded, umbonate, tawny yellow, darker when moist; gills broad, emarginate, decurrent-toothed, cinnamon coloured; stem equal, solid, subflexuous, a little paler than the pileus.—Report, p. 92.

Height 1-1½ in.; breadth 4-8 lines.

Agaricus (Naucoria) autumnalis. Peek.—Pileus thin, fleshy, convex, smooth, hygrophanous, watery cinnamon, and marginally striatulate when moist, dull yellow when dry; gills close, slightly emarginate, spuriously decurrent-toothed, easily separating from the stem, yellowish, then cinnamon colour; stem slender, equal, hollow, fibrillose, paler than the pileus.—Report, p. 92.

Often caspitose, sometimes with a trace of a ring.

Agaricus (Naucoria) curvomarginatus. Peek.—Pileus, thin, convex, smooth, reddish-yellow, margin paler, reflected, extending beyond the gills; gills subventricose, emarginate, decurrent-toothed,
pale yellow or whitish, with a flesh-coloured tinge; stem equal, solid, wavy, with a whitish silky lustre.—Report, p. 22, t. ii. f. 1-5.

In mossy places in woods. North Elba. August.

Height 2-3 in.; breadth 4-6 lines.

Agaricus (Hebeloma) subochraceus. Peck.—Pileus thin, conical or convex, sometimes expanded, generally umbonate, fibrilloso-squamulose, pale ochraceous-yellow; gills rather broad, attached, emarginate, whitish, becoming brownish-yellow; stem equal, whitish, slightly fibrillose, solid.—Report, p. 96.

Ground in groves and open plains. Sandlake and West Albany.

June—Oct.

Height 1-2 in. breadth 9-18 lines.

Agaricus (Hebeloma) sarcophyllus. Peck.—Pileus fleshy, short and obtusely conical or convex, smooth, white, margin incurved; gills broad, not crowded, attached, deeply emarginate, dingy flesh-colour; stem equal, smooth, white, firm, stuffed, mealy-squamulose above; spores smooth, very dark, ferruginous.—Report, p. 96, t. i. f. 7-11.


Height, 1-2 in.; breadth, ½-1½ in. Taste slightly bitter.

Agaricus (Psalliota) Johnsonianus. Peck.—Pileus fleshy, soft, brittle, broadly convex or expanded, smooth, white; disc yellowish; margin thin, sometimes purplish stained, when moist striatulate; gills close, rounded behind, nearly free, white, then brown; stem equal, smooth, annulate, solid, slightly striate at the top; ring white, tumid, stained with the brown spores.—Report, p. 98, t. iii. f. 4-6.


Height, 2-4 in.; breadth, 2-4 in.; stem, 3-5 lines thick. Has a sweetish, nutty flavor.

Agaricus (Hypholoma) perplexus. Peck.—Pileus fleshy, convex, then expanded, often broadly sub-umbonate, smooth, yellow, the disc red or brownish-red, margin paler; gills not broad, rounded behind, easily separating from the stem, pale yellow, then greenish-tinged, finally purple-brown; stem subequal, firm, slightly fibrillose, hollow, yellow-reddish at the base; flesh white; spores purplish-brown.—Report, p. 99.


Height, 2-3 in.; breadth, 2-3 in.; stem, 2-3 lines thick. Taste mild.

Agaricus (Panaeolus) solidipes. Peck.—Pileus firm, at first hemispherical, then sub-campanulate or convex, smooth, whitish, the cuticle at length breaking up into dingy-yellowish, rather large, angular scales; gills broad, slightly attached, whitish, becoming black; stem firm, smooth, white, solid, slightly striate at the top; spores very black, with a bluish tint.—Report, p. 101, t. iv. f. 1-5.

BRITISH FUNGI.
By M. C. Cooke.

Hyphomycetes.

**Volutella roseolum.** Cooke. "Rosy Volutella."

Stem distinct, whole plant rose-pink; stroma subglobose, crowned above with obtuse cylindrical spores, surrounded by long flexuous, septate, attenuated, hyaline setæ.

On *Bilbergia*. Glasnevin. (W. S. Keit.)

Evidently allied to *Chaeotostroma stipitatum*, Corda.

**Volutella stipitatum.** B. & Br. "Stipitate Volutella."


"This belongs properly to the genus *Volutella*."—B. & Br.

**Epicoccum micropus.** Corda. "Small-stemmed Epicoccum."

Gregarious; tufts effused, black; stroma subglobose, then depressed, reddish-brown; casidia emergent, clavate, transversely septate, brown; spores subglobose or tetrahedral, base depressed, apodal or very shortly pedicellate, smooth, brown.—*Corda Ic. iii. f. 82. B. & Br. Ann. N.H. no. 1313.*


**Spondylocladium.** Preuss.

Hyphasma creeping, septate; fertile flocci erect, simple or somewhat branched, septate; spores homogeneous, cellular, laterally opposite or verticillate.—*Preuss in Sturm. D.F. vi. p. 105.*

**Spondylocladium fumosum.** Preuss. "Smoky Spondylocladium."

Tufts effused, black; hyphasma branched, septate; flocci simple, septate, erect, pellucid, brown, bearing three or four spores in a verticillate manner from the upper septa, spores subfusiform, brown, with the endochrome twice divided.—*Preuss in Sturm. D.F. no. 35, t. 53. B. & Br. Ann. N.H. no. 1314, t. 18, f. 7.*

On rotten sticks. Batheaston. March. Spores 0.001 in. long, 0.004-0.005 in. wide.

**Graphium stilboideum.** Corda. "Cabbage stalk Graphium."

Gregarious; stem erect, subulate, simple, black, opaque; head of spores glutinous, whitish, then livid; threads simple, whitish; spores ovate, oblong, pellucid.—*Corda Ic. ii., f. 69. B. & Br. Ann. N.H. no. 1315.*

On cabbage stalks. Batheaston. April, 1869. Spores 0.002-0.004 in. long.

**Peronospora entospora.** B. & Br. "Clavate Peronospora."

Fertile threads simple, clavate, surmounted by a crown of apiculi, bearing the ellipsoidal conidea, each of which papillate at the apex; endochrome granular. Oogonia yellowish, subglobose, tuberculate.

On Erigeron canadense. Wimbledon. June. Resting spores echinulate 0.001 in. diam. (M.J.B.)

Peronospora Lam.ii. Brown. "Dead nettle Peronospora."
Fertile threads short, 5-7 times dichotomous, branches attenuated, patent, all more or less arcuate, ultimate ramuli often elongated and acutely subulate. Conidia pedicellate, globose or ovoid, quite obtuse, membrane pale violaceous. Oospores slightly brown.—Rabh. Myc. ii., no. 325. De Bary Ann. Sc. Nat., 1863, xx., p. 120.


Forming dense, irregular, effused, bright orange tufts, sometimes several inches in length. Hyphasma creeping, branched, robust, septate, surmounted by simple or branched moniliform threads, which break up into subglobose or elliptical spores; endochrome granular.—Cooke exs. no. 448.


Endodesmia. B. & Br.
Forming little tufts; flocci shining, glaucous, smooth, without septa, slightly curved; spores concatenate, uniseptate, elliptical, appendiculate at each extremity.—B. & Br. Ann. N. H. no. 1318 (1871).

Spores 0.004-0.005 in. long, 0.002 in. wide.—B. & Br. Ann. N. H. no. 1318, t. xx. f. 9.

On cabbage stalks. Batheaston. April.

Acremonium ranigenum. B. & Br. "Frog Acremonium."
Stem composed of the aggregated flocci; tips elongated, free; spores agglomerated, globose, echinulate, shortly pedicellate.—B. & Br. Ann. N. H. no. 1319, t. xviii. f. 10.


Stem composed of a multitude of septate threads, of a delicate lemon-yellow, which diverge upwards and form a subglobose head; the threads give origin on all sides to globose spores crowded so as to form little masses. Spores 0.0004 in. diameter.
RECENT OBSERVATIONS ON COLLEMA, &c.,
BRIEFLY CONSIDERED.

By William Archer.

As promised in the preceding number of this journal, I purpose setting forth, as briefly as possible, the views of Schwendener and Recess (page 11) on Collema, &c. Relinquishing the opinions supported by him in the earlier portions of his elaborate memoir on the Lichen-thallus,* Schwendener, before he concludes, propounds the doctrine that not only are the "Lichens" in question (the Collemaceae, alluded to by de Bary) no "Lichens," but that the whole class, without exception, fall under the same category; that is to say, that each is to be regarded as some one or other Algal-type which has become, as it were, the home or residence of a parasitic growth—the combination of the two being, in point of fact, the so-called Lichen. His views on the question the author has given more at large, in relation to various types, in a subsequent memoir.† These he states generally thus:—"As the result of my researches all these growths [Lichens] are not simple plants, not individuals in the ordinary sense of the word; they are rather colonies, which consist of hundreds and thousands of individuals, of which, however, one alone plays the master, whilst the rest, in perpetual captivity, prepare the nutriment for themselves and their master. This master is a fungus of the class of Ascomycetes, a parasite which is accustomed to live upon others' work; its slaves are green algae, which it has sought out, or indeed caught hold of, and compelled into its service. It surrounds them, as a spider its prey, with a fibrous net of narrow meshes, which is gradually converted into an impenetrable covering; but, whilst the spider sucks its prey and leaves it lying dead, the fungus incites the algae found in its net to more rapid activity—nay, to more vigorous increase. . . . If this mode of illustration be permissible, this fungus forms a remarkable contrast not only to the predatory and murderous spider, but, in quite an analogous way, to the vine and potato-fungus, as well as all other fungi which vegetate in living organisms, and destroy their host-plant, or host-animal, in the unequal struggle."‡ Such, "popularly" expressed, is Schwendener's view as to "Lichens" at large, which he now holds and supports. This quotation, I would venture to suggest, would seem sufficiently to convey its own refutation of the hypothesis, inasmuch as this assumed parasitic fungus does not destroy or live upon its assumed algal-host. If the "parasite" cannot be a "fungus" it must be something else—that something else no more nor less than the veritable "lichen," though it may be, indeed, but in part represented; though, of

† Dr. S. Schwendener—"Die Algentypen der Flechtengonidien," Basel, 1869.
‡ Schwendener—"Die Algentypen," etc., p. 3.
course, on all hands it is agreed that Lichens and Fungi, save the
gonidia, have between them no absolute line of demarcation.

Seemingly at first more impressed with the applicability of the
theory to the Collemaceae, though he no doubt afterwards accepts
its complete tenability as regards the whole class of the "Lichens,"
Reess conceived the idea of "sowing" the spores of Collema upon
the substance of Nostoc, and a description of the experiment and
its results forms the subject of his memoir previously alluded to.*
He states, indeed, that the spores of Collema can be readily enough
made to germinate upon any moist substratum, such as a glass-plate,
stones, and so on, and will slowly produce even a branched and
sparsingly jointed growth, but this goes on only so long as the reserve-
stuff is supplied by the spore, but when this is exhausted the hypha-
mass thus produced, though it may survive even weeks, will then
slowly die off. But when he brings a spore or the young hypha
upon the Nostoc, it at once becomes further developed, sending more
or less copiously through its surface many branches, and penetrat-
ing within. Soon, however, they cease to increase in length, be-
come swollen at the points and at other places, and become attached
by these swellings upon the Nostoc. Thereupon thinner processes
become sent further into the gelatinous mass of the Nostoc, from the
swellings; these become branched, and, tortuously surrounding the
chains of gonidia, form, in fact, the "Collema-mycelium," and the
complete transformation or conversion of the "Nostoc" into the
Collema is brought about by the hypha producing a peripheral
stratum of fibres, from which break forth, through the "Nostoc-
jelly," the first root hairs. Such an artificially produced "Collema"
the author had not been able to rear up as far as the production of
fructification (apothecia), but he doubts not the tenability of the
assumption that every Collema in free nature is a "Nostoc," thus
made the nidus for the development of the spores, evolved of course
from a preceding "Nostoc" so naturally inoculated (as one might
say), i.e., in other words, a preceding compound organisation which is
known as "Collema." Such is, as brief as possible, the result of
Reess's experiences, and the views he holds; it would far exceed
the limits available in these pages to go more closely into the
arguments and statements of Reess and Schwendener—those of
the latter applied to the Lichens at large, not the Collemaceae only
—but it may not be wholly without use to have directed attention
to their remarkable memoirs.

Basing his opinion, as it would seem, at least mainly, upon the
result of the experiments of Professor Reess alluded to, Professor
Cohn† would exclude the Collemaceae from the Lichens, which
(without these), as a Class, he would retain, remarking that "he

* Prof. Reess—"Ueber die Entstehung der Flechte Collema glaucescens,
Hoffm. durch Aussaat der Sporen derselben auf Nostoc lichenoides, Vauch." in
† Prof. Dr. F. Cohn—"Conspectus Familiarum cryptogamarum secundum
knows no Algae which could be transformed by the influence of a fungus into Usnea, Cladonia, Cetraria, etc., but that it appears to him that the parasitism has been rendered by de Bary and Reess extremely probable for the 'Collemae.'"

Schwendener himself, in his later memoir,* figures certain Nostoc specimens whose gelatinous matrix is seen to be penetrated by what he denominates fungal threads (Pilfsaser), and these he points to as evidence of the truth of his view; that is, that they become the hypha, and that the phenomena of growth thereby induced absolutely convert the "Nostoc" into "Collema;" and he firmly holds his figures prove the case. Now, Reess, referring to these very figures, conceives the fungal threads depicted must be strictly those of a (destructive) fungus—a mould, in point of fact; he thinks, indeed, they may be anything whatever, but one thing clearly he avers, be they what they may, they are by no means a Collema-hypha, founding his opinion, of course, upon the knowledge gained from his recently conducted experiments. So that whatever may be the opinion of other observers as to the result of the researches of Reess, at least the examples adduced by Schwendener relating to Collema, it would appear, must be held as inconclusive.

It may, perhaps, be not inopportune to observe that, as must be well known, the gelatinous masses of those Algae which grow on wet rocks and such situations, be they Palmellaceous or Chroococcaceous, are prone to be more or less permeated by "mycelioid" threads, and even some such as would fairly well accord with those Reess depicts for Collema, though not so copiously branched, may not be unusual. Some of these threads are, at least occasionally, those of indubitable (devastating) fungi, which, when they "attack" certain cells, destroy them; other threads, doubtless quite distinct, can apparently live independently and innocuously, though probably drawing nutriment from the common mucous matrix. What a monstrous and abnormal "Lichen-thallus" thus not unfrequently comes to view—a variable "hypha" interruptedly running hither and thither, and accompanied by "gonidia" of very heterogeneous character! The plant named by Kützing, Trichodictyon rupestre, which can hardly be doubted to be the same as Cylindrocystis crassa, de Bary, is frequently (though not always) accompanied by a number of fine filaments (which seem, however, to be inarticulate), twisted in and out through the gelatinous mass made by the alga, but so running as to leave rounded spaces between containing the groups of the Cylindrocystis-cells; they seem, in fact, to urge their way between the more dense mucous envelopes formed round the groups of dividing cells, simply because they find the intervals, being softer, more readily permeable. These filaments, whatever their nature really may be, cannot be doubted I should think to be foreign, though they were actually introduced into the generic

characters by Kützing, being considered by him as somehow a portion of the structure of the alga, which, indeed, itself reproduces by conjugation, and is, no doubt, in fact, a desmid.

Schwendener claims as the foundation or basis for the production of "Collemaceae" only such nostochaceous plants as live in moist or wet habitats—the entirely aquatic forms (Trichormus, Sparerozyga, Cylindrospermum, Dolichospermum), he considers, being inaccessible under water, are protected from the attack of the parasite, and thus "cannot enter into the 'gonidia question.'" The fact that these latter form independent "spore-cells" (reproducing the plant), he would seem, so far as we can judge, to hold as having no material, if any, bearing on the question, for he dwells only on their being submerged as giving them an immunity. "But in any case," he says, afterwards, further on, as regards the question, "whether certain species of Cylindrospermum pass into the 'gonidia state' [that is, become the basis of Collemaceae] remains for so long doubtful, till the transition, here alone decisive, be observed. In the Collema-thallus itself a decision is of course no longer possible, since the spores characteristic of Cylindrospermum apparently just as little come to development in the gonidial state, as do the 'manubria' of the Rivulariae." (This last allusion has a bearing on Lichina, &c., which the author thinks have plants appertaining to Rivulariæ for their basis, but without manubria.)

I would venture to suggest were such Algae as these truly seized upon by this completely innocuous parasite—nay, which, if the hypothesis be true, rather tends to favour the growth and vigour of the "gonidia"—we should hardly expect that, on the other hand, the innate or inherited tendency to produce "spores" would at the same time become wholly extinguished. It would, I should venture to suppose, seem probable, even admitting the views of Schwendener and Reess as regards Nostoc, that Cylindrospermum is not likely to have anything to say to the "gonidia question." But the isolated observation, for the first time recorded in the preceding brief communication,* would seem to show that Nostoc, too, may form spores, though it be, indeed, so very exceptionally, and so extremely rarely.

The main object, then, of the present communication is to offer the following three suggestions which occur to me:—

1. To suggest the possibility that, if we may conceive Dolichospermum, &c., excluded from the "gonidia question" as forming special fruit (that is, "spores"), so might we regard Nostoc as excluded, though its formation of spores be so extremely rare. Seemingly, indeed, the formation of spores by an algal species, supposed to become occasionally lichenized, is not a reason against the hypothesis as viewed by Schwendener—he only assumes that such an example of the alga surrenders, or leaves in abeyance, its tendency to the production of spores.

2. To suggest that there are veritable lichens which live submerged, and produce their apothecia. I presume, however, it might be replied that such may have received their inoculation by the parasite during some season of drought, when the _algæ_ lay "high and dry."

3. To suggest the possibility that the spores of Collema, if "sown" on some other gelatinous substratum, besides that of _Nostoc_—say, for instance, a Palmella or Mesotænum—might equally well germinate, penetrate therein, and develop a hypha. There seems, I venture to think, no _à priori_ reason against this supposition—inside the _Nostoc_, the "reserve-stuff" of the spore being exhausted, and the chains of _Nostoc_ filaments admittedly intact, the only next immediate source of nutriment for the growing hypha would, I imagine, in the experiment of Reess, appear to have been the " _Nostoc-jelly."

Now a "Palmella-jelly," or a "Mesotænum-jelly" (both aërial, that is, not under water), would seem in themselves to be possibly just as likely to afford the requisite _pabulum_ for the germinating and growing _Collema_-spore. If this conjecture should be borne out, which I would indeed put with all diffidence, what would be the result of Reess's experiments, or, rather, what proven thereby? Such a combination (_if_ capable) with a Palmella or a Mesotænum would not be " _Collema," because it would not have "nostochaecous" gonidia, nor the characteristic periderm. If, indeed, we might for a moment assume that which direct experiment alone could prove, and a germination of spores and penetration of the hypha of a _Collema_ with a Mesotænum effected, such a " _lichenthalus_" would be, I apprehend, unprecedented—a hypha _like_ other lichen-hyphae, no doubt (but _known to be that of a_ _Collema_), with large elliptical or cylindrical "gonidia" containing a central "chlorophyll-plate," and which would probably (in free nature at least) go on and produce _zygospores_!

I trust that the readers of these and my foregoing remarks will understand that I put them forward but with great diffidence; it was the occurrence of my little spore-bearing _Nostoc_, which suggested to me to venture to do so. Isolated, indeed, as was that example, still no matter from what aspect viewed, even though it be urged that we should look upon it as "abnormal" on account of its rarity, it cannot, I apprehend, but be regarded under any circumstances as to a certain extent suggestive and as possessing a considerable amount of significance.

**Clavaria rosea.** _Fr._—At the Liverpool Naturalists' Field Club Excursion to Saddleworth, June 29th, this rare _Clavaria_ was collected. 
H. H. Higgins.

**North American Fungi.**—A series of papers on this subject, by the Rev. M. J. Berkeley, M.A., will be commenced in the next number of this Journal.
A NEW MOSS FROM IRELAND.

By Dr. R. Braithwaite, F.L.S.


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. Dioicus, male flower terminal, gemmaceous, without paraphyses. Plants small, slender, with distant spathulate leaves. Natives of equatorial America and India.


Dioicus, minute, gregarious. Stems 1/2 to 3/4 in. 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. 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.)

We 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, and thus accidentally scattered on the sandstone wall, where it was found. So much do the leaves resemble those of Splachnaceae 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 Trichostomaceae, 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. Müll. Bridel (Weissia obtusa, Sp. Musc., i., p. 118, 1806; Didymodon? splachnifolius, Hook. Musc. Exot., t. 126, 1820; Dissodon rotundifolius, C. Müll, Syn., i., p. 140, 1849), from the Antilles, to which the present species was referred by Sullivant in the “Musci Cubenses Wrightiani”
(Proc. Amer. Ac. of Arts and Sc., 1861); but it is separated by C. Müller in the paper quoted, and with the Cuba plant the Irish specimens, kindly sent by Dr. Moore, agree in everything but size, and though Müller describes the leaf as "margine integerrima" in both, it is distinctly crenulate.

The other species of the genus are—
5. *S. Bernoullii*, C. M., from Guatemala.

Another species is also referred to with papillose leaves, from Tranquebar.—Journal of Botany, for July, 1872, p. 193.

Observations on the above Moss. By Prof. Lindberg.

The characters of the plant before us show that it cannot be an *Entosthodon* (i.e., *Funaria*), but that it must belong to a different tribe of mosses, and if we pass before us all the European species, we do not find one allied to it, and must therefore extend our view to exotic forms. In the tropical parts of America and Asia grow a few minute tufted mosses, which have lately been considered to form a proper genus (*Tapeinodon* or *Splachnobryum*), the type of which is the old *Didymodon (?) splachnifolius*, Hooker.

The specimens named *Tapeinodon splachnifolius*, from Tarapoto (No. 209, b. coll., R. Spruce), seem to be a proper robust form or species distinguished by its size and larger flaccid leaves.

Another species is *Weissia flaccida*, Harvey, very distinct by its erect narrow leaves, reflexed at apex, which is obtuse as in all other forms of the genus.

As to its systematic position, it has not a natural place among *Splachnaceae*, or *Funariaceae*, for the following characters militate against it:—The habitat on rocks or naked barren soil; the habit resembling that of certain *Trichostomea*, thus the plant from Tarapoto is very like some states of *Tr. tophaceum*; the usually dull green or light dirty brown colour of the leaves, which are small and nearly all of one size, easily softened in water, and with cells for the most part distinctly incrassated, and the uppermost much smaller than the rest; the dioecious inflorescence (no dioecious form has yet been found among *Funariaceae*); the open indistinct androecium, which wants all trace of paraphyses; the very narrow pungent teeth of the peristome, with numerous trabecule on the inside and papillose on both surfaces, and, indeed, not much unlike that of *Eucladium verticillatum*; and, lastly, the very narrow calyptra, and seta twisted just as in *Trich. rubellum*. Judging from all these characters, of great importance in a natural arrangement, I must place the genus in *Trichostomea*, where we find some forms, *e.g.*, *Pottia vernicosa* (Bryol. Javan. t. 51), having leaves of nearly the same structure.
The oldest denomination of the genus is rather difficult to determine. The species have been called by different authors Didymodon, Dissodon, Pottiia, Syrrhopodon, and Weissia; but only Dr. C. Müller and Mr. Mitten have given them proper generic denominations. The former called the genus at first Amblyphyllum among the synonyms under his Dissodon rotundifolius (Synop. Musc. I., p. 140), but without any diagnosis; later (in Verh. Z. B., Ges. Wien, 1869, p. 503) Splachnobryum. Mr. Mitten also has named it, but without any generic description, Tapeinodon, in Spruce, Cat. Musc. Amaz. And., p. 4 (1867), and in his Musc. Austr. Amer., p. 141 (1869), Weissia, Sect. 8, Tapeinodon. Which name must we adopt according to the law of priority? I think Amblyphyllum; but we must not forget that in Müller's Syn. Musc. I., p. 286, we again find the same name applied to a section of Bryum.* But this section, formed of B. calophyllum and cyclophyllum, is very unnatural, and can never be considered as a genus, distinct from the other species of the vast genus Bryum. I cannot, therefore, see any objection to using the denomination Amblyphyllum for this very natural and interesting genus of Trichostomace.

A Grimmia new to Britain.

Mr. Bagnall, of Birmingham, detected, in June last, a species of Grimmia he could not determine, which I at once recognised as G. crinita, Brid., a species closely allied to G. anodon, and occurring in Southern Europe, on the plaster of walls. He found it occupying a precisely similar locality on the wall of a bridge over the canal a few miles from Warwick, and its characters are as follows:—


Monoicous, in low diffuse flat tufts, silky on the surface, with long white hairs, which form a pencil-like tip to the branches. Stem simple, or but slightly divided. Leaves imbricated, ereto-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 perichaetial 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; calytra dimidiate, bilobed; teeth of peristome red, erect, bi-trifid to the middle.

R. B.

* As the system of vegetation in mosses must be regarded as of much greater importance than that of fructification, in the natural limitations of the higher divisions, I am convinced that Leptobryum pyriforme holds a very artificial place among the true Bryea; and I propose to transfer it to Ditrichaceae (Leptotrichaceae), on account of its habit and mode of growth, the form and structure of the leaves and bracts, the synoicous inflorescence, and the glossy leptodermous theca. The habit and leaf structure are nearly the same as in D. palidum, and this very natural genus thus holds in Ditrichaceae a place analogous to Lamprophyllum (Webera), among Bryee, and, indeed, there exists between these two genera (Leptobryum and Lamprophyllum), analogy, but no affinity at all.
NOVARA DIATOMS.

Descriptions of New Genera and Species of Diatoms obtained by the Austrian Imperial Frigate Novara, during her Voyage round the World.

By Herr A. Grunow.

(Translated by F. Kitton.)

Part I. (with Plate ii.)

We have much pleasure in introducing to our readers an English translation, and fac similes of the new forms obtained during the above expedition. As copies of the original paper are difficult to obtain, we have no doubt that this and the succeeding paper will be welcomed by those who are studying the Diatomaceæ.

Gomphonitzschia Ungexiana, Grun.—Frustules small, linear cuneate, valve linear lanceolate cuneate, apex rounded.

Puncta 33 in. 001, striae transverse, delicate, about 60 in. 001. Sometimes sessile on a mucous cushion, at others attached to a short stipes.

[Pl. ii, f. 1, valve a, b side view of frustule, c front view do., d stipitate variety, e sessile do.]

Upon Cladophora macrogonia, Upper Egypt, Unger.

A well marked species, nearly approaching the Nitzschiae, but also bearing a resemblance to Gomphonema, Meridion, Lichmophora, Roikosphenia, &c.

Synedra investiens, W. Smith, Synopsis Brit. Diat.—[Pl. ii, f. 2, a valve, b d c front view of a double frustule.]

In a mass upon Ectocarpus littoralis, from the shores of the Island of St. Paul, in the South Sea.

Its appearance on Ectocarpus, as well as the strong stria leaves no doubt about the determination of this unfigured species of Smith. I have given two side views, and a front view of a double frustule.

(The fact of its growth on an Ectocarpus is of no specific importance; I have found it investing Polysiphonia pulvinata? and also parasitic on the stipes of a Rhipidophora, F. K.)

Diatoma ? exiguum, Grun., n. s.—Frustules minute, linear, valves linear with rounded apices; costæ strong 18-20 in. 001. [Pl. ii, f. 3, a b c d front view, e side view.]

Upon Lessonia, from the coast of Chili.

It may possibly be a small Denticula; it also resembles a Diatoma or Odontidium, between which the generic differences are very uncertain. (I should be inclined to refer it to Diatoma elongatum, var. γ, Sm. Brit. Diat. = D. tenue, Kutz. Bacill. Pl. xvii., 9, 10. F. K.)

Berkeleya Harveyana, Grunow.—[Pl. ii, f. 4.] He says it is distinguished from other species of Berkeleya by the club-shaped form of the mucous envelope (Schleimmassen). The frustules are small
linear, with rounded ends, and extremely fine striae, fig. 4, a. (The author does not distinctly allude to fig. 4, which but for the absence of a central nodule might be referred to Navicula Levisiana, of Greville.

**Campyloneis Grevillei** = Cocconeis Grevillei, Smith, Brit. Diat., pl. 3, f. 35 = C. parva, Bail, in Proceed. Phil. Acad., 1853. Upper valve cellules small, confluent and elongated, as they approach the narrow depressed median space.

**Var. obliqua** minute, median space depressed, broad, subrhomboidal, cellules minute, sometimes oblique; confluent, elongated on the margin, minute, irregular, lower valves with large radiant costa, reaching to the narrow median blank space, which is sometimes oblique.

[Pl. iii, f. 5, a lower valve, b upper do.]

On *Ballia callitricha*, New Zealand, and other parts of the Southern Ocean.

**Cocconeis pseudomarginata**, Gregory.—**Var. intermedia** small, finely striate, upper valve pale, yellow, median line generally sigmoid. = *C. Kirchenpaueriana*, Rab. & Jan. [Pl. ii, f. 6, a upper valve, b lower.]

Common on Algae in the warmer seas, Cape of Good Hope, Nicobar Isles, Manila, Tahiti.

**C. pellucida** var. β. minor, Grun., = *C. exarata*, Grun., in litt. —Broad, median line straight or slightly sigmoid, furrows (longitudinal), conspicuous, 3-5 on either side of the median space = *C. lineata*, Ehr. Micro. Geol., vi., 1, 40 ? [Pl. ii, f. 7, a upper valve, b lower do.] On *Sarcomenia intermedia*, St. Paul, in the South Sea, on Algae from the Cape of Good Hope, &c.

**C. pellucida** var. γ *sigmoidea*.—Median line sigmoid, central nodule sometimes transversely dilated, longitudinal furrows sometimes subsigmoid or equally arcuate, abbreviated towards the margin. [Pl. ii, f. 8, upper valve.] On Algae, from Tahiti, common in the Red Sea.

**Cocconeis ambigua**, Grun., n. sp.?—Upper valve ? marginal striae interrupted by a smooth sub-marginal median line, following the contour of the valve; marginal striae distinct, sub-radiant, 40 in. ‘001, interior part of the valve longitudinally and transversely striate; longitudinal striae conspicuous; terminal and central nodules more or less distinct. [Pl. 2, f. 9, upper valve ? growing on *Ptilota asplenioides* on the coast of Kamtschatka.]

**Var.** Transverse striae obsolete; transverse striae even on the marginal part of the valve, conspicuous. [Pl. 2, f. 22, upper valve with the preceding.]

(The large size of the valve and the peculiar striaation renders it difficult to imagine that this form is the upper valve of the foregoing species. The so-called longitudinal striae resemble the furrows on *C. pellucida*. [Fig. 7 a, and f. 8. F. K.]

**Cocconeis pacifica**, Grun., n. sp.—Lower valve with a distinct border of conspicuous granules, interior of valve hyaline and finely striate, median line straight, central nodule dilated into a transverse
CRYPTOGAMIC LITERATURE.

fascia, upper valve, median line linear, or acutely lanceolate; costae strong, sub-radiant. [Pl. 10, a lower valve, b c d upper do. upon Macroystus from the coast of Chili.]

The upper valve has some resemblance to my Raphoneis scutelloides, which does not, however, appear to be a Cocconeis, as I have never been able to discover a lower valve. Cocconeis Grantiana, Greville, is perhaps the lower valve of a similar species, if not that of a small form of C. scutellum.

(I scarcely see how the upper valves differ from that of Campyloneis Grevillei, var. obliqua, f. 5 a, F. K.)

CONTENTS OF PLATE II.

Fig. 1. Gomphonitzscha Unger i.—Fig. 2. Synedra investiens.—Fig. 3. Diatoma (?) exiguum.—Fig. 4. Berkeleya Harveyi.—Fig. 5. Campyloneis Grevillei var. obliqua.—Fig. 6. Cocconeis pseudomarginata var. intermedia.—Fig. 7. Cocconeis pellucida var. β minor.—Fig. 8. Cocconeis pellucida var. γ sigmoidae.—Fig. 9. Cocconeis ambigu a.—Fig. 10. Cocconeis pacifica.—Fig. 11. Orthoneis binotata var. Atlantica.—Fig. 12. Mastogloia marginulata.—Fig. 13. Pleurostaunon Frauenfeldiana.—Fig. 14. Pleurostaunon Javanicum.—Fig. 15. Stauroseis oblonga.—Fig. 16. Navicula javanica.—Fig. 17. Navicula pacifica.—Fig. 18. Pleurosigma australa.—Fig. 19. Diadesmis confervacea.—Fig. 20. Diadesmis peregrina.—Fig. 21. Craticula Perrottetii.—Fig. 22. Cocconeis ambigu a var.?—Fig. 23. Oscillaria Poepiggiana.—Fig. 24. Oscillaria Tahitensis. All the figures, with the exception of 13 d. (which is × 500) are × 400 diameters.

CRYPTOGAMIC LITERATURE.

Bulletin de la Société Royale de Botanique de Belgique, tome x., No. 3, June, 1872, contains an excellent "Catalogue pour servir d'introduction à une monographie des Hepatiques de Belgique," by Alfred Cogniaux.

Quarterly Journal of Microscopical Science, for July, 1872, includes a communication on "Some peculiar forms of Navicula from the Sulu Archipelago," by Rev. E. O'Meara, M.A. (with plate).

Monthly Microscopical Journal, for July, 1872, contains a continuation of Dr. R. Braithwaite's paper, on "Bog Mosses," with description and plate of Sphagnum rubellum (Wils).

Journal of Botany, for July, 1872, contains part v. of Dr. R. Braithwaite's "Recent Additions to our Moss Flora," and "Recent Researches on the Diatomaceae," by Rev. E. O'Meara, M.A.

Flora, for May, includes "Discussion on the Gonidia Question," by S. Schwendener; and "Bryological Notes from the Rhöngebirge," by A. Geheeb.

Grevillea,

A MONTHLY RECORD OF CRYPTOGRAMIC BOTANY, AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By the Rev. M. J. Berkeley, M.A., F.L.S.

It is proposed in this and future papers to continue what was already begun in the "Annals of Natural History" for December, 1853, and October, 1859. Of species already described only the more rare will be noticed, of all undescribed species the characters will be given. Specimens of many have already been published without characters by Mr. H. W. Ravenel in his "Fungi Caroliniani." Some have already been described in my Decades of Fungi contained in Sir W. J. Hooker's "London Journal of Botany" and the "Kew Garden Miscellany," and of these the characters will be given, as the works may not be readily accessible. The numbers will be continued from the Paper of 1859. The cyphers following the descriptive characters are those of an enormous mass of Fungi, amounting to more than six thousand numbers, forwarded to me from time to time by the late Dr. Curtis.


Pileus $\frac{1}{2}$ in. across, infundibuliform, thin; stem $\frac{1}{2}-\frac{3}{4}$ in. high, 1 line thick, slender, incrassated upwards, fibrillose and spongy at the base; gills entire, narrow, decurrent.


Pileus 1$\frac{1}{2}$ in. across, umbilicate, ochraceous, smooth, margin lobed; stem 1 in. high above $\frac{3}{4}$ in. thick, spongy at the base,umber; margin of the gills serrated.

103. Lentinus hæmatopus. B.—Pileo umbilicato depresso, ochraceo, glaberrimo; stipite brevissimo, cruento; lamellis decurrentibus, margine laceratis. N. America, locality unknown.

Pileus 1$\frac{1}{4}$-1$\frac{3}{4}$ in. across, umbilicate or depressed, ochraceous, quite smooth; stem 1-2 lines high, blood red, almost laccate at the base, $\frac{1}{4}$ in. thick; gills decurrent, margin lacerated.

104. Lentinus pallidus. B. & C.—Pileo convexo-plano, margine

Pileus ¾ in. across, convexo-plane; margin inflexed; stem 1½ in. high 2½ lines thick, smooth above, and furfuraceous below; gills decurrent, lacinate at the margin.

* Lentinus lepideus. Fr.—No. 1259, Car. Inf.

* Lentinus tigrinus. Fr.—No. 963. Santee River. No. 3148, Texas (C. Wright) is, I believe, a monstrous state of this species in which the gills form a reticulated spongy mass like the hymenium of Sécotium. The same thing occurs in Ohio.


Pileus ½-1 in. across, thin, umbilicate, delicately punctato-squamose; stem ½-1¼ in. high, 1 line thick; gills thin, decurrent with a tooth; margin lacerated.

* Lentinus Lecomtei. Fr.—No. 5152. Penns. Dr. Michener, on walnut.

* Lentinus ursinus. Fr.—No. 3983. Penns. Dr. Michener.


* Lentinus vulpinus. Fr.—Ohio, Lea.

* Xerotus nigrita. Lév.—No. 2868. Car. Inf. Ravenel, on Rhus radicans, R. toxicodendron, & Laurus Carolinae.


Pileus ½ in. across, thin, black, ramoso-sulcate, rough; margin paler; gills rather broad.


Pileus by confluence 7 in. across, 3 in. long, suberoso, dilated, springing from an orbicular disc, sulcato-zonate above, whitish, quite smooth; gills poroso-anastomosing, interstices about ¼ in. wide.


Pileus 2 in. across, 1 1/4 in. long, hoof-shaped, rugose, pallid, velvety, then becoming smooth; margin thin; gills broad, poroso-ramose, waved; margin acute, tomentose, rudimentary behind.


Pileus reniform 1 1/4 in. across, 2/3 in. long, zonate, rugose, velvety, then nearly smooth, rhubarb coloured, at length marked with red bands; gills sub-ramose, lacerated at the margin.


Pileus above 3 in. across, convex, yellow, with crimson scales; stem yellow, dotted with crimson, 1 1/4 in. high, nearly 1 1/4 in. thick above, attenuated below; pores greenish yellow, broad, angular, decurrent, the thin white veil evanescent; flesh yellow, becoming purplish; spores ochraceous.


Pileus 1 in. or more across, hemispherical, viscid; stem 2 in. high, 1/4 in. thick, attenuated upwards, polished, reticulated; pores, umber, free; spores ferruginous.


Pileus 1 1/2-2 1/2 in. across, convex, thick, powdered with yellow; stem 1 in. high, 1 1/4-1 1/2 in. thick, nearly of the same colour, pulveraceous below; mycelium yellow; pores broad, decurrent.


Pileus 1-1½ in. across, convex; stem 1½ in. high; 1½-3 lines thick, attenuated upwards, as well as the veil, sulphury-pulverulent; pores plane, umber.


Pileus 1 in. across, convex, and as well as the stem powdered with golden yellow; stem attenuated upwards, 1 in. high, with a strong depression round the top; pores free, broad, the orifices scarlet. A lovely species, allied to the two last.


In grassy woods.

Pileus 1½ in. across, convex, dry, powdered with yellow; stem 2 in. high 1½ in thick, reticulated to the base, pulverulent downwards; pores yellow, adnate. Pilei arising from a common base.


* **Boletus edulis.** Bull.—No. 5333. New England. Sprague. (cum iconе.) This was returned with the name *B. alvéolatus*, B. & C., but it is either *B. edulis* or very nearly allied.


Pileus 2 in. or more across, floccoso-verrucose the flocci whitish above, flesh coloured beneath; margin torn, membranaceous; stem 4 in. high, white; pores plane, yellow; spores ferruginous.


Pileus 2¾ in. across, nearly 1½ in. thick, vivid red, granulated; flesh yellow; stem clavate, yellow, even; pores about a line deep, decurrent, yellow. Spores, as in *B. castaneus*, pale yellow.


115. **Polyporus (Mesopus) dibaphus.** B. & C.—Pileo orbiculári, atropurpureo, subtiliter tomentoso, glabrescente, lineis pallidis hie illic radiato; stipite gracili, subconcolor, deorsum pruinato;
NOTICES OF NORTH AMERICAN FUNGI.

poris decurrentibus, ochroleucis, angulatis, parvis. No. 6062, Alabama, Peters, on Ilex opaca.

Pileus 1 in. across; orbicular, dark purple, finely tomentose, becoming smooth, with here and there pallid radiating lines; stem slender, nearly of the same colour, pruinate downwards; pores decurrent, pale ochre, angular, small.

* Polyporus (Mesopus) lepideus. Fr.—No. 3068. Sartwell.


Pileus \( \frac{1}{2} \) in. across, turbinate, ferruginous, silky-striate; stem \( \frac{3}{4} \) in. high, about a line thick, villous, springing from a spongy base; pores angular, small, of the same colour. Hymenium sometimes proliferous.


Pileus 1-1½ in. across, orbicular, umbilicate, brown, pulverulent, sometimes rugose, margin incurved; stem \( \frac{1}{2}-\frac{3}{4} \) in. high, 2 lines thick, rooting; pores ash colored, small, angular.


Pileus 4 in. or more across, often oblique, soft, tomentose, pulvinate, dark purple; stem 2 in. high, 1½ in. thick, concolorous; pores angular, \( \frac{3}{4} \) in. across, flesh-red, dark purple beneath the cuticle; sometimes zoned.

* Polyporus (Mesopus) tomentosus. Fr.—No. 5699. New Eng. Sprague.


— 119. Polyporus (Mesopus) Delicatus. B. & C.—Pileo orbiculari, ochraceo, tomentoso; margine tenui, acuto; stipite brevi, radi-
cante; poris angulatis, dissepsimentis tenuibus, usque ad basin de-

Pileus \( \frac{3}{4} \) in. across, orbicular, ochraceous, tomentose; margin
thin, acute; stem \( \frac{1}{4} \) in. high, 2 lines thick, rooting; pores angular,
dissepsiments thin, decurrent to the very base, \( \frac{1}{5} \) in. across.

* Polyporus (Mesopus) ovinus. Fr.—No. 1034. Car. Inf.
Curtis. Ohio, Lea.

—120. Polyporus (Mesopus) flavo-virens. B. & R.—Pileo mollis,
irregulari, pulvinato, vel depresso, subtiliter tomentoso, flavo-viridi;
stipite pallido, sub-concolore, crasso; poris irregularibus, dissepsi-

Pileus 3-4 in. across, soft, irregular, pulvinate or depressed,
delicately tomentose, greenish-yellow; stem pallid, 2 in. high, \( \frac{1}{2} \) in.
厚; pores irregular, \( \frac{1}{5} \) in. across, dissepsiments thin, yellow.

* Polyporus (Mesopus) confluentis. Fr.—No. 1622, Car. Inf.
Ravenel.

* Polyporus (Mesopus) leucomelas. Fr.—No. 5662. New.

Car. Fasc. i. no. 10. Pileo cupulaeformi demum reflexo, rufo to-
mentoso; stipite brevissimo; poris minimis, concoloribus. No.
1209. Car. Inf. Curtis, on Khus capallina.

Pileus a line or more across, cupulate, at length reflexed, rufo-
tomentose; stem scarcely a line high, \( \frac{3}{8} \) thick; pores minute, about
\( \frac{3}{20} \) in. across, concolorous. Stem and pileus sometimes white
with age.

101. Pileo excentrico, molli-suberoso, sulcato, zonato, ochro-
leuco, hic illic sanguineo-laccato; stipite elongato, rugoso, sangui-
neo-laccato; hymenio ex albo ochraceo; poris punctiformibus.

Pileus 3-6 in. across, eccentric, between soft and corky, sulcate,
zonated, pale ochre, here and there red-laccate; stem 2-5 in. high,
\( \frac{1}{2} \)-1 in. thick, rugose, laccate; hymenium white, then ochraceous;
pores punctiform.

* Polyporus (Pleuropus) luteus. Nees.—No. 2256, Car. Inf.
Curtis.

—122. Polyporus (Pleuropus) Ravenelii. B. & C.—Pileo sub-fla-
belliformi, demum lobato, zonato, albido, lineato-sericco; stipite
Ravenel.

Pileus 1-1\( \frac{1}{2} \) in. across, sub-flabelliform, at length lobed, zoned,
whitish, with silky lines; stem \( \frac{3}{4} \) in. high, 2-3 lines thick, white,
pruinata; spores pale-ochrey, \( \frac{3}{20} \) in. across. Allied to the last.

—123. Polyporus (Pleuropus) mutabilis. B. & C.—Pileo flabel-
liformi, zonato, postice pallido, antice rufo, sericeo-striato; stipite
Ravenel.
Pileus 2½ in. across, very variable, sometimes much elongated, flabelliform, zoned, pallid behind, rufous in front, silky striate; stem variable, obsolete or much elongated; pores minute, 1/₅₀ in. across, pale ochre. The same species occurs on Rio Negro. Poly-
porus fibroso-radians, Mont. is very near, but if the same not the typical form.


Pileus nearly 2 in. across, reniform, irregular, rugose, tomentose, here and there hispid, ochraceous; stem 1-1½ in. high, 2-4 lines thick, irregular, distorted, sometimes adnate behind, pulverulent; pores minute, 1/₅₀ in. across.


Pileus ¾-1½ in. wide, convex, zoned, sometimes sulcate, becoming whitened; stem 2½ in. high, ¼ in. or more thick, distorted, pruinose; hymenium concave, whitish; pores microscopic, ½₀₀ in. across. Sometimes mesopodous.

A NEW BRITISH WEISSIA.

Weissia truncicola. De Notaris, Epilogo della Briol. Ital., p. 598 (Journ. Bot., 1871, pl. cxix., f. 2). Dioicus? in large dense tufts, interwoven at base with branched radicles, bright green. Stem innovating dichotomously, 1-2 in. high, flexile, reddish, bearing lax radicles at the lower part from the axils of the leaves. Leaves approximated, erect when moist, and often somewhat secund on the second shoots, rather soft, papillose at back, from a narrowly lanceolate base, gradually subulate, channelled, with a thin nerve reaching the apex, the margin not revolute, sharply denticulate above, and on the back of the nerve; when dry strongly cirrhate and twisted. Cells at base large cylindrico-vesicular, the rest small, quadrate, or subhexagonal, filled with deep green chlorophyll.

Growing in expanded tufts, like Weissia cirhata, the leaves resembling those of Weissia Bruntoni, but longer, and the margin not revolute.

BRITISH FUNGI.

By M. C. Cooke.

Gasteromycetes.

Lycoperdon Hoylei. *B. & Br.* "Hoyle's Lycoperdon."

On the ground.—Reading (Mr. Hoyle). Oct.

Stem 1 in. high, ½ in. thick, lacunose, olivaceous within; peridium 2 in. across; warts 1½–2 lines high; capillitium and spores lilac; spores 0.0015 in.; mycelium threadlike, white.

Scleroderma geaster. *Fr.* "Stellate Scleroderma."


Geaster tunicatus. *Vitt.* "Tunicated Geaster."

Amongst Rhododendrons.

Messrs. Berkeley and Broome seem to regard this as the correct determination of the species described in Cooke’s Handbook, No. 1079, under the name of *Geaster lageniformis*. Not having seen specimens we accept their decision.

Badhamia capsulifer. *B.* "Capsular Badhamia."

On living leaves of *Tussilago petasites*. Cheshire (T. Brittain.)

Perichæna quercina. *Fr.* "Oak Perichæna."
Peridia globose, yellow; somewhat lacerated, flocci and spores yellow.—*Fr. S. M.*, iii., 192.

On oak trunks. Autumn. Rare.

Detected by Mr. T. Brittain near Manchester, and determined by C. E. Broome, Esq., on whose authority it is inserted, as we have never seen specimens.
Orthoneis binotata, Grun. = Cocconeis binotata = C. scutellum, \( \gamma \), Roper, Mic. Jour. vol. vi. 6, pl. 3, f. 9.

Var. atlantica.—Valves ovate, sometimes lanceolate ovate, striato-punctate, delicate, marginal marking elongate. [Pl. 2, f. 11, \( a b c \).]

On Sargassum bacciferum in the Atlantic Ocean.

Mastogloia marginulata, Grun., n. sp.—Minute, valves narrow, lanceolate, obtuse; marginal loculi minute 30—33 in. \( \cdot 001 \); striae transverse, delicate, 60 in. \( \cdot 001 \); central nodule small, oblong. [Pl. 2, f. 12, \( a b \).]

On Sargassum plumosum, from New Zealand, and not uncommon on Algae from the Island of Tahiti.

Pleurostauroon Frauenfeldianum, Grun., n. sp.—Small valves narrow, lanceolate, somewhat acute; stauros broad, dilated toward the margin; striae delicate, transverse. [Pl. 2, f. 13, \( a b c d \).]

Fossil in Essebaren Erde (Bergmehl) from Java.

(= Stauroneis scaphulceformis, Greville, Mic. Jour. vol. xiv. pl. 9, f. 32, differs from S. legumen var. of Lewis, in the ends of the stauros being dilated. F. K.)

P. javanicum, Grun.—Large; valves lanceolate; apices somewhat obtuse; stauros broad, dilated towards the margin; striae transverse, punctate, 33—100". [Plate 2, f. 14.]

Bergmehl, Java.

(This form is identical with S. phænecenteron, Ehr., and the Synopsis. Smith’s specific characters are “lanceolate, obtuse; stauros linear, reaching the margin; striae 33 in. \( \cdot 001 \); length \( \cdot 0055 \) to \( \cdot 0066 \).” Grunow gives the length of his specimens as \( \cdot 0056 \) to \( \cdot 0066 \). F. K.)

Stauroneis oblonga, Grun. n. sp.—Small, valves broad, linear, oblong; apices rounded; stauros narrow, linear, reaching the margins of the valves; striae punctate, delicate, 40 in. \( \cdot 001 \). [Pl. 2, f. 15, \( a b \).]

Bergmehl, Java.

Resembles my S. bacillum, but differs in its greater breadth and more conspicuous striaion.

Navicula Javanica, Grun., n. sp.—Valve convex, narrow, lanceolate, somewhat acute, a well-marked undulating line on each side
of the median line; median and central nodules oblong; striae reaching median line, delicate, 50 in. ‘001’. [Pl. 2. f. 16, a b.]
Bergmehl, Java.

Distinguished by the well-marked undulating sub-marginal lines from any other species of Navicula. (The outline of the valve and the undulating lines seem to show some affinity with the genus Cylindrotheca, a genus, however, with which I am only acquainted by name. F. K.)

**Navicula pacifica**, Grun.—This form is not described in the text. [Pl. 2, f. 17.]

**Pleurosigma australae**, Grun., n. sp.—Small, narrow, lanceolate, sub-sigmoid; apices somewhat acute; median line gracefully sigmoid; central nodule round; striae oblique, delicate, 55—60; colour of dry frustule yellowish-brown. [Pl. 2, f. 18.]

On *Ballia Callitricha*, from New Zealand. Resembles *P. Aestuare*, but is smaller, and not of the pale purple of that species, but a yellowish-brown. And as it can be compared with no other of Smith’s species of Pleurosigma, I am reluctantly obliged to describe this uncharacteristic species as new.


The valves closely enough resemble Kützing’s fig. and description to warrant our referring this form to Kützing’s species.

The striae are 56 to 60 in. ‘001”.


The specimens from Kew Gardens, London, have enabled me to obtain a view of the valve, and I am satisfied of their identity with the Tahitian form.

As this species is but little known I have given figures of valve and filament.

The valves are stout, ovate, sometimes nearly rhomboid, often with slightly produced apices; median nodule distinct. The striae are delicate, above 60 ‘001.

It resembles *Navicula brachysira*, Breb., and it must not be overlooked that this form also occurs in short filaments, produced by the cohesion of the smaller valves.

**CRATICULA**, Grun., Gen. Nov.—Frustules naviculoid, valves double, outer valve? furnished with central and terminal nodules, punctatostriate; interior valve surirellæform, costate; costæ linear, distinct, reaching median line, for the most part wanting from the central portion.

**Craticula Perrotettii**, Grun., n. sp.—Valve lanceolate; apices shortly produced, obtuse; longitudinal lines distinct, 24 in. ‘001”; transverse, 48 in. ‘001”, costæ 7-4 in. ‘001” [Pl. 2, f. 21, a internal valve, b external do.]

From Senegal, amongst *Nitella*, Perrotet.
To this species belong some of the earlier species of Surivella, viz.:

- \( S. \text{ Craticula, Eh. } = C. \text{ Ehrenbergii, Grun. } \)
- \( S. \text{ megaloptera, Eh. } = C. \text{ megaloptera, Grun. } \)
- \( S. \text{ procer, Eh. } = C. \text{ procer, Grun. } \)

\( C. \text{ Perrotetti } \) is distinguished from the above by its distinct longitudinal striæ. \( S. \text{ Craticula } \) has already been figured with a distinct central nodule, as a variety, Greg. Mic. Jour. vol. ii., pl. 4, f. 6. With careful examination it may always be observed, my figure of \( \text{ Navicula rhyncocephala, var. } \alpha \text{ and } \beta. \) in Verh. Wien, zool.-bot. Gesellsch, 1860, t. 4, f. 31, \( a \) and \( c \) are outer? valves of \( C. \text{ Ehrenbergii. } \) The position of the genus \( \text{ Craticula } \) still requires consideration.

(Prof. H. L. Smith, in his new Conspectus of the families and genera of Eutomaceae deletes the genus \( \text{ Craticula, } \) and unites it with Greville’s genus, \( \text{ Stictodesmis. } \) F. K.)

Figures 23 and 24, although occurring in the original plate, do not represent diatoms, but are two species of \( \text{ Oscillaria. } \)

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**NOTE ON ACALYPTOSPORA.**

**Acalyptospora nervisequia.**—In the 10th volume of the “Ann. Sc. Nat.,” at page 343, an elaborate description is furnished by Desmazieres of an original structure found on the leaf of the elm, which he regards as a fungus of the Family Coniomycetes, and has named \( \text{ Acalyptospora nervisequia. } \) Berkeley and Broome, in the 15th vol. of the “Annals of Natural History,” record it as occurring at Apethorpe, in Northamptonshire, and remark that it looks like a short obtuse Puccinia, and that it closely resembles a gland. In the “Handbook of British Fungi” it is stated to be intermediate between Torulacei and Pucciniae, and to appear to be more closely allied to the former than the latter. A diligent examination of the leaves of the common elm has left me without any doubt that this so-called Fungus is simply a glandular hair. It occurs on every leaf of the common elm in all stages of its growth, from its first expansion to its fall. By macerating the leaf in liquor potasse, and subsequent washing with water, the tissues are rendered transparent, when the object is seen plainly to be a process of the cuticle as much as any other hair on the surface of the leaf, and to have none of the characters of a fungal growth. I am strengthened in this view of the matter by finding on the leaves of \( \text{ Vicia faba, Agrimonia Eupatoria, Sambucus nigra, Anagallis arvensis, } \) and \( \text{ Solanum Dulcamara, } \) similar growths, which are, I presume, regarded without dispute as glandular hairs. C. J. Müller.

[N.B.—Has our correspondent examined specimens of \( \text{ Acalyptospora, } \) published by Desmazieres himself, and compared them with his glandular hairs? — Ed. Grev.]
THE GENUS TETRAPEDIA (REINSCH) WITH TWO NEW FORMS. (Plate iii.)

By WILLiAM Archer.

Amongst unicellular Algae falling under the class Chlorophyl-
laceae, forms with specially figured cells—that is, otherwise than
globular, ellipsoidal, or cylindrical, with more or less abruptly or
broadly rounded ends—are, as is well known, numerous; but
amongst such plants belonging to the class Phycochromaceæ, so
frequently found in the same situations associated with the fore-
going, so far as I am aware, not until recently has attention been
drawn to any examples of a specially figured outline.

It does not appear, until the genus Tetrapedia was founded by
Professor Reinsch* for two new and singular exceedingly minute
chroococcaseous forms, that examples of specially figured forms
were known in this family of Algae. Inasmuch as Reinsch's work
is but little known in this country, and as I have on one occasion
encountered his T. Crux-Michaelii in this country, and am acquainted
with two other forms of a kindred nature, it has appeared to me that
a brief notice thereof might find a fitting place in these pages, ac-
accompanied by a reproduction of Reinsch's plate, and a sketch of
my own forms, reserving a fuller description and details to be pub-
lished elsewhere, in deference to the limited space which can be
devoted to this subject in this Journal.

The description given by Reinsch of his genus is as follows:—

Class. Phycochromaceæ.
Family. Chroococcaceæ.
Genus. Tetrapedia, Reinsch.

Cellulæ solitariae aut floris consociatione individuorum plurium
familias ex cellulis binis, quaternis aut 16is exstitutis constituentes,
in sciaphragia quadratice, cellula singula incisuris quaternis in
cellulas filias quaternas dilapsa, cellulae filiae post divisionem indi-
viduas singulas se praebentes, incisuram directio in marginum
lateralium directione perpendiculari aut in angulo semirectangulo
versa; cellularum interanea granulosa, colore aerugineo.

So far as our acquaintance with these little Algae reaches there
appear to exist four (if not five) distinct, yet kindred forms of
figured "Chroococcaceæ"—their remarkable shapes preclude their
being regarded as "Lichen-gonidia," but whether mature plants
or stages in the growth of any more complicated structure remains
a problem. Ours are at least forms which here and there recur,
and one can at once recognise them as always offering the same
characteristics and as maintaining their apparent individuality.
Whether they are "species" or not, it may be a matter of conve-
nience, should observers meet them elsewhere, and be able to throw
a light upon them, to have at least a means of their recognition;
for these reasons it occurs to me as desirable (at least, provi-

* "Die Algenflora des mittleren Theiles von Franken," by Prof. Paul Reinsch.
Nürnberg, 1867, p. 37, t. ii. f. 2, and t. i. f. 6.
sionally) to record them under Reinsch's genus, if indeed that observer may not consider it unallowable so far to modify the terms thereof as to admit of its embracing the two new forms. It may be objected that the very name of the genus would preclude the admission of a three-lobed form into it, but the name Staurastrum is retained though only a minority of the forms referable thereto are cruciate or quadrangular in end view, so also with Triceratium, where four and five-angled forms occur, &c. I venture, therefore, to cast the description of these forms as follows:—

**Tetrapedia** (Reinsch) mut. quodammodo char.

Cells compressed, quadrangular or triangular, equilateral, becoming subdivided into quadrate or cuneate segments, or rounded lobes, either by deep vertical or oblique incisions, or by wide angular or rounded sinuses.

**Tetrapedia gothica.** *Reinsch.*—Cells quadrato, angles rounded, lateral margins emarginate at the middle, whereat afterwards deeply incised, each of the four roundly angled quadrato segments thus produced becoming equal in dimensions to the original cell, and their lateral margins emarginate at the middle, whereat afterwards also deeply incised; each of the sixteen (secondary) roundly angled quadrato segments thus produced becoming equal in dimensions to the original cell, and their lateral margins emarginate at the middle (whereat afterwards incised?); all the incisions perpendicular to the sides, rounded below, somewhat wide, of an equal average width throughout; ultimately a quadrato foramen through the cell at the central points of junction of the segments (the incisions afterwards completed and the segmented tablet breaking up?); in side view the single cell oblong at the middle, slightly concave at each side, ends rounded. [Pl. iii. figs. 1-7.] Diameter of single cell about $\begin{array}{c} 4 \frac{1}{12} \\ to \ 3 \frac{1}{2} \frac{1}{12} \end{array}$.

In a ditch and in a mill-race (scantily) near Erlangen.

It seems to be probable that another distinct form exists—that figured by Reinsch (op. cit. t. ii. f. 2. i.), and reproduced in our plate [Pl. iii. f. 8]. Should that form recur to him, probably he may be in a position to throw further light on it on a future occasion.

**Tetrapedia Crux-Michaeli.** *Reinsch.*—Cells quadrato, lateral margins entire, with two shallow concavities, each extending half the length of the side, thus producing an obtuse-angled central prominence, deeply incised at the angles, incisions diagonal, rectilinlear, deep, acute below, slightly expanding upwards, thus bisecting the angles, and dividing the cell into four broadly cuneate segments, the upper angles of which are subacute (the incisions ultimately completed, and the cell breaking up?); in side view lanceolate, ends acute. [Pl. iii. f. 9-10.] Diameter of cell about $\begin{array}{c} 3 \frac{1}{12} \\ to \ 2 \frac{1}{2} \frac{1}{12} \end{array}$.

In running water (very scantily) near Erlangen, also (very scantily) near Mullingar, Co. Westmeath, Ireland.
**Tetrapedia Reinschiana.** nov. sp.—Cells quadrangular, two opposite margins excavated by a wide triangular sinus, thus subdividing the cell into two broadly cuneate segments connected by a wide isthmus, and somewhat convex on their lower margins; the other two opposite margins of the cell, that is the upper margins of the segments, very slightly concave at the middle, somewhat raised towards the acute outer angles; in side view oblong, constricted at the middle, ends rounded. [Pl. i. f. 11-13]. Diameter of largest cell met with (from angle to angle in both directions equal) from about $\frac{1}{2}$ to one-third, or even one half smaller.

In moor pools, Co. Dublin and Wicklow.

**Tetrapedia setigera.** nov. sp.—Cells triangular, the lateral margins somewhat deeply excavated by a broad rounded sinus dividing the cell into three lobes, rounded at the ends, and each terminated by a very delicate straight bristle, in length about equal to the diameter of the cell; in side view oblong, somewhat inflated at the middle at each side, ends rounded, and each seen tipped by the bristle. [Pl. iii. f. 14-17.] Diameter of cell (without bristles), about $\frac{1}{4}$ to $\frac{1}{3}$, from end to end, including the bristles about $\frac{1}{4}$.

In moor pools, Co. Dublin and Wicklow.

Reinsch’s figures are so much enlarged that they are calculated to mislead. In the present plate they are reduced into uniformity with our own to a scale of some 400 diameters. The descriptions of his forms are a direct translation, somewhat altered in order, from the original.

Pl. iii. f. 1, *Tetrapedia gothica*, Reinsch, a single developed cell, whose lateral margin presents the indication of division.

F. 2. A cell with the indication of division, the angles bluntly rounded.

F. 3. A cell [the division] somewhat more advanced.

F. 4. A four-celled family, the [secondary] cells still connected in the middle by the angles, the depth of the incisions almost their breadth, the individual cells fully formed, i.e., already with the commencement of a division into a new cell-generation, the margin of the side-lobes of the [secondary] cells somewhat emarginate at the middle.

F. 5. A four-celled family, the tablet furnished in the middle with a quadrangular hole (Loch).

F. 6. A sixteen-celled family formed from four smaller families, still connected at the corresponding angles, all the cells of like figure and presenting the indication of continuous division.

F. 7. Side view of a cell.

F. 8. A four-celled family of peculiar form, which, perhaps, represents a distinct species, of which, however, I [Prof. Reinsch] have observed but a single specimen, the cell cruciate, formed of four semicircular lobes, but whether the cells present the de-
veloped condition, or the condition of beginning of a new division, I [Prof. Reinsch] do not venture to decide; the dimensions as in a four-celled family of the ordinary form.

F. 9. *Tetrapedia Cruz-Michaeli* (Reinsch)—an individual in the state as observed, showing the division furthest advanced.

F. 10. Side view of the same individual.


(Fig. 18 represents an example of the spore and adjacent heterocysts of a minute Nostoc, the subject of a communication in No. 1 (p. 10) of this Journal.—W. A.)

LICHENS IN SOWERBY’S HERBARIUM.


5. *Lichen lanatus*. *E. B. t.*, 846. = *Alectoria lanata*. L. The middle figure may be accepted as the type. The upper figure represents a good variety = var. *parmelioideae*. Cromb. MSS. To the typical form, as a young condition, is also to be referred *Lichen scaber*. *E. B. t.*, 2318.


7. *Lichen fastigiatus*. *E. B. t.*, 890. = *Ramalina fastigiata*. P., and *Ramalina fraxinea*, Q. The lower left hand figure = *R. fastigiata*. Of the two other figures, the upper is a smaller state of *R. fraxinea*, and the lower apparently a hybrid between them.


9. *Lichen pinastri*. *E. B. t.*, 211, = *Platysma juniperinum* *pinastri*. Appears by a note to have been figured from a specimen
in the herbarium of Linnaeus. The *Lichen juniperinus* of E. B. t. 194, is only a state of *Physcia parietina*.

10. **Lichen sepincola.** *E. B. t.*, 2386. = *Platysma sepincola*, Ehr., and var. *ulophylla*, Ach., fig. 1, represents the type from near Yarmouth; fig. 2, from a Continental specimen; fig. 3, from Scotland, is var. *ulophylla*.


13. **Lichen resupinatus.** *E. B. t.*, 305. = *Nephromium lusitanicum*, Scher. The specimen drawn is from Cornwall.

14. **Lichen spongiosus.** *E. B. t.*, 1374. = *Solorina limbata*, Smurfrt. The figure in E. B. is not very characteristic, and is too deeply coloured.

Lichenologists are recommended to consult this paper for the sake of the valuable notes not included in this brief abstract.

**CRYPTOGAMIC LITERATURE.**

**Pilobolus.** Pringsheim’s Jahrbucher, B viii., Hft. 3, contains a copiously illustrated paper, by Julius Klein, entitled “Zur Kenntniss des Pilobolus.”


**Fungi Austriaci.** Three fascicula of Austrian Fungi have already been published by Baron Thuemen, of Teplitz, at a reasonable price; others are in preparation.

**Hedwigia,** Nos. 5, 6, 7, contain notices of recent Cryptogamic papers and communications, together with an enumeration of specimens published in recent fasciculi.


**Botaniska Notiser** (1872), Nos. 1, 2, 3, contains several short cryptogamic papers, amongst which is one by J. M. Norman, entitled “Cives novi lichenosae arcticae Norvegiae.”


Grevillea,

A MONTHLY RECORD OF CRYPTOGRAMIC BOTANY, AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By the REV. M. J. Berkeley, M.A., F.L.S.

(Continued from Page 39.)


Pileus 3 inches across, fleshy, somewhat imbricated, of a dull yellow, with adpressed dark scales; stem rudimentary; spores $\frac{1}{3}$ inch across, waved, irregular. Smells strongly of vanilla or bitter almonds.


* P. (Merisma) cristatus, Fr., No. 6218. Wisconsin, Lapham.


Pileus some inches across; 2 long, lobed, flexuose, ragged and waved, clothed with down which becomes in parts shortly strigose or scabrous; margin inflected; pores $\frac{1}{3}$ inch across, but very variable; dissepsiments thin. Flesh compact, not fibrous.


* P. (Anodermei) tephroleucus. Fr.—No. 4282, Penns. Michener; on Liriodendron.

Pileus \( \frac{1}{2} \) inch across, pale ochre, at first resupinate, thin clothed with a few short fibres, smooth as if very thinly laccate behind; pores \( \frac{1}{80} \) inch wide, but variable, with thin dissepiments. No. 6054. Alabama, Peters, is a form of the same species.


Pileus 1 inch across, often laterally confluent, sessile, dimidi- ate of a slightly ochraceous white, here and there smooth as if thinly laccate; hymenium cribose; pores angular, minute; \( \frac{1}{100} \) inch wide; dissepiments toothed.


Pileus \( \frac{1}{14} \) inch wide, \( \frac{1}{2} \) long, often laterally confluent, dirty white, tinged with ash-colour, floccose, here and there slightly strigose; hymenium cinereous; pores \( \frac{1}{100} \) inch wide, angular.


Pileus 3 inches across, 1\( \frac{1}{2} \) long, rigid when dry, imbricated, rugose, pruinoso-scabrous; margin lobed; flesh umber, fibrous, at length blackish; pores \( \frac{1}{100} \) inch wide; hymenium concave.

* **P. (Anodermei) crispus.** *Fr.*—No. 4281. Penns. Michener on *Carya*.


Pileus 6 inches wide, 2 long, sparingly aculeato-setose, at length quite smooth and reddish; strongly zoned within; flesh coarsely fibrous; pores \( \frac{1}{50} \) inch wide. Allied to *P. labyrinthicus*, but the surface is different, and the texture looser and darker.

* **P. (Placodermei) senex.** *Mont.*—No. 1558. Santee River.

* **P. (Placodermei) dryadeus.** *Fr.*—No. 3094. New Eng. Oakes. *P. dryadeus*, Schwein, is *P. scruposus*, Fr., which occurs in many parts of the United States, on various trees as *Rhus toxi*—
coddendron, Castanea, Quercus, and seems to be the same with \( P. \) gilvus.

* \( P. \) (Placodermei) cervinus. Nees.—No. 5218. Alabama, Peters, on lime.

* \( P. \) (Placodermei) fulvus. Fr.—No. 5991, 6013. Penns. Michener, on Liriodendron.

133. \( P. \) (Placodermei) novangeliae. B. & C.—Pileo reuniformi, disco pulvinato affixo, ferrugineo, velutino; hymenio concolor; poris parvis; dissepimentis rigidis. No. 5807. New Engl.

Pileus \( \frac{3}{4} \) inch wide, laterally confluent, kidneyshaped, fixed by a cushion-like disc, velvety, ferruginous; hymenium of the same color; pores \( \frac{1}{10} \) inch wide; walls rigid.


Pileus \( \frac{3}{4} - \frac{1}{2} \) inch wide, ferruginous, tomentose; then black and smooth; hymenium bordered by a projecting margin; pores angular, \( \frac{1}{10} \) inch wide.

135. \( P. \) (Placodermei) palustris. B. & C.—Pileo pulvinato, cuticula laevi ochroleuca viestito; hymenium convexulo; poris parvis, angulatis. No. 1566. Santee River. On \( Pinus palustris \).

Pileus 2 inches across, 1 long, pulvinate covered with a smooth ochre-white cuticle; hymenium slightly convex; pores \( \frac{1}{10} \) inch wide, angular. Resembles \( P. \) betulinus.


* \( P. \) (Inodermei) valenzuelianus. Mont.—No. 974,976. Santee River. Curtis.


Pileus 1-2 inches wide, \( \frac{1}{4} \) inch long, dimidiate, decurrent behind, dirty white, zoned, clothed with velvety down, which is here and there matted and strigose; pores \( \frac{4}{10} \) inch wide, angular, elongated.


Pileus \( \frac{1}{2} \) inch wide, \( \frac{1}{4} \) long, ochraceous; dimidiate, decurrent behind, clothed with radiating towlike fibres; pores \( \frac{3}{10} \) inch wide, elongated, angular, decurrent.


Pileus 3 inches wide, 2\( \frac{3}{4} \) long, deeply lobed, fanshaped, zoned, rufous behind, pallid and pulverulent in front; hymenium ochraceous; pores \( \frac{1}{10} \) inch wide. Looks at first like some form of *P. versicolor,* but is very different.


Pileus 1 inch wide, \( \frac{1}{2} \) inch long, imbricated, decurrent behind, pallid, silky; margin thin inflected; hymenium ash-coloured; pores \( \frac{1}{5} \) inch wide. Ravenel compares this with *P. amorphus,* but it seems very different, the pores being deficient in the peculiar waxy appearance which characterises that species.


Pileus \( \frac{3}{4} \) inch wide and long, flabelliform, but frequently laterally confluent, pallid, at length quite smooth, marked with little radiating lines; pores \( \frac{1}{2} \) wide, sinuated. Hymenium much like that of *P. abietinus.*

2-4 inches long, pale, silky, at length nearly smooth and shining, repeatedly but delicately zoned; hymenium white; pores small; dissepiments very thin and delicate, soon torn, and toothed so as to present the appearance of a Hydnum. Car. Inf. Curtis.

**P. (Inodermei) chartaceus.** B. & C. l. c.—Effused for many inches, and completely surrounding the smaller branches, broadly reflexed; margin membranaceous but rigid; obscurely zoned, dirty white, slightly silky, but by no means hairy or bristly; pores \( \frac{1}{10} \) inch wide, soon broken into obtuse lamellar processes. Allied to *P. pinitus*.

**P. (Ruspinati) favillaceus.** B. & C.—Brevis, sparsus; margin liberato, tomentoso; hymenio cinereo; poris minimis. No. 5266. New Eng., Sprague. Consisting of little scattered patches: margin at length free and tomentose; hymenium ash-coloured; pores \( \frac{1}{10} \) inch wide. Parasitic, together with a minute Hydnum, on some indeterminable resupinate Polyporus.


**P. (Resupinati) aurantio-pallens.** B. & C.—Suborbicularis, margin elevato obtuso cinctus; poris parvis. No. 2600. Car. Inf. On pine. About an inch wide; margin obtuse raised; pores \( \frac{1}{10} \) inch wide. Allied apparently to *P. bombycinus*.


Entirely resupinate without any distinct margin; of a golden yellow, inclining to olive; pores elongated, oblique, \( \frac{1}{5} \) inch wide; spores ferruginous.


Several inches broad, thin near the margin, of a rich salmon colour, at length brown. Pores \( \frac{1}{5} \) inch wide; very tender when young. Allied to the three last.

**P. (Resupinati) barbæformis.** B. & C.—Totus resupinatus

Wholly resupinate with a thin white margin; hymenium tawny; pores \( \frac{1}{8} \) inch wide, but variable in size. No. 4266. Penns., Michener. Appears to be a form of the same species, with the margin free and elevated, and the dissepiments elongated and toothed.


145. P. (Resupinati) clathratus. B. & C.—Niveus, effusus, late cribrosus; parietibus cribrorum lacca-loveibus; poris punctiformibus, dissepimentis crassis obtusis. No. 3656. Louisiana. Dr. Hale. Widely effused, the hymenium with large apertures, the walls of which are smooth and honey colored. Pores \( \frac{1}{2} \) inch wide.

* P. (Resupinati) cremor. B. & C.—Rigidus, brevis, discincola, totus resupinatus; poris suborbicularibus; dissepimentis crassiusculis, obtusis. No. 1074. Car. Inf. On oak branches, especially on the disc where branches have been broken off. About an inch broad, consisting almost entirely of tubes. Pores \( \frac{1}{2} \) inch wide, nearly round.

146. P. (Resupinatus) Lindbladii. B.—Pileo resupinato, rigido; margine tomentoso albo dumnum libero; hymenio griseo, fuscescente; poris angulatis. No. 1623. Car. Inf. Spreading for some inches; of a peculiar grey tint. Pores \( \frac{1}{8} \) inch wide. The Carolina specimens are a little darker than those originally received from Sweden.

147. P. (Resupinatus) limitatus. B. & C.—Totus resupinatus rigidus alidus; margine nigrescente rimoso; poris angulatis. No. 2686. Car. Inf. entirely resupinate, the margin thin, barren, and cracked. Pores \( \frac{1}{8} \) inch wide.


148. P. (Resupinati) salviae. B. & C.—Effusus, mollis, albus, fere totus et poris minimis flexuosis constitutus; dissepimentis tenuibus. No. 2602. Car. Inf. On *Salvia*, surrounding the branches, consisting almost entirely of the minute flexuous pores; dissepiments thin; pores \( \frac{1}{8} \) inch in diameter. Allied to *P. vaporarius*.

Running over grass and various substances, after the fashion of Thelephora sebacea; white, soft, springing from a thin cotton-like mycelium; pores \( \frac{1}{6} \) inch wide, short, angular, with thin dissepiments.

BRITISH FUNGI.

By M. C. Cooke.—(Continued from page 40.)

Hymenomycetes.


Pileus white, slightly fleshy, fragile, at first campanulate, then expanded, covered with a minute, dense, viscid pruinosity, which, as well as the white flesh, instantly changes to crimson when touched; margin at length striate; stem slightly attenuated upwards, also covered externally with minute, viscid pruinosity, changing to crimson when touched; ring evanescent; gills free, very thin, moderately distant, somewhat ventricose, white, the edge becoming crimson when touched; spores white.—Smith in Seem. Journ. Bot. ix. (1871), p. 1, t. 112.

On mosses in a cool fernery. Chelsea.

Pileus \( \frac{1}{2} \) to 1 in. across. Stem 1-2 in. long. Spores \( 0.003 \times 0.002 \) in.


Pileus campanulate, rather fleshy, white, grooved, adorned with small pallid scales; margin appendiculate; stem nearly equal or slightly clavate; pallid, lemon-coloured, stuffed; gills white, ventricose, approximate; spores nine-pin shaped, or obliquely clavate; mycelium thread-like.—B. & Br. Ceylon Fungi, no. 67. Ann. N.H. no. 1182.

Pileus 1 in. across; stem 2\( \frac{1}{2} \) in. high, 1 line thick; gills nearly 2 lines broad. This species, which at present has been found only once in this country by Mr. Broome, and which in external characters approaches A. Clypeolarius, is at once distinguished by the length of the spores, which is \( 0.006 \) in.—B. & Br.

Agaricus (Lepiota) Terrei. B. & Br. "Terry's Lepiota."

Pileus sub-hemispherical, bright tawny, rough with minute warts; stem sub-equal, clad with furfuraceous scales of the same colour; ring at length torn; gills white, narrow, remote.—B. & Br. Ann. N.H. no. 1183.

On sandy ground. Forres.

Pileus 1-2 in.; gills not branched; spores \( 0.002 \times 0.0015 \) in. This species, which appears quite distinct, approaches A. granulosus on one side, and A. acutesquamosus on the other, but it is nearer to the latter than the former. The spores of A. granulosus are slightly larger, those of A. acutesquamosus are rather longer, and at the same time narrower.—B. & Br.
**Agaricus (Lepiota) ermineus.** Fr. "Ermine Lepiota."


In grassy places. Coed Coch.

Fragile, wholly white, inodorous, with the taste of radishes. Krombholz says that the spores are fusiform.

**Agaricus (Lepiota) ramentaceus.** Bull.—Bull. t. 595. f. 3.

**Agaricus (Armillaria) ramentaceus.** Cooke, Hubk. no. 35.

Under trees. Coed Coch.

In the "Handbook," No. 35, this is referred to *Armillaria*.

**Agaricus (Lepiota) sistatrus.** Fr. "Fibrous-ringed Lepiota."


On sandy ground. Forres.

This pretty species is remarkable for the filamentous ring.

**Agaricus (Lepiota) delicatus.** Fr. "Delicate Lepiota."


Pileus hemispherical, obtuse, rivelose, viscid, smooth, pallid, 1 in. across; stem ½ in. high ¼ in. thick, transversely punctate, squamulose, stuffed with flocci, white above; veil floccose, slightly appendiculate; gills free, rounded behind, approximate, pallid. The veil is really double, floccose, covered with scaly particles. Taste like *Polyporus squamosus.*—B. & Br.

**Agaricus (Armillaria) robustus.** A. & S. "Robust Armillaria."


In woods, &c. Leigh Down, Bristol.

Short, robust, pleasant; pileus bay, tawny, or reddish, variable in size.

**Agaricus (Armillaria) denigritus.** Fr. "Smutty Armillaria."

Pileus hemispherical, obtuse, fleshy, tawny; flesh whitish; stem subequal, solid; striate above the ring, white; gills adnexed, tawny.—Fr. in Mus. Succ. B. & Br. Ann. N. H. no. 1187.

On a grass plot near shrubs. Coed Coch.

At first sight very like *A. Leveillei*, but the white spores at once distinguish it.—B. & Br.
LICHENOLOGICAL MEMORABILIA.—No. 2.

By the Rev. W. A. Leighton, B.A., F.I.S., F.B.S.Ed.

The Lichens of Bettws-y-Coed, North Wales.

A fortnight’s sojourn, in the month of June, 1872, amongst the magnificent and romantic rocks and woods surrounding Bettws-y-Coed, in the valley of the Conway, is, in itself, a thing long to be treasured in the memory; but to the lichenist, who finds those rocks and woods abounding with rare and beautiful lichens, it is “a beauty and a joy for ever.”

As a general rule, mere lists of localities of plants are scarcely advisable, but the knowledge of lichens, and of their distribution over the British Isles, is as yet so incomplete and imperfect, that a deviation from this rule may be possibly pardoned. Assuming this, I proceed to enumerate the lichens which I observed and collected in this circumscribed nook of lovely scenery.

The Collemacei, curiously enough in so damp a locality, seem to be comparatively rare, Collema flaccidum, Ach., barren as usual, but abundant; a few plants of Collema nigrescens, L., sterile; Leptogium lacerum, (Ach.), sterile; and a single specimen of the rare Leptogium Burgessii, (Lightf.) in fine fruit, being all their representatives. Calicium hyperellum, Ach., was the only representative of the Calicii, though I think I also observed the barren thallus of Coniochybe furfuracea, Ach. Cladonia squamosa, Hffm., and Cladonia digitata, Hffm., var. macilenta, Hffm., f. carcata, Ach., occurred in surpassing beauty and luxuriance on the trunks of trees, at the Conway Falls, together with well-fruited Usnea barbata f. hirta, Fr.; and Cladonia cervicornis, Schr., in equal luxuriance on the rocks above the Gwydir woods. Stereocaulon nanum, Ach., very fine, and abundant, but sterile as usual. Ramalinafarinacea, (L.), large and abundant but sterile, and Ramalina fustigiata, Fr., finely fruited. A single specimen in fruit! of Cetraria aculeata, Fr., was gathered on the rocks. Nephromium lusitanicum, Schr., was most abundant, in fine fructification in all the woods, especially in the Gwydir woods, where the trees were clothed with it. Pettigera horizontalis, (L.), and P. scutata, (Dicks.), were not unfruited, the latter sterile. Stictina limbata, (Sm.), Stictina fuliginosa, (Dicks.), and Stictina scrobiculata, (Scop.), and Sticta pulmonacea, Ach., very fine and luxuriant, but always sterile, were abundant, and Riccosia latévirens, (Lightf.), in fine fructification, but partial. Of Parmelia, the following were noticed: caperata, (L.), olivacea, (L.), physodes, (L.), and its variety labrosa, Ach., clothing the young trees, one specimen in fruit, perlata, (L.), fuliginosa, Dub., corticole in fruit, conspersa, Ehrl., and its form Mougeotii, Schr., saxatilis, (L.), corticole form in good fruit, and its variety omphalodes, (L.), also in fruit, Borneri, f. olivacea, Leight., and tiliacea, (Ach.). Umbilicaria polyphylla, (L.), f. lacera,

**Lecidea occulta**, (Körb.)—Thallus pallido-lutescent, effuse, adnate, thin, minutely areolate, areole somewhat convex; hypothallus dark; apothecia very minute, adnate, nigro-fuscous, at first margined by the thallus, eventually free and somewhat convex, proper margin more or less visible; epithecium fuscous; paraphyses indistinct; hypothecium lutescent; spores 8, fuscous, small, oblong, 1-septate.

Thallus tinged yellow with K, and on immediate subsequent application of C still yellow, but soon obliterated (Ky C—). It may be well to state that my herbarium contains a similar lichen gathered at Diganwy, near Conway, in 1851.

See plate 4, fig. 6, a thallus nat. size, b section of apothecium, c spores, magn. 1200.

This Lecidea bears a considerable general external resemblance to *L. stellulata*, Tayl., but that has a white thallus, and a dark hypothecium, and different reaction, keeping them distinct.

A very interesting and instructive series of forms of *Lecidea resinia*, Fr., occurred on the resin issuing from the spruce fir-trees. Its normal condition may be seen in plate 4, fig. 9 a, in which the apothecia were pale yellowish-brown, adnate and plane, variable in size. A section of the apothecium (fig. 9, f. & d.) showed a pale yellow hypothecium, with a darker yellow hymenium, consisting of distinct slender paraphyses, and linear ascii, containing innumerable spherical colourless spores (fig. 9, i. & h.) The spermogonia were
tubercular, of similar colour with the apothecia, and contained sterignata (fig. 9, l.), and small spherical colourless spermatia (fig. 9, m.). A biatorine state sparingly occurred, represented in Leight. Exs. 277. In the cicatrices, where branches had been broken away, the resin assumed a brownish, or greenish brown, or even purplish hue, through discoloration from some unascertained cause, and here the apothecia and spermogonia became black, the former being much more concave, and even in some cases somewhat stipitate, the epithecium shining (fig. 9, c. & g.). A section of the apothecium exhibited a nigrofuscous hypoteichium, and a dark epithecium (fig. 9, e.), and the spores (fig. 9, k.), were slightly smaller than those of the normal state. There is, however, no reason to imagine that these are distinct plants, but merely states of one and the same lichen, transitional forms having been observed. The dark form may be named forma cicatri&ic;cola, Leight. The normal state is the Peziza resinae of Fries, and the spermogonia the Spharia resinae of the same writer. I subsequently found L. resinae in both its forms on the spruce firs in Glanartro, the woody valley leading to Cwm Bychan near Barmouth.

The Graphidaceae were very plentiful; Graphis elegans, (Sm.), G. scripta, Ach., in its forms diffusa, Leight.; varia, Leight., flexuosa, Leight., and divaricata, Leight.; and its varieties serpentina, Ach., and pulverulenta, Ach. G. inusta, Ach., f. simplicisscula, Leight. G. sophistica, Nyl., in its forms radiata, Leight., and divaricata, Leight., and its variety pulverulenta, (Sm.). Opegrapha atra, Pers., and its forms paralela, Leight., denigrata, Ach., and arthonoidea, Leight. Opegrapha Turneri, Leight., Opegrapha vulgata, Ach., and Opegrapha saxisola, Ach., f. gyrocarpa, (Zw.), very sparingly. Stigmatidium Hutchinsiae, Leight., clothed the shaded rocks in profuse perfection and beauty. Arthonia lurida, Ach., and Arthonia vinosa, Leight., and its var. pineti, Körb. (fig. 5), plentiful. The latter Arthonia may be readily distinguished from its congeners by a section of the ardealia turning vinous or red-purple in hydrate of potash. Arthonia astroidea, Ach., and var. opegraphina, Ach. (plate 4, fig. 7 a. & b.), not unfrequent. It should be here observed that the variety opegraphina, Ach., and also the var. epipastoides, Nyl. (plate 4, fig. 8, a. & b.), appear to be erroneously joined to A. astroidea, Ach. (see Leight. Lich. Fl., p. 397), insasmuch as they possess spores different from those of A. astroidea, and in all respects assimilating those of Arthonia cinnabarina, Wallr., viz., obovato-clavate, rounded at the extremities, 4-septate, the uppermost cell largest, and occupying nearly half of the spore, and the other cells in the lower half. (Plate 4, fig. 7 b. & 8 b.), of which they are no doubt states or forms, and to this species they must in future be referred. Arthonia epipasta, (Ach.); Arth. cinnabarina, Wallr., var. anerythraea, Nyl., f. detrita, T. & B.; and the following, which I believe are new to Britain:—
**Arthonia proximella**, Nyl.—Thallus effuse, hypophlæodal, silvery-grey; arcellæ nigro-fuscous or black, minute, round, lecideoid, opaque, plane, internally nigrescent; spores 8, fuscous, obovate, 1-septate.

On holly, rare. Gwydir woods.

**Arthonia aspersella.** Leight, n. sp.—Thallus pale-yellowish, maculari-effuse; arcellæ very minute, scattered, punctiform, linear or angulari-contluent, black or nigro-fuscous; hymenium untinged by K.; spores 8, colourless, obovate, 1-septate.

On holly; Gwydir woods.

This lichen assimilates in general aspect with *A. vinosa*, var. *pineti*, but in that the arcellæ are roundish, and the hymenium is untined red-purple with K.; whilst in *aspersella* the arcellæ are remarkable for a peculiar sharp angularity, and the hymenium is untined by K. (Plate 4, fig. 4, a. & b.)

On one rock in the Gwydir woods, I met with, what I believe to be, the sterile thallus of *Arthonia decussata*, Fw., which is perfectly identical with Zwackh 10, A. & B., and Mass. 123, and has similar reaction K—C red. This is new to the British Flora, and is mentioned here to induce further research for fructified specimens.

**Endocaropus fluviatile**, (D.C.), in small quantities on wet rocks. *Verrucaria epidermidis*, Ach., f. *fallax*, Nyl.; *V. punctiformis*, Ach., *V. antecellens*, Nyl. (Leight. Lich. Fl. G. B.), see plate 4, fig. 2, a. b. c., and to which as Exsicatei may be quoted Zw., 363, A. & Hepp. 954, rather abundant on hollies. The cells of the spores have a singular tendency to become spuriously septate; *V. biformis*, Borr.; *lectissima*, (Fr.), very plentiful; *V. chlorotica*, (Ach.), and its f. *carpinea*, Schér.; *V. nitida*, (Weig.) especially plentiful, and also a remarkable form or state, on old laurel and other trees, having a nigro-fuscous thallus resembling an indeterminate, diffuse, dark-brown, oily stain, which may be named f. *elwodes*, Leight.; *V. horistica*, Leight. (Lich. Fl. G. B., 451), abundant on rocks. (Plate 4, fig. 1, a. b. c. d.)

I may mention that the duplicates of the above collections will be made up into a few sets for distribution at 30s. per 100 specimens. First applicants will have the most complete sets.

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**Old Nettle Stems and their Micro-Fungi** is the title of a communication, by the Editor, which appears in the current number of the Journal of the Quexett Microscopical Club. It contains also a paper by C. H. Peck on *Cucurbitaria morbosa*, Schwein.
NEW BRITISH LICHENS.

Communicated by the Rev. J. M. Crombie, M.A., F.L.S.

The following new species of British Lichens have been described by Dr. Wm. Nylander, in the "Flora," 11th August, 1872:

1. **Obryzum doliocoteron.** Nyl.—Parasitic on the lobes of *Collema auriculatum*, var. *pinegescens*, Nyl. Similar to *O. corniculatum*, but with the spores longer, 3-5 septate, cylindrico-oblong, 0,023 27 mm. long, 0,0045-50 mm. thick. On shady calcareous rocks of Craig Tulloch, Blair Athole (Crombie, August, 1870).

2. **Lecidea asemea.** Nyl.—Thallus white, thin, unequal, subdispersed; apothecia black or livid-black, margined, often subulate; spores 8 n., ellipsoid, 0,013-16 mm. long, 0,006-8 mm. thick, epithecium glaucescent, hypothecium reddish; hymenial gelatine bluish, and then tawny wine-coloured with iodine. On sandstone rocks. Jersey (Larbalestier). Allied to *L. sublatypea* Leight.

3. **Lecidea mesotropoides.** Kyi.—Thallus externally somewhat similar to that of *L. mesotropa*, but with the areolae convex (K + (yellow), medulla I — ); apothecia at first plane, margined, at length convex, prominent, immarginate, the lamina thinner than in *L. mesotropa*, and the spores shorter, 0,009-11 mm. long, 0,006-7 mm. thick; perithecium circumcinct. Spermogones frequent, scattered over the areolae, with spermatia 0,007-10 mm. long, scarcely 0,001 mm. thick. On calcareous stones of an old wall on Craig Tulloch, Blair Athole (August, 1871, Crombie).

4. **Lecidea subfurva.** Kyi.—Thallus brownish-black or greyish-brown, above minutely furfuraceous and opaque, areolato-diffract, indeterminate (K — ); apothecia black, plane, ruguloso-opaque, margined, often angulose, obscure within; spores 8 n., colourless, subgloboso-ellipsoid, simple, 0,011-12 mm. long, 0,009 mm. thick; paraphyses slender, irregular, indistinct; epithecium and hypothecium obscure; hymenial gelatine intensely blue with iodine. On micaceous stones of old walls in Glen Fender and on Craig Tulloch, Blair Athole (Crombie, August, 1870). Externally somewhat resembling *L. furvella*, but belonging to the section of *L. petrosa*.

5. **Lecidea confusa.** Nyl.—Thallus olive-grey, or bright brownish-grey, thinnish, granulated or granulato-conglomerated, the glomeruli dispersed; apothecia black, adnate, convex, immarginate, white within; spores 8 n., ellipsoid, simple, somewhat small, 0,007-11 mm. long, 0,0040-45, mm. thick; epithecium yellowish-brown, paraphyses slender, indistinct (visible with K); hypothecium colourless. On micaceous stones of an old wall on Craig Tulloch, in Blair Athole (Crombie, August, 1871).
6. Lecidea deparcula. Nyl.—Thallus greyish, thin, subareolate, dispersed, evanescent, hypothallus black, but little conspicuous; apothecia black, small, somewhat diffused, slightly prominent, subumbonate in the centre, concolorous within, the margin obtusely turgid and sometimes subcrenate; spores 8 n, colourless, ellipsoid, simple, 0,009-12 mm. long, 0,005-7 mm. thick; epithecium obscurely bluish; paraphyses moderate, bluish-green towards the apex; hypothecium brownish-black; hymeneal gelatine intensely bluish or dark-blue with iodine. On calcareous stones amongst detritus, on the summit of Ben-y-gloe (Crombie, August, 1871).

7. Lecidea atro-badia. Nyl.—Thallus dull-brown or greyish-brown, thinnish, areolato-diffract, hypothallus black, radiating at the circumference (medulla I — ); apothecia black, somewhat convex, immarginate, concolorous within; spores 8 n, brown or blackish, oblong, 1-septate, 0,021-30 mm. long, 0,010-14 mm. thick; epithecium violet-brown, with K faintly purple; paraphyses not very distinct; hypothecium brown; hymeneal gelatine intensely bluish with iodine. On quartzose rocks on the summit of Ben-y-gloe (Crombie, August, 1871). Allied to L. badio-atra.

8. Verrucaria submicaN. Nyl.—Not unlike V. punctiformis, var. tremula, but with longer spores, 0,020-26 mm. long, 0,006 mm. broad. It is allied also to V. elongatula, but this species has the spores more fusiform. On the bark of hollies in the New Forest (April, 1868, Crombie).

9. Verrucaria analeptella. Nyl.—Similar to V. epidermidis, f. analepta, but with the paraphyses soft, distinct, though but slightly evolute. From V. fallax it is distinguished by the smaller apothecia, and different theca and spermata. On the bark of trees in Ireland, frequent (Carroll). It appears in Anzi L. min. r. No. 395, s. n. Sagedia aenea.

10. Verrucaria spilobola. Nyl.—Thallus black, thin, evanescent; apothecia black, small, somewhat prominent, crowded or submucular-aggregated, the perithecia entire, black; spores 8 n, colourless, oviform or oblongo-oviform, slightly 1-septate, 0,015-2 mm. long, 0,007-8 mm. thick; paraphyses none; hymeneal gelatine not tinged with iodine. On calcareous stones on Craig Tulloch (August, 1871, Crombie). This species has the green gonidia often 4 connate, and belongs to the section of V. mesobola.

Synopsis of New York Uncinulae; by Charles H. Peck, contains the following species:—Uncinula circinata, C. & P., on maple leaves; Uncinula adunca, Lev., on leaves of willow and poplar; Uncinula macrospora, Peck., on elm leaves (scarcely tenable); Uncinula parvula, C. & P., on leaves of Celtis; Uncinula flexuosa, Peck., on horse-chestnut leaves; Uncinula Clintonii, Peck., on leaves of Basswood, and Uncinula ampelopsis, Peck., on leaves of woodbine.

The July part of the "Lens" contains the Index to the above Conspectus. It will be found that the Professor has applied the pruning knife most unsparingly, doubtless to the great disgust of the "species mongers." Some of the genera might, we think, have been retained with advantage; for example, the Gymnodiscus, which has been relegated to the Surirella. This genus has two unvarying characteristics, viz., the circular form of the valves, and the median space of the two valves of the frustule are always at right angles to each other; consequently the valve must be truly circular. Professor W. Smith, the author of the Synopsis, has erred in placing Campylodiscus spiralis in that genus. Kützing was right in making it a species of Surirella (S. spiralis).

The union of the genera Triceratium and Amphitretas with Bidulphia we think will not be generally accepted; to do so necessitates the enlargement of the generic characters of the last to too great an extent. The number of species will also be inconveniently large.*

The genus Triceratium might, we think, be united to Amphitretas without much alteration of the generic character. The author is, no doubt, right in abolishing the conditions of stipitate, tubular, &c., as being of no value. He remarks, "The conditions frondose, stipitate, filamentous, tubular, &c. I have not considered sufficient to warrant the formation of new genera. A long study of living forms has convinced me that these characters are fleeting—not to be relied on.

"Among the Schizoneemae, e. g., the fronds are quite variable which enclose the same siliceous frustules; and the fronds themselves vary with the habitat. The tubes of Colletonema and Encyonema disappear in quiet waters, and the frustules become embedded in amorphous jelly, or quite free."

The number of genera dealt with in the Conspectus, and which the Professor says "includes, as far as I am aware, either as admissible or among the synonyms, the name of every genus hitherto constituted," is 299; the number deleted is 189, thus abolishing nearly two-thirds!!!

We find on comparing the Conspectus with the Synopsis of British Diatomaceae 23 out of the 59 genera described therein deleted.

The following list shows the genera retained, but in order to

* The author will no doubt complete the Synopsis by publishing a Conspectus of the Species of Diatomaceae.
embrace all the species in the Synopsis, nine genera not included in that work are added:

1. Actinocyclus.  20. Fragillaria.

Additional genera to which some of the forms in the Synopsis are referred:

38. Actinoptychus, Ehr. (Actinocyclus undulatus, Sm.)
39. Auliscus, Ehr. (Eupodiscus sculptus, Sm.)
40. Ceratoneis, Kutz, non Ehr. (Part of Synedra and Eunotia, Sm.)
41. Campyloneis, Grunow. (Cocconeis Grevillii, Sm.)
42. Ditylum, Bailey. (Triceratium striolatum ? Sm.)
43. Diatomella, Greville. (Grammatophora Balfouriana, Sm.)
44. Gomphogramma.
45. Stictodesmis, Greville. (Surirella Craticula.)
46. Toxarium, Bailey. (Synedra undulata, Sm.)

Genera abolished in the new Synopsis. (The numbers refer to the genera to which the species belonging to the deleted genera are relegated.)

Doryphora. 27-29.  Encyonema. 13.  Pinunaria. 27.
Dickia. 27.  Himantidium. 17.  Podospenia. 24.
Dickiea. 27.  Schizonema. 27-32.
Encyonema. 13.  Triceratium. 8-42.

F. Kitton, Norwich.

CRYPTOGAMIC LITERATURE.

On the Spermogonia and Pycnidia of Crustaceous Lichens, by Dr. Lauder Lindsay, in "Linnean Transactions," xxvi., part 2.

NOTICES OF NORTH AMERICAN FUNGI.

By the Rev. M. J. Berkeley, M.A., F.L.S.

(Continued from Page 55.)


  Widely spreading, pale tan-coloured; pores \( \frac{1}{10} \) inch wide, looking like minute burst bladders.

- **151. Polyporus (Resupinati) minimus.** Ravenel.—Pulvinatus fere totus e poris mollibus ceraceis candidis elongatis minimis constitutus; No. 2988. Car. Inf.

  Only one or two lines across, forming little cushions, consisting almost entirely of very minute, elongated, wax-like pores.

- **152. Polyporus (Resupinati) fatiscens.** B. & Rav.—Rav. Fung. Car. Fasc. 2, No. 21. Totus resupinatus albus tennissimus pulveraceus; poris serius enatis primum punctiformibus dein angulatis. Car. Inf. Entirely resupinate. At first consisting of a thin white pulverulent stratum, which, after a time, bears pores about \( \frac{1}{10} \) inch wide, which are at first punctiform, then angular.


  Entirely resupinate; very thin and tender, of a watery texture, tawny; pores very small, confluent, with very thin dissepiments. On bark of *Ulmus Americana*.


* Trametes hydnoides. Fr.—No. 3093. Texas, C. Wright.


Pileus 6 inches across; 3 long, pale, tawny, dimidiate, plane, clothed with soft, matted strigose hairs, which are quite distinct in young specimens, though always inclined to become fasciculate; margin thin; pores at length dingy-umber, $\frac{3}{5}$ inch across, slightly angular; dissepiments rigid, often elongated into one or more teeth. Allied to T. ozonioides and the Cuban T. aculeifera.


Pileus flattened, but slightly convex, minutely tomentose; of a very pale tawny, somewhat sulcate or zoned at the margin, which is barren; pores quite punctiform, with rigid obtuse dissepiments about $\frac{1}{5}$ inch wide. Only a portion of a single specimen was sent, but the characters will be sufficient to recognise it.

- 156. Trametes limitata. B. & C.—Suborbicularis, planato, pallida subtiliter tomentosa zonata; poris minimis concoloribus; dissepimentis tenuibus; marginem sterilis acuto, No. 6377. N. Mexico, Dr. Bigelow.

About an inch in diameter, thin, coriaceous, minutely tomentose, pallid zoned; pores about $\frac{1}{5}$ inch across, angular, with thin dissepiments; margin sterile, thin, about a line broad. At first sight bearing some resemblance to the last, but the pores are quite different, with thin dissepiments; when young, distinctly angular.


Pileus $\frac{3}{4}$-1 inch wide, $\frac{3}{4}$ inch long; often laterally confluent pulvinate, decurrent behind, ochrey-white, zoned; at first tomentose, at
length smooth, as if laccate; hymenium white, concave; pores punctiform, \( \frac{1}{10} \) in. wide, with broad, obtuse dissepiments. Allied to *Trametes ochroleuca*, B. In the measurement of the pores, the dissepiments are always included, so that \( \frac{1}{100} \) means a hundred to the inch. This was formerly referred to *P. pubescens*, Fr.


Pileus 3 \( \frac{1}{4} \) inches across, 2 long; reniform, rather rugged, with a few shallow grooves; white, polished; margin thin; stem \( \frac{1}{2} \) inch long and wide, lateral, obtuse; pores \( \frac{1}{10} \) inch wide, at length sinuated. This is just one of the bushes which oscillate between *Trametes* and *Daedalea*.

- *Daedalea pallido-fulva*. B.—Hook Lond. Journ., v. 6, p. 322. Of a corky substance; pileus 1\( \frac{1}{2} \) inches long, 3 or more across; dimidiato, rather shining, rugged, zoneless, pallid; hymenium pale tawny; pores narrow, \( \frac{1}{10} \) inch wide, straight, here and there sinuated. Ohio, T. G. Lea.

- *Daedalea confragosa*. Fr.—No. 5862. Maine, Morse. Few fungi are more liable to be attacked by insects.


About 4 inches across; irregular, corky, of a soft substance, which is slightly zoned, attached behind, and more or less decurrent, even, with the exception of a few obtuse, tubercular, elevations, finely pubescent; ochraceous; pores about \( \frac{1}{10} \) inch across, sinuated; of the same colour as the pileus. This species just forms the transition between the two sections of *Fries*.

- *Daedalea cinerea*. Fr.—No. 1865. Rhode Island, Bennett.


Ferruginous in the younger part, with sometimes a tawny tint. Pileus \( \frac{1}{2} - \frac{3}{4} \) inch across, scarcely \( \frac{1}{4} \) inch long, decurrent behind, tomentose, becoming dark brown in the older parts; pores irregular, about \( \frac{1}{36} \) inch across, at first pubescent.


Entirely resupinate, of a tawny brown, forming little, interrupted, rather convex patches; pores springing abruptly, without any margin, about \( \frac{1}{36} \) of an inch across, but very variable in size; disseminations acute. The under surface, when detached, is tawny and tomentose.

* Hexagona variegata. B.—No. 3133. Key West, Blodgett. The species was described from Jamaica, St. Domingo, and British Guiana specimens.


Pileus \( \frac{1}{3} \) inch across, very thin, and transparent; margin irregular, ciliated; stem 1 inch high, 1½ line thick at the base, about \( \frac{2}{3} \) line at apex, hispid; pores oblong, about \( \frac{1}{15} \) inch wide. Resembling *P. arcularius*, but much more delicate.


Specimens of *F. cucullatus* from St. Domingo exactly connect the South Carolina plant with that of Cuba. The pores are quite concealed in both on the upper side. *F. induratus*, from St. Domingo, has larger pores.


It occurs also in tropical climates, as at Bombay.


Pileus 1 inch or more across, ¼ long, white, except at the margin, where it has a pale umber tint, quite smooth, slightly wrinkled; margin lobed, probably from the lateral confluence of one or more individuals; hymenium deep flesh-coloured, wrinkled.


About ¼ inch long and wide, reniform, externally furfuraceous; hymenium dirty white, with a few radiating pores. A very curious species, apparently intermediate between Laschia and Merulius.


Two to three inches across, orbicular, at length reflected on one side, villous and sulcate, white; hymenium red-brown when dry; folds radiating, and at length reticulate. This is clearly very different from authentic specimens of *M. fugax* from Fries, resembling in fact the Fl. Danica figure more than the plant of the great Swedish mycologist.


Orbicular, 2 inches or more across, surrounded by a distinct, white, tomentose border; hymenium tan-coloured, then sienna brown, at last deep brown, with distinct, nearly regular pores. This again is very different from authentic specimens of *M. serpens* from Fries, to which it was originally referred.


Forming small, thin, resupinate patches with a thin white border; hymenium tan-coloured at first, quite even and waxy, at length distinctly porous. The first condition is exactly that of *M. serpens*, but the appearance is ultimately very different.


Eflused, more or less byssoid; hymenium tan-coloured, dis-
tinctly porous as soon as the hymenium is formed. This is quite different from the last, though difficult of definition; the walls of the pores are not rigid as in *M. ceracellus*.


We have no specimen from N. America in the normal condition.

170. **Merulius spissus.** *B.*—Poris primum pallidis dein fuscis elongatis e strato membranaceo oriundis. Car. Inf. Curtis. Resupinata several inches across, at first membranaceous with shallow pale pores about \( \frac{1}{4} \) th of an inch in diameter, then much elongated and forming a dark brown mass.

* **Arrhytidia flava.** *B. & C.*—No. 1349. Car. Inf. Forming little, scattered, sometimes confluent patches \( \frac{3}{4} \) in. broad, consisting of a white mycelium which forms a distinct border to the smooth orange-yellow hymenium; sometimes the border is double. Spores oblong, fixed obliquely at the base.


About 1\( \frac{1}{2} \) line long, horizontal, spathulate, abruptly narrowed behind into a short stem; hymenium like the pileus fulvous.


The papillæ in the latter specimen are elongated as in *Solenia*. On *Liriodendron*.


Hydnum farinaceum, but the pruinose setae soon become yellowish above and at length brown.


Pileus 1-2 inches across, about 1 inch long, uniform, pallid red, pulverulent; margin inflexed; stem lateral, 1½ inch high, ½ thick, striate when dry; tubes more or less decurrent.


Pileus ¼ inch across, thin, pulverulent, spathulate, attenuated behind into the lateral stem; stem 2 inches or more high, ½ line thick above, much attenuated downwards. Apparently a very distinct species.


Pileus 3 inches across, convex, smooth, of a tough fleshy substance, at length much cracked and split; margin involute; stem 1½-2 inches high, ¾ thick, buff, and split like the pileus, tender when fresh; spines even, subulate, soft, entire, pale buff; smell vinous.

175. **Hydnum Curtisii.** B.—Fuligineo-fuscum; pileo orbiculari laevi; margine inflexo; stipe centrali sursum attenuato; aculeis elongatis acutis integris. No. 2809. Car. Inf.

Whole plant of a dingy brown; pileus ⅜ inch across, even; margin inflexed; stem bulbous at the base, where it is nearly ⅜ an inch thick, attenuated upwards; spines even, entire, elongated. Allied to II. lavigatum.

* **Hydnum infundibulum.** Sw.—Ohio, T. G. Lea. A noble species.


* **Hydnum compactum.** Fr.—No. 1383. Car. Inf.


Agaricus (Tricholoma) praevus. Lasch. "Deformed Tricholoma."
Reddish brown, pileus somewhat fleshy, campanulate, then expanded, umbonate (slightly silky), stem stuffed, then hollow, floccose, attenuated downwards; gills adnerved with a tooth, eroded, powdered with white.—Lasch. Lin. iv., No. 532. B. & Br. N. H. No. 1191. Fr. Ep. p. 42.
In a stove. July. Kew.
Considered by Fries as a variety of A. ionides.

Agaricus (Tricholoma) caelatus. Fr. "Embossed Tricholoma."
On the ground. April. Charmy Down.
Spores subglobose, 0.003 x 0.0015 in. Stem 1 in. high, at length fistulose, incrassated above, scarcely or slightly pruinose. Pileus scarcely 1 in. broad, brownish, then greyish-brown.

Agaricus (Tricholoma) sordidus. Fr. "Dingy Tricholoma."
Tough, pileus somewhat fleshy, campanulato-convex, then plane or depressed, subumbonate, smooth, hygrophanous, margin at length slightly striate; stem stuffed, fibrilloso-striate, rather curved, thickened at the base; gills rounded, rather crowded, violaceous or dingy-white, at length sinuato-decurrent.—Fr. Ep., p. 51. B. & Br., Ann. N. H., No. 1196. Fl. Dan. t. 1843, f. 2. Buxb. iv., t. 12, f. 1.
On the ground, amongst dung. Sept.
Spores pale ferruginous, 0.003 in.

Agaricus (Tricholoma) lixivius. Fr. "Ashy Tricholoma."
Fragile, pileus rather fleshy, convex then plane, smooth, moist, umbo evanescent; margin flattened, membranaceous, slightly striate; stem stuffed, then hollow and compressed, equal, floccoso-pruinose; gills truncate, free, soft, rather distant, greyish.—Fr. Ep., p. 54. B. & Br., Ann. N. H., No. 1197.
In pine woods. Nov. Ascot.

Agaricus (Tricholoma) putidus. Fr. "Stinking Tricholoma."
In fir woods. Nov.
Stem 1½ in. high, 3 lines thick, wholly fibrous, soft and fragile; pileus olive-grey, hoary when dry, here and there glistening. Gills 2-3 lines broad, distinct. Odour mealy, rancid.

Agaricus (Tricholoma) resplendens. Fr. "Shining Tricholoma."
White, pileus fleshy, convexo-plane, smooth, glutinous, with a
british fungi.

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silvery lustre; stem solid, stout, smooth, or flocculose at the apex; gills free, then uncinate adnexed, somewhat distant, unspotted.—Fries Summ. Veg. Scan. p. 274.

In shady places. Reading.

Stem sometimes equal, sometimes bulbous, \(\frac{1}{2}\) in. thick. Pileus 3 in. broad.

**Agaricus (Clitocybe) nigrescens.** Lasch. “Blackish Clitocybe.”


In larch plantations. W. G. S.

Pileus 2-3 in. broad; stem \(1\frac{1}{4}-1\frac{1}{2}\) in. long, 2-3 lin. thick. Odour rather sweet, taste unpleasant.

**Agaricus (Clitocybe) tornatus.** Fr. “Regular Clitocybe.”


Amongst grass at the foot of old decayed elm stumps. Oct. Leicestershire.

Small, very regular, inodorous, stem slender, firm, pubescent at the base. Disk of pileus darker.

**Agaricus (Clitocybe) orbatus.** Fr. “Grey-gilled Clitocybe.”


Pileus blackish-brown.

**Agaricus (Clitocybe) membranaceus.** Fr. “Membranaceous Clitocybe.”


In pine woods. Street, Somerset.

Fries, in his Epicrisis, regards this as a form of *Ag. infundibuliformis.*

**Agaricus (Clitocybe) parilis.** Fr. “Flocculose Clitocybe.”


By the side of plantations. Coed. Coch.

Slightly hygrophanous, but not becoming white.
Agaricus (Collybia) distortus. Fr. “Distorted Collybia.”
Pileus fleshy, convex, then expanded, obtusely umboate, smooth,
even, growing pallid; stem somewhat hollow, ventricose, tomentose,
attenuated, somewhat twisted, sulcate, pallid; gills slightly adnexed,
subseriate, narrow, very much crowded; white, then spotted with

Agaricus (Collybia) coracinus. Fr. “Rancid Collybia.”
Strong smelling. Pileus rather fleshy, convex, then expanded,
rather irregular, even, naked, hygrophanous; stem hollow, rigid,
not rooting, subcompressed, squamulose with a white meal above;
In fir plantations. Nov. Batheaston.
Pileus fuscous then grey, not silky, 1½ in. and more broad; stem
tough, 1½ in. high, 4 lines thick.

Pileus rather fleshy, conpanulato-convex, then expanded, umbi-
licate, smooth, then somewhat squamulose or rugulose, growing pale;
stem hollow, cylindrical, not rooting; gills slightly adnexed, broad,
rather distant, dirty white, becoming pallid.—Batsch. f. 19. B. & Br.
Pileus brownish, becoming pale.

Agaricus (Collybia) clusilis. Fr. “Closing Collybia.”
Pileus submembranaceous, hemispherical, expanded, umbilicate,
smooth, hygrophanous; margin rounded, inflexed, slightly striate;
stem stuffed with flocci, then hollow, smooth, flexile, not rooting;
gills subseriuate, affixed, broad, semicircular, plane, white, growing
Stem 1½-2 in. high, 1 line thick; pileus 1½-1 in. broad.

Agaricus (Mycena) cohaerens. A. & S. “Velvety Mycena.”
Pileus rather fleshy, campanulate, then expanded, obsoletely um-
boate, velvety, cinnamon-brown, growing pale; stem horny, very
rigid, even, smooth, shining, bay, pallid above; gills free, distant,
connected by slight veins, white, then yellowish, growing pallid.—

Fragile, inodorous; pileus membranaceous, campanulate, then
convex, sulcate, covered with an evanescent white powder; umbo
irregular, obtuse; stem straight, filiform, dark-blue, base villosa,
somewhat bulbous, gills attenuated, adnexed, lanceolate, distant,
On the ground. Nov. Ascot.
Pileus 3-5 lines broad, brownish, then grey, becoming bluish.
Weissia truncicola—Dicranum montanum.—Observing that you have re-printed my description of Weissia truncicola De Not., I beg now to correct the same by informing you that the species is a nonentity. Having shown the specimen to Prof. Lindberg, during his recent visit, he informed me that he was under the impression that Juratzka had referred it to Dicranum montanum Hedwig, and on comparing the two, I find that they are truly identical. The species is, however, none the less an addition to our Flora, and one that ought to occur here, since it is found throughout Europe, though most frequent in pine forests; its place will be next to D. strictum.—R. Braithwaite.

New British Lichen, Lecidea fossarum.—Thallus tenuissimus, obscurus vel evanescentis, apothecia late croceo-rufa, planiscula, adpressa, inmarginata mediocria, thcœae polyspora. Spore oblongæ vel oblongo-cylindricæ. Description furnished in letter from the Revd. W. A. Leighton, Shrewsbury, of date March, 4th, 1869. The above Lichen was gathered in a Cryptogamic trip with Dr. James Stirton, Glasgow, in the month of July, 1868, on Ben Lawers, near the head of the ravine where the saxifages are usually got. Unfortunately all the specimens gathered got quite broken, except the one which was forwarded to Mr. Leighton, and from which he sent the above description.—Walter Galt, Glasgow.

Fungus Show at South Kensington.—Amongst the exhibits were a beautiful specimen of Thelephora multizonata from Epping; a species of Hydnum new to Britain, several specimens of Sparassiscrispa—a peculiar form of Cantharellus allied to Cantharellus cibarius from Reading, besides some other very interesting fungi. Messrs. B. J. Austin of Reading, English of Epping, and W. G. Smith exhibited good collections.

Luminosity in Fungi.—A striking example is recorded by the Rev. M. J. Berkeley, in "Gardeners' Chronicle" for Sept. 21. A log of Spruce or Larch, 24 feet long, had the inside of its bark covered with a white byssoid mycelium. This was so luminous that when wrapped in five folds of paper the light penetrated through all the folds on either side as brightly as if the specimen was exposed. "Observers as we have been of Fungi in their native haunts, for fifty years," adds the writer, "it has never fallen to our lot to witness a similar case before." From the observations it seems probable that putrescence had as much to do with the luminosity as the mycelium. We regret that our space will not permit us to reprint this communication or the remarks of Mr. W. G. Smith in the succeeding number of the same journal.
NOVARA DIATOMS.

Descriptions of New Genera and Species of Diatoms obtained by the Austrian Imperial Frigate Novara, during her Voyage round the World.

By Herr A. Grunow.

(Translated by F. Kitton.)

Part II.

Schizonema reptabundum, Grun.—Frond minute, tubes minute, thin, creeping on various Algae, naviculae generally in simple series, frustule broad at the ends, centre slightly attenuated, valve narrow, rhomboido-lanceolate, apices somewhat obtuse, central nodule large, round, strito-punctate, delicate, 60 in. ·001, slightly radiant, more conspicuous near the centre. Pl. v, fig. 1, a portion of a tubule, with the frustules included, b c valves.

Upon Calithamnium Borreri, from the coast of Madeira, Jelinek; from Dalmatia, Dr. Lorenz.

This small, but characteristic species, has been long known to me as frequently occurring on C. Borreri, obtained from various localities.

The valves bear boiling in nitric acid very well.

Striatella chilensis, Grun.—Minute frustules, quadrate, longer or shorter than broad, septæ (dissepimentis) imperfect, more or less numerous, arcuate; valves broad, linear, apices rounded, sides slightly orbicular, striæ delicate, parallel, 50-55 in. ·001; median line distinct in the large valves, obsolete in the small valves. Pl. i, fig. 2, a and d valves, b narrow frustule, c broad frustule.

Upon Algae, from Valparaiso.

Approaches my S. kamtschatica very nearly, but differs from it in its smaller form, delicate striæ, and especially by its constantly arcuate septæ, which are many times repeated and cut through, and overlie the conspicuously convex central line, something after the manner I have figured my Euodia Frauenfaldii.

Fragillaria (?) Nankoorenis, Grun.—Valves linear, lanceolate, constricted below the apices, which are round, subcapitate, and produced; median line and terminal nodules distinct, striæ transverse, not punctate, 17 in. ·001, absent from the centre and below the apices. Pl. v, fig. 3.

Very rare in the "Polycystin stone," from Nankoori.

Of the form of Denticula fulva, Greg, but differs materially in the strong costa-like non-punctate striæ, which are interrupted by a narrow smooth space at the centre. It also resembles F. amphiceros, but Ehrenberg has not figured his form with the central smooth space.

Plagiogramma stipitatum, Grunow.—A variety distinguished by the peculiarity of the central costæ, which are frequently inter-
ruptured by an elliptical ring similar to a form figured by Greville as *P. elongatum*, and which does not reach the margin of the valve. Pl. v. fig. 4 a. b.

**P. constrictum** var. ? *Nankooresis*, Grun.—Valve broad, deeply constricted, central space annular. Pl. v. fig. 9.

The transformation of the two central costa of Plagiogramma into enclosed elliptical and round rings clearly indicates the necessity of uniting *Glyphodesmis* with *Plagiogramma*.

Our form is distinguished from *P. constrictum* by the form of the terminal smooth spaces which are longly elliptical, whilst in Greville's figure the lower part of the nodule has a flat base.

(I am unable to agree with the author's remarks that *Plagiogramma* and *Glyphodesmis* should be united; the latter genus has a distinct central nodule, in Plagiogramma this is wanting.—F. K.)

**Denticula nicobarica**, Grun.—Small, valves narrow, linear, sometimes linear lanceolate, rounded at the apex, costa 12 to 14 in. '001, striae granular, 24 to 28 in. '001. Pl. v. fig. 6, a. valve, b. frustule. Not uncommon in the "Polycystin stone" from Nankoori.

A characteristic species with conspicuous moniliform striae between the costa, and occasionally with interrupted or imperfect costa.

(This form seems to me to be identical with the *Eunotia Sancti-Antonii* of Ehrenberg's mikrogeologie and the *Denticula Lauta* of Bailey in Smithsonian Contributions. A very common form in the Californian deposits.—F. K.)

**Rhaphoneis Rhombus**, Ehr. var. *dubia*, Grun.—Valve broad, ovato-lanceolate; apices slightly produced, somewhat obtuse; median line narrow in the central part, slightly dilated; central nodule obsolete, sometimes slightly visible; striae punctate, radiant, 24 in. '001; punctae minute, confluent. Pl. v. fig. 7.

**Synedra Nitzschioides**, Grun.—Small variety; valve marked on both sides with cuneate, marginal puncta, 30 to 32 in. '001. Pl. v. fig. 8. a. b. c. d.

On Algae from Valparaíso.

Many of the valves are slightly cuneiform, and resemble the more delicate and short wedge-shaped frustules of *Meridium marinus*, Greg., which I found in detached frustules in shore sand from Auckland, and which I at one time took to be a *Sceptroneis*.

(I am unable to detect any resemblance to the genus *Nitzchia*, at least as that genus is usually understood. Judging from Grunow's figures I should refer this form to *Denticula*, possibly a variety of *D. mutabile*.—F. K.)

**Nitzschia panduriformis**, Greg. Var.? *Nicobarica*, Grun.—Valves large, irregularly granulate; granules minute; transverse striae delicate; longitudinal striae obsolete; oblique none; puncta on keel large. Pl. v. fig. 5.

In sea sand from the island of Kamortha.
Larger than *N. panduriformis*, but of similar shape; the structure, however, differs, whilst the irregular, closely packed puncta show no symptoms of oblique arrangement, but very delicate transverse lines, whilst the longitudinal lines are not resolvable. This form would, perhaps, better be considered a variety of *N. plana*, Sin., to which it bears resemblance. I have only had the opportunity of examining two valves. To this genus, perhaps, belongs also the *N. panduriformis* of Hantzsch in "Rabenhurst-Beitragen," Part I. Pl. vi. fig. 7. There also no oblique striæ can be detected. *N. bilobata*, Sm., has a similar outline to this form, on account of its central keel, and although not observed by Smith, its central nodule, like *Amphiprora latestriata*, Breb., should be placed with the Amphiprora or some Amphiprora-like genus which possess punctate keels.

(The author was no doubt misled, like De Brebisson, by Smith's erroneous figure, which represents *N. bilobata* with distinct striæ. The *Amphiprora latestriata* of De Brebisson, from whom I received authentic specimens, is *Navicula convexa*, Sm.!! The present species can hardly be a variety of *N. panduriformis*, Greg., the arrangement of the striæ in that being totally different, viz., in regular lines and their oblique direction being very distinct.—F. K.)

**Euphyllodium spatulatum**, Shadbolt.—Many characteristic forms occur in the Polycystin stone from Nankoori, showing distinctly the costa between the quadratic puncta. On the narrow base the costaæ are bifid, nevertheless I believe the species now before me, although not absolutely identical with Shadbolt's form, must be placed with Podocystis. Pl. i. fig. 10 is a valve from Nankoori enlarged to 500 diameter.

(It is to be regretted that the author did not figure a normal instead of an abnormal form. My specimens have both margins alike, as in other species of Podocystis.—F. K.)


In Polycystin stone, Nankoori, very rare. The valves are much smaller and narrower than in the type form, and the puncta nearest the median line form curved lines, which in Greville's figure are straight. The structure, however, closely enough resembles the type species.

**Mastogloia Jelinekiana**, Grun.—*Navicula Jelinekiana*, Pl. v. fig. 12.

I have recently found this form in tolerable plenty among diatomaceæ collected by Lindig at Honduras, and find in many examples the marginal oblong plates (platten) which appear to be the analogues of the marginal plates of *Orthoneis fimbriata*. But on account of the lanceolate form of the valves and generally produced apices I cannot well place this form in the genus Orthoneis.

In the meanwhile I place it in Mastogloia, which must therefore
be divided into two sections, the one containing forms with marginal loculi, the other those surrounded with marginal plates.

**Amphora kamorthensis**, Grun.—Frustules complex, oblong, sub-rectangular, or with a slight median constriction; angles rounded; valves linear cymbiforme; ventral margin straight; dorsal elevated in the central part, straight, or slightly constricted; apices slightly produced; median line somewhat bi-undulate, approaching the inferior margin; central nodule transverse, dilated; longitudinal sulcus parallel with the dorsal portion; striae punctate, sub-radiant, 35 in. '001. Pl. v. fig. 11. a. b. c. d.

Not uncommon in shore sand from Kamortha, one of the Nicobar Islands.

I have formerly described the form as *A. Grevilleana*. Further observations on better preparations, in which valvular veins were abundant, show that the distinct, broad, median line is constant. I have occasionally observed valves greatly resembling *A. Grevilleana*.

**Navicula fortis** = *Pinnularia fortis*, Gregory.

**Var. opima**.—Frustules broad, truncate, slightly constricted at the centre; valves broad, ovato-lanceolate, rounded at the apices; median line straight, central nodule small, oblong; terminal nodules minute, remote from the ends, striae conspicuous, non-punctate, sub-radiant, 14 to 15 in. '001; a smooth space surrounds the central nodule. Pl. v. fig. 13. a b.

Amongst sand from the roots of Ecklonia, from St. Paul, and rare in shore sand from Auckland.

Among all the figures known to me, the best is one of *N. varians* in Mic. Jour. iii, pl. 2. fig. 25. *N. varians* is, however, entirely confined to freshwater. *N. retusa*, Breb., appears to be closely related to this form; but the valves are smaller, and not so broad as in *N. fortis*.

**Navicula quadrisulcata**, Grun.—Valves broad, ovato-lanceolate, ends slightly produced, obtuse, central nodule small, oblong, striae transverse, distinct, minutely punctate, radiate, 16 to 20 in. '001; furrows longitudinal, connivent at the ends, double on each side. Pl. v. fig. 14 a b.

Amongst sand, from the roots of *Ecklonia buccinalis*, from St. Paul's, South Sea. A characteristic form that cannot be confounded with any other species. It is distinguished from *N. nitescens* not only in form and its conspicuously punctate striae, but also in the greater number of longitudinal furrows.

**Navicula suborbicularis** var. *nankoonensis*, Grun.—Costae distinct, 10 in. '001, alternating with a series of minute granules. Pl. v. fig. 16.

In Polycystin stone, from Nankoori.

The form, median line, and longitudinal furrow same as in the type species; the delicate rows of puncta stand between strong costæ, which in that form are delicate and scarcely visible.
Hedwigea, I have described a second form of this species from Honduras, which differs essentially from *N. Smithii*, and which have only costae and not series of puncta.

(Query.—Would this form be identical with Greville's *Cocconeis caelata*, Mic. Jour. vol. x. pl. x. figs. 5, 6.)

**DESCRIPTION OF PLATE V.**

Fig. 1.—*Schizonema reptabundum*; a portion of frond, b and c navicula × 400.

Fig. 2.—*Striatella chilensis*; a valve, b, c and d frustules.

Fig. 3.—*Fragillaria nankoorensis*.

Fig. 4.—*Plagiogramma stipitatum*; a and b valves.

Fig. 5.—*Nitzschia panduriformis var. (?) nicocharica* × 400.

Fig. 6.—*Denticula nicocharica*; a valve, b frustule.

Fig. 7.—*Rhaphoneis rhombus var. dubia*.

Fig. 8.—*Synedra nitzschoides var. minuta*; a b and c valves, d frustule.

Fig. 9.—*Plagiogramma constrictum var. nankocorensis*.

Fig. 10.—*Euphyliodium spathulatum*.

Fig. 11.—*Orthoneis barbadensis var. nankocorensis* × 400.

Fig. 12.—*Mastogloia Jelinekiana*.

Fig. 13.—*Amphora kamorthensis*; a and b valves, c and d frustules.

Fig. 14.—*Navicula foris var. opima*; a valve, b frustule.

Fig. 15.—" quadriscrupulata; a and b valves.

Fig. 16.—" suborbiculata var. nankocorensis.

All the figures, with the exception of 1, 8, and 11, are magnified 500 diameters.

**CRYPTOGAMIC LITERATURE.**

**Botaniska Notiser** utgifne af O. Nordstedt oct A. Falck. (Lund.) The "Botanical Notices," originally and for some years published in Upsal, are now published at Lund, in a new and entirely remodelled form, by Otto Nordstedt, who is both Editor and Publisher since the lamented death of his colleague, Mr. A. Falck. Nearly all of the papers are in Swedish. The following is a list of those relating to Cryptogamic Botany which have been published during the last year:

N. J. Scheutz; Sketch of the Moss Flora of Smaaland: Vert Wittrock; Dispositio *Oedogoniacarum sueciae*; J. Agardh; On the Algae collected during the "Josephine" Expedition: Hy. Mosén; Contributions to the Moss Flora of Sweden: Nordstedt and Wahlstedt; List of the Scandinavian Characeæ. Sophia Akermark; List of dried specimens of Scandinavian Algae. Wittrock; *Oedogoniaceae Novæ* in Suecia lectae. Norman; Fuligines lichenose or Moriolei. Areschong; On a Collection of Algae from Alexandria. Lundell; Desmidiaeis que in Suecia inventæ sunt, Observationes Criticæ. Norman; Civès novi lichenaceæ articeæ Norwegiaæ. S. Berggren; Bryological Sketches of the Norwegian Coast. N. Wulfsberg; New Norwegian Mosses. In addition to translated and reproduced papers, the former being almost entirely limited to the writings of German botanists, Canon Kingsley's address on "Biology" being the only English contribution so honoured. The Journal is published six times in the year, each issue consisting of two sheets, and costing for the year about 3s. 6d.

R. B.
Agaricus (Mycena) ammoniacus. Fr. "Strong-scented Mycena."
Strong scented; pileus membranaceous, conical, then expanded, umbonate, naked, discoid, opaque; paler at the margin and striate; stem rather firm, even, smooth, dry, rooting; gills adnate, linear, distinct, whitish.—Fr. Ep. p. 109. Fr. Obs. ii., p. 155. B. & Br. N. II. No. 1214.
Pileus normally brown or blackish, sometimes cinereous; stem not yellowish, 2 in. long, \( \frac{1}{2} \) line thick.

Agaricus (Mycena) peltatus. Fr. "Peltate Mycena."
Pileus rather firm, convex, then plane, obtuse, densely striate to the middle, disc somewhat fleshy orbicular, even, plane; stem even, smooth, villous below; gills with a decurrent tooth, crowded, ventricose, grey, with the edge paler.—Fr. S. M. i. p. 145. Fr. Epic. p. 110. Br. Bath Trans. 1870, p. 64. Ag. ambustus, Secr., No. 927.
Amongst moss. Warleigh Down.
Inodorous. Pileus \( \frac{3}{4} \) in. broad, dark brown when moist, when dry becoming somewhat depressed at the centre, and paler.

Agaricus (Mycena) sacchariferus. B. & Br. "Sparkling Mycena."
Pileus 2 lines broad; stem 2 lines high, fixed at the base by a few flocci; gills 8-9, very distant, arcuato-decurrent, their margin and even the surface granulated. Allied to A. tenerrimus, which has crystalline particles on the pileus, but the gills are free and ventricose. B. & Br.

Agaricus (Omphalia) leucophyllus. Fr. "White-gilled Omphalia."
Pileus submembranaceous, infundibuliform, becoming even, not floccose, dark cinereous, margin reflexed, involute; stem stuffed,
then fistulose, rather rigid, equal, even, smooth, cinereous; gills
decurrent, rather distant, arcuate, distinct, whitish.—Fr. in Vet.
No. 1217.

Amongst short grass. Coed Coch.

Stem 1½ inch and more long, 1 line thick. Pileus about an inch
across.

Pileus membranaceous, slightly convex, umbilicate, striate,
smooth, hygrophanous, when dry smooth and silky; stem somewhat
stuffed, slender, smooth, greyish brown; gills decurrent, thick,
rather distant, equally attenuated towards each extremity, grey,


Agaricus (Pleurotus) mutilus. Fr. "Mutilated Pleurotus."
White, soft, pileus rather fleshy, versiform, when dry silky,
becoming smooth; stem excenteric, short, and sublateral, terete,
erect, villous at the base; gills decurrent, narrow, rather thick,


Agaricus (Volvaria) medius. Fr. "Intermediate Volvaria."
White, pileus fleshy, convexo-plane, obtuse, viscid, of one colour;
margin even; stem solid, equal, smooth; volva lobed.—Fr. Épicer.

In woods, &c. Warleigh Down.

Agaricus (Clitopilus) vilis. Fr. "Paltry Clitopilus."
Pileus rather membranaceous, convex, umbilicate, somewhat
striate with silky flocci, soft, hygrophanous; stem hollow, thin,
equal, fibrilloso-striate, grey; gills adnate, decurrent, crowded,

In pine woods, amongst moss. Leigh Woods.

Stem 2-3 in high, about 1 line thick. Pileus about an inch broad.

Agaricus (Leptonia) lappula. Fr. "Bur-like Leptonia."
Pileus rather fleshy, convexo-plane, the darker umbilicus punctate
with short erect fibrils; stem fistulose, slightly striate, lilac
with a brown tint, apex naked, punctate with black; gills adnate,
Ann. N. H. No. 1225.

Amongst leaves of beech. Forres.

Agaricus (Leptonia) solstitialis. Fr. "Solstitial Leptonia."
Pileus rather fleshy, depressed, papillate in the centre, rugulose,
obsolete clad with innate fibrils; stem somewhat hollow, smooth,
smoky; gills emarginate, broad, whitish.—Fr. Ep. p. 152. B. &

Amongst stones by the side of Lake Ceneord, Aberdeenshire.
Sept.
**Agaricus (Leptonia) lazulinus.** *Fr.* “Bright-blue Leptonia.”
On the ground amongst grass. Sept. Aber.

**Agaricus (Nolanea) mammosus.** *Fr.* “Mammose Nolanea.”
In meadows. Chippenham.
Pileus brown. Stem elongated, fragile, shining.

**Agaricus (Nolanea) verecundus.** *Fr.* “Modest Nolanea.”
Pileus campanulate, then convex; disc fleshy, smooth, somewhat umbonate, about the thin margin striate and flocculose; stem fistulose, rather firm, growing pale, mealy at the apex; gills adnate, whitish.—*Fr. Spic. p. 6. Fr. Ép. p. 158. B. & Br. Ann. N. H. No. 1228.*

**Agaricus (Stropharia) inunctus.** *Fr.* “Anointed Stropharia.”
Pileus campanulate, then convexo-plane, covered with an evanescent gelatinous cuticle; stem attenuated downwards, white, floccoso-fibrillose below the ring; gills broad, adnate, purplish-brown.—*B. & Br. Ann. No. 1229.*
On rich ground. Ely, &c.
Pileus 2 in. across, fleshy, livid; stem 2½ in. high, ¾ in. thick, stuffed, composed of fibres; spores purplish-brown, *00028* in. long. Resembles some states of *A. aeruginosus*, but the spores are of a different colour and much smaller.—*B. & Br.*

**Agaricus (Pholiota) confragosus.** *Fr.* “Rugged Pholiota.”
On an old fallen elm. Coed Coch.

Step 3 in. long, about 2 lines thick. Subcæspitose, fragile. Spores oblong, ferruginous (*0003 × 00015* in.)

**Agaricus (Hebeloma) phæjocephalus.** *Bull.* “Bullard’s Hebeloma.”
Pileus subcampanulate, rarely flattened and umbonate, fuliginous, becoming brownish, smooth; stem thick, swollen at the base, naked, straight, grey with brownish lines, white at the base; gills free, semilunate, very broad, yellowish bistre colour.—*Bull. t. 555. f. 1. B. & Br. N. H. No. 1233.*
Pileus 2-4 in. broad; stem 3-5 in. high, 4-7 lines thick. The spores are bright ferruginous red.
Agaricus (Hebeloma) calamistratus. Fr. "Crispate Hebeloma."


A noble species, remarkable for the blue colour of the base of the stem. Spores 0.005 in. long, smooth.

Agaricus (Hebeloma) geophyllus. Sow. Var. lateritius.


This curious form, if it is really the same species, has been sent to us by Mr. Jerdon from Jedburgh. When dry it retains its brick-red colour. B. & Br.

Agaricus (Hebeloma) scabellus. Fr. "Ragged-cap Hebeloma."

Pileus rather fleshy, campanulate, then plane, when dry lacerated into scales or fibrils, umbo obtuse, even, smooth; stem somewhat stuffed, thin, smooth, growing pale, pruinose at the apex; gills adnexed, ventricose, rather distant, pallid.—Fr. Épicr. p. 177. Fr. S. M. i. p. 259. B. & Br. Ann. N. H. No. 1235.


Pileus chestnut, sericeo-squamulose; stem white, pruinose at the apex; gills ventricose, adnexed, ascending, pallid.


Taste not bitter, smell raphanoid. Colour exactly as in Batsch's figure.

Agaricus (Hebeloma) elatus. Batsch. "Elevated Hebeloma."


Amongst pine leaves.

Odour very strong; stem 4 in. long, 4 lines thick. Pileus orbicular, 3 in. broad, tan colour, margin thin; gills 3 lines broad, unspotted.

Agaricus (Hebeloma) Hongardii. Weim. "Bongard's Hebeloma."

Pileus rather fleshy, campanulate, obtuse, disc squamose, torn and fibrillose about the margin; stem solid, rigid, pale rubescent, reddish silky below, apex sprinkled with a whitish powder; gills adnate, ventricose, broad, pale reddish, then cinnamon.—Weim. p. 190. Fr. Épicr. p. 173.

On sandhills. Forres. (J. K.)

With the odour of Bergamot. Stem 2-3 in. long, 2 lines thick.
Pileus 1-1½ in. broad, fuscescent when moist, pallid when dry, not rinose.

**Agaricus (Hebeloma) lanuginosus.** Bull. "Woolly Hebeloma."

Pileus rather fleshy, hemispherical, then expanded, obtuse, flocoso-squamulose, the scales of the disc erect and squarrose; stem solid, thin, squamose, fibrillose, with a whitish powder above; gills seceding, thin, denticulate, pallid clay colour.—*Bull. t. 370. Br. Bath. Trans. 1870. p. 67. Fr. Epicr. p. 171.*

On the ground. Near Bristol.

**Agaricus (Hebeloma) uniformis.** P. "Uniform Hebeloma."


In fir plantations. Bathford.

**Agaricus (Flammula) mixtus.** Fr. "Mixed Flammula."

Pileus fleshy, convex, then plane, obtuse, viscid; disc darker, rugulose; stem hollow, curved, pallid, with brownish fibrils, and rufous scales below; gills subdecurrent, crowded, pale clay colour. —*Fr. Ep. p. 185. B. & Br. Ann. N. H. No. 1239. bis.*

On the ground in pine woods. (C. E. B.)

Stem 1-3 in. long, 3-4 lines thick, somewhat flexuous, incrassated at the base. Pileus 1-2 in. broad, margin paler.

**Agaricus (Flammula) alnicola.** Fr. "Alder stem Flammula."

Pileus fleshy, convexo-plane, moist, even; from the first rather fibrillose or squamose, sometimes smooth; stem somewhat hollow, attenuated and rooting, fibrillose, yellow, becoming ferruginous; gills sub-adnate, broad, pallid, then ferruginous.—*Fr. S. M. i. p. 250. Fr. Epicr. p. 187. B. & Br. Ann. No. 1242.*

On stumps of various trees. Epping.

**Agaricus (Flammula) conissans.** Fr. "Tan-coloured Flammula."


On dead stumps.

Often confounded with *A. fascicularis*, but with differently coloured gills and spores. Pileus yellowish-tan, rather viscid.

**Agaricus (Flammula) lubricus.** Fr. "Slippery Flammula."

Pileus fleshy, convex, then plane, even, viscid; stem solid, rather attenuated, fibrillose, whitish, apex striate; gills adnate, broad, pallid, then clay-coloured.—*Fr. S. M. i. p. 252. Fr. Epicr. p. 183. B. & Br. Ann. N. H. no. 1245.*

On trunks. Tunbridge Wells.

**Agaricus (Naucoria) semiflexus.** B. & Br. "Half-turned Naucoria."

Pileus hemispherical, chestnut colour, hygrophanous, margin fringed with a delicate white veil; flesh white; stem semi-hori-
zontal, solid; gills distant, adnexed, brownish; spores echinulate.


Pileus \( \frac{1}{2} \) in. across, subcampanulate, then hemispherical, or flattened above, moderately fleshy; stem \( \frac{3}{4} \) in. high, \( \frac{2}{3} \) line thick; spores oblong; 0.003-0.004 long, 0.0025-0.003 in. wide. Allied to A. horizontalis. B. & Br.

Agaricus (Naucoria) scolecinus. Fr. “Rusty Naucoria.”

Pileus rather fleshy, campanulate, then convex or plane, smooth, margin slightly striate; stem fistulose, equal, ferruginous, or rufous-ferruginous, sprinkled with white meal; gills adnate, rather distant, pale flesh colour, then ferruginous, edge flocculose.—Fr. Ep. p. 194. B. & Br. Ann. N. H. No. 1247.

On moist ground under alders. Sept Powys.

Spores apiculate, 0.003 in. long, .0013 in. wide; stem 2-3 in. long, 1 line thick; pileus \( \frac{1}{2}-\frac{3}{4} \) in. broad, ferruginous bay, paler at the margin.

Agaricus (Naucoria) tenax. Fr. “Tough Naucoria.”

Pileus somewhat fleshy, campanulate, then expanded, smooth, slightly viscid, hygrophanous, stem stuffed, then hollow, equal, yellow, brownish, slightly striate with adpressed fibrils; veil fuga-


Pileus cinnamon, ochraceous when dry; stem becoming ferru-
ginous or oliveaceous; gills pallid, oliveaceous, becoming ferruginous.

Agaricus (Naucoria) crobulus. Fr. “Scaly Naucoria.”

Pileus rather fleshy, convexo-plane, obtuse, with whitish eva-
nescent floccose scales, then smooth; stem fistulose, brown, with whitish scales, gills adnate, decurrent, crowded, ferruginous, brown.


In a ditch amongst fragments of sticks. Oct. Welford, Norths.

Pileus slightly viscid, scarcely striate, when dry tan-coloured, rather shining.

Agaricus (Galera) rubiginosus. Pers. “Rubiginous Galera.”

Pileus membranaceous, campanulate, obtuse, everywhere sulcate or striate, hygrophanous; stem filiform, equal, thin, shining, smooth, rubiginous; gills adnate, ascending, distant, broad, opaque.


Pileus cinnamon or honey-coloured, tan colour when dry; stem 2 in. long, flexile.

Agaricus (Psalliota) merdarius. Fr. “Dung Psalliota.”

Pileus convexo-plane, obtuse, smooth, moist, hygrophanous; stem hollow, tough, short, flocculose when dry, and pallid; ring
lacerated, fugacious; gills adnate, broad, yellowish, then umber.—
Densely gregarious. Pileus moist, prettily edged with the remains of the veil, \(\frac{1}{2}-1\) in. across; stem \(\frac{1}{2}-\frac{3}{4}\) in. high.—B. & Br.

**Agaricus (Hypholoma) leucotephrus.** B. & Br. “White-capped Hypholoma.”

Caespitose. Pileus at first pallid, subcampanulate, rugose, then convex, expanded, whitish; stem silky-fibrillose below, apex striate, or between sulcate and striate, fistulose; ring broad, here and there appendiculate; gills narrow, at first cinereous-white, slightly adnate, then grey, nearly black.—B. & Br. Ann. N. H. No. 1256.

Pileus 3 in. across; stem 4 in. high, 5 lines thick; gills \(1\frac{1}{2}\) line broad; spores 0.0025 in. long '0019 in. wide, very dark brown purple. Clearly different from *A. Candollianus* and *A. appendiculatus*, Fr. The pileus is not of a rich brown when young, nor are the gills when old at all brown.—B. & Br.

**Agaricus (Psilocybe) agnarius** Fr. “Whitish Psilocybe.”

Pileus conical-convex, then expanded, whitish, then becoming cinereous, not hygrophanous, subumbonate, between sulcate and striate; flesh white; stem flexuous, fistulose, white; gills rather distant, somewhat broad, briefly adnate or adnexed, cinereous.—Fr. M.S.S. B. & Br. Ann. N. H. No. 1257.


Allied to *A. coprophilus*. In colour the pileus somewhat resembles *Hygrophorus ovinus*.

**Agaricus (Panæolus) acuminatus.** Fr. “Acuminate Panæolus.”


Exactly accords with Batsarra's figure, which scarcely agrees with the specific name. B. & Br.

**Agaricus (Psathyrella) subatratus.** Batsch. “Blackish Psathyrella.”


In grassy places. Sept. Batheaston.
Pileus rufescent, growing pale, scarce exceeding 1 in. broad. Stem \(\frac{1}{2}\) line thick, clad with whitish down at the base.
ON THREE NEW SPECIES OF AGARICUS FROM A STOVE.

By the Rev. M. J. Berkeley, M.A., F.L.S.

It is pretty certain that most of the Hymenomycetous fungi which occur in stoves are of exotic origin. A. cepastipes and an allied similarly coloured species, which are the produce of our hot-houses, occur naturally in hot countries, and have never been found wild in Europe, and the same may be said of some others. The three species at present described appear to be quite new, and one of them is amongst the most interesting of the genus.

1. Agaricus (Collybia) Dorotheae. B.

Pileus primum subgloboso fusco, dein planato subumbonato pallidio, demum depresso usque ad centrum radiato-sulcato granulato, setulis brevibus candidis sparo; margine crenato; stipite basi fibrillosilo luteo vel rufo, sursum candidae velut pileus granuloso-hispidulo setuloso; lamellis candidis distantibus adnexis leviter ventricosis postice connexis, acie integra.

On a dead fern stem from Jamaica, in a hothouse at Dangstein. Lady Dorothy Nevill.

Pileus at first globose, dark brown, then flatly hemispherical, at
length expanded, with a slight umbo, and eventually depressed, pale brown, an inch or more across, radiated, sulcate from the crenate margin almost to the centre, granulated, beset with short white bristles, which in the young state point in every direction. Stem 2-2½ inches high, scarcely a line thick, at first brownish above, white below, with a minute disc-like swelling at the base, then yellowish or rufous below and white above, granulated like the pileus, and beset with white bristles. Gills white, distant, adnexed, slightly ventricose, connected behind; edge quite entire.

2. **A. (Collybia) caldarii.** B.

Pileo hemisphérico umbonato brunneo rugoso non expallente; stipite brunneo lari extus cartilagineo; lamellis adnato-decurrentibus subcinereis, interstitiis marginem versus venosis.

On Sphagnum, in an orchid pot at Dangstein.

Pileus hemisphérico, umbonate, brown, rugose, not turning pale; ½ an inch across; stem paler, even, cartilaginous externally; 2 inches high, not a line thick; gills adnato-decurrent, somewhat ash-colored, interstices near the margin veined.

3. **A. (Omphalia) Nevillae.** B.

Pileo hemisphérico brunneo depresso rugoso striato minute granulato; marginé tenuissimo, pallescente impunctato; stipite pallidiore nigro-granulato albo-farcto, basi subdilatato villoso-strigoso; lamellis candidis arcuato-decurrentibus, interstitiis lateribusque venoso-rugosis.

On Sphagnum, in an orchid pot at Dangstein.

Pileus ½ an inch across, brown, hemispherical, depressed in the centre, rugose, minutely granulated, striate, growing pale, when parting with its moisture, towards the margin, which is not dotted like the centre; stem 1 inch high, not a line thick, brownish, stuffed, white within, rough with black granules, rather dilated at the base, and clothed with villous hairs; gills white, arcuato-decurrent; interstices and sides venoso-rugose.

Somewhat resembling *A. africus*, but not infundibuliform nor variegated with pilose scales, while the gills are white, not cinereous.

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**Professor H. L. Smith's Conspectus.**—I have just received a communication from my friend the author, calling my attention to one or two errors in my notice of his work. He says—"I did not intend to place all the Triceràtæ among the Biddulphiæ, for a large number of them belong among the Coscinodisceaæ. . . . . .

It is true this does not appear clearly in the Conspectus as it now stands, but this was my idea."

*Tetracyclus*, Ralfs. should have been referred to *Biblarium*, Ehr. F. Kitton.

* Professor Smith informs me that an addenda will shortly be published.
The tea-planters of Cachar have been complaining of late that the leaves of the tea plants have become blighted, so as to interfere seriously with the production of tea. Two or three of the diseased leaves have been sent us for examination. They were not in good condition for the purpose, but on one we detected some punctures of an insect, and on two of the others a parasitic fungus. The leaves are blistered, deformed, and stunted; the fungus appearing on both surfaces like minute black points. The following is a description drawn up from the dry specimens:

**Hendersonia theæcola.** *sp. nov.*—Perithecia globose, black, prominent, pierced at the apex, scattered over both surfaces, or subgregarious; spores cylindrical, rounded at the ends, triseptate, pale brown, on long hyaline pedicels (0.0004-0.0005 in.), 01-0125 m.m. long, without the pedicels.

On leaves of *Thea.* Cachar, India.

The ultimate cells have sometimes a more hyaline appearance, but we could detect no terminal cilia, otherwise it reminds us of such species of *Pestalozzia* as *P. Guépini*, which occurs on *Camellia* leaves. The only remedy we can suggest is to pick off the diseased leaves and burn them. What portion of the destruction is also due to the insect we have no material for determination, but both are probably culpable.

From Dharwar we have also received samples of "Black blight" on naturalised American Cotton. The cotton presents but little external indication of disease so long as the seeds remain entire, but, on crushing the seed the cotton becomes covered with a sooty powder, which at first we were disposed to regard as the spores of a species of *Ustilago*, which entirely fills the seed. After a closer examination, however, we became satisfied that the spores are concatenate, being produced in chains, or jointed threads, in the interior of the seed, and afterwards break up into subglobose spores. This is rather an anomalous habitat for a *Torula*, but such, nevertheless, we are disposed to regard it, and append its description.

**Torula incarcerata.** *sp. nov.*—Produced within the seeds of *Gossypium*. Threads simple, or slightly branched, breaking up into minute, subglobose, fuliginous spores.

Within cotton seed. Dharwar, India.

It is rather to be presumed that the *Torula* makes its appearance after the commencement of decay in the seed, stimulated by moisture, than that it should be the cause of disease in the plant. The species of *Torula* with which we are acquainted are produced upon decaying substances, and we have no experience of any one causing disease in living plants. Had this proved to have been a species of *Ustilago*, the case would have been different, but we believe that, notwithstanding its habitat, we are justified in placing it with *Torula*. 
NOVARA DIATOMS.

Descriptions of New Genera and Species of Diatoms obtained by the Austrian Imperial Frigate Novara, during her Voyage round the World.

By Herr A. Grunow.
(Translated by F. Kitton.)

Part III.

Navicula gemmata. Greville var. biseriata. Grun.—Striae transverse, 10 in. '001 composed of a double series of minute granules. Pl. 6, fig. 1.

A very interesting form, perhaps a distinct species. The striae consisting of two rows of closely-pressed, somewhat irregular shaped granules. The central nodule is large, square, and as in Greville’s figure tridentate on both sides.

The smooth space between the striae and the costae on each side of the median line is less than in the type form, and the outline of the valve more symmetrical.

To this species perhaps belongs my N. spectabilis, in Verh Wiener zool bot. Gesell, 1860, pl. 3, fig. 11, and which was changed by Rabenhorst to N. Grunowii, on account of the N. spectabilis of Gregory.

Entopyla ornata. Grun.—Frustule large, valve linear, apices rounded, median line not reaching the apices, costae pervious (not alternate) parallel, 10-12 in. '001, striae distinctly granular, in pairs between the costae. Pl. 6, fig. 2, a valve, b apex of a larger valve.

Not uncommon on Polycystin stone from Nankoori.

Differs from Gephyria incurvata in the costae, which do not, as in that species alternate, but cross the valve. In G. incurvata we find a great number of minute puncta between the costae.

Coscinodiscus ellipticus. Grun.—Valve elliptical or oblong, puncta in central part large, subradiant or irregularly disposed, decreasing as they approach the margin, where they form minute radiant striae. Pl. 6, fig. 4, a b.

Very abundant. Polycystin stone, from Nankoori.

Has a remarkable resemblance to Cestodiscus ovalis, Grev., but I can in no instance find a trace of the round processes or nodule.

Coscinodiscus oblongus. Grev.—Has radiating puncta, and the puncta on the margin are only a little smaller, whereas our species has a marginal band of very delicate and closely arranged puncta.

Amphipleura Frauenfeldii. Grun.—Central nodules × 1500 diameters. Pl. 6, fig. 3.

Var. (?) nicobaricum. Grun.—Valve broadly lanceolate, somewhat obtuse, median line straight, central nodule dilated towards the margin, striae transverse and oblique, transverse striae distinct, 40 to 44 in. 0.001. The striae become more oblique as they approach the ends. Pl. 6, fig. 5 a, b. portion of an abnormal valve more enlarged. In Polycystin stone, Nankoori.

This species has a resemblance to my P. giganteum, but is smaller, shorter, and less obtuse at the apices; the transverse are somewhat stronger than the oblique striae, which, towards the ends, become somewhat more oblique.

In one specimen I detected from one to two rows of puncta, enclosed between delicate, often interrupted costae, as I have sketched in fig. 5, b.

(P. validum is identical with P. rigidum of the Synopsis, and the preceding is only a straight form of the same. I have it from several localities.* The statement that this and many other diatoms have two sets of striae (rows of punctae) is erroneous; those said to have transverse and oblique striae have them arranged thus:

if the space between the transverse rows is greater

than that between the oblique, then the so-called transverse striae are more easily resolved, if, on the contrary, the space is greater between the oblique rows, then they are more easily detected. The same applies to the so-called transverse and longitudinal striae. In this case, the puncta are arranged in the following manner:...

* F. K.)

Isthmia nervosa. Var. (?) Nankoorensis. Grun.—Frustule somewhat flatter than in I. nervosa; between the costae are one, two (or more) rows of square reticulations, rounded at the angles, which become smaller in size, and greater in number as they approach the margin of the valve. The connecting zone in I. nervosa is connected with the valve by a row of large cells. In this form they are wanting.

Pl. 6, fig. 6, b. portion of valve and connecting zone enlarged to 500 diameters.

Perhaps a distinct species; it differs from I. nervosa in the form of the reticulations; in the latter they are circular or five and six sided.

Asteromphalus Nankoorensis. Grun.—Broadly ovate or suborbicular, centre hyaline, orbicular, slightly excentric; rays binate, forked, distinct, narrow; margin divided by two broad rays, reaching the circumference; space between the rays about 2/7 of the valve, a single thin ray not reaching the margin divides this into two unequal parts. The inferior portion of the valve has five narrow short rays, of which the first and fifth are longest. Spaces marked with decussating punctate striae. Pl. 6, fig. 9.

Not uncommon on Polycystin stone. Nankoori.
This appears to be a very constant species, it bears the most resemblance to A. Malleus, Wallich, but differs in many respects from that species. A peculiar characteristic of our species are the short rays on the inferior punctate portion of the valve, and the two broad rays reaching the superior margin. All examples we have observed are very constant in form.

**Stictodiscus californicus.** Gree. Var. nankooreshis. Grun.—Costae radiant, generally bifid as they approach the margin, irregularly reticulate in the centre.

Pl. 6, fig. 8, a. b. part of a larger valve. Polycystin stone. Nankoori. Somewhat rare.

As in Dr. Greville's species a row of large granules lies between the costæ; the costæ divide as they approach the margin, so that more rows of puncta will be found near the circumference than near the centre. The irregularly disposed puncta of the middle portion are placed in a kind of network, from which apparently the marginal costæ proceed; this may also be seen in the Californian species.

**Climacodium Fraunfeldianum.** Grun.—Frustules scarcely silicious, smooth, expanded at the ends, truncate, forming long filaments. Pl. 6, fig. 10.

In the sea by Tilanshong, floating in masses.

A wholly distinct genus, with very weak silicious frustules, which perhaps remotely approach *Eucampia Zodiacus*, one of the specimens consisted of 16 frustules, the frustules were .007 long. I know no form that can be better compared with a little ladder than this. I have therefore given it the above generic name.

This form appears to be a very doubtful diatom. The author gives no side view, and the figure shows no connecting zone between the valves; it approaches more closely to *Triceratium malleus*, Brightwell, which is also a very doubtful diatom. (F. K.)

**Plagiogramma spectabile.** Gree. Var. quadrigibbum. Grun.—Valve lanceolate, constricted at the centre, and with two smaller constrictions between the ends and the central constriction, apices produced acute, central nodules, elliptical in a transverse smooth central fascia, median line absent; puncta minute (30 to 32 in. .001 in longitudinal and transverse lines). Costæ pervious. Pl. 6, fig. 7.

In Polycystin stone. Nankoori.

Differs chiefly from Greville's species in the greater number of its undulations, and the smaller number of its striae, which towards the end are closer, whilst in Greville's figure they are equally distributed over the whole valve.

**Cocconeis surirelloides.** Grun.—Minute, valve broadly elliptical; upper valve median line narrow, straight, central nodule obsolete, costæ subradiant, 20 in. .001 furrow elliptical, submarginal interstices granulate. Pl. 6, fig. 11.
Lower (?) valve median line more or less arcuate, central nodule small, oblong, terminal, nodule approaching the apices, striae punctate, delicate (50 to 54 in. 001), radiant furrows double, marginal one more or less approximate. Pl. 6, fig. 12.

In sand, from the roots of Ecklonia burchellii, from St. Paul, in the South Sea.

A diminutive species. I am not certain whether the form described as the lower valve belongs to it. They occur commonly enough in the cleaned material of the same form, size, and quantity as the characteristic upper valve, so that they belong to each other is very probable. It is distinguished from C. scutellum in the costae of the upper valve, and from the small form of Campyloneis Grevillei in the number of narrow costae and delicate puncta. Cocconeis costata, Greg. has also much stronger costae, and a broad lanceolate median space.

(I do not observe in the author’s figures any resemblance to the Surirelle, none at least to warrant his specific name. F. K.)

(Berkeleya Harveyi, of this form we have no additional description. The fig. (pl. 6, fig. 13) is apparently given to show the resemblance of the median line to Amphipleura Frauenfeldiana, and the transverse striae. F. K.)

(An uncorrected printer’s error occurs in the otherwise very correct text of the original paper; this would hardly have called for notice had it not been repeated in the catalogue of forms sent with Möller’s Typen Platte, and repeated again in his printed catalogue, viz., Craspedodiscus, for Craspedodiscus. A similar repetition of a printer’s error occurs in the very imperfect index to the diatomaceae, figured in Qua. Mic. Jour., by C. J. Muller, Esq., vol. x., N.S. In the description of figures in Greville’s paper, vol. xiv., page 79, Croispedodiscus is printed for Craspedodiscus, and the error has been repeated by the author of the index. F. K.)

CONTENTS OF PLATE VI.

Fig. 1.—Navicula gemmata, var. biseriata.
Fig. 2.—Entopyla ornata. a frustule, b portion of valve more enlarged.
Fig. 3.—Amphipleura Frauenfeldiana. (Central nodule.)
Fig. 4.—a. b. Coscinodiscus ellipticus.
Fig. 5.—Pleurosigma validum; var. nicobarensis. a, valve; b, portion of ditto more enlarged.
Fig. 6.—Ithmia nervosa, var. nankoorensis. a, frustule, b, portion more enlarged.
Fig. 7.—Plagiogramma spectabile, var. quadrigibbum.
Fig. 8.—Stictodiscus californicus, var. nankoorensis.
Fig. 9.— Asteromphalus nankoorensis.
Fig. 10.—Climacodium Frauenfeldianum.
Fig. 11.—Cocconeis surirelloidis, upper valve.
Fig. 12.—, lower valve.
Fig. 13.—Berkeleya Harveyi.

Fig. 6 X 200 diameters; fig. 10 X 100 diameters; fig. 11 X 1000 diameters; all the others (with the exception of 3 and 13, of which no amplification is given), are X 500 diameters.
THE AGUE PLANT.

Some years since I became interested in the statements of Dr. J. H. Salisbury, of Cleveland, Ohio, in reference to the germs of ague. Dr. Salisbury* believes to have discovered the malarial essence in the cells of certain Palmelloid plants. Desiring to investigate the subject, I sought for the plants described by him, in the ague bottom of the Mississippi river, opposite Keokuk, Iowa, lat. 10° 25'. Not being provided with a suitable microscope, I was unable to discover the microscopic algae described by the doctor. I was pleased, however, to find the fungi, samples of which I send you. Generally it answers Salisbury's description.

It does not correspond in these important particulars: Salisbury's plants are so minute that it requires a powerful lens to render them visible. A single specimen of plant may be discovered as you stand. Salisbury's plants were not less. These have roots 1/8 or 1/32 of an inch in length. They grow on the flat moist alluvium of the slough and river margins and their drying beds; in the vicinity of such localities they may be found on ordinary soil in damp places, even at some elevation. The specimens sent you are green; I have observed them slate-coloured, pink, and black. They vary in size from a mere point to 3/32 of an inch in diameter. When in natural state they are globular in shape and of a fresh colour, when covered with water they swell and present a gelatinous appearance. They discharge their spores when ripe by slitting open at the top and a falling in, collapsing of the upper circumference; so that a discharged plant appears cup-shaped, and to the naked eye it seems to have lost the upper half of its circumference. So far as I have been able to determine with the imperfect means of observation at my command, the cells are composed of two walls, the outer green or (otherwise coloured), composed of laminated cells, the inner white and structureless. Upon puncturing the plants a liquid is forcibly ejected. I have never been able to discover the contained cells for want of a good microscope. By placing the cake of earth sent you in a plate, and adding water enough to make it of about the consistence of potter's clay, and keeping it at a temperature above 60°, you will find a fresh crop of the plant to develop, and you will thus have an opportunity of studying them. Should you allow them to flourish, and remain uncovered in your room, you might have the satisfaction of demonstrating the "cause of ague." This fungus was first found, so far as I know, by Dr. J. P. Safford, of Keokuk, who was kind enough to search for me while I visited an ague patient. In the locality of their growth they are to be seen in myriads, and near them, even on elevations of over 100 feet, everybody had the ague. The course of this disease seemed pari passu with that of the plant.

Dr. JOHN BARTLETT, Chicago.

* See American Journal of Medical Sciences, 1866.

The venerable Fries has made some critical observations on this and the previous part, to which we shall have occasion to refer hereafter.

Schistostega osmundacea. Web. & M. Gathered by myself and Dr. Dowson in a sand cave near Farunham, in Oct., 1872, where in the spring of 1842 I found it fruiting in abundance. I believe this to be the only station nearer London than Nottingham.—W. W. Reeves.

CRYPTOGAMIC LITERATURE.


Botaniska Notiser (September). P. J. Hellbom, Lichenological excursions in Lule Lappmark, in 1871.

Botaniske Zeitung (Sept.) M. Woronin, Researches on the development of *Puccinia Helianthi* causing the disease of the "Sunflower."


Monthly Microscopical Journal for October.—On *Sphagnum neglectum*, Angs., by Dr. Braithwaite, with a plate.

Karsten, P. A. Fungi in insulis Spitsbergen et Beeren Eiland collecti.

Hedwigia, No. 9. Einige neue Hyphomyceten Berlin und Wiens, by Dr. C. O. Harz.
No. 7.]

[January, 1873.

Grevillea,

A MONTHLY RECORD OF CRYPTOGRAMIC BOTANY, AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By the Rev. M. J. Berkeley, M.A., F.L.S.

(Continued from Page 71.)


- 176. Hydnum (Apus) glabrescens. B. & Rav.—Umbrinum, pileo dimidio, glabrato, concentrice sulcato; aculeis elongatis; acutis, demum compressis. No. 1634. Car. Inf. Ravenel, on Carya. Ceylon, G. H. K. Thwaites. No. 385. Central Provinces. Pale umber, or reddish-brown, with a paler margin; pileus 1-3 inches across, dimidiate, more or less imbricated, and sometimes elongated, tomentose, gradually becoming smooth, deeply sulcate concentrically; prickles of the same colour as the pileus, acute, more or less compressed, about a line long.

* Hydnum (Apus) flabelliforme. B.—After examining a large series of specimens, this appears to be too closely allied to H. Rhois, Schwein. Indeed, it approaches so near to unusually thick specimens of H. ochraceum, that it is sometimes difficult to distinguish.


Pileus 1-2 lines across, white, conchiform, villous; prickles acute, tomentose, pale flesh-coloured. Specimens occur not exceeding.
these in size, resupinate, with the margin reflected, and others nearly an inch across, also resupinate.


Ferruginous. Some inches in breadth, resupinate, with one edge slightly reflected and somewhat velvety; prickles compressed, sometimes compound, paler at the tip, more or less velvety.


Effused for several inches, irregular, \( \frac{1}{3} \) an inch or more thick, of a firm corky substance, but fibrous when torn across; prickles elongated, subulate, acute, rufous.


Two or three inches across, at first orbicular, white and delicately tomentose, then waxy; prickles lemon-coloured, scattered, compressed, often compound, tips, when perfect, white and tomentose.


One inch or more across, thin, crust-like, with sometimes a very thin pale margin; prickles short, yellow, at length obtuse. Like many resupinate species difficult of definition, though distinct. H. armeniacaum, B. & Rav. No. 1296, is apparently a younger state of the same species in which the subiculum is more evident.


About an inch across, entirely resupinate, interrupted by the white substratum; prickles elongated, acute, yellow. Allied to the last.

At first of a delicate fibrillose substance, which gradually acquires a waxy covering, on which the elongated acute yellow prickles are sparingly scattered.


Widely effused, very thin, waxy, inseparable from the matrix, pallid, but varying in tint; prickles fasciculate, short, obtuse, sometimes ciliated at the top as in Kneiffia. No. 6105. Alabama, Peters. Specimens on Carya, distributed as H. areolatum are perhaps an advanced state of this species, in which the prickles are collected in groups, and approaching H. udum.


Thin, membranaceous, more or less separable from the matrix, here and there byssoid or fibrillose; hymenium of a brownish-buff, with scattered, short, obtuse, small prickles.

* Hydnum (Resupinatum) pithyophilum. B. & C.—Kew Gard. Misc. i. p. 235. Resupinate, effused, subiculum very thin, byssoid, farinaceous; prickles ochraceous, compressed, toothed, and lacerated above. No. 1501, 2060, 4811. Car. Inf. No. 5603. Connect., C. Wright. No. 4811, was originally named H. mellitum, but it appeared afterwards that it was discoloured by poison.


Effused for several inches, at length more or less separable at the margin, where it is slightly byssoid or tomentose; hymenium reddish-ochre; prickles compressed, somewhat velvety, toothed and lacerated at the apex. A fine species.


The latter is infested with a Sepedonium.


Subiculum white, tomentose, soon running over the short waxy prickles, which are sometimes fasciculate.


Subiculum almost obsolete, or extremely thin and farinaceous; prickles waxy, scattered, subulate, acute, easily coalescing.


Entirely resupinate, white, becoming dingy and somewhat umber when old, pulverulent; prickles joined into distinct, somewhat digitate, flat, petal-shaped bundles.


Extremely brittle when dry; subiculum white, byssoid, with a few creeping fibres; hymenium waxy; prickles short, distinct.


Subiculum copious, pulverulent; prickles elongated, subulate, acute, sometimes pencilled at the tip. Whole plant dry, of a dull buff.


Parasitic on the teeth of some Hydnum; subiculum obsolete; prickles short, compressed, obtuse.


Subiculum membranaceous, white, forming a broad border to the hymenium, which is quite confined to the centre; prickles waved, subulate, minutely setulose under a lens. A very distinct species.

On very rotten wood. Subiculum, spreading widely, very thin, membranaceous, slightly byssoid and pulverulent; prickles scattered, of a reddish tint, subulate, smooth.

This species, perhaps, should come next to *H. Cookei*. It is, however, very difficult to say what is the colour of the prickles when fresh.


Entirely resupinate; subiculum composed of interwoven flocci, which here and there send out creeping threads; aculei verruciform, the tips sometimes minutely ciliated. This species approaches *Kneiffia*.

- **196. Hydnum (Resupinatum) ischnodes**. *B.*—Subiculo e floccis intertextum hic ilice fibrillis repentibus; aculeis subulatis gracilibus. No. 6093.

Subiculum as in the last, but the hymenium totally different; prickles slender, waxy, subulate or nearly cylindrical, almost rufous when dry.


This is *Hydnum gelatinosum*, Scop., but differs materially in structure from *Hydnum*. There are two or three other species.


Pileus dimidiate, plane; coriaceous, dirty white, tomentose; prickles long, compressed, tips subulate or dilated. No. 1729. Car. Inf. (1744. Rav.), No. 3203. Car. Inf. In some specimens the pileus is decurrent behind, or resupinate.

* Irpex crassus. *B. & C.*—Thick, corky; adnate behind and decurrent, subimbricate; pileus finely pubescent, zoned within, teeth lamellar, somewhat fimbriated at the tips. Two inches thick, teeth \( \frac{3}{4} \) inch long.


* Irpex sinuosus *Fr.*—No. 5593. 5600. Connect., C. Wright.

Pileus tobacco-coloured, coriaceous dimidiate, decurrent behind; concentrically sulcate, 1½-2 inches across; teeth short, irregular, compressed, with a greenish bloom. This is Hydnium trachyodon. Lév. From Bogota. It is found also in Cuba.


Shortly reflexed, imbricated, decurrent behind, velvety, sometimes zoned, bright brown; hymenium of the same colour; teeth compressed. Allied to the last, but the teeth have not the bloom of that species, and the pileus is less dimidiate.


Pileus scarcely ½ inch across, conchiform, brown, somewhat velvety, silky towards the margin; hymenium of the same colour; teeth compressed. Allied to the two last.


Scarcely exceeding ½ an inch in breadth; suborbicular; subiculum thin, membranaceous, byssoid, separable from the matrix; teeth confined to the centre, compressed, pinkish-grey, subporiform.

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**Schistostega Osmundacea.**—Your correspondent (W. W. Reeves) is in error concerning this moss, as I find it abundantly at Guildford, in the holes made by sand martins. It was first pointed out to me by the celebrated cryptogamist, Mr. Borrer, in 1852-3.

E. Capron.


On *Silene inflata* in company with *Ecidiunm behenis.* Near Chichester (Dr. Paxton). Aug.
BOTRYDIUM GRANULATUM, (DESV.)

By E. Parfitt.

This curious little plant, which is not uncommon in certain places in the neighbourhood of Exeter, and it is also generally distributed both in England and Scotland, has been known to botanists for a very long time, but as Dr. Greville observed in his Algae Britannicae in 1830, and I believe up to the present time, its fructification is not known, and so far as I have been able to find, the true structure, and peculiar physiology, have not been studied. Dilwyn in his "British Confervae" p. 79 has done more to illustrate some of its peculiarities than any of the numerous writers that I have consulted, if his be really the same species that I have in view, and it differs only in one particular, and that is, he has made the underground stems in his figures septate. He says, "the joints are very long in the creeping stems," which is perfectly true. I have observed but one septum in the many specimens that I have examined. Dr. Greville has very accurately described this little plant, so far as a general description goes, and which is rendered quite sufficient for its distinction, but he has gone no farther. The Doctor says, "Plant about the size of a pin's head, sessile upon the surface of the ground, covering a large space in a densely crowded manner, composed of a hollow vesicle, not homogeneous as in the genus Vancheria, but filled with a watery fluid, which escapes by an irregular terminal orifice. The receptacles at length collapse, become cup-shaped, and then cover the ground with a thin greenish crust, like that of some lichens. At its under part, each receptacle is terminated by a very short neck, which divides into a radiating tuft of pale fibres. Substance fragile and membranaceous, colour a pale green," and he adds to this—"The fructification of this plant is not known. Does the watery fluid contain it? The structure of the receptacle seems minutely granular." In this description it will be observed nothing is said about the underground stems being septate. We may from this infer that Dr. Greville did not observe them. The specific name of this plant is granulatum, and as Dr. Greville and others have said, its surface seems minutely granular. Now this I have ascertained by careful microscopic examination to be not external, although the effect is seen on the surface of the vesicles, but it results from the pressure of the protoplasm and grains of chlorophyll on the inside.

The membranes composing the walls of the vesicles, for there are two, an outer and an inner membrane, although this cannot be ascertained with certainty, except at the base of the vesicles and where the inner membrane begins to dry up when it shows in folds, by carrying, and the breaking up of the endochrome, into folds with it, and in the underground stems, where they are distinctly visible, they appear to me to be perfectly structureless, that is, they
are thin transparent membranes only, without any cellular structure, and when the plant is alive they remain distended to their very utmost from the pressure of the fluid within. The young vesicle which, as will be observed, is only the swollen apex of a branch of the creeping or underground stem, when it emerges from the ground it is frequently only a clear transparent sac filled almost to bursting with a watery fluid; after a time minute green spherical grains will be seen, mostly adhering in little groups to each other, and at length they take up their position on the wall of the inner membrane, until the whole vesicle appears to be filled with them; but the vesicle being filled with them is only in appearance, as it is only the walls that are covered, with a few exceptions of granules floating in the fluid. When a full-grown plant is pressed between slips of glass and examined the membranes composing the vesicle will be seen to shrink up into folds, on which are seen the adhering granules. When the plants are full-grown the epidermis is furfuraceous, or having a number of minute scale-like processes attached to it, as if it were a very thin outer membrane broken up.

These vesicles have generally been treated as separate and distinct plants, but it will be observed by the sketch, and also Dilwyn has shown, that several of these vesicles are attached to underground stems, and I find, as it has been before observed, that the vesicles are only the apices of the young branches of underground stems. These, then, it will be observed, are all attached, forming a kind of system, the tubular stems connecting all the vesicles together, so that we have a minute spreading underground plant whose branches rise to the surface, where they swell into little ovate or spherical vesicles. Now Dilwyn has made his plant septate, or in other words, has divided the connecting tubes or stems by little nodes or rather diaphragms, consequently cutting off the communication between the different parts of the plants, so that it would be impossible for the granulose matter to traverse the tubes, except in the internodes. In my examination of groups of this plant, after having washed the stems perfectly clean, I could only detect one septum, and the tubes appeared to me perfectly free, and that the granulose matter can float freely in them. I noticed particularly that the full-grown plants contained the largest grains, with a large proportion also of minute granules, the larger generally having several of the minute ones attached to them. This led me to investigate them still further, and I now feel convinced in my own mind that the small granules are zoospores, which attach themselves to the larger or female grains, for on liberating some of these on a slip of glass and examining them carefully under the microscope, I distinctly saw the minute granules moving about as I have seen zoospores in fresh-water Algae.

Finding some of the vesicles of apparently the same age as others containing only minute granules, whilst others contained both
large and small, I conclude that the small granules are generated in distinct vesicles, whilst others contain only female grains, and also that these free or moving zoospores have access through the tubes to the larger grains, as the tubes are all seen to be more or less filled with granulose matter. These larger grains are the means adopted by the plant for perpetuating its species—it may not be its true fruit. The Rev. M. J. Berkeley (“Introduction to Cryptogamic Botany”), page 157, foot-note, says:—“The plant figured by Cienkowski, in Bot. Zeit. 1855, tab. XI, as Protococcus botryoides, is probably a Botrydium, and if so, that genus produces large resting-spores and minute swarming-spores. It is said to grow with Botrydium (Hydrogastrum granulatum), and is certainly no Protococcus.”

Now, what I have stated here in regard to the smaller cells being filled with zoospores, and which appear to traverse the tubular underground stems to the larger cells, seems to confirm, to a great extent, the observations of Cienkowski.

This plant has been generally regarded as of very rapid growth, and of as quickly decaying, and so far as the vesicles above ground are concerned, this is true, but I believe that the underground stems and roots remain for a considerable time, and that at certain seasons, when a favourable hygrometric condition favours the development of the branches, it bursts up again with new vigour, so that it may be termed perennial. I have frequently searched to find, if possible, some of the full-grown vesicles in conjugation, similar to those of the genus Vancheria, but have never been successful. I therefore conclude that the only mode adopted to perpetuate its species is the one I have indicated above; at the same time it would be well if observers would direct their attention to this curious little plant, and endeavour, if possible, to clear up this interesting portion of its history, for it is in these lowly forms that we detect the key to some of the more intricate structures in the larger and grander portions of the vegetable kingdom.

NOTES ON THE ABOVE COMMUNICATION.

By William Archer.

This is a plant I have had but seldom an opportunity to see myself. Any new information in reference to it would no doubt be desirable. The paper you forwarded, however, I would venture to think, while it serves to draw fresh attention to this organism, has not an à priori probability in favour of the author’s conclusions, and yet there is no saying they may not be true, so unexpected phenomena sometimes offer themselves. He is no doubt right that the plantlets, if we may so say, have a mutual intercommunication by their subterranean branching “rootlets.” Of course, as
regards the author's statement that the membrane is double, one cannot say nay. I did not notice that myself, but I would venture to suppose the possibility that he may have mistaken the boundary of the shrunken-in protoplasmic contents—the so-called "primordial utricle"—for an inner membrane. In several algae this is seen, and looks very like a membrane. Still, doubtless, many algae have laminated membranes. That immediately investing the contents remains generally firm, the outer older laminae removable or "dissolvable." The author has seen "zoospores," but while he calls them by that name he seems to regard them functionally as spermatozoids, and that these travel across from certain of the "vesicles" by the under-ground connecting tubes to certain other "vesicles," there to fertilize certain other larger "grains." It would not befit one who has not followed out his observations to say nay again to this; but the view does not seem to have the ground of analogy. But it would not on that account be untrue. It would seem to be the case where spermatozoids occur that they are themselves generated within a more or less specialized structure, and, from which set free, that they proceed to act upon what the Germans would call a "Befruchtungskugel"—a specially differentiated portion or mass of protoplasmic matter, when fertilised an oospore—and not that in the same or an adjoining cavity one portion of the contents becomes spermatozoids, another the future oospore. Not only is the "oospore" thus a specialised body, but it is enclosed (singly or several) within a specialised "oogonium." But the Conjugatae are examples of germ-cell and sperm-cell (if you admit in that group the applicability of these terms), mutually co-operating, whilst the spore is not in a specialised "oogonium" (so as to say), but both factors in the process occupy a common cavity. The author's views may not, indeed, be impossible. If true it would degrade Botrydium considerably below Vaucheria, where the antheridia and the oogonia are highly differentiated. The author says he has not seen anything like the "conjugation" of Vaucheria. This is surely a misapprehension of his, for "conjugation" does not take place there (comparable to Spirogyra or Mesocarpus, &c.). The probability, I venture to think, is rather he has seen the zoospores (zoogonidia Aut.), not spermatozoids. Doctor Itzigsohn is stated to have seen zoogonidia. Since I came home I havn't had time to try and work up where. If the author's views were correct the larger grains would, I suppose, have necessarily to be regarded as its "true fruit," for they would be fertilised protoplasmic masses. If, on the other hand, the motile bodies be only zoospores, this plant, as regards our knowledge of its history, would remain much in the position of several other algae—say, for instance, Characium, &c. As, however, the contents have been seen simultaneously segmented into individual portions, if any fertilization occurs it would be more probable that they it is that would be acted upon by spermatozoids.
The following is Reinsch's account of this, given in his "Die Algenflora des mittleren Theiles von Franken," &c., pp. 218, 219:—

"The plant about 1½ m.m. diam.; the upper portion, or that above ground, globular; gradually narrowing downwards, and passing into one or two principal roots, which become gradually rami-fied into many fine rootlets; the chlorophyll-contents at the beginning dense and homogeneous, and, clothing the inner cell-membrane, extends only to the neck of the root; the membrane is rather rigid, upon being broken the cell-contents become extruded, the membrane collapses as a thick pellicle, whose contents admit of being completely pressed out; the fluid contents in this condition consist of finely-granular plasma, tinged by chlorophyll-granules. Subsequently the green plasma layer becomes separated from the membrane, breaks up into single equal-sized portions, which become rounded off, coated with a membrane, and gradually individualized as daughter-cells. At last the entire globose cell is densely filled with rounded daughter-cells; whilst, previous to this state, the plant presented an intensely grass-green colour, it shows in this latter state a clear or sea-green colour; mature and immature plants hence readily admit of being distinguished by the tint with the unassisted eye. The membrane of the mother-individual at last passes to decay, it collapses, and the daughter-cells become the germs of new individuals in the soil. The maturity of the individuals occurs towards autumn, and accordingly the germ-cells lie resting in the earth during winter, and germinate in the following spring. The development of the germ-cells to new individuals takes place without formation of a 'prothallus,' ("ohne Vorkeimbildung.") One end elongating as a root at once penetrates the earth, the other end becomes developed as the above-ground portion. The diameter of a ripe germ-cell is 0.009-0.012 m.m. The plants prefer to establish themselves on the surfaces of the large clefts which are produced when the waters retreat and the ground becomes gradually dried by the air."

The author refers to Cienkowsky's observations on "Protococcus botryoides." (Bot. Zeit. 1855.) This original paper I had not before seen; but at this point I stopped writing this letter, and went to the Royal Dublin Society's Library and fished it up. Berkeley, I fancy, is right in supposing this really refers to a Botrydium. Cienkowsky's figure of his plant shows "resting-spores" and "swarm-spores." His fig. 8 rather shows something very like spermatozoids; quere then, may his "resting-spores" be really fertilised spores—true oospores? That author does not so interpret the matter. He only refers to "swarm-spores" and "resting spores," and does not infer any analogy with Vaucheria. If fig. 8 show really spermatozoids, they escape by the bursting of the parent cell (which would then be an "antheridium") at the summit, not by travelling round to meet the resting-spores in a common cavity; for they are separate cells (possible "oogonia"). The paper
DICRANUM UNDULATUM.

You sent I should think must be interesting, and though possibly à priori open to some question, ought to serve to draw attention to a little-understood plant. There are some slight inaccuracies in phraseology; for one I would presume he means "spermatozoids" when he writes "zoospores," for they are physiologically and functionally distinct things. According to the "priority-laws" it would seem that this plant should pass rather as Hydrogastrum grundelatum (Linn.) Desv. than as Botrydium argillaceum (Wallr.). Hydrogastrum has priority over Botrydium, but the latter name is often employed in algological works, apparently without due regard to that circumstance.

DICRANUM UNDULATUM (EHRHART).

By R. Braithwaite, M.D., F.L.S.

This may now with certainty be entered as a member of our Moss-Flora, Prof. Lindberg having detected it in Mr. Spruce's herbarium. Having recently paid a visit to that gentleman, he kindly gave me some of his original specimens, and informed me that he found it in August, 1842, growing in dryish sand-pits in a fir plantation on Stockton Forest, near York, and although specimens were sent to the late Mr. Wilson, it has no place in his "Bryologia Britannica." My friend Mr. Anderson, of Whitby, has found it again in the same locality a few weeks ago, and it is probable that it occurs in many other places, but, being barren, has not been distinguished from D. scoparium or D. Bonjeanii; at least, this is much more probable than that such a widely diffused Continental and American species should be totally absent from Britain.

Mr. Spruce informs me that it is not uncommon in the lower Pyrenees, growing in grassy glades of sandy woods.

D. scoparium is at once separated by its non-undulated leaves, and we may indicate the other two by the following diagnostic characters.


Setae aggregated; stems naked and decumbent at base; leaves patulous, the uppermost somewhat falcato-secund, or appressed and slightly secund, from a broad oblong base, lanceolate, gradually narrowed into a dagger-shaped point, ending somewhat abruptly in the acute apex, beautifully undulate in the upper half, carinate; margin revolute below, coarsely serrate above, the teeth spinulose and somewhat irregular in direction; nerve flattened, narrow and extended to apex, narrowly two-winged and serrated at back; cells elongate-oblong or elongate-hexagonal, those of the central base subquadrate and hyaline.


Seta solitary; stem erect; leaves more or less erecto-patent, straight, from a broad linear flat base, broadly oblong-lanceolate, gradually narrowed into a strap-shaped point, tapering into an acute apex; lightly undulate above, canaliculate; margin acutely serrate above, the teeth uniform in shape and direction; nerve very narrow, vanishing below apex, smooth at the back; cells at base short, quadrate, brownish; above elongate-hexagonal or parallelogramic, the uppermost elliptic oblong. Schimper erroneously describes this species as having leaves "serrated on the back," so that it seems barren specimens of the two species are liable to be confounded by the best authorities. De Notaris, in his "Syllabus," points out the difficulty of distinguishing them, a difficulty which does not seem greatly lessened in our own day, especially since both are subject to considerable variation. The British specimens of *D. undulatum* certainly show little approach to the falcate direction, usually observable in continental specimens. De Notaris, in his Epilogo della Briol. Ital. points out that La Pylaie's specimens of *Dicr. palustre* (Bridel Bryol. Univ. i. p. 814) belong to *Campylopus flexuosus*, and hence the name *Bonjeanii* is to be preferred.

I hope on a future occasion to illustrate the subject of these notes by figures, and in the meantime leave the point to be further elucidated by our numerous collecting bryologists.

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**Note on Sphagnum neglectum.**—I have just received a letter from Prof. Lindberg, in which that great Bryologist informs me that he has identified *Sphagnum neglectum*, Angst., with an original specimen of *Sph. laricinum*, Spruce. This celebrated observer detected the plant in 1846, in Terrington Carr, Yorkshire, and since that time its place in the genus or its title to specific rank has never been settled; *Sph. neglectum* therefore drops into a synonym, and the species must stand as *Sph. laricinum*, Spruce. The figure 6x in my plate, representing a section of the leaf, is erroneous, for the chlorophyllose cells are elliptic and central, just as in *Sph. subsecundum*, to which, indeed, *S. laricinum* appears to stand in the relation of a sub-species. Angstrom described both *S. laricinum* and *S. neglectum* as species in the "Ofver. Vet. Ak. Förhandl.," for 1865, but Prof. Lindberg points out that the Lapland specimens collected by him and published under No. 712, in Rabenhorst's "Bryotheca," as *Sph. laricinum*, and also those of Austin's "Musci Appalachian," do not belong to the species, but to *S. cuspidatum*. Fine specimens of *S. laricinum* in fruit, from the Island of Aland and Stockholm, accompanied the note.—R. Braithwaite, in "Monthly Microsc. Journal."
Cortinarius (Phlegmacium) triumphans. Fr. "Magnificent Cortinarius."

Pileus fleshy, convex, then plane, viscid, even, at first spotted with evanescent darker adpressed scales; stem solid, clavate, concentrically squamosely beneath the ring; gills emarginate, quite entire, crowded, pallid, then clay-coloured.—Fr. Epicr. p. 256. B. & Br. Ann. N. H., No. 1263. Cortinarius sublanatus. Hussey Myc. Illus. ii. t. 22.

In woods.
A large species. Pileus yellowish.

Cortinarius (Myxacium) pluvius. Fr. "Pluvial Cortinarius."

In woods. Lea. Sept.
Pileus ½-1 in., stem sometimes short, sometimes 3 in. long, 2-3 lines thick. Gills at length free, pallid.

Cortinarius (Dermocybe) anthracinus. Fr. "Fiery-gilled Cortinarius."

In a wood. Coed Coch.
Certainly different from C. sanguineus. The Welsh plant exactly accords with a drawing from Fries. B. & Br.

Stem 2 in. long, 1-2 lines thick.

Cortinarius (Dermocybe) orellanus. Fr. "Red fleshed Cortinarius."

With C. cinnamomeus, to which it is nearly related, but very distinct.

Cortinarius (Telamonia) bivelus. Fr. "Twin-veiled Cortinarius."

Pileus soft, bibulous, moist, but not truly hygrophanous.
Cortinarius (Telamonia) incisus. Fr. "Incised Cortinarius."

Pileus rather fleshy, between conical and convex, at length plane, umbonate, naked, soon innato-fibrillose or squamose, hygrophanous; stem somewhat stuffed, equal, fibrillose with ferruginous fibrils, veil interwoven into a ring, or obsolete; gills adnate, distinct, scarcely crowded, cinnamon becoming ferruginous.—Fr. Epier. p. 301. B. & Br. N.H., No. 1272. Fr. Sys. Myc. i. 213. Bull. t. 586, f. 2.

On the ground. Loughborough.

Gregarious. Stem 1 in. high, 1-2 lines thick. Pileus ferruginous tawny, olivaceous brown or brownish when young.

Cortinarius (Telamonia) hematochelis. Fr. "Blood-cinctured Cortinarius."


Cortinarius (Hygrocybe) subferrugineus. Fr. "Rusty Cortinarius."


In woods. Coed Coch. Sept.

Odour and taste unpleasant.

Cortinarius (Hygrocybe) obtusus. Fr. "Obtuse Cortinarius."


In woods. Coed Coch. April.

Paxillus filamentosus. Fr. "Filamentose Paxillus."

Pileus fleshy, excentric, gibbous, at length depressed, torn into dense villous scales; margin thin, inflexed; stem solid, attenuated downwards, sub-incurved; gills crowded, narrow, straight, white, then yellowish, simple behind.—Fr. Epier. pp. 317. Buxb. iv. t. 8, f. 1.

On the ground. Aug. Forres.

Stem from an inch in length, and \( \frac{1}{2} \) in. thick, lateral. Pileus 1\( \frac{1}{2} \)-3 in. broad, tawny-yellowish. Gills decurrent, at length becoming darker.
NEW BRITISH NITOPHYLLUM.

Dr. J. E. Gray has kindly drawn our attention to a recent and valuable memoir by J. G. Agardh, entitled "Bidrag till Florideernes Systematik," with which Algalogists in this country should make themselves acquainted. Apart from the new and systematic arrangement of the Floridea which it contains, descriptions of new species are interspersed, and one of these is from our own coasts. The specimen was communicated to the author by Mrs. Griffiths, under the name of Nitophyllum Hilliae, and is here described as follows:

**Nitophyllum litteratum. J. Ag.**—Stem short, cuneate; frond rather obscurely venose beneath with dichotomous anastomosing veins, cuneato-reniform, palmately pinnatifid, lobes linear-cuneate, margin minutely undulato-crenulate, base contracted, sori seriate between the veins, more or less confluent amongst themselves, forming irregular figures.

The shores of England (Mrs. Griffiths).

Sori not punctiform and scattered, as in N. Hilliae, but linear, oblong, or variously configurate, seriate between the veins. The substance is also thicker.

CRYPTOGAMIC LITERATURE.

**Monthly Microscopical Journal for December.**—On the structure of the valves of Eupodiscus Argus and Isthmia enervis, showing that their silicious deposit conforms to the general plan of deposition in simpler forms, by Henry J. Slack, F.G.S.

**Hedwigia, No. 10 (1872),** contains "Pyrenomycetes novi Austriaci," by George Winter.


Figs. 1, 2, *Peziza Chateri* Sm.
" 3, *Peziza Bullii* Sm.
Hygrophorus limacinus. Fr. "Slimy Hygrophorus."

Pileus fleshy, convex, then plane, smooth, glutinous, umber, then fuliginous; margin paler; stem solid, firm, ventricose, fibrilloso-striate, viscid, squamulose above; gills rather thin, white, then cinereous.—Fr. Epicr. p. 324. B. & Br. Ann. N. H., No. 1277. Paul, t. 77, f. 3.

In woods, &c. St. Leonards.

Hygrophorus caprinus. Fr. "Streaky Hygrophorus."

Pileus fleshy, fragile, conical, then flattened, and umbonate; at length depressed, subrepand, moist, streaky, as well as the stem, which is solid, fibrilloso, fuliginous; gills deeply decurrent, thick, scarcely distant, white, then glaucous.—Fr. Epicr. p. 326. B. & Br. Ann. N. H., No. 1278.

In pine woods. Near Bath.


Pileus $\frac{1}{2} - \frac{3}{4}$ in. across; stem 1-1$\frac{1}{4}$ in. high, 1-2 lines thick; gills narrow.

Hygrophorus irriguus. Fr. "Moist Hygrophorus."

Pileus rather fleshy, campanulate, then expanded, somewhat umbonate, even; stem fistulose, equal, tough, smooth, viscid, livid; gills rather decurrent, somewhat distant, whitish.—Fr. Epicr. p. 329. B. & Br. Ann. N. H., No. 1280.

Russula nauseosa. Fr. "Nauseous Russula."
Rather mild, strong scented, fragile; pileus fleshy, thin, plane, rather swollen, then depressed and infundibuliform, viscid; disc darker, margin sulcate, submembranaceous, stem stuffed, rather striate, white; gills adnexed, ventricose, somewhat distant, yellow, then dingy ochre.—Fr. Epicr. p. 363. B. & Br. Ann. N. H., No. 1283.

Lentinus resinaceus. Trog. "Gummy Lentinus."
On trunks. Forres, N.B.

Boletus collinitus. Fr. "Ringless yellow Boletus."
Pileus pulvinate, even, with an evanescent tawny gluten, growing pale, stem firm, rather attenuated downwards, ex-annulate, white, then becoming brownish, somewhat reticulated with adpressed scales, pores adnate, elongated, didymous, pallid, then yellow, mouth naked.—Fries. Epicr. 410. B. & Br. Ann. N. H., No. 1284.
In fir woods. Ascot. Nov.
With the stature and color of B. luteus, but absolutely ex-annulate.

Boletus pruinatus. Fr. "Brown mealy Boletus."
Pileus convex, then plane, rigid, dry, becoming purplish-bay, smooth, sprinkled with an umber powder, stem firm, somewhat ventricose, even, smooth, yellow, or variegated with reddish, punctate at the base, tubes adnate, minute, didymous, pallid yellow.—Fries. Epicr. 414. B. & Br. Ann. N. H., No. 1285. Bull. t. 393, f. b. c.
On grassy ground. Kew, &c.
Pileus 2 in. and more broad, scarcely rimose, margin obtuse; flesh white, firm, reddish beneath the cuticle.

Polyporus melanopus. Fr. "Black-stemmed Polyporus."
On dead wood. Scotland.

Polyporus (Placodermei) populinus. Fr. "Poplar Polyporus."
On the trunk of a poplar. Lincolnshire.
Has very much the habit of P. connatus.
**Polyporus (Resupinatus) micans.** *Ehr.* "Glistening Polyporus."
Effused, thin, flesh-coloured, becoming whitish; circumferencebyssoid, whitish; pores honeycombed, angular, somewhat crenate.—

**Polyporus (Resupinatus) hibernicus.** *B. & Br.* "Irish Polyporus."
Wholly effused, not separable, white; margin thin, tomentose; pores small, angular; dissepiments rather rigid.—*B. & Br. Ann. N. H.*, No. 1291.
At first orbicular, then by confluence forming effused patches, with a narrow, very thin, tomentose margin; pores ¼ in. across; dissepiments mostly entire. Apparently nearer to *P. radula* than to *P. vaporarius.—B. & Br.*

**Polyporus (Resupinatus) farinellus.** *Fr.* "Mealy Polyporus."
On beech. Dec.

**Trametes Bulliardi.** *Fr.* "Bulliard’s Trametes."
Pileus corky, flattened, even, smooth, white then tawny, at length zoned; pores long, subrotund, unequal, pallid, then rufescent.—

**Hydnum scrobiculatum.** *Fr.* "Furrowed Hydnum."
Ferruginous, pileus between corky and coriaceous, clavate, then plane or infundibuliform, pubescent; disc furrowed, squamose, zoned within, stem very short, naked, rooting; spines very short.

**Hydnum melaleucum.** *Fr.* "Black and white Hydnum."
In fir woods. Ascot.

**Hydnum cirrhatum.** *P.* "Cirrhose Hydnum."
On beech. Epping Forest. (J. English.)
At first whitish, then yellowish or rufescent.
Hydnum bicolor. A. S. "Two-colored Hydnum."

Odontia barba-Jovis. Fr. "Jupiter's beard Odontia."
On decayed wood. Epping.

Stereum frustulosum. Fr. "Frustulose Stereum."

Solenia fasciculata. P. "Fasciculate Solenia."
This was included in the Handbook in error, under the name of Solenia candida.

In pine woods. Coed Coch.
Stem thick at the base, but not so thick as in Persoon's figure. B. & Br.

Pterula. Fr.

Pterula multifida. Fr. "Multifid Pterula."

We have been unable at present to meet with a description of this plant.
ON SAPROLEGNIÆ.

By Dr. Anton de Bary.*

The existence of a sexual generation in a certain number of Fungi has latterly been demonstrated. The Mucorini offer an example of a copulation which, in my idea, and that of M. Hofmeister, is a particular form of this mode of generation; and, since Micheli and Bulliard a multitude of Fungi are, at any rate, supposed to possess sexes, flowers, anthers, &c.

We will first quote the Saprolegnia, the sexual organs, and the fecundation of which were first discovered by M. Pringsheim, and described by him.† In the types which may be imagined to be monocious, such as the Saprolegnia monoica, the Pythium and our Aphanomyces, the female organs consist of oogonia, that is to say, of cells which are at first globose, and rich in plastic matters, which most generally terminate short branches of the mycelium, and which are but rarely seen in an interstitial position. The constitutive membrane of the adult oogonium in Saprolegnia monoica is reabsorbed in a great number of points, and is there pierced with rounded holes. At the same time the plasma is divided into a larger or smaller number of distinct portions which are rounded into little spheres, and separate from the walls of the conceptacle, in order to group themselves in its centre, where they float in an aqueous liquid. These gonospheres are then smooth and bare; on their surface there exists no membrane of the nature of cellulose. In the genera Pythium and Aphanomyces, and in some of the Saprolegnia all the plasma of the oogonia is condensed into one solitary central sphere, surrounded by liquid.

During the formation of the oogonium, there arise from its pedicel, or from neighbouring filaments, slight, cylindrical, curved branches, sometimes twisted around the support of the oogonium, and which all tend towards this organ. Their superior extremity is intimately applied to its wall, then ceases to be elongated, becomes slightly inflated, and is limited below by a septum; it is then an oblong cell, slightly curved, filled with protoplasm, and intimately applied to the oogonium; in one word, an antheridium, or the organ of the male sex. Each oogonium possesses one or several antheridia. Towards the time when the gonospheres are formed, it may be remarked that each antheridium sends to the interior of the oogonium one or several tubular processes which have crossed its side wall, and which open at their extremity in order to discharge their contents. These, while they are flowing out, exhibit some very agile corpuscles, the diameter of which is barely equal to .002 m.m., and which, considering their resemblance to what are termed "spermatozoids" in the Vaucheria, ought to

be regarded as the fecundating corpuscles. After the evacuation of the antheridia, the gonospheres are found to be covered with cellulose; they then constitute so many oospores, with solid walls, if I may use an expression specially applied to the algae by M. Pringsheim. Phenomena which are analogous in several respects and have been studied in the Vaucheria and other coniferae, as also direct observations which are due to M. Pringsheim, do not permit of any doubt but that the cellulosic membrane, which appears on the surface of the gonospheres, is only the consequence of sexual fecundation, and that this ought not to be attributed to the corpuscles which issue from the antheridea, which would penetrate into the gonospheres, and unite with their substance.

In Saprolegnia dioica and Achlya dioica, the gonospheres and the oogonia are formed in the manner we have just described; the membrane of these latter is pierced with openings or pores, and yet no antheridia-bearing filament is seen to be applied to it. It must be elsewhere that M. Pringsheim has seen organs which everything authorizes us to qualify as antheridia. Thick tubes, similar to those which engender the zoospores, spring from the mycelium at a given moment, and are divided by septa into a series of cylindrical cells, each of which is an antheridium. In Saprolegnia dioica, the plastic contents of the antheridia are transformed into an infinitude of very small vacillary corpuscles which escape with much agility by the orifice of a prolongation of the antheridium, made in the manner of a neck and very short. The antheridium of Achlya dioica is cylindrical, the plasma which it encloses is divided into particles which have nearly the volume of the zoospores of the plant. These particles become globose cells, grouped in the centre of the antheridium. Posteriorly the contents of these latter cells are divided into numerous bacillary spermatozoids, which first break the wall of their mother-cell, and then issue from the antheridium in the same manner as the spermatozoids of Saprolegnia dioica. These corpuscles, in the two plants of which we are speaking, resemble the spermatozoids of the Vaucheria; they are bacillar, and their agility is assisted by a long cilium. It is presumable that here, as in the algae, concerning which we have positive demonstration, the spermatozoids introduce themselves into the cavity of the oogonium, and unite with the gonospheres. On this point, however, observations are wanting, and therefore we cannot consider ourselves perfectly sure in our appreciation of the organs of which we have just treated.

We may also class amongst bodies of a doubtful nature, but which are certainly worthy of further observation, the organs first seen by M. Nageli, then by M. Alex. Braun, and M. Cienkowski, and, lastly, by M. Pringsheim, who has carefully described them, and who considers them to be the probable antheridia of some species of Achlya or Saprolegnia. These bodies, according to the learned Professor of Jena, have their origin in thick filaments or
tubes, similar to those which form the zoosporangia, and represent so many distinct little masses of plasma in the midst of a homogeneous and parietal ganglion; the contents of these plastic masses are soon delineated in a more precise manner; we see in their interior some homogeneous granules, which are at first globose, then oval, and finally pass to the enlarged and ampullæiform extremity of the generating tube; there they become rounded or oval cells, covered with cellulose, and emit from their surface one or several cylindrical processes, which elongate towards the wall of the conceptacle, and pierce it, without, however, ever projecting very far beyond it. At the same time the lacunose plasma of each cell is divided into a multitude of corpuscles, the diameter of which equals about 0.004 m.m.; these escape by the open extremity of the cylindrical neck of which we have spoken, and, as regards their organization and agility, they resemble the spermatozoids of Achlya diótica. In water these corpuscles quickly become motionless, and do not germinate. During the development of these organs, the protoplasm of the utricle, which contains them, offers at first quite normal characteristics, and disappears entirely by degrees as they increase. That these organs belong really to the Saprolegnia, which presents them and constitute its antheridia, there are good reasons to believe, as M. Pringsheim has shown. Another opinion, which the same author refutes, is that the corpuscles in question are parasites from outside, entered into the cavities of the Saprolegnia, and which fructify at the expense of its protoplasm. This opinion relies principally on the great resemblance of these corpuscles to certain veritable parasites, such as Chytridium. It may also be supported by the fact that M. Pringsheim has sometimes observed near the corpuscles in question, and in their conceptacles, globules similar to those which have been often met with in the Spirogyrae, the Vauchérie, and other Algæ, and which belong incontestably to vegetables which are parasitic upon them. The reasons which M. Pringsheim brings against this appreciation ought to have lost some of their value in consequence of the new observations which have been made on the biology of microscopic parasites, and the whole subject should be studied again. More ample details concerning the sexual organs of the Saprolegnia will be found in the already quoted works of this celebrated Algologist.

The oosporæ of the Saprolegnia, when they have arrived at their maturity, possess, like many other spores, a tolerably thick integument, which is double, viz., formed of an epispore and an endospore. After a considerable time of repose, they originate tubular or vesicular germs, and, by exception, these germs are only as yet slightly elongated, when they produce zoosporæ.

Hitherto it has not been possible to obtain a direct experimental proof of the reality of a fecundation in the Saprolegnia, unless we can consider as such an instance observed by M. Pringsheim, in which the multitude of the gonospheres of a Saprolegnia perished
totally from the accidental default of antheridia. However, if we consider the analogies of all kinds which exist between the organs of the *Saprolegnia* and those among the Alge, of which the sexual office is well known, we cannot refuse to the former the value which we grant to the latter. Experimental researches on the phenomena of sexual multiplication in the other Fungi, and on the organs which are employed in it, are barely possible. The physiological office of these latter, as sexual organs, can only be concluded from the constancy of their reciprocity of action, and from their resemblance to the organs of *Saprolegnia*.

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**TWO SPECIES OF PEZIZA.***

*By Worthington G. Smith, F.L.S.*

**Peziza (Humaria) Chateri.** *Sm.* "Chater's Peziza."

Cups concave, at length expanded, margin incurved, sessile, bright orange-red within, pale brown externally, from the colour of the cells of the cup, asci cylindrical; sporidia elliptic, binucleate, episporium rough. Paraphyses clavate above.—*W. G. Smith, in Gard. Chron., No. 1 (1872), with fig. Rabh. Fung. Eur., No. 1517.*

On the ground.

Cups 1 to 6 lines across, composed of clavate, pale brown, septate cells, the tips of which give a granulated appearance to the outer surface, which is otherwise smooth.

(Pl. viii., fig. 1. 2.)

**Peziza (Mollisia) Bullii.** *Sm.* "Bull's Peziza."

Cups subhemispherical, at length irregular, sessile, or very shortly stipitate, whitish, margin inflexed, rather pulverulent from the remains of the veil, hymenium often proliferous, mycelium brownish, asci subclavate, sporidia sub-elliptic, minute.—*W. G. Smith, in Gard. Chron., (1873), with fig. B. & Br. Ann. N. H., No. 1324, t. 19, f. 17.*

On a wooden cistern. Dec.

Sporidia .0002--.0003 in. long.

(Pl. viii., fig. 3.)

* For the use of the figures illustrating this communication, we are indebted to the *Gardener's Chronicle.*

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**Batarrea Phalloides.**

Mr. W. G. Smith has announced in the *Gardener's Chronicle* that four specimens of this very rare and interesting fungus have been found recently in Britain. One of these has been deposited in the Museum of the Royal Botanic Gardens, at Kew.
LICHENOLOGICAL MEMORABILIA.—No. 3.


Hellbom's Lichens of Lule Lapmark.

Messrs. P. J. & E. V. M. Hellbom, of Orebro, Sweden, have issued a "Centuria" of dried specimens of Lichens, collected by them in 1871, in Lule Lapmark. Unfortunately, though with printed labels, they are not numbered, so that it will be difficult to quote them as Exsiccati. For convenience sake I have numbered them in the following notes. They appear to be named after Th. M. Fries Lichenes Arctoi, but I have transposed them into the nomenclature adopted in Dr. W. Nylander's system, as that which is best known and most used in Britain. The specimens, in general, are good and characteristic, and comprise many rare and newly-detected lichens. Amongst them are many species which occur also in Britain, and the whole collection is interesting not only to the general lichenist, but also to the British lichenist, inasmuch as it identifies our insular species with those of more northern continental countries, and also enables us to detect several which have not heretofore been recorded as British. The following notes made during examination and identification, before placing them in my herbarium, may prove of some value and interest:


5. "Icmadophila æruginosæ. (Scor.)—In terra humida ad Aktse." = Bœomyces icnadophilus (Ehrh.) Leight. Lich. Fl. G. B. 54, & Exs., there cited, to which add Reich. & Schub. 27.


8. "Cladonia amaurocræa. FLKE.—Inrupibus muscosis infra
Snjárrak & in Pakti Sullo ad Qvickjock." Small specimens (K.
9. "Pilophorus cereolus. (Ach.) P. Fibula. Tuckerm.—In schisto
micaceo ad Qvickjock et amphibolitico ad Jockmock." = Pilophoron
10. "Thamnolia vermicularis. (Sw.)—In terra nuda campi alpini
Walliware prope Qvickjock." = Leight. Lich. Fl. G. B. 82, and Exs.,
cited there.
11. "Usnea barbata. (L.)—In ramis abietis ad Qvickjock." Speci-
mens without fructification, forma hirta, Fr. Leight. Lich. Fl. G.
B. 84; Schær. Exs., 399; Mudd., 35; Anzi. It. S., 16; Hepp.,
828; Leight., 1; Spruce Amaz., 50.
12. "Bryopogon jubatus. (L.), c.fr.—Ad ramulos abietis prope
13. "Bryopogon Fremontii. Tuckerm.—Ad truncos ramosque
pinum prope Jockmock." = Alectoria Fremontii, Tuckerm. Suppl.
1, p. 422. Conspicuous by the greenish-yellow prima of the
apothecium (K—C—).
14. "Alectoria ochroleuca (Ehrh.) a rigida (Vill.).—In ripibus
campisque alpinis prope Aktse." K fiant yellow, C full yellow.
Leight. Lich. Fl. G. B., 87; Reich. Schub. 67; Fellm. 52; Schær.
15. "Cornicularia divergens. (Ach.)—Ad rupes Aktse Kallou
prope Aktse." = Alectoria divergens (Ach.). Thallus K—C—, me-
dulla K—C reddish. No fructification. Small specimens = Som-
16. "Parmelia lanata. (L.) WALLR.—Ad rupeis campi alpini Tjackeli
prope Aktse." Typical form, but somewhat approaching var. par-
846, central fig. Hepp. 588; M. & N. 557; Schær. 257; Anzi.,
53; Fellm. 82. This lichen must be removed to the genus Alec-
toria, and be named A. lanata, Ach.
17. "Evernia divaricata. (L.) Ach.—Ad ramulos abietis in pro-
montorio Parkijaur Morka." Sterile; thallus K—C deep yellow.
18. "Ramalina calicaris (L.) FR. β fastigiata * minuscula
(NYL.) Th. FR.—In ramulis abietis ad Qvickjock." = Ramalina minus-
19. "Cetraria odontella. Ach.—Ad saxa muscosa campi alpini
supra Aktse." Small and poor specimens, intermixed with Cetraria
aculeata, Fr.
Delisei Bory.—In locis humidis inter rupeis infra alpem Nammats." =
Cetraria Delisei (Schær.), medulla K—C red = Fellm. 60. Th.


29. "Sticta limita. ACH.—In terra muscosa ad Tjamâtis & Aktse." = Sticta limita, ACH. Sterile = Fellm. 73; Anzi. Langob. 47; Scher. 385.


34. "Parnelia hyperopta. Ach.—In truncis mortuis ad Aktse." This is P. aeurites, Ach.; see Nyl. in Flora, 1872, p. 248. What British lichenists have heretofore regarded as P. aeurites is now to be considered Platysma diffusum, Webb. Spic. Fl. Gotting., 250 (see Nyl. l. c.), and E. Bot. t. 858; and Dicks. Crypt. 3, 17, t. 9, f. 6, must be quoted to it.


44. "Pannaria elaeina. (Wnbg.)—In alpe Nummats prope Aktse." This is the true plant of Whlbng. Fl. Lapp. 425, t. 28, f. 3. The plant of E. Bot. 2158, and Leight. Lich. Fl. G. B. 165, is most probably Physcia adglutinata, (Flr.). Leight. l. c. 149.

45. "Pannaria brunnea. (Sw.)—In terra muscosa l. subnuda ad Aktse. = Pannaria pezizoides, (Web.) Precisely the plant of Fellm. 96.
46. "Placodium chrysoleucum. (Sm.) Ach.—In praeruptis parietibus alpis Rittok." = Squamaria chrysoleuca (Sm.) Status marginae squamariam atque pagina infera nigricantibus = Reich. & Schub, 36. K yellow, C orange-yellow.

47. "Xanthoria elegans. Link.—In schisto micaceo ad Qvickjock." Under this name three specimens are given, two of which have the surface of the thallus minutely punctellato-impressed, and are therefore referable to Placodium murorum, (Hffm.), var. miniatum, (Hffm.), and Leight. Lich. Fl. G. B. 175; and the third is the true Placodium elegans, (Link.). Leight. l. c., 178. It is questionable whether miniatum should not be distinguished as a distinct species, since it has nothing in common with Pl. murorum, with which it is usually associated.


49. "Dimeleena oreina. (Ach.)—In alibibus Nunnats et Rittok prope Aktse." K faint yellow, C deeper yellow, a poor specimen; thallo maeriore ambitu parum effigurato, hypothallo nigro predominant = Hepp. 209. From there-action this will be L. Mougetioiides, Nyl. see Flora, 1872, p. 364 & 427. True L. oreina, Ach. has K==.


53. "Aspicilia cinereorufescens. (Ach.)—In saxis ad Aktse & Qvickjock." This specimen has re-action, K yellow then red, and is, therefore, not Lecanora cinereorufescens, (Ach.), which has K—C—. Judging from the black colour of the somewhat pruinose epithecium it should be referred to Lecanora Myrini, (Fr.). Th. Fries. Lich. Scand., 283, states how L. Myrini (Fr.) and L. alpina Smrft. may be distinguished, the former having a black naked or pruinose epithecium, and the latter a rufous or rufous-black epithecium, especially visible when moistened, but remarks that they may be possibly only states or varieties of the same lichen. With these criteria Richardson Arct. Am., 124, Zeo., 4, should represent L. Myrini (Fr.), of which I possess a specimen under a different name, without locality, but probably British, from Rev. T. Salwey. L. alpina (Smrft.) will then be represented in Exs. by Arnold, 341, and 341 b., and 116, Schær. 130; and I possess it from Cader Idris, and from Noirmont, Jersey.
54. "Aspicilia Myrini (Fr.) Th. Fr.—In saxis campi alpini supra Aktse." See note on "Aspicilia cinereorufescens."

55. "Aspicilia pelobotrya. (Wnbg.)—In alpe Walliware prope Qvickjock." This is not identical with Lecidea pelobotrya (WHLN.) of Leight. Lich. Fl., 293; but has an areolate thallus and convex or granular areolae, with tuberculose reddish cephalodia and reaction, K faint yellow, C red, consequently = L. panæola, Ach. Leight. Lich. Fl., 280, and Exs. there cited, to which add Smrft. Norveg., 51.

56. "Lecanora pallescens. (L.)—Incortice Salicis caprese & Sorb. aucupariae ad Aktse." In this specimen the disk of the apothecium alone has re-action K yellow and C becoming red; it is, therefore, referable to Lecanora parea (L.) forma pallescens (L.). Leight. Lich. Fl., G. B., 135.

57. "Lecanora cateilea (Ach.) NYL.—In cortice alni infra Snjär-rak." Very like Lecanora subfuscus f. argentata, Ach.

58. "Lecanora rhypariza. Nyl.—In praeruptis muscosis alpis Nammats." Similar in structure and in numerous minute spores with Lecanora cervina (Pers.), and of which it may be possibly a state.

59. "Lecanora chlorophana. (Wnbg.)—In saxis campi alpini supra Aktse." A miserable specimen of the sterile scattered thallus of Lecanora chlorophana (WHLN.). Perfect specimens in fruit will be found in Schær, 336; Hepp, 770; Anzi. Langob. 68; Anzi. Ital. Sup., 214. K—C—.

60. "Acarospora chlorofusca. (Nyl.)—Ad saxum erraticum micaceo schistosum prope Qvickjock." = Lecanora chlorofusca (Nyl.) Scand, 174. Similar in structure and in numerous minute spores with Lecanora cervina (Pers.), and of which it may be possibly a state. K—C—.


CRITICAL NOTES

On Mycological Illustrations (W. G. Smith), Part 2.
By Prof. Elias Fries.

Pl. 25, f. 1. Ag. obturatus. Fr. Habit very different from Ag. obturatus, but possibly a small form.
25, f. 2. Ag. merdarius. Fr. Genuine, but a small form.
26, Ag. porrigens. P. Excellent.
27, Cort. elatior. Fr. = Cortinarius grallipes. Fr. very different from Cort. elatior.
29, f. 1. Ag. albo-cyanescus. Desm. Differing from A. albo-cya- neus, and appears to be a new species, which may be called Ag. Worthingtoni.
29, f. 2. Ag. inunctus. Fr. Most excellent.
30, Ag. confluens. P.
31, Ag. clavipes. P. Gills should be less crowded.
32, Ag. portentosus. Fr. A beautiful figure. This form is intermediate between Ag. sejunctus and Ag. porten- tosus. (Monogr. p. 52.)
33, f. 1. Ag. Taylori. B. Most excellent: allied to Ag. medius.
34, f. 1. Ag. lacrymabundus. Bull.
34, f. 2. Ag. candollianus. Fr.
35, f. 1. Ag. Terrei. B. & Br. Scarcey differing from Ag. cinnabarinus (Monogr. p. 29), the fourth sub-species of Ag. granulosus.
36, Ag. subinvolutus. Batsch. Unknown to me.
37, f. 1. Ag. gracilis. Fr. Good.
37, f. 2. Ag. atomatus. Fr. Good.
38, Ag. eximius. W. G. Sm. Remarkable.
39, f. 1. Ag. candidans. Fr.
40, Ag. strangulatus. Fr. Most noble!
41, f. 1. Thelephora fastidiosa. Fr. Figures most.
41, f. 2. Thelephora caryophyllea. Fr. Excellent!
42, f. 1. Ag. elatus. Fr.
42, f. 2. Ag. fastibilis. Fr.
43, f. 1. Boletus purpureus. Fr.

" f. 2. Ag. terreus. Schäff. Right and good.

45, f. 1. Polyporus rutilans. Fr.

" f. 2. Polyporus Stephensii. B. & Br.

46, Ag. majalis. Fr. A new and distinct species, clearly different from Ag. majalis, which I would call Ag. Saundersii.

47, Boletus cyanescens. Bull. Without doubt, but the colour of the flesh not blue.

48, f. 1. Ag. patulus. Fr. Right, but the colour darker than I have seen.

CRYPTOGAMIC LITERATURE.


Finsca Vetenskaps Soc. Förhand (1872). Contributions towards the Morphology and Systematic History of the Mosses, by S. O. Lindberg. All the above papers are in Swedish.

Thuemen (F. de.) Fungi Austriaci Exsiceati Cent iv., v., vi., 4to. Teplitz.


PEZIZA (ALEURIA) ISABELLINA, W. Sm.
Grevillea,

A MONTHLY RECORD OF CRYPTOGRAMIC BOTANY, AND ITS LITERATURE.

BRITISH FUNGI.

By M. C. Cooke.

(Continued from p. 116.)

ASCOMYCETES.

Peziza (Humaria) hinnulea. B. & Br. "Brown Humaria."
Cup sessile, flexuose, marginate, bay-brown, between fleshy and waxy; sporidia globose, even with a large globose nucleus.—B. & Br. Ann. N. H., No. 1320.*

Sporidia (-0006 in.) 015 m.m. diameter.

Gregarious, sessile, urceolate then plane, red, becoming brown, externally pruinose; sporidia spherical, smooth, with a large nucleus, paraphyses filled with orange granules, clavate at the tips.—Phillips in litt.

On burnt or sandy ground. Shrewsbury. (W. Phillips.)
Sporidia (-0004 in.) 01 m.m. diameter, containing a single large nucleus, which escapes by rupture of the epispore.
Allied to P. Wrightii.—B. & Br.

Peziza (Humaria) subhirsuta var. macrocystis.
Gregarious or scattered, cup shaped then flattened; margin entire, slightly elevated, externally brownish, smooth, or minutely granular; disc orange-red; asci cylindrical; sporidia elliptical, narrow; paraphyses clavate, filled with orange granules.
On burnt soil. Shrewsbury. (W. Phillips.)
The external cells of the cup are very large: cups 1-2 lines broad, sporidia 0009 X 0005 in.

Peziza (Dasyscypha) citricolor. B. & Br. "Lemon-coloured Peziza."
Cups very shortly stipitate or sessile, between fleshy and waxy, turbinate, finely tomentose, lemon-coloured; sporidia fusiform, with

On rotten wood. March.

Cups ·0009 in., sporidia (·0008-·001 × ·0002-·00025 in.) ·02-·025 × ·005-.006 m.m. Asci (·0035-·004 in.) ·085-.1 m.m. long.

**Peziza (Dasyscypha) stereicola.** Cooke. "Rose-pink Peziza."

Gregarious, minute; cups globose, then cup-shaped, between fleshy and waxy, externally woolly, of a delicate rosy-pink when dry; disc of the same colour; asci subclavate; sporidia minute, cylindrical, obtuse.

On the hymenium of *Stereum*. Scotland. (Herb. Edin.)

Sporidia (·00025 × ·00005 in.) ·007 × ·0015 m.m.

**Peziza (Dasyscypha) candidata.** Cooke. "White Bramble Peziza."

Snowy white, sessile, soft, scattered or subgregarious, soon flattened; margin often lobed and irregular, slightly elevated, externally clothed with soft tomentose hairs; asci subclavate; sporidia minute, cylindrical, obtuse, hyaline.

On stems of *Rubus*. Highgate.

Sporidia (·00025 × ·00005 in.) ·007 × ·0015 m.m.

**Peziza (Dasyscypha) escharodes.** *B. & Br.* "Grey Bramble Peziza."


Sporidia (·0004 in.) ·01 m.m. long. Cup at first closed, globose, ·03 in. diameter, quite black when the hairs have vanished.

**Peziza (Hymenoscypha) amenti.** Batsch. "Catkin Peziza."


On female catkins of Abele. March.

Sporidia (·0004 × ·0002 in.) ·01 × ·005 m.m.

**Peziza (Mollisia) elaphines.** *B. & Br.* "Granular Peziza."


Granules often disposed in lines so that the cups are radiated. Asc ii·0015 in. long; sporidia fusiform (·00035-·0004 in.) 0085-.01 m.m. long.

**Peziza (Mollisia) aquosa.** *B. & Br.* "Watery Peziza."

On or with Sphæria hirsuta on willow. Jan.
Resembling P. cinerea, but smoother and more concave when young, with totally different fruit. Cup 0.024 in. diameter, growing on Sphæria hirsuta and its mycelium, accompanied by a brown mould, consisting of erect, simple, articulated threads, surmounted by a single oblong, uniseptate spore 0.005 in. long; asci (0.002 in.) 0.05 m.m. long; sporidia (0.0002 - 0.0025 × 0.0001 - 0.0015 in.) 0.005 - 0.006 × 0.0025 - 0.0035 m.m., bright orange when treated with iodine.

**Peziza (Mollisia) hydnicola. B. & Br.** "Green Parasitic Peziza."
On Hydnum ochraceum.
Sporidia (0.0004 × 0.0003 in.) 0.01 × 0.0075 m.m. Conidia (0.0001 - 0.0015 in.), 0.0025 × 0.0035 m.m. long.

**Peziza (Mollisia) flaveola. Cooke.** "Yellow Fern Peziza."
Sessile, minute, bright yellow, submembranaceous; soft, soon becoming discoid, smooth, even. Asci cylindrical.
A very pretty little species, but apparently very scarce, and the specimen found was not sufficiently matured for a perfect description.

**Peziza (Mollisia) Typhae. Cooke.** "Bulrush Peziza."
Gregarious or scattered, minute, erumpent, sessile, black, soft or waxy, soon plane, laterally compressed when dry; disc fuliginous, black when dry, minutely papillate, even; asci cylindrical, sporidia fusiform, hyaline simple. Cooke, Exs., No. 570.
Sporidia (0.0004 - 0.0005 × 0.0001 in.), 0.012 - 0.014 × 0.0025 - 0.003 m.m., twice as long as in Peziza atrata, to which this plant has great external resemblance.

**Peziza (Mollisia) Plantaginis. Fclkl.** "Plantain Leaf Peziza."
On leaves of Plantago lanceolata. King's Lynn. (C. B. Plowright.)
Sporidia (0.0005 × 0.0015 in.), 0.016 × 0.004 m.m.

**Peziza (Mollisia) incarnata. Cooke.** "Rosy fir-leaf Peziza."
Scattered, minute, roseate, sessile, cups soon expanded, nearly plane, externally paler; asci cylindrical, sporidia linear, obtuse, hyaline.
On pine leaves. Scotland. (A. Jerdon.)
Sporidia (0.0004 × 0.0005 in.), 0.01 × 0.0015 m.m.

**Peziza (Patella) artemisiae. Lasch.** "Mugwort Peziza."
Erumpent, thin, almost stipitate; cups at first top-shaped, then
flattened, somewhat rounded, naked, brownish-black; disc whitish; margin incurved. Asci cylindrical; sporidia linear, minute, hyaline. —Lasch. in Rath. Herb. Myc. No. 335.

On stems of Artemisia vulgaris. Isle of Wight.

Peziza (Patellea) amphibia. Nyl. "Lichenoid Peziza."

On bark of Pinus sylvestris. (Dr. Holl and W. Phillips.)

Sporidia (0.0005-0.0007 × 0.0001-0.00015 in.) 0.014-0.02 × 0.003-0.004 m.m.


On dung (cow, rabbit, &c.). Herefordshire. (J. Renny.) Near London. (M. C. C.) Near Bath. (C. E. B.)


On cow dung. Feb.

Sporidia (0.0015-0.003 in.) 0.0035-0.007 m.m.


On Carex paniculata. June.

Desmazieres describes the sporidia as "very minute, globose." Fuckel as "filiform, as long as the ascus." Not having seen the British plant, we cannot determine the form of the sporidia.

This appears from comparison of authentic specimens of both to be only Patellaria livida, B. & Br., with the sporidia more fully matured.
LICHENOLOGICAL MEMORABILIA.—No. 3.


Hellboni’s Lichens of Lule Lapmark.

(Continued from p. 126.)


73. “Psora atrorufa.” (Dicks.)—In alpe Nammats prope Aktse.” = Lecidea atrorufa (Dicks.), Leight. Lich. Fl. 250, and Exs. there cited.


75. “Lecidea aglaea.” Smrft.—In alpibus Rittok et Walli.” A poor specimen, but probably the true plant.


80. "Lecidea perfidiosa. Nyl. — In rupibus muscosis infra Snjårrak." Nyl. Scand. 244. Probably the true plant, but state of specimen unsatisfactory for correct examination.

81. "Sporastatia Morio (Ram.) β coracina (Smrfl.t.) — In alpibus Nunnats & Passo prope Aktse." A poor specimen, externally resembling Lecidea nitida, Schær. (K—C—), but polysporous, and according with Sommerfelt’s description in his Suppl. Fl. Lapp., 142.

82. "Buellia insignis. (Næg.) — In terra muscosa alpis Snjårrak = Lecidea insignis var. muscorum, (Wulf.), Hepp. 40, Fellm. 201. Anzi Ital. Sup., 292. The var. corticicola Körb., is Hepp. 39, Anzi Ital. Sup., 297. Both vars. have reaction, K yellow C orange or orange-red. The spores are brown, 1-septate, and the hypothecium dark fuscous. I have the var. corticicola from Bomerere Pool, Shropshire (1871), not as yet recorded as British.

83. "Buellia Rittokensis. Hellbr. — In rupibus infra Rittok et Nammats." A very remarkable lichen, well described by M. Hellborn in Kongl. V. A. Fordh. 1866, p. 463. On a black hypothallus, the roundish, fuscobadious shining areolae, plane or concave, with an elevated albopulverulent margin, are distantly and dispersedly scattered, and the larger black apothecia are sessile on the hypothallus. The hypothecium is very large and thick, nigro-fuscous, the hymenium very narrow, paraphyses coherent or indistinct, and spores 8, fuscous, very broadly and obtusely oblong or ellipsoid, 1-septate. Reaction K—C—

84. "Rhizophialle coronata. Th. Fr.—In terra muscosa infra alpem Nammats." Assuredly a very distinct and beautiful species, described in Th. M. Fries Lichenes Arctoi, p. 205, but I cannot see any particular reason why it should be removed from the genus Lecidea of Ach. & Nyl. into a new and separate genus. It is Lecidea rhizobolephara, Nyl. Scand. 240 and 293. Leight. Lich. Fl. 333.


86. "Rhizocarpon geographicum β alpicolum. (Wnbg.) — In rupibus infra Njåmmelst." This specimen has reaction K yellow then red, whereas in L. alpicola (Schær.), the reaction is K—C—, according to Schær. 178, Hepp. 151, and specimens from Dr. Nylander. The spores are colourless in a young state, but brown 1-septate when mature. Can it be L. alpestris, Schær. En. 107?


89. "Biatora phæostigma. (Korb.)—In ramulis abietis ad Aktse." Korb. S. L. G. 199., Par. 157.


94. "Lecidea Diapensiæ. Th. Fr.—In campis alpinis Tjackeli & Walli." = Fellm. Lapp. Or. 149.

95. "Lecidea alpestris. Smrfl. * toninioïdes. Helleb.—In campis alpinis Snjárrak, Walli & Nammats." A form of Lecidea alpestris, Smrfl., with the granules of the thallus larger, more areolato-verrucose, and the apothecia conglomerate. K—C.—. I possess a specimen collected by Mr. Crombie at Ben Mac Dhui, which may be referred to the typical form. (Schaër. 195. Fellm. 161,) not yet recorded as British.


NEW ASCOMYCETOUS FUNGI.

By Worthington G. Smith, F.L.S.

Mitrula alba. W. G. Sm.

Head globose, even, white; stem stuffed, white; asci linear, sporidia lanceolate, hyaline, enucleate.


Sporidia 0.0065 × 0.0012 in. Differs entirely from M. paludosa, Fr., in colour, and especially in the globose head and stuffed stem.

[Plate 10, fig. 7., Mitrula alba, nat. size. Fig. 8 section. Fig. 9 asci and sporidia ×700 dia.]

Peziza (Aleuria) isabellina. W. G. Sm.

Cups large, sessile, fleshy, subglobose, internally smooth, brownish yellow with a shade of red, externally paler, subpruinose; sporidia elliptic.

On decayed coniferous wood. King’s Lynn, Norfolk. (Chas. B. Plowright, Esq.) April, 1871.

Cups 1-2 in. across; sporidia 0.0056 × 0.0034 in. Allied to P. macrocalyx and P. vesiculosa, but entirely differs from both in colour, habit, and fruit.

[Plate 9, fig. 1, 2. Peziza isabellina nat. size. Fig. 3 section Fig. 4 asci and sporidia ×700 dia.]

Peziza (Aleuria) undata. W. G. Sm.

Middle sized, fleshy, slightly concave, at length reflexed, generally corrugated, rooting, variable in colour, purple, buff, grey, yellowish, or pallid; sporidia elliptic.


Cups ⅓-⅔ in. across; sporidia 0.0023 × 0.0018 in. Allied to P. purpurascens, but differing in the sporidia, which, in the latter, are three times as long as broad; also allied to P. viridaria, P. applanata, P. violacea, and P. fuliginea, but differing from all.

[Plate 10, figs. 1, 2. Peziza undata, nat. size. Fig. 3 side view, Figs. 4, 5 sections. Fig. 6 sporidia ×700 dia.]

British Mosses.—At the moment of going to press we have received a copy of Mr. C. P. Hobkirk’s “Synopsis of British Mosses,” consisting of 196 pages of neatly printed letter-press, bound in cloth. Of its contents we have at present had no opportunity of forming an opinion, but, as the most recent authorities appear to have been consulted, we have no doubt that a closer acquaintance will be as satisfactory as the present casual one. Such a handy volume was much needed by British Bryologists.
ON REPRODUCTION IN FUNGI.

By M. L. R. Tulasne*

Assiduous observation, and the perfection with which microscopes are constructed, will have enabled the botanists of this age to determine that there are no really agamous plants, that is, without sex; at any rate they can, from the present time, suspect with foundation, that in all vegetables, no matter to what group they belong, there exist two distinct orders of reproductive organs, the relative value of which may be compared to that of the two sexes in animals. Until latterly, however, the Lichens and Fungi seemed to form exceptions to this law, for all the researches of phytologists could not discover in them that duality of organs which, after having been for so long the exclusive privilege of cotyledonous plants, has since been found to belong to nearly all cryptogams. I have applied all my efforts to make this anomaly disappear, and I wish I could flatter myself that I had worked efficaciously.

As regards the Lichens I have shown† that the thallus of the greater number of them conceals small globose organs, kinds of simple or multilocular conceptacles, provided with an ostiolum, which, at a certain period of their development, allow the escape of an incredible number of extremely fine linear corpuscles, straight or curved, such, in fact, that no resemblance usually exists between them and the real spores of the lichen. Spermogonia (antheridia, male flowers), entirely similar, or very analogous, are also observed in different tribes of Fungi.‡

The Pyrenomycetes, to which I particularly devoted my first work, furnish many very fine examples, but very varied ones are also found amongst the Discomycetes to which I now wish specially to draw the attention of those botanists who are interested in the physiological and organographical history of Fungi.

Among the Discomycetes of an inferior order, I have already noticed the foliicolous Rhytismae, the development of which begins in summer by the production, on a black spot of variable extent and form, of small pulviniform capsules (spermogonia), filled by a solid, conical kernel, quite covered by a hymenium, like that of Cytispora. Out of these capsules spreads a golden pulp, in which very slender corpuscles (spermatia) are mixed with an abundant mucilage; and it is only after the expulsion of this spermatie matter that the stroma of the fungus thickens around the spermato-

gonia to serve as a base for the lirellæ, that is to say, for the generative apparatus of the spores. These new organs take all the autumn and winter to gain their full size, and do not ripen their seeds until the early spring. The spermatia of *Rhytisma acerinum* are linear and short, those of *Rhytisma salicinum* are globular. We know that M. Léveille considered as a fungus *sui generis* the apparatus which engenders these corpuscles, and that he gave it the name of *Melasmia*.

Several *Hysteria* certainly possess spermogonia, but they are generally rather easy to confound with productions foreign to the fungus; we ought, however, to recognise as those of *Hysterium Fraxini* the small lageniform, and very black bodies, which are so abundantly sprinkled over the area occupied by the lirellæ, and which no longer contain any spermatia long before the maturity of the spores. The spermogonia of *Hysterium commune*, like those of *Hysterium scirpinum* and *Hysterium rubi*, are small, depressed capsules, of a brilliant black, in which we find an innumerable quantity of atomic spermatia; they have hitherto been taken for species of *Leptostroma*.

The spermogonia of *Triblidium quercinum* imitate in their form and structure those of *Rhytisma*; they are produced fastened to the first rudiments of the lirellæ, and their debris remain near these during the whole period of their long vegetation. The spermatia are linear, straight, and about 0.065 m.m. long; the spores are also very slender, but of a much more considerable length.

In *Stictis ocellata*, a Pezizoid fungus which gives out a very decided odour of honey, a great number of the tubercles which ought to be transformed into cups do not pass into this perfect state until after having produced either linear and very short spermatia or stylospores; the latter are aerogenous, oblong, reproducing bodies, which are equal in volume to the spores of the endothecium. Some tubercles confine their fecundity to this gangliary generation, and remain pyenidia, pure, and simple, that is to say, organs analogous, as regards their office, to the conceptacles I have thus designated in the Lichens. *

I also consider as pyenidia the small unilocular capsules with thick walls, which are seen mixed with the cups of *Heterosphaeria patella*, and which are generated on very short basidia, lanceolate, arcuate stylospores. There also exist such relations between *Ceurthospora phacidioides* and *Phacidium Ilicis* that the first ought to be considered the pyenidia or spermogonia of the second.

The spermogonia of *Tympanis conspersa* have a turbinate-oblong form, the hard consistence and black colour usual to the perithecia of the *Sphaeria*, but their inner wall is tapstried with the same hymenium as the central kernel of the spermogonia of *Rhytisma*, that is to say, with slender branched filaments from which spring

innumerable spermatia. These corpuscles, enveloped as they are in mucilage, issue from their conceptacle under the form of a long tendril, and each of them, taken separately, is only 0.003 m.m. long. There is no appearance as if these spermatophorous appliances were ever transformed, as has been thought, into cyathiform organs provided with thecae. Such organs are habitually rarer in *Tympanis conspersa* than the spermogonia; they are especially developed around the sori formed by the latter, and an infinitude of extremely fine spores are observed in each theca.

The spermoginia of *Cenangium ligni* (Desm.), a fungus barely differing from the true *Peziza*, are very small punctiform perithecia easy to confound with the young cups, and the simple cavity of which encloses an infinitude of straight spermatia which are not more than 0.0035 in. long.

Other *Cenangia* offer commonly only pycnidia, and ascochorous cups. The pycnidia of *Cenangium fuliginosum* are a kind of not very regular and unilocular tubercles; they have a more symmetrical form in *Cenangium Ariae*, and *Cenangium Padi*, and also contain arched-lanceolate stylospores, from 15 to 20 thousandths of a millim. in length. Those of *Cenangium Cerasi* and *Cenangium Prunastri* are frequently narrow and elongated in the manner of tubes; they are joined at their bases, and their cavities communicate with each other; we find very large linear-lanceolate and flexuous stylospores. *Cenangium Ribis* possesses on the other hand globular substipitate pycnidia, agglomerated on a thick subiculum, and their compact mass is divided by a network of coloured partitions into a multitude of compartments in which innumerable ovoid, and very small stylospores take their rise.

The *Cenangium Frazini* and *Cenangium Frangula* deserve a special mention, for they possess, more than their legitimate congeners do, spermatia. In the first these corpuscles, which are curved and about 0.01 mm. in length, are developed either in small special ovoid processes, or in the cavity of the pycnidia towards their orifice, but in the latter case they are perfectly distinguishable from the stylospores, which are similarly arched, but relatively very voluminous. The spermatia of *Cenangium Frangula* are straight, from three to five thousandths of a millim. long, and fill the orifice of some of the young cups, while they are still almost closed, and their hymenium seems to be formed of similar elements. On the other hand, the pycnidia of the same fungus, which resemble the perithecia of *Sphaeria*, habitually produce no spermatia.

In several *Dermatea* stylospores and spermatia co-exist. According to what takes place in the fungi already quoted, these two kinds of reproductive corpuscles are disseminated before the appearance of the ascochorous cups, but they are here generated together on a stroma, which has no proper tegument. This subiculum much resembles a *Tubercularia* in *Dermatea carpinea*; it is less well defined, of less consistence, and sometimes locellate in *Dermatea*.
coryli, *D. dissepta* and *D. amaena*, which are all kinds of small cæspitose and corticolous *Peziza*.

The *Bulgaria inquinans*, which, in the adult state, represents a very large, deep black *Peziza*, is in its extreme youth an obtuse tubercle, the whole mass of which is divided into ramified lobes, and of very irregular form. The extremities of these lobes become towards the surface of the tubercle recipients, from which escape, for some time, waves either of pure spermatia, or of spermatia mixed with stylospores. Both are ovoid, but the spermatia are rose-coloured, or colourless, and much smaller than the stylospores, which are as black as the spores of *Melanconium*.

Quite a different organization is observed in *Bulgaria sarcoides*. The unequal and sometimes branched clavules which accompany its cups are covered throughout their superior part by a spermatophorous hymenium, and disseminate in very great abundance, straight, very slender corpuscles (spermatia). In the early period of their vegetation they are also covered with globular conidia. As these cæspitose clavules are not always joined to the perfect form of the *Bulgaria*, they have been hitherto taken for a distinct species of fungus of the group of the *Tremellinae* (Tremella sarcoides).

We know of the cohabitation on the dead stalks of nettles of *Peziza fusarioides* with *Dacrymyces Urtica*, and the orange-red colour common to both. There is no doubt but that these two products belong, as several mycologists have already supposed, to one and the same species, of which the *Dacrymyces* represents the spermogonia state, and the *Peziza* the perfect form.

Another small *Peziza* which grows in autumn around Paris on the dead branches of different trees, and which I would call *Peziza benesuada*, on account of the instruction its study affords to the mycologist, offers in some of its cups instead of the ordinary paraphyses, which are linear, straight and simple, slender branched and flexuous filaments, from which spring in great quantity very fine spermatia. The cups thus gifted none the less contain numerous fertile thecae, and can consequently be rigorously qualified as hermaphrodites. They are just in the same case as the perithecia of certain Lichens (Verrucaria), while in several species of *Pyrenomycetes*, such as *Polystigma rubrum*, *Isothea saligna*, and others, there is only a succession in the same recipient of spermatia and thecae, the latter never coming except after the former.

* I was wrong in saying ("Ann. des Sci. Nat.," 3rd ser., xvii., p. 84, note 2,) that the small, imperfect, and scarcely coloured spores, which accompany the normal spores of *B. inquinans*, were unfit for germinating, for I have since found that these small spores germinate quite as well, and even more quickly than the others.
NEW BRITISH LICHENS.

Communicated by the Rev. J. M. Crombie, M.A., F.L.S.

The following new species of Lichens, recently discovered in Great Britain, have been described by Dr. Nylander in the "Flora," January, 1873, pp. 17-23: —

1. Lecanora præpostera. Nyl.—Thallus white, thin, sub-smooth, areolato-rimose, sub-fimbriated, and darkly limited at the circumference (K + yellow, and then cinnabarine-reddish); apothecia blackish, opaque, glano-suffused or subdennudate, moderate, the thalline margin rugulose or subcrenate, spores 8 μ, ellipsoid, 0,009-14 m.m. long, 0,005-6 m.m. thick; paraphyses slender, epithecium yellowish; hymenial gelatine, and especially the thecae bluish with iodine.

On basalt rocks, in Jersey (Larbalestier, 1872). Not unlike a variety of Lecanora atryna, Ach., but sufficiently distinct by the smaller spores, the reaction of the thallus and the hymenial gelatine, as also by the other characters as above.

2. Lecanora coniopota. Nyl.—Thallus greyish-brown, indeterminate, moderate, unequal, rimoso-diffract; apothecia black, innate, at first slightly margined, at length somewhat convex and immarginate, white within; spores 8 μ, brownish-black, ellipsoid, 1-septate, 0,015-20 m.m. long, 0,008-10 m.m. thick, epithecium brown, paraphyses moderate, subarticulated, hypothecium colourless; hymenial gelatine, bluish with iodine.

On gneissic maritime rocks on the coast of Kincardineshire (Crombie, August, 1872). Not unlike Lecidea coniops in external appearance, but a true Lecanora. The spermogones are frequent, black punctate, with arthrosterigmata, and slightly bacillar spermata. In the same locality was also gathered very sparingly, Lecanora diphyodes. (Nyl., in "Flora," 1872, p. 353.)

3. Lecidea leucophæopsis. Nyl.—Thallus white, consisting of small, rotundato difformd squamules, which are adnate and depressed in the centre, and either dispersed or contiguous (K + yellow); apothecia brownish-black, opaque, convex, concolorous within (the hymenial stratum dark-greyish); spores 8 μ, colourless, fusiform, 3-5-septate, 0,024-34 m.m. long, 0,005-8 m.m. thick; paraphyses slender, not always very well discrete, epithecium and hypothecium yellowish-brown; hymenial gelatine bluish, and the thecae wine-red with iodine.

On quartzose stones of a wall on Ben Lawers. (Crombie, August, 1872.) The thallus of this species is not very uncommon here and there on Ben Lawers, but it is very rarely seen in fruit. Between the squamules there usually occur the pulvinuli of Sirostiphon saxicola, Næg. Nylander observes that the present species recedes from all known species; but probably is to be systematically arranged near to Lecidea sabuletorum.
4. **Lecidea mesotropiza.** Nyl.—Thallus white, verrucose, moderate (K + yellow); apothecia black, convex, immarginate, bluish-grey within; spores 8 n., colourless, ellipsoid, 0,011-12 m.m. long, 0,007 m.m. thick; paraphyses not very well discrete, epithecium dark greenish-blue; hymenial gelatine bluish, the thecae violet-coloured with iodine.

On schistose stones of an old wall on the hill of Ardo, near Aberdeen, very sparingly. (Crombie, August, 1872.) From *Lecidea mesotropoides*, its nearest ally, it differs amongst other characters by the verrucose thallus and the bluish epithecium. The apothecia are sometimes slightly pruinose.

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**HERBARIUM MYCOLOGICUM ET ECONOMICUM.**

The first Fasciculus of this publication, comprising specimens of 50 species of those fungi which exert a baneful influence upon agriculture and horticulture; and also those which take part in the administration of household economy, has just been published by Baron Thuemen of Teplitz.

The aim of the editor has been to give ample and characteristic specimens, in order that the study of those species of fungi which are hurtful to our cultivated plants or forest trees, may be facilitated, as it is only in this way that we can hope to combat the ravages of our numerous enemies. Consequently the greater portion of this fasciculus consists of those species which have their abode upon living plants. Puccinia, Uredines, and Peronosporæ find several representatives.

Amongst the more interesting species contained in this fasciculus are, *Uredo sorghi* (Pers.), *Puccinia Helianthi* (Schw.), *P. maydis* (Pötsch.), *Ustilago destruens* (Schl.), *Uredo cichoracearum* (D.C.), var. *Endive*, *Phacidium medicaginis* (Lasch.), *Exoascus pruni* (Fckl.), *Septoria oleæ* (D. & M.), *Septoria Mori* (Lév.) *Hysterium nervisequum* (D. C.), *Oidium lactis* (Fr.), *Saccharomyces, apiculatus* (Rees), and several others.

The specimens are very good in quality, and abundant in quantity, each species being enclosed in a separate paper wrapper, their examination is greatly facilitated. Upon the whole, the author, Baron Thuemen, must be congratulated for the eminently practical turn this publication gives to the study of Fungology.

Charles B. Plowright.

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**Potato Disease.**—The time for the preparation of the prize essay, for which one hundred pounds has been offered, is now extended from March until the autumn, in order to give more opportunity for original investigation.
A PARASITE ON PEZIZA.

By the Editor.

We have lately received from C. J. Muller, Esq., of Eastbourne, a very interesting specimen of a Sarcoseyphous Peziza, which appears to be P. hemispherica, Wigg. The surface of the hymenium is rough, with the projecting upper portions of semi-immersed, pale brownish perithecia, each of which is furnished at the mouth with a tuft of delicate, erect hairs. The perithecia are themselves membranaceous and translucent, sometimes wholly immersed in the hymenium, as if proceeding from the inferior stratum, and composed of hexagonal cells, with a brownish tint, so as to render them conspicuous amongst the surrounding hymenium. Many of the asci, and septate paraphyses of the Peziza are normally developed. These parasitic perithecia contain free lemon-shaped spores, reminding one of the sporidia of certain sphæriae which occur on dung, as S. stercoraria, &c. The spores are dark-brown, and near .001 inch in length, but in no instance could we detect asci, or sterigmata, nor obtain any direct evidence of the mode in which the spores are produced in the perithecia. No perithecia were found with the spores in their early stage, and before acquiring colour, but in all instances they seemed to be matured and free in the perithecia. From these circumstances we have been led to regard the parasite as coniomycetous, although not agreeing with the characters of any genus of which we have any knowledge. It has been suggested that these perithecia are not truly parasitic, but that they are another form of fruit of the Peziza. Such is not impossible, but, from present experience, we are disposed to consider it as rather improbable, although the fact that the perithecia seem to originate from the lower cellular stratum would favour the conjecture. Under any circumstances, the specimens in question are of a very interesting character, and we have at once placed on record all the facts which have come to our knowledge, in the hope that by turning attention to the subject, other specimens may be found, and a more complete history elaborated for this rather anomalous production.

The whole of the features of this parasite seem to favour the supposition that it may be a species of Melanospora, but no asci having been found, it would be too great an assumption to place it in that genus until an examination of specimens in an earlier condition settle the question whether the spores are produced on peduncles, or whether they are at first enclosed in asci. No species of Melanospora has hitherto been recorded as occurring in Britain.
A New British Riccia.

A very distinct and interesting species *R. sorocarpa*, Bischoff (Nov. Acta Ac. Nat. Cur. xvii. 2, p. 1053, t 71, f 11), was detected last spring by Mr. B. M. Watkins, growing at Great Doward Hill, between Ross and Monmouth. The plant grows in tolerable abundance on the top of a projecting limestone rock, overhanging the Wye, and about three hundred feet above that river, but barren specimens only have hitherto been found.


Fronds bifid or sub-dichotomously divided into linear laciniae, carinato-sulcate in the middle, slightly incrassated beneath, and of the same colour; lobes oblong, rather acute or obtuse, or retuse; margin plane, smooth; fruit aggregated, superior at the base of the laciniae, at length with a gaping fissure.

R. Braithwaite, M.D.

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CRYPTOGAMIC LITERATURE.

Hampe, E. Musci novi Australiae ex herb Mueller, in “Linnæa” for October, 1872.

Muller, J. Lichenum species et varietates nova, in “Flora,” Dec., 1872.


Geheeb, A. Bryological Journey to Lapland, in “Hedwigia,” for Dec., 1872.


Smith, W. G., on Cordiceps capitata, with figs., in “Gardeners’ Chronicle” for Feb. 8, 1873., pp. 178.
PEZIZA (ALEURIA) UNDATA. W Sm

MITRULA ALBA W Sm
Grevillea,

A MONTHLY RECORD OF CRYPTOGRAMIC BOTANY,
AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By the Rev. M. J. Berkeley, M.A., F.L.S.

(Continued from Page 102.)


Effused, entirely resupinate, immarginate, pallid; teeth triangular at the base, subulate above, arranged in parallel lines. A very pretty species.


 Entirely resupinate; subiculum thin, white, soon porous; hymenium umber, teeth fasciculate, subulate.


On the smooth bark of Magnolia glauca. Effused, in part thin, bright ochraceous, with a smooth hymenium, with no distinct border; in part thick; composed of irregular cylindrical teeth, which are more or less connate.


On bark of Carya. Forming oblong patches, the upper margin of which is tomentose from a tendency to become reflected; the lower margin whitish; teeth scattered, cylindrical, often adnate on the lower side.

* Radulum aterrum. Fr.—Arctic America. Drummond.


- 209. Phlebia anomala. B. & Rav.—Tota resupinata, margine et strato inferiore adnato pallido; hymenio e rufulo fusco; venis obscuris. Rav. No. 1449. On fallen oak limbs. Entirely adnate; margin narrow, pallid from the projection of the lower stratum; hymenium tinged with rufous, at length brown; veins very obscure, so that it approaches Corticium.

slightly raised; papillae granular, scattered, so as to leave some parts nearly free.


Forming a rather thick resupinate stratum, consisting entirely of rather large obtuse papillae, apparently the same as *Hydnum Botrytis,* Schwein.


Margin very thin, barren, hymenium cracked, pallid, thickly covered with the prominent irregular granules.


At first forming a thin pure white stratum, looking like a *Corticium,* without granules, at length thickening and sprinkled with numerous granules. Occasionally it acquires a slight ochraceous tinge.


Widely effused, without any distinct margin; brick red, staining the wood with the same tint; spines short, tomentose.

This appears to be the same with *Phlebia hydnoides,* Schwein. *O. albo-miniata,* B. & C. is a peculiar state of *Polyporus sanguineus.*

* **Craterellus clavatus.** *Fr.—No. 5786.* Maine, Sprague.

* **Craterellus crispus.** *Fr.—No. 5713.* New Engl., Sprague.

* **Craterellus sinuosus.** *Fr.—No. 2982.* Car. Inf. Ravenel.


On the ground; 2 inches wide; brick-red; pileus deeply umbilicate, cyathiform, margin lobed; stem 1½ inch high, dilated above; veins narrow, radiating. This is *Thelephora craterellus,* Schwein. Fine specimens were gathered in Ohio by F. G. Lea.

**Craterellus odoratus.** *Schwein.*—No. 1288. Car. Inf.

216. **Craterellus unicolor.** *Rav.*—Fasc. ii., 26. Pallide fuscus, umbilicatus; stipite sursum incassato in hymenium rugosum effuso. About an inch high, ½-1 inch across, pale brown; stem dilated upwards, confluent, with the rugose hymenium lobes very much like some *Omphalia* infested with *Hypomyces*.


Pileus about ¾ inch across, cup-shaped, at first quite regular, then slightly divided, subcoriaceous, stem 1 inch high, cylindrical, nearly equal; hymenium slightly veiny. The whole plant has a more or less rufous tinge.


Pileus ½-1 inch across, cup-shaped, lobed and split, minutely tomentose; stem pallid, cylindrical, about ¾ an inch high, not a line thick; hymenium at length brown. In larger specimens there are narrow zones.


On the ground, gregarious, crowded, bright ochraceous, at least when dry, 1½ inch high; pileus at first infundibuliform, at length split into numerousacute laciniae, which are slightly tomentose below, smooth above; stems crowded, compressed, dilated upwards.


Growing on decayed matted herbaceous fragments, on which it forms a mycelium, which is in part smooth, in part filamentous; pilei thread-shaped. A very curious species, but the specimens scarcely show whether the pilei are really filiform or deeply split.


On the ground. Pileus about an inch across, deeply lobed and split, pallid, tomentose, as is also the short stem; hymenium grey, at length rimoso, probably from its being of a softer consistence than in neighbouring species.


On the ground. At first somewhat infundibuliform, broadly lobed, dirty white, rough, with little raised wrinkles; hymenium brown below, pale above, nearly even. One to two inches or more across.


On the ground, two or three inches across; margin laciniate, the surface rough, with adpressed prickle-like processes; brownish above, pale beneath. A very fine species, of which I have only an imperfect specimen.


* **Thelephora albo-marginata.** *Schwein.*—No. 1009, Santee River. No. 369,793, on *Cornus florida.* Car. Sup., and No. 1368, Car. Inf. on *Castanea pumila* appear to be the same. Fine specimens were gathered by Lea on *Platanus occidentalis,* in Ohio.


Forming a thin, black-brown stratum on various kinds of wood, &c., with a floccose brownish mycelium; hymenium distinctly and closely granular. *Thel. olivacea M. (β, botryoides, Schwein)* is the same species.


NOTICES OF NORTH AMERICAN FUNGI.


Effused, of a thick, rather fleshy substance, margin pallid, narrow, tomentose, hymenium cracked, granulated, at first whitish, then of a greyish flesh-colour.

ON SEXUAL REPRODUCTION IN THE PERONOSPORÆ.

By Dr. Ant. de Bary.*

[At this time, when attention is directed more specially to the Potato Disease, on account not only of its devastations, but also of the prize which has been offered for its elucidation, the following observations may be opportune.]

In the form and initial mode of development of their sexual organs, the Peronosporæ are completely analogous to the monœcious types of the Saprolegnia. It is in the intercellular spaces of the living phanerogamic plants, inhabited by these parasites, that we find their oogonia, which are large, rounded cells, filled with plasma. These cells generally terminate certain branches of the mycelium, and are only rarely interstitial. Long before the oogonium has reached its normal dimensions, there springs from the filament which bears it, or from some other neighbouring one, a slender branch, which is firmly applied by its free extremity to the walls of the said organ. Then this branch ceases to elongate, its extremity inflates, takes a basilary division, and thus becomes a distinct cell, a clavate, or oval antheridium, which is straight, and of less diameter than the oogonium, firmly applied to the latter by a relatively extensive surface. I have never met with an adult oogonium which was certainly without an antheridium, and I have only very rarely seen oogonia with two antheridia.

When the two sexual organs have attained their full development, the protoplasm contained in the oogonium is divided into a peripheric layer, with but few granules, and almost homogeneous; and into a central rounded mass, which is rendered opaque by

accumulated granules of fatty matter. This mass is what I call
the gonosphere. Immediately this is formed, the antheridium
emits from its contiguous side a tubular and slender process, a sort
of beak, which pierces the membrane of the oogonium, and reaches
the gonosphere, crossing the ambient plasma. As soon as this
fecundating process has touched the surface of the sphere in ques-
tion, it no longer increases, but the latter becomes enveloped in a
fine membrane of cellulose, and takes all the characteristics of an
oospore.

The antheridium is at first filled with a rather dense protoplasm,
which, at the moment of fecundation, often represents a rounded
central sphere, from which slender processes radiate in all directions.
This appearance is preserved before and after fecundation, and even
until the perfect maturity of the oospore. The extremity of the
fecundating canal remains closed, and is intimately joined to the
membrane of the oospore. There is no appearance of spermato-
zoïds. The mode of action of this fecundating tube on the gonos-
sphere may then be compared to the pollen tube in phanerogamic
plants. The cellulose membrane with which the oospore is en-
veloped then becomes thicker, and finally its endospore is a solid
inner integument, made up of several superimposed layers. At the
same time there is formed outside, and around this interior cell, a
second protecting membrane, which is ordinarily resistant, and is
the epispore. This gradually passes from brownish yellow to a
darker tint, and is finally ornamented on its surface, according to
the species of Peronospora, with warts, folds, filiform and articu-
lated prominences, &c. In Cystopus the epispore is made up of
encrusted cellulose. This outer tegument is formed at the expense
of the peripheric plasma of the oogonium, which is by degrees
precipitated on the oospore, and assumes consistency. The ripe
oospore occupies the centre of the oogonium, in the midst of a fluid
of an aqueous nature, and only holding in suspension a few scat-
tered granules. As regards the wall proper of the ripe oogonium, it
is, according to the species of fungus under consideration, either
very much thickened and rigid, or thin and somewhat evanescent.
The endospore finally surrounds a finely granulated plastic layer,
which forms, as it were, an envelope around a large central vacuole.
The fecundating tube remains recognizable until the maturity of
the spore, and it is generally covered by a case, which, proceeding
from the epispore, extends as far as the side of the oogonium.

The oospores of the Peronosporæ germinate after a prolonged
repose, which lasts at least as long as the winter. As yet two
modes of germination are known; in the Cystopus candidus the
endospore becomes swollen with its contents under the influence
of water, then the epispore bursts at one point, and allows a broad,
short, obtuse hernia to issue. Then large and changing vacuoles
are observed in the protoplasm, then it divides simultaneously into
a multitude of equal parts, which soon become so many zoospires,
quite similar to those which are engendered in the sporangia without previous fecundation. Immediately after this division, the herniary prominence, which we mentioned as issuing from the episporium, increases into a globose, and very thin bladder, into which the zoospores pass to commence their agile movements, but this vesicle soon dissolves, in order to allow the zoospores to disperse.

In *Peronospora valerianella*, and the most nearly allied species, the oospore, when germinating on a damp body (but not in water) emits a tubular filament, the membrane of which proceeds from the inner layer of the endosporium, and which has broken the exterior integument of the spore. The germ elongates considerably, ramifies, and assumes completely the appearance of the mycelium of the *Peronospora*. Its introduction into the nourishing plant has not yet been observed.*

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**SEXUAL REPRODUCTION IN THE ERYsipHEI.**

*By Dr. Anton de Bary.*

Amongst the Fungi whose sexual organs are known, we must certainly place *Erysiphe*, according to the researches which I published on the fructification of the *Ascomycetes* (Leipzig, 1863). The fecundated oogonium or oocyst in *Erysiphe* does not develope into a simple oospore, but into a complex perithecium, which encloses the thecae, or sporidia-bearing cells. The mycelium of *Erysiphe echoracearum*, like that of other species, consists of branched filaments crossed in all directions, which adhere as they climb to the epidermis of the plant on which the fungus lives as a parasite. The perithecia are engendered where two filaments cross each other. These swell slightly at this point, and each emits a process which imitates a nascent branch, and remains upright on the surface of the epidermis. The process developed from the inferior filament soon acquires an oval form, and a diameter double that of this filament, then it becomes isolated from it by a septum, and constitutes a distinct cell, which I qualify as an oocyst. The appendage which proceeds from the superior filament always adheres intimately to this cell, and elongates into a slender cylindrical tube, which terminates in an obtuse manner at the summit of the same cell. At its base it is also limited by a septum, and soon afterwards another septum appears a little below its extremity, at a point intimated beforehand by a slight strangulation. This new septum completes a terminal, short, and obtuse cell (the antheridium), which thus becomes borne on a narrow tube like a sort of pedicel. Immediately after the formation of the antheridium, new productions show themselves, both around the oocyst and within it.

Underneath this cell, and from the filament which bears it, are seen to spring eight or nine tubes, which join themselves to each other by their sides and to the pedicel of the antheridia, while they apply their inner face to the oocyst, above which their extremities soon meet. Each of these tubes is then divided by means of transverse septa into two or three distinct utricles, and in this manner the multicellular wall of the perithecium springs into existence. During this time the oocyst enlarges and divides, without its being possible to detect precisely how it happens, into a central cell, and an outer layer, which is ordinarily simple, of smaller utricles contiguous to the general enveloping wall. The central cell becomes the single theca proper to the species of *Erysiphe* of which we are speaking, and the layer which surrounds it constitutes the inner wall of the globose perithecium. The only changes which are afterwards to be observed are the considerable increase of the perithecium, by the fact of the development of all its component cells, the production of the radicular filaments which proceed from its outer wall, the brown tint which this assumes, and finally the formation of the spores in the theca. The atheridium remains for a long time recognizable without undergoing any essential modification, but the dark colour which the perithecium assumes finally hides it from the eye of the observer.

In other species of *Erysiphe*, oocysts and antheridia, but slightly different in form from those just described, may be seen. The structure of their perithecia, when they are ripe, agrees also as regards the principal characteristics with that of the one we know, only these conceptacles generally enclose several thecae, among which are distributed numerous series and special groups of barren cells. In consequence, the method of division of the oocyst must be much more complex than in *Erysiphe cichoracearum*, but this phenomenon has not as yet been visible, on account of the opacity of the young perithecia. Concerning the final structure of the perithecia, the first volume of "Selecta Fungorum Carologia," of M. M. Tulasne, may be consulted, as also the dissertation published by them in the "Annales."

Bonds of analogy, as regards the formation of the perithecia, doubtless unite the genus *Eurotium* to *Erysiphe*. As I have shown elsewhere,† the generative filaments of the perithecium in the *Eurotium* twist together at their summit like a corkscrew, and generally present six turns of a screw solidly united to each other, and forming a conical hollow body. After a short time this body is slightly swollen, and composed of a multitude of rounded cells, which even fill its central cavity. The most superficial of these cells are again very distinctly arranged in spiral series. How the changes and sub-divisions of cells, which bring about this second state of the young perithecium, take place, has not as yet been ascertained; at

† "Botanische Zeitung," for 1854.
any rate, it is not improbable that some phenomenon (fecundation or copulation) takes place, which is connected with our subject. The multi-cellular body increases by the multiplication and subdivision of its component cells, and soon assumes a globose form. The cells of the superficial layer (or simply their exterior wall, which will have to be examined anew) become polygonal, assume a yellow colour, and constitute the thin integument of the conceptacle.

In the interior of this the cellular partition still continues for a long time, until finally all the utricles have become rounded oval thecae, and normally octospores.

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HUNGARIAN FUNGI.

"Kalchbrenner Karoly : Icones selectae hymenomycetum hungariae."

The work is edited by and at the expense of the Hungarian Academy of Sciences; it will be published in three parts, the first of which has appeared already. The text as well as the work of the plates, are a most successful imitation of the "Icones selectae hymenomycetum of Fries," so far, that the now publishing Hungarian work may be considered a continuation of the Swedish. The Hungarian and Latin text is arranged in columns, and as far as the description of the pileus is concerned, it is quite on the level of the science of the present day.

The 10 plates of the first part published contain the following new or little known species—

1. Ag. Amanita, aureola, Kalchbr.
2. Ag. Amanita, cygnea, Schulzer.
3. Ag. Lepiota, nymphaeum, Kalchbr.
4. Ag. Lepiota, Schulzeri, Fries.
5. Ag. Tricholoma, macrocephalus, Schul.
6. Ag. Tricholoma, psammopus, Kalchb.
7. Ag. Tricholoma, argyricus, Kalchb.
8. Ag. Tricholoma, centurio, Kalchb.
9. Ag. Tricholoma, tumulosus, Kalchb.
10. Ag. Clytocybæ, trulliformis, Fries.
11. Ag. Collybia, atramentosus, Kalchbr.
15. Ag. Omphalia, cyanophyllus, Fries.
17. Ag. Pleurotus, sapidus, Schulz.
18. Ag. Pleurotus, pardaus, Schulz.
19. Ag. Pleurotus, superbiens, Schulz.

Fr. Hazslinszky.

Epries, Hungary.
Peziza (Mollisia) pteridis. A. & S. "Bracken Peziza."


On stems of Pteris aquilina. Darenth (m. c. c.) King’s Lynn. (C. B. Plowright.)

Sporidia (-0003–0004 in.) -008–01 m.m. long. Nearly black when dry. The figure in Alb. & Schw. is much paler externally than the specimens published by Fuckel with which ours agree.


Scattered, minute; perithecia ovate, yellow, or lurid-red; sporidia subcymbiform, triseptate, hyaline.—Berk. in Fungi Cubensis. Linn. Journ. (1868), p. 379.

On larch, &c. Yorkshire. (Rev. W. Leighton.)

Also found in Cuba. Sporidia (-001 in.) -025 m.m. long.


On cabbage stalks. Feb., 1869.

Sporidia (-0015–0002 in.) -0035–005 m.m. long. Conidia (-0002–0003 in.) -005–0075 m.m. long.

Diatrype (Diatrypella) verruciformis. Ehr. var. Tocciæana. De Not.


On Alnus glutinosa. King’s Lynn. (C. B. Plowright.)


On twigs of Ligustrum vulgare. Twycross.
Sporidia (0.0004 × 0.00075 in.) 0.011 × 0.002 m.m. Spermatia (0.0002-0.0025 × 0.00005 in.) 0.005-0.006 × 0.0015 m.m.

**Sphaeria (Villosa) felina.** Fekl. “Fückel’s Hairy Sphaeria.”

On Rubus. Mar.
Sporidia (0.0025 in.) 0.065 m.m. long; conidia (0.001-0.002 in.) 0.025-0.050 m.m. long.

**Sphaeria (Villosa) cupulifera.** B. & Br. “Cup-bearing Sphaeria.”
Perithecia conical, obtuse, at length collapsed, delicately rugulose, shining, with here and there erect, articulate, rigid, even flocci, the ultimate articulations wedge or cup-shaped, resolved into truncate cuneate conidia. Sporidia fusiform, at length 4-septate.—Berk. & Br. Ann. Nat. Hist., No. 1333, t. xxii., f. 24.

On rotten elm roots. April.

The cladotrichoid hairs sometimes spring immediately from the mycelium. The conidia are sometimes pentangular; sporidia (0.0008-0.001 in.) 0.02-0.025 m.m. long; conidia (0.0005 in.) 0.0125 m.m. long, (0.0003 in.) 0.0075 m.m. wide at the top.

**Sphaeria (Denudata) pomiformis.** P. Handbook, No. 2580.
Conidia.—Flocci erect, simple, articulated, white, the two superior articulations minutely echinulate, acrosores elliptical, brown, borne on distinct, narrowly elliptical sporophores, forming a sub-globose head.—Sporocybe albipes, B. & Br., MSS., Ann. Nat. Hist. No. 1333* t. xxii., f. 28.

Acrosores (0.0003-0.0006×0.0002-0.00025 in.) 0.0075-0.015×0.005-0.006 m.m.; threads (0.004-0.009 in.) 1-2.25 m.m. high.

**Sphaeria (Erumpentes) lichenicola.** De Not. “Solorina Sphaeria.”
Perithecia innate, erumpent, scattered or crowded, rounded, verrucose, black, pierced with a punctiform ostiolum which is scarcely conspicuous, and impressed. Asci clavate; sporidia cylindrical, obtuse, sometimes curved, at first binucleate, at length quadri-loccular and slightly coloured. (Not Sph. lichenicola, Somm.)

On Thallus of Solorina crocea. Scotland. (Dr. Stirton.)
Sporidia (0.0015-0.002 in.) 0.04-0.05 m.m. long. Bertia Solorinae, Anzi (Hedwigia, viii., p. 14) is closely allied, but seems to be distinct.

**Sphaeria (Ceratostoma) crinigera.** Cooke. “Woolly-beaked Sphaeria.”

On pine wood. King’s Lynn. (C. B. Plowright.)
Allied to Sphaeria cirrhosa, Fr. Sporidia (0.0004-0.0005 in.) 0.01-0.0125 m.m. long.
From Hobkirk’s “Synopsis” we have extracted two or three descriptions of recently discovered species, which may be of service as indicating the character of that work, and its claims upon all students of British Bryology.

**Bartramia (Philonotis) adpressa.** Ferg.—Plant widely caespitose, erect, 2-3 in. either dull, glaucous green or reddish; leaves papillose, erect when moist, with one wide plica on each side of nerve, incurred towards apex, slightly twisted when dry, widely ovate from an amplexical base, not acuminate, apex either obtuse or cucullate, with a very slight mucro, or in the slender forms rather acute, margin denticulate, slightly reflexed; nerve very thick, continuous; areolae small, ovoid above, shorter and wider towards the base. G. E. Hunt, Mem. Lit. & Sci. Soc., Manchester, v. 102. Hobk. Syn., p. 130.

Glen Prossen, &c., Clova (Fergusson); Glas Mheal, Perthshire, 2,500 ft. (Hunt).

**Hypnum Breadalbanense.** Buchanan White.—Stem procumbent or sub-erect, covered with villi; vaguely pinnate; leaves secund ovate lanceolate concave, nerve strong single, reaching about half way, margin of base slightly recurved; sub-denticulate. Hobk. Syn., p. 172.

Breadalbane Mountains, and Ben Lawers, 1865. (Dr. F. B. White.) Fruit not known.

**Hypnum rupestre.** Buchanan White.—Stem procumbent, covered with very short villi, irregularly pinnate; leaves strongly falcato-secund, lanceolate-acuminate from a wide base, much curved; obscurely two-nerved, margin plane, scarcely denticulate. Hobk. Syn., p. 172.

Ben Lawers, Aug., 1865. Fruit unknown.


Wet débris of slaty rocks near springs.

Glen Callater, Loch-na-gar, Carnlochan Glen (Hunt).

With pleasure we also give publicity to the “Notice to Collectors,” which is placed at the commencement of this volume, as follows:—
“It is my intention, as soon as sufficient material can be accumulated, to publish ‘A Geographical Distribution of the British Mosses,’ and in furtherance of this object I should esteem it a great favour if all collectors throughout the kingdom would kindly be at the trouble of forwarding to me, as early as convenient, complete lists of the mosses found by themselves or their friends, in their several districts, with any notes they may think desirable respecting them, and, where possible, the range and habitat of the various species. I feel sure I have only to mention this to ensure an abundant return of information for a work which is really wanted, and shall, as far as any exertions on my part can ensure it, be really valuable.”

This information should be forwarded to C. P. Hobkirk, Esq., Arthur Street, Huddersfield.

LICHENS OF SOWERBY’S HERBARIUM.

By Rev. J. M. Crombie, M.A.*

No. II. Parmelia—Gyrophora.

1. Lichen perforatus. E. B. t., 2423. = Parmelia perforata, var. ciliata, D.C. The middle fig. with the perforated apothecia being from an exotic specimen. The true Parmelia perforata (Wulf) = P. reticulata, Tayl., is distinguished by its minutely reticulorimose thallus, of which the medulla gives reaction with K +, yellow, and then red. It is very rare in Britain, though a specimen with young apothecia from Dunkerron, Ireland, occurs in herb. Brit. Mus.

2. Lichen physodes. E. B. t., 126. = Parmelia physodes and its var. labrosa, Ach. The fig. is a composite one, made up of the type and this variety, which latter is more distinctly delineated in fig. 5. Fig. 3 = var. recurva, Leight. Lich. Fl. p. 126, which is a condition of var. labrosa. The var. vittata, Ach., though not drawn, also occurs in herb. Sowerby, and is referred to in the description.

3. Lichen incurvus. E. B. t., 1375. = Parmelia Mougeotii (Scheur.) The specimen drawn, is not true P. incurva (Pers.), as certain expressions in the description would lead us to suppose, but a very characteristic specimen of the larger form of P. Mougeotii, connecting it with P. conspersa. True P. incurva = Lichen multifidus, Dicks., Crypt. iii., p. 16, t. 9, f. 7, is not unfrequent, though with the apothecia not very well developed on the mountains of Braemar, where also f. discreta, Nyl. pro p. occurs, but infertile.

4. Lichen encaustus. E. B. t., 2049. = Parmelia alpicola, Th. Frs. The colouring of the fig. and the language of the description—“This dirty ill-looking Scotch plant, both point to P. alpicola as the species denoted, which is confirmed by the specimen in herb.

Sowerby, and the fragment attached to the original drawing. True
\textit{P. eucalupta}, Sm. Linn. Trans., \textit{i.} p. 83, \textit{t.} 4, \textit{f.} 6, is a very rare
species in Britain, and seems to have been gathered only on one or
two of the higher Grampians in Braemar.

and \textit{P. aleurites}, Ach., Nyl. The former is represented by the two
lower figs., and the latter by the two upper; the British specimens
of both, which are found in herb. Sowerby, being barren, as in figs.
For the correct synonymy of these two species, vid. Nyl. \textit{Animad.
circa F. Arnold}, in Flora, 1872, which is so far confirmed by spec-
cimens in Herb. Linn. Soc. Lond.

6. \textit{Lichen ciliaris}. \textit{E. B. t.}, 1352. \textit{=} \textit{Physcia ciliaris} (Linn.), and
\textit{f. actinota}, Ach. The specimen drawn, from Bedfordshire (Abbot),
has, as is usually the case in Britain, some of the apothecia with
the margin smooth, and others with it proliferous. Hence, as the
margin thus varies in one and the same specimen, a separate name
is not necessary for the so-called form.

7. \textit{Lichen pulverulentus}. \textit{E. B. t.}, 2063. \textit{=} \textit{Physcia pulverulent}a,
var. \textit{lacinio}lata, mihi. Although the fig. has been referred to var.
\textit{venusta}, Ach., which has the apothecia crowned with short hori-
mental laciniae, yet, as these are also scattered over the thallus in
the specimen drawn, as shown in the middle fig., this evidently
represents a better developed condition than \textit{venusta}, and may be
named as above.

8. \textit{Lichen stellaris}. \textit{E. B. t.}, 1697. \textit{=} \textit{Physcia stellaris} (?). The
fig. by mistake was coloured green, \textit{vid}. \textit{E. B. sub Ph. pulverulent}a.
The specimen drawn, which unfortunately does not occur in herb.
Sowerby, may, judging from the fig., belong rather to \textit{Ph. aipol}ia,
and represent an intermediate state between the type and var.
\textit{anthelina} (Ach).

9. \textit{Parmelia erosa}. \textit{E. B. S. t.}, 2807. \textit{=} \textit{Physcia erosa} (Borr.),
Leight. The specimen in herb. Sowerby, from Hurstpierpoint,
Sussex, is evidently that drawn in E. B., and was rightly separated
by Borrer from \textit{Ph. stellaris} var. \textit{tribacia}, Ach., with which it has
frequently been confounded.

virel\textit{la} (Ach.), and \textit{ulothrix} (Ach.) Of these the former is repre-
sented in the two upper figs., and the latter in the lower fig. The
supposed peculiar character of \textit{ulothrix}, however, is found in other
vars. of \textit{Ph. obscura}, so that it can scarcely be considered distinct.
\textit{Lichen cycloselis} E. B. t., 1942, is \textit{Ph. obscura} (Ehrb.), sufficiently
typical.

11. \textit{Lichen elaeinus}. \textit{E. B. t.}, 2158. \textit{=} \textit{Physcia adglutinata} (Flk.)
The specimen, drawn from the bark of trees, Sussex, shows that
this is not \textit{Pannaria elaeina} (Whlnb.), which does not occur in
Britain, but \textit{Physcia adglutinata}, as observed by Borrer, \textit{E. B. S. t.}, 2796, descript.
12. Lichen candelarius. E. B. t., 1794. = Physcia lychnea (Ach.).
The specimen figured does not occur in herb. Sowerby, but fragments attached to the original drawing show that it is entirely as above. True Lecanora candelaria (Ach.), Nyl., is not the Lichen candelarius of our older British authors.

13. Lichen proboscideus. E. B. t., 522. = Gyrophora cylindrica, Linn., and var. denticulata, Ach. Of these the type is represented in the two upper figs., and the var. in the two lower. The confounding of the two species, both of which occur in herb. Sowerby, s. n. proboscideus, as observed in E. B. t., 2484 (the true proboscidea), was, owing to specimens of cylindrica being so named, no doubt by accident, in herb. Linnaeus.

14. Lichen pellitus. E. B. t. 931. = Gyrophora polyrrhiza (Linn.). Along with the specimen figured in herb. Sowerby is one of the polyphyllus var. luxurians, Ach., which is the form usually seen in the Scotch Highlands.

15. Lichen deustus. E. B. t., 2483. = Gyrophora flocculosa, Hfhn. The fruited specimen figured, from Swartz, is absent from herb. Sowerby, in which, under the same name, there appears from Scotland a specimen of G. proboscidea, which is evidently the Lichen deustus of Lghft. Fl. Scot. ii. p. 861. Of G. arctica there is no specimen in herb. Sowerby, nor is this likely to have been gathered in Devonshire.

CRYPTOGAMIC LITERATURE.

Venturi, Dr.—"Ueber Orthotrichum," in Hedwigia, No. 2, Feb., 1873.
Witt, Otto N.—"Bericht über die Untersuchung zweier Diatomaceen-Gemische." Ein Beitrag zur Kenntniss der Flora der Südsee. 1 plate, 4to. 1872.
Nylander, W.—"Addenda nova ad Lichenographiam Europæam," in Flora, Jan., 1873.
Wells, Samuel.—The Structure of Eupodiscus Argus, in Monthly Microscopical Journal, for March.
De Notaris, Dr. G.—Le Piante Crittogame prolusione ad un corso di esercitazioni critto-gamologiche. Rome, 1873.
Stodder, Chas.—The Structure of Eupodiscus Argus, in the Lens, for Jan., 1873.
Grevillea,

A MONTHLY RECORD OF CRYPTOGRAMIC BOTANY, AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By the Rev. M. J. Berkeley, M.A., F.L.S.

(Continued from Page 150.)

226. Lachnocladium semivestitum. B. & C.—Delicatum repe- titer furcato-ramosum, ramis tomentosis; apice glabris. No. 4260. Penns. Michener. On the ground. From a common short stem straight forked branches arise, which are clothed below with whitish down, the acute tips alone being free.

227. Lachnocladium subsimile. B.—Delicatum repeteter ra- mosum, flexosum deliciosum tomentosum. No. 4600. New Jersey. On the ground. I had at first considered this as a form of L. semivestitum, but the ramification is very different. Even the base is flexuous, and the branches are not straight, while the tips are shortly forked.

228. Lachnocladium Micheneri. B. & C.—Repetiter ramosum furcatum fuscum e caudice cylindrico subdivisio; basi albo-tomento- sum. No. 3534, 3763. Penns. Michener. On dead leaves, on which it forms an orbicular villous patch, from whence arise one or two stems, which are tomentose below and soon become repeatedly forked, the ultimate very acute divisions forming a dendroid tuft. It is difficult to say whether this should be placed in Thelephora or Lachnocladium.


tomentose; hymenium nearly of the same subochraceous tint. Either the same or a closely allied species. No. 13 Spruce, was gathered at Panuré on sticks, to which it was attached by a circular disc.


On the earth, in swamps. No. 4527 is apparently a coarser form, growing on wood. Pileus very variable in size, from a line to an inch across, cup-shaped, sometimes split on one side, brownish, with a slight admixture of red, paler towards the plicate margin; stem $\frac{1}{2}$-1$\frac{1}{2}$ inch high, $\frac{1}{2}$ a line thick, gregarious, springing from a common mycelium, finely tomentose, pallid, as well as the hymenium, closely allied to S. nitidulum, B.


On the ground amongst grass and mosses. Pileus 2-3 lines broad, cup-shaped, pallid, soon lobed and split, at first tomentose; margin sometimes deeply plicate; stem thread-shaped, $\frac{1}{4}$-$\frac{1}{3}$ inch high, whitish, tomentose; hymenium even, or finely striate. This is very different from small forms of the last.


About $\frac{3}{4}$ inch long, umber; pileus lobed and plicate, with an incurved margin, minutely wrinkled, as if from contraction in drying, tomentose, becoming smooth; hymenium even dark brown. Probably of a soft coriaceous consistence when fresh.


Apparently in one specimen consisting of a number of orbicular laterally confluent individuals, each attached by a central point without any stem, bright umber above, clothed with short spongy down; hymenium even, bright ochraceous. In other specimens, however, as No. 5806, New Eng., Sprague, and Rav. No. 1732. the habit is more that of Thelephora biennis, while in No. 3582, Penns. Michener we have a thick, corky dimidiate fungus. A very curious species.

Some of the specimens are distinctly mesopodous, others merely flabelliform, pallid, zoned, minutely lineate, clothed behind, or at the base of the cup, with distinct cylindrical processes. Scearcely half an inch across; stem, when present, cylindrical, scarcely a line long.

A very curious little species, growing on dead vines in swamps. Stereum striatum and S. complicatum occur under many numbers.

* Stereum molle. Lévr.—No. 49. Car. Sup. Léveillé’s specimens were gathered in New York.

* Stereum Pini. Fr.—No. 6280, New Eng., Sprague.


* Stereum albo-badium. Fr.—Rav. Fasc. i. 29.


At first forming little peltate patches, which as they spread become closely attached to the matrix, of the colour of raspberries and cream. In age it becomes dead-white. Allied to S. papyrinum.


At first orbicular, then more or less detached all round, clothed with spongy pubescence, tinged with yellow which, however, sometimes vanishes in dried specimens; hymenium pallid. Occurs also in Cuba and Venezuela.

Running for several inches along sticks, reflexed on either side, entire or lobed, pale umber, minutely tomentose, with about two zones; hymenium rufous in the younger parts, brown in the centre, extreme edge nearly white, next to which is a rufous zone.


At first orbicular, then decurrent behind, broadly reflexed above, coffee-colored, zoned, marked with minute radiating wrinkles, very minutely pubescent, repeatedly zoned; hymenium ochraceous.


At first orbicular, ferruginous, with a paler, somewhat byssoid margin, then effused; edge sometimes free on either side; hymenium more or less rugose; when perfect of a brighter or duller ferru- ginous tint.


Very narrow, somewhat imbricated; upper margin and mycelium of a spongy tomentose texture; hymenium dark umber; some- times entirely resupinate.


Forming little orbicular, pallid patches, with an elevated tomen- tose margin; these at length become laterally confluent, with the margin free, but more depressed; hymenium pulverulent, varying from white or ochraceous to a pale brown tint.


Bright brown, at first pezizaëform, with a thin elevated margin, then laterally confluent; hymenium somewhat papillate.

NOTICES OF NORTH AMERICAN FUNGI.


Forming a thin dark fawn-coloured stratum, the edge of which is very thin, and of the same colour, but paler. Sometimes the border is narrower and shortly byssoid. Closely resembling some resupinate states of *Stereum Curtisii.*


On the rough bark of old elms. Forming irregular patches of a coffee brown, hard, woody, either entirely resupinate or with the edge here and there slightly raised. Closely allied to *H. dura,* B. & C. a Cuban species of a far brighter tint.


At first orbicular with a narrow white tomentose margin, under surface white; at length laterally confluent, ultimately continuous. As in *Polyporus igniarius,* the mycelium which penetrates below the thin bark is white.


Widely spread, or a bright ferruginous; hymenium rough with fascicles of setae.


Formerly C. spumeum, B. & R. On oak limbs. Appears to be a resupinate ambient condition of the normal form.


Spreading for some inches in length, 2 inches across, broadly reflexed; pileus with a deep groove, ochraceous velvety, margin, at least in the dry plant, incurved; hymenium very even, and continuous, of a redder tint.


At first looking like a little Cyphella or Peziza. Externally white and tomentose, with an incurved margin, then confluent, but always detached all round. Hymenium pale, fawn-coloured; spores obovate. A very distinct species. A very similar, if not identical species, occurs in the Neilgherries.


At first resupinate, with a very narrow white byssoid margin, soon detached, white beneath, like kid leather; hymenium honey-coloured, very even and continuous.


Pileus ear-shaped 1 1/2-2 inches across; dirty-white behind, rugose, and nearly smooth, zoned in front; the extreme edge umber, velvety. Hymenium at first ochraceous, then rufous, cracked, the cracks at first radiating.
SEXUAL REPRODUCTION IN THE MUCORINI.

By Dr. Ant. de Bary.

To the phenomena of fecundation already described is immediately related the copulation of the Mucorini, which has, as yet, only been observed in two species of this family. The filaments which conjugate in Rhizopus nigricans are solid, rampant tubes, ramified without order, and confusedly intermingled. Where two of these filaments meet, each of them pushes towards the other an appendage which is at first cylindrical, and of the same diameter as these filaments themselves. From the first these two processes are firmly applied to each other by their extremities; they increase in size, become clavate, and constitute together a fusiform body placed across the two conjugated filaments. Between the two halves of this body there exists no constant difference of volume, and often they are perfectly equal. In each there is an abundant protoplasm, and when they have attained a certain development, the largest extremity of each is isolated by a septum from the clavule, which thus becomes the support or suspender of the copulative cell. The two conjugated cells of the fusiform body are generally unequal; the one is a cylinder as long as broad, the other is disciform, and its length is only equal to half its breadth. The primitive membrane of the clavule forms a solid partition between the copulative cells, which is composed of the two lamelle; but soon after these cells become defined the medial partition is pierced in the middle, and soon disappears entirely, so that the two twin cells are confounded in one single zygospore, that is to say, in one organ of multiplication, which is due to the union of two more or less similar utricles. After its formation the zygospore still increases considerably in size, and acquires a diameter of more than one-fifth of a millimetre. Its form is generally spherical, flattened on the faces, which are attached to the suspenders; or it imitates a slightly elongated cask. The membrane thickens considerably, and consists, at the time of maturity, of two superimposed teguments; the exterior or epispore is solid, of a blackish-blue colour, smooth on the plane faces in contact with the suspenders, but covered everywhere else with thick warts, which are hollow internally; the endospore is thick, composed of several layers, without colour, provided with warts corresponding to those of the epispore. The contents of the zygospore consist of a large grained plasma, in which large drops of an oleaginous liquid often float. While the zygospore is increasing in size the suspender of the smaller copulative cell becomes a rounded and stipitate utricle, often divided at the base by a partition, and which attains almost the size of the zygospore. The suspender of the larger copulative cell preserves its primitive form and becomes scarcely any larger. It is rarely that there is not a considerable difference in size between the two conjugated cells and the suspenders.
The phenomena of copulation in Ehrenberg's celebrated *Syzygites megalocarpus* offers the same essential characteristics as in the *Rhizopus*, as I have elsewhere shown in detail;* the structure of the ripe zygospores is also the same in the two plants. In *Syzygites*, however, the copulative cells and the suspenders do not habitually differ in volume in any sensible manner, and the generative clavules are formed between the branches of an upright, and regularly bi—or—trichotomous carpophore. I have also observed in the *Syzygites* a fact which the *Rhizopus* has never presented to me—the copulative cells of the former often cover the whole structure of the cells without uniting to each other, and then constitute what might be called azygospores. The germination of the zygospores and azygospores has hitherto been observed only in the *Syzygites*. If, after a certain time of repose, these bodies are placed in a moist substratum, they emit a germ-like tube like the spores, with hard and resisting sides, and this germ, without giving birth to a proper mycelium, develops at the expense of the nutritive materials stored in the zygospore, into an arbuscle or carpophore, which is branched bichotomously many times, charged with terminal sporangia characteristic of the species.

**NOTES ON THE ABOVE.**

By M. M. Tulasne.†

In the chronological order of observations and discoveries relative to this subject, the fungi which demand to be first quoted are the moulds, for it is amongst them that M. Ehrenberg's *Syzygites megalocarpus* is grouped. Until lately the remarkable phenomenon of copulation presented by this plant appeared to belong to it alone, and there was no analogy in the vegetable kingdom except with the conjugation of certain fresh-water Algae. M. M. A. Janowitsch and de Bary discovered that *Rhizopus nigricans*, Ehb., also possesses zygospores,‡ and have thus once more, though indirectly, demonstrated that Ehrenberg's celebrated fungus is in all respects a true *Fungus mucoreus*.

The opinion formerly § expressed by us that *Aspergillus maximus* Lk. (*Sporodinia grandis*) is only one of the forms of *Syzygites megalocarpus* Ehb. has been fully confirmed by the observations of M. M.

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* "Beiträge zur Morphologie und Physiologie der Pilze," part i. (1864) p. 74, &c.
† Translated from Annales des Sciences Naturelles. 5th Series (Oct., 1866), p. 211. By the Editor.
Schacht* and de Bary† so that the latter no longer hesitates to qualify M. Ehrenberg’s fungus as *Mucor Syzygitites*, and associates with it not only *Rhizopus nigricans*, Ehr., or *Mucor stolonifer*, Ehr., and *Mucor mucedo*, Fres., but also *Phycomyces nitens*, Kze., and *Mucor macrocarpus*, Corda, and *Mucor fusiger*, Lk.

We shall be careful not to criticise these associations, especially after having stated, as we have done this year, that the zygospores show themselves not only in *Mucor Syzygitites* and *M. stolonifer*, but also in *M. fusiger*. We have met with this latter species finer and larger than all the others in the woods of Chaville, near Versailles; it was living on *Agaricus fusipes*, Bull., which was decayed and partly destroyed. Its mycelium is remarkable in that some of its branches, stronger and more rigid than the others, bear small short spiniform divergent branchlets in imperfect verticels close together. The hyphasma in contact with the nourishing substratum, or buried within it, is a very dense anastomosing network, which in aspect and habit are quite different from the branched filaments, barely separate and very unequal, which constitute the upright fertile tufts of the *Mucor*. The spores, which are formed in great numbers in each terminal conceptacle, are oblong-oval, and rather unequal, not less than 0.032–0.035 × 0.017–0.019 m.m. in size.‡

The globular zygospores measure about 18–2 m. m. in diameter; they are very brown, almost black, but instead of presenting a verucose surface, like the zygospores of *Mucor Syzygitites* and *M. stolonifer* they are only finely striated, and one would say that their membrane was composed of very thin bands in juxtaposition. It is not rare to find two of them soldered together. Under their exterior or striated tegument, which is only the membrane of the conjugated cells from whence they come, two smooth coats which are slightly tinted with a brownish colour can be distinguished. The middle coat, which is easily exposed, is a very thick membrane of horny appearance, which imbibes water and speedily softens.

* See “Gazette de Cologne” of 1st June, 1864, for the account of the meeting held at Bonn on the previous 7th April by the Societe de medecine et d’hist. Nat. du Bas-Bhin. M. Schacht was unable to assure himself positively that the zygospores of the *Syzygitites* were produced upon the identical mycelium which bears the fertile cymes of *Sporodinia grandis*, Lk., but he has seen that the germ filament which these zygospores issue in spring divides into dichotomous branches terminated by conceptacles which are exactly like those of *Sporodinia*, provided with an abundant mycelium.

† The principal observations of M. de Bary on the *Syzygitites* were also published in 1864 (Beitr. z. Morph. u. Phys. der Pilze 1, p. 74–88). They agree entirely with those of M. Schacht. In sowing the ascogenous spores of the *Sporodita* M. de Bary obtained a mycelium as fertile in conceptaculiferous cymes as in zygospores, but he observed that habitually the two sorts of fructification arise from different, or more or less distinct filaments, although these are the issue of the same mycelium; he therefore declares that there is perhaps no fungoid species more fit than the *Syzygitites* to demonstrate the presence of two genders of fruit in one and the same fungus.

‡ These dimensions are less than those indicated by M. de Bary, according to whom the spores of *Mucor fusiger*, Lk., measure 0.05 × 0.012 m.m.
During germination this coat sensibly loses its thickness. The interior utricle, which is thin, then swells, and bursts its two envelopes in order to elongate into an upright tube of uniform diameter, and which remains simple. This tube is obtuse, and at first continuous, but it finally exhibits some transverse partitions, especially towards its base, and it swells at its summit into a large globular conceptacle filled with spores identical with those of the adult and perfect plant. It does not appear that the zygospores directly produce a mycelium, at least we have not observed that they emit any branches at their base. Similar things take place in the germination of the zygospores of *Mucor Syzygites*, as M. M. Schacht and de Bary have reported. From this fact it would result that the zygospores of the *Mucorini* represent a life incapable of being continued without change of form, at least in the first generation, and that the Mucors possess at least two alternating modes of reproduction.

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**ON THE RARER LICHENS OF BLAIR ATHOLE.**

*By the Rev. J. M. Crombie, M.A., F.L.S.*

The district of Blair Athole occupies the N.W. portion of the Highlands of Perthshire, and is traversed by the central chain of the Grampians. Though a few species of lichens appear in some of the older British Herbaria from Ben-y-gloe, the highest ridge of mountains in the district, yet it would not appear until recently to have been systematically explored by any lichenist. The following record of the rarer species—many of them new to science, and others elsewhere extremely rare in Great Britain and Ireland—which I collected during a few weeks spent in the district in the autumns of 1870-1, will suffice to show how rich it is in this class of our Cryptogamic Flora. The majority, as will be seen, are from three localities, viz.—Craig Tulloch, a low-lying hill south of the village of Blair, some 900 feet high; Cairn Gowar, the loftiest of the Ben-y-gloe mountains, 3,690 feet in height; and from Glen Fender, N.W. of the village, and about half way between the two preceding:


2. *P. lecanopsidea*. Nyl.—Very rare on moist calcareous rocks of Craig Tulloch, with the spores but seldom well developed.

3. *P. Schaeerii*. (Mass.) Here and on dry calcareous rocks of Craig Tulloch, with both thallus and apothecia very well developed.

4. *Collema auriculatum. var. pinguescens*. Nyl.—“Thallus thicker, lobes more divided.” Rather scarce, on shady calcareous rocks of Craig Tulloch, amongst decayed mosses.
5. *Obryzum dolichoteron*. Nyl.—Parasitic on the preceding, and very rare. N.B. The genus *Obryzum*, being now ascertained to be entirely parasitic, must be removed from the *Collemei*.


7. *C. byssaceum*. Frs.—On decaying branches of alder, by the side of the Garry, probably not unfrequent, though but very sparingly gathered.

8. *Coniocybe furfuracea*. var. *fulva*. (L.) Frs.—Along with the type on dead stems of *Rosa camiua*, in crevices of walls at base of Craig Tulloch.

9. *Alectorria nigricans*. Ach.—Plentiful on Ben-y-gloe, descending to a comparatively low altitude.


11. *Peltidea apthosa*. (L.)—Plentiful and well fruited amongst mosses on a turf-covered wall by the banks of the Garry.

12. *Physcia pulverulenta* var. *muscigena*. (Whlnb.)—Very rare and infertile on decaying mosses near the summit of Craig Tulloch.

13. *Pannaria nigra* var. *triseptata*. Nyl.—Apparently rare and infertile, though readily recognised from the type by the character of the thallus.


15. *Sq. saxicola* var. *versicolor*.—Rare on rocks on Craig Tulloch. Not to be confused with states of *Sq. galactina*.


17. *Pl. chalybæum*. (Oef.)—Abundant and very fine. On calcareous rocks on the S.E. brow of Craig Tulloch.

18. *Lecanora cerina* var. *stillicidiorum*.—Amongst mosses on Craig Tulloch, sparingly, associated with other lichens.


20. *L. atryna* var. *melacarpa*. Nyl.—Very sparingly on micaeous stones of a wall high up on Craig Tulloch.

21. *Lepiniperdæ*. Krb.—Rare on old larch pales in Glen Fender, but probably overlooked elsewhere.

23. *L. leucophaea var. conglobata*. Flot.—On quartzose boulders near the summit of Cairn Gower, sparingly.

24. *L. epanora*. Ach.—Here and there, but infertile, on stones of walls, as in Glen Fender.

25. *L. epulotica*. (Ach.)—"Apotheciis rosellis."—On moist rocks of Craig Tulloch, not to be confounded with *L. lacustris*, With.

26. *L. verrucosa*. (Ach.)—Here and there on decayed mosses near the top of Craig Tulloch.

27. *L. poriniformis*. Nyl.—Very rare, only a single specimen having been observed on schistose stones of a wall on Craig Tulloch.

28. *L. rubra*. (Hffm.)—Plentiful and in fine condition in one or two places of the steep rocks of Craig Tulloch, on decayed mosses.

29. *Pertusaria Westringii*. (Ach.)—Rare, and with apothecia not sufficiently developed, on boulders of Craig Tulloch.


32. *L. turgidula*. (Fr.)—On old pales at Pass of Killiecrankie, and var. *pityophila*. Smrr. on larch pales, Glen Fender, sparingly. N.B. *L. endopella*, Leight, is another variety of this species, having the hymenial gelatine intensely blue with iodine.


34. *L. enclitica*. Nyl.—Very sparingly on old pales at Pass of Killiecrankie, but probably overlooked elsewhere.

35. *L. syncomista*. Flk.—Plentiful on the ground in crevices of rocks on Craig Tulloch.

36. *L. metamorphea*. Nyl.—Extremely rare, and seen only on one stone of wall in Glen Fender.

37. *L. subnigrata*. Nyl.—On schistose stones of wall on Craig Tulloch, very sparingly gathered.

38. *L. sublatypea*. Leight.—Not uncommon on micaceous stones of walls on Craig Tulloch and in Glen Fender.


40. *L. limosa*. Ach.—On the ground towards the summit of Cairn Gowar, but sparingly.

41. *L. silacea*. Ach.—Pretty common and very fine on micaceous stones of a wall in Glen Fender.

42. *L. mesotropa*. Nyl.—Very rare, only a single specimen having been seen on a wall on Craig Tulloch.
43. **L. mesotropoides**. Nyl.—Like the preceding, gathered only very sparingly in the same locality.

44. **L. plana**. Lainm. = **L. lithophilooides**. Nyl.—Olin in litt. Sparingly on old walls in Glen Fender, "thallus thin, rimose, greyish-white, evanescent."

45. **L. sarcogyniza**. Nyl.—Athalline on quartzose boulders, near the summit of Cairn Gowar. N.B. The true thallus of this species, which I have recently detected at hill of Ardo is "subdeterminate, thickish, rimoso-areolate, or somewhat continuous, sordid, greyish."

46. **L. aglæa**. var. **Crombiei**. Jones.—Plentiful on boulders on the N.E. brow of Craig Tulloch.

47. **L. subfurva**. Nyl.—Not uncommon on micaceous stones of walls on Craig Tulloch and in Glen Fender, but often sterile.

48. **L. coufusula**. Nyl.—Very sparingly gathered on micaceous stones of a wall on Craig Tulloch.

49. **L. nigro-glomerata**. Leight.—Not uncommon on quartzose stones on the summit of Cairn Gowar, but rather a Lecanora than a Lecidea, closely allied to **L. leucophæa**, and probably but a subspecies of that very variable lichen.

50. **L. Gevrensis**. Th Fos. var. **prolata**. Nyl.—Extremely rare, on quartzose stones on summit of Cairn Gowar.

51. **L. deparcula**. Nyl.—Like the preceding, very rare, in the same habitat and locality, only a single small specimen having been found.

52. **L. lugubris**. SmMrft.—Plentiful on micaceous stones of walls on Craig Tulloch and in Glen Fender, but with the thallus often sterile.

53. **L. atrobadia**. Nyl.—Very sparingly gathered on a quartzose boulder, near the summit of Cairn Gowar.

54. **L. lenticularis**. Ach., and its var. **rhyparocarpa**. Nyl.—On rocks of Craig Tulloch, sparingly.

55. **L. ocellata**. Flk.—Apparently rare, having been seen only on a single boulder of Craig Tulloch.

56. **L. citrinella**. Ach.—Very rare, on turfy soil, on a wall of Craig Tulloch.

57. **Xylographa parallela**. (Ach.)—Plentiful on old pales at Pass of Killiecrankie; var. **pallens**, f. **alliptica**. Nyl. Very sparingly in the same locality.

58. **Lithographa tesserata**. (D.C.)—Extremely rare, only a single specimen having been seen on a small fragment of a calcareous stone amongst detritus on the summit of Cairn Gowar.

59. **Opegrapha Turneri**. Leight.—On the trunks of ash at base of Craig Tulloch, probably frequent.

60. **O. confluens**. (Ach.)—Apparently rare on calcareous rocks of Craig Tulloch.
61. **Verrucaria pyrenophora.** Ach.—Sparingly gathered on calcareous rocks of Craig Tulloch.

62. **V. integra.** Nyl.—Plentiful on calcareous rocks of Craig Tulloch.

63. **V. spilobola.** Nyl.—Very rare, on calcareous stones of Craig Tulloch, only a single specimen having been gathered.

64. **V. Epipolytropa.** Mudd.—Sparingly on the thallus of *Lecanora polytropa*, on walls of Craig Tulloch.

65. **Melanotheca gleatinosa.** (Chev.)—Apparently common on the trunks of young alders, by the side of the Garry, associated with *Verrucaria rhyponta*.

Of the above 65 lichens, eight are new species, as yet found only in this district, seven are new varieties and forms; while, exclusive of these, seven others are now for the first time recorded as British. A further exploration of the district would, no doubt, bring other varieties to light, as my attention was directed chiefly to those localities in which primary limestone is associated with mica, slate, and quartz,—a geological combination which always yields the Lichenist, everywhere throughout the Grampians, a rich and rare harvest, *e.g.*, Ben Lawers, Movione, Crag Guîè, &c. Many other interesting species were met with, and many which might have been expected to occur, such as *Parmelias* and *Stictas*, were but few in number. To those interested in the geographical distribution of our British Lichens, I may state that there is a marked contrast in many respects between the Lichen-flora of the Central Grampians in Blair Athole and that of the S.W. Grampians in Braedalbane, as also between it and that of the N. Grampians in Braemar.

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**BRITISH FUNGI.**

*By M. C. Cooke.*

(Continued from p. 156.)

**Sphæria (Immersæ) parallela.** Fr. "Parallel Sphæria."

Immersed, black; perithecia globose, disposed in lines; ostiola rather prominent, crowded, globose, even. Asci subcylindrical; sporidia linear, obtuse, straight or curved, uniseptate, pale brown.


Grev. in Herb. Ed.

On decorticated pine wood. Scotland. (Dr. Greville.)

The specimen, on the authority of which this species is recorded as British, is in the Edinburgh Herbarium. It accords exactly with Fries’s Scler. Suec. No. 3. Sporidia (0.004 in.) ‘01 m m. long.

**Sphæria (Obiectæ) rhodobapha.** B. & Br. "Red Staining Sphæria."

Perithecia semi-immersed, compressed, ostiola papillæform; the

On dead decorticated branches. Apr.

Perithecia fragile, for the most part compressed and elongated, so as to approximate Pertuse and Maerostomae. The subjacent wood is tinged throughout with magenta pink. Sporidia with several nuclei (0.001 in.) 0.025 m.m. long.

_Sphaeria (Obtectæ) mammillana._ Fr. "Teat-like Sphaeria."

Scattered. Perithecia hemispherical, rather prominent, covered by the blackened adnate cuticle; ostiola papilliform. Asci cylin-
drical; sporidia uniseriate, or biseriate, cylindrical, obtuse, brown.

On oak twigs. Castle Rising. (C. B. Plowright.)

Allied to _Sphaeria Clypeata_, N., with which it is associated by some authors. Sporidia very variable in length, sometimes pseudo-
septate (0.0008–0.001 in.) 0.02–0.025 m.m. long.

_Ceratostoma Helvellæ._ Cooke. "Peziza Ceratostoma."

Perithecia soft, membranaceous, ovate, smooth, pale brown, at first semi-immersed; neck scarcely equal in length to the diameter of the perithecia, ending in a somewhat erect fringe of hairs. Asci clavate, fasciculate, soon disappearing. Sporidia lemon-shaped, simple, dark-brown; epispore smooth.

On the hymenium of _Peziza hemispherica_. Eastbourne. (C. J. Muller.)

Sporidia 0.0009–0.0001 in. long, about two-thirds as broad. This belongs to Corda's genus_Melanospora_, which seems scarcely capable of separation from _Ceratostoma_ of Fries.

_Venturia atramentaria._ Cooke. "Inky spot Venturia."

Hypophyllous, gregarious, forming irregular patches upon discoloured spots. Perithecia subglobose, clad with short, dense, patent hairs, black. Asci cylindrical; sporidia uniseriate, elliptic (probably septate when mature).—Scottish Naturalist, March, 1872. Cooke exs., No. 599.

On living leaves of _Vaccinium uliginosum_. Lochnagar. (Dr. B. White.)

Differs from _Venturia myrtilli_ in the larger perithecia, gregarious habit, and shorter and denser hairs, as well as in other particulars.

_Capnodium salicinum._ "Willow Capnodium."

Forming a thin velvety black stratum; mycelium moniliform, the articulations containing a single nucleus. Peridia rather short, often obtuse, but sometimes lageniform and acuminate; sparingly forked, sometimes fringed. Asci broad, obtuse; sporidia oblong, slightly curved or oblique, oblong, triseptate, with one or two longitudinal septa, constricted at the articulations.—Mont. Ann. Nat. Hist., 2nd ser. vol. iii., p. 520.—Berk. Hort. Jour. iv., p. 251. Cooke exs., No. 596.

On leaves of willows. Near Eastbourne. (C. J. Muller.)


Subgregarious or scattered, grey or cinereous; perithecium glo-
bose, brown, submembranaceous; hairs long, elastic, circinate, pel-
lucid, faintly and very rarely separte. Asci clavate, fasciculate; sporidia lemon-shaped, colourless; endochrome granular, or nucleate. On old sacking. King's Lynn. (C. B. Plowright.) On old rag and paper. Highgate (M. C. C.)

The threads somewhat resemble those of Chætotium murrorum, but are stouter, less rigid, and more transparent, the sporidia are larger and colourless (0.004-0.006 x 0.0025-0.0035 in.) 0.013-0.017 x 0.006-0.009 mm.

Perithecia scattered, sub ovate, black; hairs of the vertex very long, dichotomous or simple, erect, slender, acute, black; sporidia lemon-shaped, dingy-brown.—Cooke, Microscopic Fungi, 3rd Ed. App. p. 227.

On twine, British Museum. (W. Carruthers.)

This species is most closely allied to C. elatum, but much smaller and neater. It is wholly black, and without the fibrous base of C. elatum. The hairs are more delicate, and not half the diameter, and the sporidia are scarcely more than half as long or broad.

HOBKIRK'S "SYNOPSIS."

While I express my gratitude to Mr. Hobkirke, for his well-condensed and exceedingly handy "Synopsis of the British Mosses," the general accuracy of which is unimpeachable, I would at the same time call attention to an error into which he has been led, and which is likely to be propagated, unless corrected.

In Dr. Braithwaite's papers on "Recent Additions to our Moss-Flora," the discovery, in Britain, of Seligeria tristicha is ascribed to the Rev. J. M. Crombie; and Mr. Hobkirke, following Dr. Braithwaite, ascribes it to the same gentleman. Long ago, in the "Transactions of the Edinburgh Botanical Society," the discovery of this moss was assigned to Miss McInroy, a lady who has been very quietly but most successfully investigating the Moss-Flora of Athole, and whose important discoveries in that quarter are well known to Scottish botanists. The first specimens of Seligeria tristicha gathered in Britain, which Wilson saw or heard of, were those sent to him by Miss McInroy in 1859, and they were accompanied with Seligeria pusilla, and Anodus from the same quarter, but the first specimens gathered by Miss McInroy were gathered a year previously, i.e., in 1858.

I may also mention that I myself, not Mr. Hunt, as stated in the "Synopsis," was the first to make known the existence of Webera Briedleri as a British species, and that I gathered it in clover, &c., so early as 1867, though then I was not aware of the difference between it and Bryum Ludwigi.

New Pitsligo.                              John Fergusson.

Peziza schizospora. Phillips.—The measurement of the sporidia in this species was incorrectly stated in the description. It should have been 0.0007 in.


Effused irregular; subiculum white, well-developed tomentose projecting beyond the pale tan-coloured pulverulent hymenium and forming a narrow border. Allied to *C. Dregeanum*. Mont. & B.


Subiculum consisting of spongy pallid down; edge slightly turned up; hymenium at first ochraceous, gradually acquiring a brownish tint. If No. 6116, Alabama, Peters, is the same, the hymenium at length becomes much darker and cracks.


253. **Corticium venosum.** B. & Rav.—Late effusum; subiculo tomentoso; hymenio livido-pallido, e fibrillis subiculi parce et late reticulato. Rav. No. 1321.

Spreading widely; subiculum thin tomentose, consisting of interwoven threads; hymenium livid, but pale, marked here and there with wide reticulations, which appear to arise from the subiculum.


Subiculum thin, pallid, tomentose, here and there forming creep-
ing fibres; hymenium pale, tan-coloured, in parts tinged with brick-red.


Subiculum where well-developed, radiating byssoid, but soon vanishing; hymenium brick-red, smooth, not velvety, as in C. velutinum.


Subiculum bright yellow, thin; hymenium inmarginate pallid, or yellow tinged with tawny.

* Corticium viticola. Fr.—Rav. Fasc. iii., 34.


Subiculum spreading widely, bright saffron yellow; hymenium thin, more or less yellow. A curious species.


The two former are the normal condition. Subiculum thin, yellow-green, forming a slight margin; hymenium olive-umber, at length cracked.


Subiculum consisting of soft tomentose threads, over which the ochraceous or olivaceous pulverulent hymenium forms a thin stratum.


Spreading widely. Subiculum tomentose; margin becoming free, velvety, pale, umber; hymenium setulose, as in C. velutinum.

Subiculum obsolete; hymenium consisting of branched creeping threads, each branch of which bears at the tip a cluster of dirty yellow subglobose spores.


Subiculum forming a reticulate spidery web, round the reticulations of which the hymenium is formed at the top of short processes; varying from dirty white to pale tawny.


Subiculum consisting of white threads, which send out delicate filaments over the bark; hymenium occasionally with a white border, pulverulent yellow-olive.


Subiculum delicate spidery; hymenium thin brittle continuous, with a white margin when young.

265. **Corticium chlorinum.** B. & C.—Tenue fragile olivaceum demum granulatum. No. 6109. Alabama, Peters. On Abies. Forming a thin, brittle, olive-green membrane, which is at first pulverulent, but afterward rough, with minute papillae; resembling such Thelephorae as *T. laxa*, &c.


Subiculum extremely thin rufous, sometimes forming a slight margin; hymenium dirty white at first pulverulent.


Subiculum very delicate byssoid, spreading over the wood, but scarcely forming a distinct margin; hymenium of the same colour, scarcely pulverulent.


Subiculum very thin, tawny, covered here and there with the saffron yellow hymenium. Allied to *C. peroxydatum*, B. & Br. A Ceylon species.

On oak. Running over very rough wood, on which it forms an irregular stratum of a deep rufous tint, with a rhubarb-coloured velvety aspect.


270. **Corticium hepaticum.** B. & C.—*Latissime effusum*; *margine illic reflexo tenui subtus albido*; *hymenio continuo hepatico*. No. 5989. Penns., Michener. On ash. Very widely effused, running over the rough wood, and surrounding any projecting point; edge thin, white beneath, here and there free; hymenium liver-coloured, with somewhat the aspect of that of *C. viscosum* or *C. lividum* when dry.


274. **Corticium lilacino-fuscum.** B. & C.—*Effuseum*; *margine angusto albo*; *hymenio lilacino fusco demum rimoso*. No. 5610. C. Wright, Connect. On smooth wood, over which it forms a thin stratum, with a narrow white border arising from the subiculum; hymenium lilac, tinged with brown, at first even and paler, then cracked, shewing the white subiculum. No. 5608. Conn., C. Wright. Appears to be a form of the same species, *Corticium pauperulum*, B. & C.

ON CYSTIDIA.

By M. Anton de Bary.*

In the *Hymenomycetes* the organs of the male sex have been the object of many researches. J. Hedwig† thought that he had found their seat in the ring, the striae and scales of the stipe of pileate Fungi, and he took to be sexual organs the corpuscles accumulated on these several parts, but which, according to his own descriptions, could only have been the spores fallen from the hymenium.

Long before this Micheli had seen on the hymenium of a *Coprinus* particular vesicular organs, and he had perhaps also (for the fact does not seem to me without doubt) noticed the same vesicles in other *Agaricini*, as "apetalous flowers, naked and consisting only of a single filament." Bulliard, in his "Champignons de la France" (vol. i., p. 39—50), also considers these organs to be a sexual apparatus and a sort of spermatic vesicles. They have since been differently described by several authors. They are qualified as "cystidia" by M. Leveille, as "paraphyses" by M. Phœbus, but to Klotzsch and Corda ‡ they are positively antheridia, anthers, or pollenidia. M. Hoffmann § has more recently devoted a special memoir to them. They are found in the greater number of the fleshy Hymenomycetes, but, according to M. Phœbus, their presence is not constant in several species, such as *Agaricus lateritius* and *Ag. geophilus* and *Cantharellus aurantiacus*. It seems they have not yet been met with in the *Hydnei* and the *Clavariae*. The hymenium of the *Hymenogastri* presents a few, and, doubtless, the paraphyses which I have noticed in *Geaster hygrometricus* are analogous to them. The cystidia are large cells which are especially recognized by their projecting, more or less, on the surface of the hymenium. They have besides the same direction and the same seat as the basidia. Their form and dimensions vary much according to the species under observation. They are generally constant and characteristic for each species, but they are less so for the genera or subgenera. Among the most remarkable of them we must especially mention the large cystidia which are thought to be common to all the *Coprinii*, and which are oval or elongated cells, obtuse, and sufficiently large to be visible to the naked eye. In other cases the cystidia are cylindrical, clavate, lageniform, obtuse (in *Plyporus umbellatus* according to Corda, and *Agaricus viscidus*, L., according to Phœbus), pointed or capitate (in *Lactarius*, *Russula*, and *Boletus* according to Corda). The cystidia are simple, sometimes branched and cylindrical, capilliform,

* Translated from the 5th Chapter of De Bary's "Morphologie und Physiologie der Pilze."
† Theor. general, et fructif, Plant, Crypt.
‡ Icones Fungorum, vol. iii., p. 44.
§ Botanische Zeitung (1856), p. 137.
as in Agaricus fumosus P., Agaricus laccatus, Scop. and others. In Agaricus pluteus, P., they represent a kind of flask terminated superiorly by several short, pointed recurved appendages, which appear to me to be doubly hooked. Still more singular forms have been observed by the authors I have quoted.

The structure of the cystidia offers few peculiarities; in the greater part a delicate and colourless membrane surrounds sometimes a similarly colourless plasma, full of vacuoles, and sometimes a perfectly transparent liquid. I have observed in the hymenium of Coprinus micaceus which had not yet attained its maturity, that the cystidia enclosed a central plastic body, irregularly elongated, which sent in all directions towards the sides of the cell a multitude of filiform processes, branching and anastomosing amongst themselves. These processes changed their form with astonishing rapidity,* after the manner of the Amæbae. The older cystidia were entirely transparent.

The contents of the cystidia of Lactarius deliciosus, and allied species, are granular and opaque. In this respect the cystidia resemble the laticiferous tubes or filaments, and often when a thick slice of the substance of the fungus is observed it seems that they are branches from these filaments, the more so since they bury themselves deeply in the web of the lamelle, underneath the sub-hymenial tissue. Still I have never seen them spring except from filaments of the web deprived of latex, of which they seemed to be branches. The cystidia of Agaricus balaninus, Berk., are of a dark purple colour.†

According to Corda, and the uncertain opinions of anterior authors, the cystidia eject their contents under the form of a liquid drop and that by their summit, which is represented as open. I have not, any more than M. Hoffmann, been able to convince myself that this phenomenon is produced spontaneously. I have, indeed, only very rarely seen the cystidia burst in the water, which the same author says takes place very irregularly. If their surface is damp, and often bears liquid drops, this is a circumstance which is common to them with all fungoid cells that are full of juice.

The cystidia are developed in nearly the same time as the basidia. Sometimes they are dispersed without order amongst the latter; sometimes, and more generally, they are placed on the free edges of the prominences of the hymenium, and especially on the cutting of the lamelle of the Agaricini. Their number is always less than that of the basidia, and often it is insignificant.

Those observers who have considered the cystidia to be male sexual organs have supposed that the ripe and detached spores of the basidia fastened themselves to the moist surface of these cystidia, to be there fecundated by the lubricating liquid.‡ If this

* See Ditmar in Sturm Deutschl. Flora, part iii., No. 1, pl. 28.
† See Montagne Organ. et Phys. de la Classe des Champignons.
‡ See Klotzsch in Dietrich Flor. Boruss., vol. vi., sub Coprinus deliquescent.
entirely gratuitous opinion had foundation we should here have less to do with a real fecundation than with a phenomenon of nutrition. As far as I know, there exists no other observation on any female organ susceptible of fecundation by the cystidia, and the known facts fully authorize us only to see in them pilose productions of a particular order. Many cystidia have, in fact, just the form of ordinary cylindrical hairs, those of the Coprini have the greatest resemblance to the hairs spread over the sterile surface of the cap, and in many fungi we find positive pilose formations in the place where in others the cystidia are placed; it is sufficient to quote the edges of the tubes of Fistulina, and the setiform appendages which are prominent on the hymenial surface of several Thelephore, such as Corticum quercinum and especially Thelephora (Hymenochaete) tabacina, and other species of the group which constitute M. Leveille’s Hymenochaete; these appendages resemble, it is true, pollenidia, but their sides are everywhere hard and thick.

Quite recently M. A. S. Ersted has discovered a trace of sexual organs in the Hymenomycetes where, perhaps, no one had previously looked for them. He has seen, in fact, in Agaricus variabilis, Pers., oocysts or elongated reniform cells, which sprung up like rudimentary branches of the filaments of the mycelium, and enclose an abundant protoplasm, if not even a nucleus. At the base of these oocysts appear the presumed antheridia, that is to say one or two slender filaments which generally turn their extremities towards the oocysts, and which more rarely are applied to them. Then, without ulteriorly undergoing any appreciable modification, the fertile cell or oocyst becomes enveloped in a lacework of filaments of mycelium which proceed from that which bears it, and this tissue forms the rudiments of the cap. The reality of some kind of fecundation in this circumstance, and the mode of the phenomenon, if there is one, are at present equally uncertain. If M. Ersted’s opinion is confirmed, naturally the whole of the cap will be the product of fecundation. As long ago as 1860 M. Karsten presumed that such was the case. His observations on the first development of Agaricus campestris, as far as we can judge by the rather obscure account given in “Bonplandia” (1862, pp. 63), would agree with M. Ersted. It is impossible not to perceive the similitude between the phenomena seen by M. Ersted and those I have described in Peziza confluens.

† See Verhandl. der Konig. Dan. gesell. der Wiss.: 1st January, 1865.
TWO BRITISH MOULDS.

By M. C. Cooke, M.A.

Verticillium agaricinum. (Bon.) "Agarie Verticillium."

This mould agrees very closely with Bonorden's figure, and, unless the genus Verticillium is to be restricted to such species as have simple spores, it offers no features which would warrant its removal to another genus. The snow-white threads form a dense cottony stratum, covering the decayed Agaric.

Rose-pink. Effused, or in minute punctiform tufts, collected together in irregular patches. Threads equal, head subglobose, spores ovate or oval, smooth, attached by a slight apiculus. Cooke, exs. No. 550.

On old paper and rags. Millfield Lane, Highgate. Autumn.
This is closely allied to Eodocephalum laticolor, B. & Br., but differs in colour, as well as in the form of the spores; features which seem to be sufficient to characterize it as a distinct species. The tufts are very minute, scarcely visible to the naked eye, except as forming an effused rosy patch sometimes an inch or more in diameter, on the discoloured matrix.

Fungi from Stoves.

In the Journal of Botany for March, 1873, Mr. Worthington G. Smith has given descriptions of several new species of Hymenomycetous Fungi, which he has met with from time to time in stoves. These are doubtless of exotic origin, and although developed in Britain, can scarcely be grouped with truly indigenous species. Two coloured plates accompany the descriptions, which include the following:

Agaricus (Pleurotus) gadinioides—on tree-fern stems (t. 129, f. 1-4).
Agaricus (Naucoria) echinosporus—in orchid house (t. 129, f. 5-9).
Marasmius subulatus—in dense patches on tree-fern stems (t. 129, f. 10-15).
Marasmius aratus—on tree-fern stems (t. 129, f. 16-20).
Radulum Cyatheae—on tree-fern stems (t. 130, f. 5-8).
Clavaria cervina—on and about tree-fern stems (t. 130, f. 9).
Pistillaria purpurea—(t. 130, f. 10-12).

Amongst known exotic species, Mr. Smith cites the elegant Polyporus xanthopus, Fries., as having occurred on old wood at Bull's nursery.
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Grevillea,

A MONTHLY RECORD OF

CRYPTOGAMIC BOTANY

AND ITS LITERATURE.

Edited by M. C. Cooke, M.A.

Author of "Handbook of British Fungi," "Rust, Smut, Mildew, and Mould," &c., &c.

VOL. II.

1873-4.

WILLIAMS AND NORGATE, HENRIETTA STREET, COVENT GARDEN, LONDON; SOUTH FREDERICK STREET, EDINBURGH. LEIPZIG: A. DURR. NEW YORK: WESTERMANN & CO.
The present number (No. 24, June, 1874) completes the second volume of this Journal, and terminates the monthly issue. From this time "Grevillea" will be issued quarterly, on the 1st of September, December, March, and June respectively, and each number will consist of the same amount of letterpress and illustrations as hitherto have been comprised in three monthly numbers, so that really no difference in size will take place. The price of each single number will be one shilling and sixpence, or six shillings per annum. Subscribers by payment of five shillings per annum (exclusive of postage) in advance, will receive it by post as soon as published. The postage for Great Britain and Ireland will amount to four pence for the year, and for foreign countries one shilling, or one shilling and four pence, in the majority of cases, according to Postal Tariff. Subscribers are solicited to observe promptitude in payment of their subscriptions, and to use their efforts to extend the circulation so as to relieve the Editor from any fear of having to conduct the journal at a pecuniary loss. It is hoped that the reduction in cost of Foreign postage during the year will increase the number of subscribers abroad, and somewhat compensate others for the change, which for economical reasons has been found necessary.

It is a source of gratification that a Journal devoted to such a special subject should have been maintained for two years, continuing the meanwhile to extend itself at home and abroad so as to attain a circulation exceeding that of any Botanical Magazine yet emanating from this country. It was never contemplated as a commercial speculation, nor projected or maintained as a source of profit, but, whilst thanking those kindly disposed correspondents and friends who have proffered to combine, and guarantee him against pecuniary loss, the Editor hopes that the third year of its existence will be entirely self supporting.

Subscriptions for the third year are now due, and may be transmitted by Post Office Order, payable at Charing Cross, to M. C. Cooke, 2, Grosvenor Villas, Junction Road, Upper Holloway, N.

N.B.—The next number will be trebled in size, and issued on the 1st of September, 1874.
Callithamnion hormocarpum. N.S.—General characters: Frond capillary, densely tufted, 1-2 inches high, of a pinkish purple colour. Stems not glossy; as thick as bristle below, becoming as fine as silk above. Plumules alternately branched throughout.

Microscopical characters: Articulations at the base of the stem, coated with branched and jointed filaments; articulation of the plumules, 6-8 times as long as broad; those of the pinnae four times, decreasing to twice as long as broad; flexuose and attenuated towards the apex of the ultimate pinnales. Pinnales of the pinnae either simple, once forked, or repeatedly forked, and tufted at the apex; axils very narrow, so that the less-branched pinnales appear pinnate, and the more densely branched ones appear furcate.

Fructification of two kinds: 1st, Tufts of branched moniliform cells, of a darker colour than the cells of the frond, each cell surrounded by a hyaline border; these tufts are situated on the rachis of the plumules and pinnae, but are never formed from the terminal branchlets. 2nd, Elliptical cells, two or three in number, forming a whorl round and semi-immersed in, the upper part of the articulations of the plumules.

Both the tufts and the whorls of cells appear to contain granular matter, but show no appearance of being tetraspores.

This very remarkable plant bears some resemblance to Seriospora Griffithsiana, but differs from it in its want of gloss, different colour, in the moniliform cells never being terminal, and not formed from the branchlets, but an independent growth on the rachis, and in the presence of the whorled elliptical cells. It is interesting to find that there is a specimen in Mrs. Griffith’s collection of Algae belonging to the Linnean Society, which was gathered at Salcombe, in 1840, and which presents the same character of tufted cells, &c. This specimen is marked “Seriospora?"

I have gathered the plant at Plymouth for two consecutive years, and it has always presented the same characteristics. It grows on Fuci at low water, on the Torpoint mudbank, and is thrown up on
the shore at the same time as Seriospora Griffithsiana. I once met
with a specimen there which had elliptical lateral tetraspores, but it
has been unfortunately lost.

EXPLANATION OF PLATE XI.

1.—The entire plant.
2.—Plumule magnified X 20.
3.—Pinnule magnified X 100 \{ a. 2 elliptical cells on rachis of plumule.
\quad b. 3 ditto on ultimate branchlet.
4.—Tuft of moniliform cells.
5.—Portion of base of stem showing the coating of branched and jointed fila-
ments.

Nitophyllum thysanorhizans. N. S.—General characters: Frond, 1-2 inches long, of a thin membranaceous substance, very flaccid,
and of a pale rose colour, glossy when dry, and adhering closely to
paper. Frond much branched, branches between pinnate and
furcate, from one to two lines broad, slightly dilated upwards; the
terminal segments generally two-lobed, one lobe being shorter and
smaller than the other. The fronds are everywhere fringed, at
intervals of about one line, with minute cellular processes, which
develop roots at their extremities, and by these the plant adheres
to other Algae.

Microscopical structure: Cells polygonal, becoming smaller
and quadrate at the margin of the frond; the cellular processes
are composed of large elongate polygonal cells, which become
smaller and very dense toward the point from which the roots arise.
A network of minute veins traverses the whole of the frond, and is
especially noticeable in the ultimate segments, the veins being
formed of a single row of narrow, somewhat cylindrical cells.
Tetraspores distinctly tripartite, collected into definite rounded sori
in the apices of the ultimate segments. Capsular fructification not
yet met with.

Habitat: Thrown up on a mud-bank at Torpoint, and at Mount
Edgecumbe, near Plymouth. Perennial?

This interesting little plant has probably been overlooked for
many years as a variety of Rhodymenia bifida, under which name I
have several times received it, and have also seen it among the
Algae collected by the late Dr. Cocks, and now in the possession of
the Linnean Society. This mistake has most likely arisen from the
similarity of its branching to that of R. bifida, and perhaps
also from the rare occurrence of its tetraspores. From R. bifida,
however, and from R. cristata, which it also resembles, it is abun-
dantly distinguished by its definite sori, and tripartite tetraspores.
From Nitophyllum punctatum, to the narrow forms of which there
is a close resemblance in colour and general appearance, it is
separated by the tetraspores forming sori in the apices of the frond
only, and by its fimbriate margin.

N. thysanorhizans has not, so far as I have been able to ascertain,
been found in any other locality than the one above mentioned. It
is thrown up there in some abundance in July, but the tetraspores
are not commonly met with. It has also been found, with tetras- 
pores, in the month of January, by my friend Mr. Goode, of  
Plymouth.

EXPLANATION OF PLATE XII.

1.—The entire frond.
2.—Apex of ultimate segment, showing the unequal terminal lobes with the  
definite sori × 20.
3.—One of the marginal processes × 100.
4.—Tetraspores in situ, showing also the veins and cells of frond × 100.
5.—Tetraspores × 200.

NOTICES OF NORTH AMERICAN FUNGI.

By the Rev. M. J. Berkeley, M.A., F.L.S.

(Continued from Page 180.)

stratsum, hymenio cretaceo diminuente. No. 4009. Alabama,  
Peters.

Consisting of several layers, each separated by a dark line;  
hymenium white, diminishing in width each time of growth, so as  
to leave a narrow zoned border.

277. Corticium subgiganteum. B.—Effusum rigidum cremori-  
color marginem versus subfuscum; hymenio e velutino glabo.  
Rav. No. 1669.

On Magnolia glauca. Sent as a form of C. giganteum, but the  
texture is different. Widely effused; at first cream coloured,  
rigid, then acquiring a brownish tint, especially towards the margin;  
velvety in the younger parts, smooth in the older.

278. Corticium scariosum. B. & C.—Tenue secernibile mem-  
branaceum immaginatum; hymenio pulverulento ochroleuco.  

Forming a thin, oblong, membranaceous separable stratum,  
without any distinct border; hymenium pulverulent ochroleoucous.

279. Corticium aschistum. B.—Tenue rigidum secernibile ochro-  
lencum tuberculatum papillatumve; hymenio velutino. No. 1430.  
Car. Inf. On the under side of a trunk of Acer rubrum, lying on  
damp soil.

Effused, thin, separable, smooth beneath, rigid; hymenium  
papillate or tuberculate; velvety.

280. Corticium portentosum. B. & C.—Ochroleucum, contextu  
crasso albo molli spongioso; hymenio tuberculato glabo. No. 3620.  
Penns. Michener.

Forming a thick mass on very decayed wood, spreading widely;  
substance soft, white, spongy; hymenium tuberculate smooth.  
Some parts, however, are free from tubercles.

281. Corticium colliculosum. B. & C.—Tenue adnatum; mycelio  
albo; hymenio lete ochrolenco papillato granulatoque glabo. No.  
5297. New Eng., Sprague.
Thin, adnate, inseparable from the matrix, springing from a white mycelium which penetrates the matrix, but is scarcely visible externally; hymenium papillate, and also minutely granulated, independently of the matrix. No. 6025. Penn., Michener (Corticium compactum, B. & C.), is possibly a state of the same species.


Widely effused, thin, inseparable, immarginate; hymenium from dirty white to tan-coloured or tawny. It occurs also in Venezuela.

* Corticium quercinum. Fr.—Under many numbers from various quarters. No. 1717, on Vaccinia, is an unusually thick form. Corticium marvinum, B. C. No. 4023, on Cornus Florida, is perhaps also a form.

* Corticium incarnatum. Fr.—Equally common with the last.

* Corticium polygonium. Fr.—No. 4893, Massac., Sprague.


Either on smooth or rugged bark or wood, following all the inequalities; bright, tan-coloured, papillate.


* Corticium arachnoideum. B.—No. 2523, Car. Inf., and several other numbers.


Effused immarginate, of a reddish olive, beset with delicate white bristles.


Effused, resupinate, inseparable; margin white, narrow, byssoid; hymenium brownish.


* Guepinia Spathularia. Fr.—No. 246, Car. Sup. No. 3146, Texas, C. Wright.

On dead wood about an inch high; stem compressed; pileus flabelliform, with the margin crisped and tuberculate; hymenium naked above, pubescent and venose below.


Pileus ½-inch across; orbicular or slightly flabelliform between velvety and pulverulent and ferruginous below; hymenium even; brownish amber coloured; stem hispid, ½-inch high, ½ a line thick. Very distinct from the allies of *G. Spathularia.*


Forming little erumpent tufts pezizæform, clothed externally with tawny down. *Cantharellus fasciculatus,* Schwein. Torrey, New York, is the same.


Like the last, growing in little groups, but consisting of fewer individuals; stem cylindrical, often forked, terminated by cyathiform cups, tomentose and ferruginous externally. A very curious species.

289. **Cyphella filicina.** B. & C.—Stipite brevissimo; cupulis irregularibus minutis extus subtiliter tomentosis umbrinis. No. 4934 Car. Sup.

On dead fern. Stem very short, cups irregular, sometimes oblique, very obscurely tomentose umber.

290. **Cyphella subgelatinosa.** B. & Rav.—Sessilis applanata fusca; margine leviter inflexo. Rav., No. 1714.

On *Alnus serrulata.* Looking like a brown subgelatinous Peziza; brown, flat, sessile, with a narrow inflexed border.


Scattered, externally grey, cup-shaped sub-globose, very obscurely tomentose; hymenium brown. Resembling at first sight *Peziza Godroniana.*

292. **Cyphella Ravenelii.** B.—Sparsa globosa ore parvo aperta extus tomentosa pallide cervina. Rav., No. 1755. On bark of *Carya.*
Scattered globose opening with a minute orifice, pale fawn colour, tomentose, hairs minutely rough, spores elliptic, 00025 long.


Like *C. fulva,* forming little erumpent tufts, consisting of pallid obscurely tomentose irregular shallow cups.


Forming little gelatinous tubercles, varying from honey-coloured to brownish, consisting of flexuous threads with filiform, slightly curved, trinucleate conidia, 002 long, and elliptic spores.


Consisting of little dark purple hysteriiform specks, which produce a multitude of filiform strongly curved spores or conidia.

* **Sparassis crispa.** Fr.—Rav. No. 1613.
* **Sparassis spathulata.** Fr.—No. 1000. Santee River.


Stem quite obsolete; branches crisped, waved and twisted, confluent with each other, so as to present a tremelloid aspect. This does not agree with any of the four figures of Krombholz.


* **Clavaria fastigiata.** L.—No. 5963.


* **Clavaria rugosa.** Bull.—Rav. No. 1285.
* **Clavaria fuliginea.** P.—No. 1265. Car. Inf.
* **Clavaria subtilis.** P.—No. 3000. Car. Inf.
* **Clavaria pyxidata.** P.—No. 1620. Santee River, Ohio.

STRUCTURE OF AGARICS.


Pale yellow; stem moderately thick, soon divided, branches curved, all leaning one way, tips shortly divided, apiculate; spores yellow. *C. spinulosa,* Schwein. Herb.


About 2 inches high, with the thickish common base; branches straight, forked and apiculate at the tips, tomentose below.


About 2 inches high, branched from the very base; branches straight, somewhat fastigiate, rufous, tips apiculate. No. 4576. seems to be **Clavaria decolor,** B. & C. U. S. E. E., from Hong Kong.

*Clavaria stricta.* P.—No. 5321, 5322. Maine.


STRUCTURE OF AGARICS, PARTICULARLY OF THE HYMENIUM.

By J. De Seynes.*

When first studying the *Hymenomycetes* one easily perceives that there are no precise rules nor definite characters for their classification. The limitation of the species among Phanerogams has already been subjected to much controversy, but in this respect the Fungi are far surpassed by the more fortunate vegetables, the fruits and flowers of which can be submitted to rigorous analysis. Here the characters are founded upon organs of such a nature as to necessitate the employment of the microscope, and a simple cell corresponds with many more complicated organs among the superior vegetables. The form of this cell ought to have its importance, above all the study of the fruit in one of large size, although it may be reduced to a simple cell; this cell offering differences of form, colour, &c., sufficient to furnish good characters. One ought not, therefore, to separate the anatomic study of the types from that of their external characters, which are visible to the naked eye. Whilst we are searching in this way for a fit union between the two, an important work is being published in Germany with

* Translated from the Introduction to "Flore Mycologique de la Montpelier."
the same end in view, and M. H. Hoffmann has given two parts, which appear to us to supply the actual wants of the science, which has until now been a veritable gap. By the representation of the specific type in its normal state, the study of its tissues, and of its development, all three being presented, reveals some facts which will facilitate the classification of the Agarics. The works of Corda, before those of Hoffmann, have opened the way, for they embrace all Fungi, and are produced more particularly from an anatomic and physiological point of view. They have in this respect rendered great service, and facilitate ulterior researches.

Three principal parts together compose the vegetation of an *Hymenomycete*—the mycelium, the receptacle, or hymenophore, and the hymenium.

I. *The mycelium and receptacle, or hymenophore.*—The mycelium, the elementary composition of which is very simple, found under the soil, or under the débris of dead leaves or branches, affects different appearances, generally white, sometimes yellow, and also red. It is at times filamentous or silky (*nematoid* mycelium of M. Léveillé*), at times like felt (*hymenoid* mycelium of the same author); finally, at times it becomes compact and solid, for a long time regarded as a perfect fungus, and was called *Sclerotium*; this is the *scleroid* or tuberculous mycelium of M. Léveillé. This author has also signalised the *malacoid*, or pulpons mycelium belonging to some *Physariacei*, or to some *Trichiacei*, the fungoid nature of which is actually contested.†

The nematoid mycelium, which is more frequently found amongst Agarics, varies extremely in appearance, at times presenting itself like some rayed threads of silk, and prickly, at times ramified or dichotomous, like some radicular fibres, and at times so thin that it is easily pulverized; it certainly has its characteristic value. Hoffmann, draws from its absence, or its concrete form, a conclusion which appears to us quite just. "That there is more difference," says this author, "than the kind of development in *Amanita* without a mycelium, which recals the *Gasteromycetes*, and among which the mycelium is replaced by the veil, and some Agarics, with a permanent mycelium in the form of *Sclerotium*, as for example, *Agaricus tuberosus*."‡ One can, perhaps, place more value on the permanence or annual disappearance of the mycelium, than to the perennial, or to the annual or biennial life of the stem of Phanerogams, where the form of the organs of vegetation so notably differ, it follows that they are monocotyledons or dicotyledons, the mycelium may affect different modes of development, as in the two examples cited by Hoffmann.

The concrete mycelium or sclerotium is rather scattered amongst

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† The observations of Wigand (Pringsheim’s Jahrbucher) appears to me to shake strongly the hypothesis of M. de Bary, as to the animal nature of these small productions.
‡ Hoffmann, Icon. Analyt. Fung., Heft. i, 1861.
the Agarics, as the remarkable researches of Léveillé have demonstrated it,* and removed all doubts on the subject. In his recent work ("Selecta Fungorum Carpolo gia," p. 107), M. Tulasne gives a rather instructive history of Sclerotium, which appears to be most complete on the subject.

M. Léveillé has indicated the mode of sclerotial formation, which has greater analogy with the rhizome, as is remarked in Agaricus fusipes; the base of the pedicel is permanent, and produces the following year some new Agarics, becoming more or less branched. The mycelioid nature of the Sclerotium, and its assimilation to the organs which, in the Phanerogams, take the place of veritable stems, is a proof more in favour of the theory, first noticed by Palissot de Beauvois, and then by Dutrochet, of the identity of the mycelium with a stem or thallus.

The hymenophore, which is only the condensed mycelium, participates in the vegetative function, but in a more especial manner, to elaborate the reproductive bodies. It is cellular, membranaceous or parenchymatos, formed of a pedicel and a cap, at times reduced to a cap, which spreads into a membrane, and is clothed with a hymenium, reposing upon a smooth surface (Thelephora); at other times the inferior surface is folded, forming plates, pores, spines, &c., upon which are the organs of fructification (Polyporus, Hydnnum, &c.)

The collected cells which form the stipe, and which afterwards expand in the cap, are generally rather uniform, long, fibrous, often much separated, rarely ramified, presenting at times in their distance from each other, at others in their dimensions, differences which on the fissure of the stipe, present an aspect either fibrous, granulated, spongy, or woolly. The cellular fibres are always closer and more compact at the cortical part. The volva and ring, which give excellent characters for classification, ought always to be studied in their structure in each type. The cells of the parenchyma of the cap are more ramified than those of the stipe. One sees them form by anastomosing and crossing each other, some polygonous trellis-work. In the meshes so formed, there is a second system of larger cells. These two systems have been described by Corda, especially amongst Russula. "These two forms," says this author, "are not always neatly separated, but pass, as the organ requires, more or less rapidly one into the other, or, what is more rare, they are substituted one for the other. These two forms of tissue taking part, generally both together, in the structure of the hymenium, each giving birth, or both together, to one or many organs of the hymenium."†

Amongst the Lactarii some lacticiferous vessels may be seen, often of a larger calibre, running over the meshes of the parenchyma, and forming a new system of organs. Why give them the

† Corda, Icones Fungorum.
name of vessels? This does not appear to us exact, because if the cells which form them are very long, it is yet possible to find, from time to time, that some are divided transversely. We have seen them in Lactarius deliciosus, but they are to be perceived in other species; the Lactarii affording an opaque, resinous juice, which fills the cells, and it is not easy to discover the real nature of the cellular tube. In Fistulina buglossoides, which contains an abundant red juice, the juice is more fluid, is not so concreted, and is contained in the special varicose and sinuous tubes, like the laticifers, but perfectly furnished with transverse divisions. These cells have not always a distorted or varicose disposition, they are often rectilinear, like those figured by Hoffmann (Icon. Analy. Fung., i., tab. 2, f. 5) but on approaching the lamelle the same series of cells is curved, and recurved, thus showing that here the milky secretion appears more abundant; one sees more numerous drops after the section. This only really exists, not when one has cut a greater number of laticiferous cells, but when one has cut the same one many times. It is, at least, this which we have seen very well in Lactarius deliciosus. As to the importance of the liquid, it is difficult to judge, because numerous Agarics are deprived of this proper juice, at least it can only be admitted that, if existing at all, it is not equally visible, because of its containing resinous or fatty bodies, which may be seen. One finds this same milky juice in the organs of the hymenium, for if the lamelle are cut when a Lactarius begins to ripen, one sees in the basidia, the cystidia, and the sterile cells of the hymenium, the concrete matter of the laticiferous cells.

The exterior surface of the cap, or of the stipe, is sometimes furnished with productions which contribute to give them a particular appearance, at times these are rather large hairs, simple or branched, in which are accumulated granulations which are only slightly disseminated in the exterior cells of the parenchyma (Agaricus phaiocephalus, Bull., Agaricus setiger, Fr., Agaricus terreus, Schaëff., and a great number of others). At other times these hairs are not visible to the eye, and give simply a dull aspect to the surface on which they occur. In fine, one finds at times some cells which belong to this kind of production, but which, in lieu of preserving the elongated cylindrical form of the parenchymatous cells, dilate and become spherical, like the primitive vegetable cell. The surface always takes a more or less characteristic pulverulent or pruinose aspect. Agaricus chrysophorus, Schaëff., offers a very good example; its cells are large, and filled with grey-brown granulations of the same nature as those which colour the exterior cells of the cap. In Agaricus micaceus, Bull., these same cells take still more considerable dimensions; they are filled with a clear liquid, and send out luminous rays, so as to take the appearance of sheets of mica, from which the name of the Agaric is taken. These cells have greater analogy, as for their structure and
contents, with the cystidia, which are also bright, and found on the hymenium, and at the margin of the gills. The degree of abundance of these cells vary according to conditions which have not been studied as amongst the phanerogams. One sees, in effect, what enormous differences of aspect the same species, here smooth, and there extremely velvety, can present. It is the same with fungi, of which the hairs, scales, viscid, and soft state seldom vary much. One may easily guard against confounding the scales arising from the débris of the volva with the productions of which we have just spoken. There are also some scales which have the same specific importance; they are formed either upon the stipe or upon the pileus, by a stoppage of the development of the external stratum of cells, which, not following that of the internal parenchyma, break and leave at the surface of these organs more or less irregular fragments, thus causing the external suberous layers of the bark to present a cracked appearance. Agaricus obturatus, Fr., often presents itself under this aspect in our region. Krombholz has also given a figure under the name of Agaricus obturatus rimosus. The dessication caused to the periphery by external agents has great influence upon this phenomenon. I have often discovered, in a dry time, some Agaricus melleus, Wahl., the stipe of which presented some circular rings; their origin can only be attributed to the dessication of the external cellular layer, during which the stipe increases in height. There are some Agarics with which the elongation of the stipe is such that it is scarcely possible that external agents act in this sense, and one cannot call it a sort of deformity in them.

The agglomeration of the coloured granules to which the fungus owes its colour, either in the cells disposed in phaneres, or simply epidermic cells, is also subject to many variations. I cannot say whether the want of colour, the albinism has been noticed in many fungi, but I have in several cases encountered it upon some well characterised and easily recognised species; among others Agaricus semiglobatus, Batsch.; Agaricus coronillus, Bull; Agaricus micans, Bull. By the side of this fact there is another quite opposite, it is the greater intensity of colouration, according with the bases of temperature; I have had occasion to verify it so frequently that I can no longer doubt it. Agaricus nudus, Bull, is found during winter in the parks in the neighbourhood of Montpellier; according as the temperature falls, it takes a dark violet, almost black, or a deep brown. When the spring arrives one finds some almost white individuals, shaded with lilac, or fawn colour, as we have proved upon an exposed hillock at midday. Agaricus terreus, Schäff., and Agaricus dryophillus, Bull, which accompany Agaricus nudus and pass the cold season with it, present with it the same phenomena.

I found, during December last, at a very cold time, in a farm yard of the Chateau Levat, a well characterised Agaricus medius, Schum., and the microscopic analysis has confirmed its identity,
the pileus was of an almost black sepia colour. Ordinarily this Agaric is white, at other times a little dirty. A figure by Delile shows a like phenomenon of colouration produced in this same species, but with less intensity, upon an individual found also during the month of December. As I am assured, by microscopic study, there is no new production of cellular elements, but simply a greater agglomeration of pigmented granules. Finally, during a herborization, made in the beech woods of the Lozère, at a temperature of 5 to 6 degrees, I have been struck with the deep colouration of *Agaricus melleus* and *Agaricus lateritius*, Schaff., which were to be seen by hundreds, and the aspect of which differed very much from the same species found in the woods of inferior zones, during the fine days of autumn.

The result of numerous observations makes me certain that although the cold has an influence upon the intensity of the colouration among the Agarics, it does not follow that, in certain given conditions, an observer cannot, in the middle of winter, find an example of a normal colour, perhaps even more clear; it may be caused by its being shaded or placed in the neighbourhood of a source of heat, causing the body to develop in fermentation, the dunghill for example; an individual so found is placed in such conditions with few exceptions. If one cannot find a sufficient reason in the external circumstances, it follows then to recall the contingency of physiological phenomena, the limits of variation of which escape us, because of not knowing the exact causes. The phenomena due to the atmospheric influences ought to be submitted to some very numerous observations, and not to draw conclusions from isolated facts.

As to the influence of light upon the colouration of vegetables, one may believe that it is much more upon the green matter which it acts than upon the substances which colour the petals or other organs. A herborization in the oil mines of Rochebelle, near Alais, has enabled me to prove the little influence of the deprivation of light upon the colouring matters of Fungi. I have found at 80 metres depth, in the most complete obscurity, almost a kilometre from the entrance shaft, an Agaric allied to *Agaricus conopilus*, Fr., presenting upon the pileus the fawn-colour habitual to this Agaric. Some *Polyporei* reduced to a crustaceous expansion, with some vestiges of pores, have offered to me, in the same conditions, a sulphury tint. Moreover, the figures given by authors who are specially occupied with the fungi of mines, demonstrate this fact. F. Hoffmann has represented in his "*Vegetabilia in Hercyniae subterraneis collecta,*," an Agaric which appears rather like *Agaricus galeiculatus*, Scop., this species, called by him *Agaricus myurus* (pl. iii.), is much coloured, also *Agaricus undulatus*, given in pl. iv. of the same work. The want of light which acts so little upon the colouration, has it more effect upon the general vegetation? "That which is most evident," says E. P. Fries, "up to what point the
development of the *Hymenomycetes* is subject to the action of light, it is that those which have not been exposed to its influence; those, for example, which have grown in the galleries of mines, in caves, or in hollow trees, take the most curious abnormal forms, their metamorphosis remaining incomplete, or otherwise the whole fungus, preserving its mycelioid nature, its growth is cut short in a monstrous modification of the mycelium." In admitting this fact generally, it does not, it appears to me, follow the idea which one has of the superior vegetables. I believe that an equal temperature, certain conditions of constant warmth and humidity, ought to have here as much effect as the want of light, and to cause rather a sort of exuberance which is opposed to the formation of the fructifying organs, thus a too luxuriant vegetation often puts an obstacle in the way of the flowering or fructification of the Phanerogams.

NOTE ON LECANORA RALFSII (Salwey), CROMB.

By the Rev. J. M. Crombie, F.L.S. & G.S.

In the Rev. Mr. Salwey's "Observations on Penzance Lichens," in the Annals of the Penzance Natural History Society, ii. (1853), p. 144, there occurs the following notice of a supposed new species of *Lecidea*:

No. 34. *Lecidea, nova species*, gathered with Mr. Ralfs at Lamorna.

"This is hitherto a unique specimen, though I hope Mr. Ralfs will be able to find more of it. It consists of a thin, closely pressed, crustaceous thallus, of a dusky-green colour, with irregular warty protuberances and flattened scales intermixed. The apothecia, which are extremely minute, have scarcely any border, and are of a dull reddish-brown. Some of them are of a dull fawn-colour; but this appears to be an older state, in which the disc has been worn away, leaving the pale colour of the apothecium visible."

Should it prove to be, as I believe it, undescribed, I would venture to call it *Lecidea Ralfsii*, from its discoverer.

The plant so named provisionally, does not appear, at least under the proposed name in any subsequent list of British Lichens. Its identification is, therefore, a matter not simply of curiosity, but of importance. Did Salwey rightly conjecture that it was a new species, or is the name proposed merely another synonyme of one previously described? From authentic information recently obtained from Mr. Wm. Curnow, of Penzance, I believe that I am now in a position fully to identify this plant, and, as will be seen from what follows, it has a rather singular and interesting history. Several months ago I received from the above gentleman two specimens of *Lecidea Muddii*, Salw., to my great delight, as no British lichenist, save Messrs. Mudd and Salwey, would seem ever to have seen this lichen, nor does it appear amongst the large collection of British lichens from the latter gentleman in the herba-
rium of the British Museum. On first examination, the specimens thus received seemed to agree sufficiently well in all respects with that plant as described in Mudd Man., p. 178, *sub Biatorina*, and I took it for granted that they undoubtedly belonged to the desired *Lecidea Muddii*, Salw. (Mudd Man. 1. e.), Cromb. Enum., p. 74, Leight. Lich. Fl., p. 315. The receipt, however, of several other specimens, with the apothecia in various stages of development, led me to hesitate somewhat as to the identity. This arose from the circumstance that one or two of the younger apothecia had a distinct though evanescent *thalline* margine. A more accurate microscopical examination revealed also that the hypothecium was *moderate* rather than *thin*, and *nearly colourless* rather than *pale-brown*, as Mr. Mudd describes it—a discrepancy, however, which can easily be otherwise accounted for, as the apothecia in the specimen examined by Mr. Mudd were most probably old ones.

On sending a specimen to Dr. Nylander for his opinion, he wrote in reply that the plant was a true *Lecanora* and that if not the veritable *Lecidea Muddii*, it was certainly a new species. This led to further correspondence with Mr. Curnow, the result of which was the conclusion that *Lecidea Ralfsii* and *Lecidea Muddii* were one and the same plant. The evidence for their specific identity appears to be, in all respects, perfectly satisfactory, and is to the following effect. Amongst some forty specimens of the lichens described by Mr. Salwey in the above paper, one of his *Lecidea Ralfsii* was deposited in the Penzance Museum. This was borrowed by Mr. Mudd at the time when he was preparing his manual, and by some oversight or other, was not afterwards returned. The identity, however, even in the absence of the original specimen, can otherwise be sufficiently established. That the original specimen of *L. Ralfsii* was identical with the specimens received by me from Mr. Curnow, *s. n.* *L. Muddii*, is proved by others subsequently gathered by Mr. Ralfs in company with Mr. Curnow, in the same spot, where the type, the appearance of which was quite familiar to Mr. Ralfs, was obtained. And that Mr. Curnow’s specimens were identical with *L. Muddii* of Mr. Mudd’s manual is proved by their equally corresponding with the description there given of this species, except in the two minor characters above mentioned, and also in the thalline margin of the apothecia, which evidently was wanting in the single specimen seen by Mr. Mudd. It is, therefore, I think, quite clear that *Lecidea Muddii*, Salwey, in litt. 1860, = *Lecidea Ralfsii*, Salwey, in Ann. Nat. Hist. Soc., Penzance, 1853, and that as the latter was the first published name, the plant, for the reasons assigned, must henceforth be known as *Lecanora Ralfsii* (Salw.), Cromb. Why Mr. Salwey should have subsequently changed the name, and why *L. Ralfsii* should not be alluded to in Mudd Man., is a matter with which we have nothing to do, for our present purpose, though no doubt an easy explanation could be given by either of these gentlemen.
Geasters.—In a series of papers on Geasters which recently appeared in the “Gardener’s Chronicle,” Mr. Worthington G. Smith has figured all the British representatives of this genus. The species which is recorded in Grevillea, vol. i., p. 40, is considered distinct from both G. lageniformis (Vitt.) and G. tunicatus (Vitt.), and for it is proposed the name G. Michelianus (W. G. S.), it being regarded as identical with the plant Micheli has figured in his Nova Plantarum Genera t. 100, f. 1, under the name Geaster major umbilico-fimbriato, and with the specimens published in “Erbario Crittogamico Italiano” (No. 343 and 397) as Geaster tunicatus Michelianus.

In the same communication there is a figure of what is regarded as Geaster lageniformis, Vitt. This is a much smaller and more delicate plant, differing from the majority of Geasters in possessing perfectly round and smooth spores. It is comparatively a recent addition to our flora, having been up to the present time only recorded from Devonshire, and, possibly, Norfolk.


Dr. L. Rabenhorst, of Dresden, has for disposal some sets of Chinese Lichens, collected in the neighbourhood of Saigon, Hong Kong, Wampea, and Shanghai, by Rudolph Rabenhorst, in 1871-2, and determined by Dr. Kremplhuber, of Munich. The price of each set will be 5 thalers.
Botanical Prizes.—We are pleased to learn that the Botanical Society of Edinburgh offers a prize of Ten Guineas for the best essay on the Reproduction of Lycopodiaceae, to be competed for by Students who have attended the Botanical Class at the Royal Botanic Garden, Edinburgh, during at least one of the three years preceding the award, and has gained honours in the class examinations.

A prize of Ten Guineas is also offered through the Council of the Botanical Society, by Charles Jenner, Esq., for the best essay on the Structure and Reproduction of the Frondose and Foliaceous Jungermanniaceae. This prize is subject to all the conditions of the preceding.

CRYPTOGAMIC LITERATURE.


Bulletin de la Société Botanique. Vol. xix., parts I. & II., contain—A. Chatin, On the Truffle and its naturalisation; E. Roze, on the Fertilization of the Higher Cryptogams, especially Sphagnum.; J. de Seynes, Physiological Experiments on Penicillus glaucum; H. Bonnet, on a New Truffle (Tuber piperatum); V. Payot, on woodsia ilvensis; E. Boudier, on a remarkable anomaly in Agaricus maculatus; M. Cornu, on the Zygospores of Mucor fusiger; A. Chatin, on the culture of Morels.


Thuemen (F. de.). Fungi Austriaci Exsiccati Cent. vii. and viii., 4to, Teplitz.

Magnus, P. Mycologische Bermerkungen, in Hedwigia. April, 1875.

Geheeb, A. Bryologische Notizen, Hedwigia. April, 1873.

Niessl, G. Beiträge zur Kenntniss der Pilze. 5 pl. 8vo. Berlin.


Clavaria fusiformis. Sow.—In woods, Rav. No. 1080. Pale yellow, not so brittle as C. inaequalis, and more fasciculate.


Springing from a white mycelium; pale rufous; stem about an inch high, slender, club the same length.


On wet-rotting stumps.


Forming dense rufous pulvinate masses; very much branched from a common base; branches slender, apices pencilled.

* Calocera albipes. Mont.—(sub Clavaria.) Ohio, Lea. No. 56.


Thread-shaped, opaque, cylindrical, springing at once from the matrix; clavate at the apex. About $\frac{1}{3}$ of an inch high.


A variety with the tips acute, and sparingly branched.


Not above the $\frac{1}{4}$ of an inch high; slender, threadlike, springing from a minute bulb-like base, very acute. A much smaller species than T. subuliformis.


Stem short, cylindrical, springing from a flat, dark-brown sclerotium; head very obtuse orange. About $\frac{1}{3}$ inch high.


Black, expanded, oblique, attached on one side, velvety beneath, as in E. glandulosa, hymenium without spicules.


About $\frac{1}{6}$ inch across, pitch black; stem short, cylindrical; hymenium cup-shaped, smooth externally.

About $\frac{1}{5}$ of an inch high, horn-colour; stem erect, sulcate, bearing at the apex the expanded, lobed, and at length deflexed hymenium, about $\frac{1}{12}$ of an inch across. At first tuberelliform, and attached to a white floccose mycelium, which at length entirely vanishes.


About $\frac{1}{12}$ inch across, looking like a flat Peziza; thin, orbicular, white beneath, hymenium brown. Sometimes laterally confluent, and forming a continuous mass.


Very near *T. ferruginea,* but paler and firmer.


Sacklike, elongated, subclavate, subtranslucent, thin, watery, mucilaginous, dissolving when the thin outer skin is broken; pale, watery, greenish-yellow, $\frac{1}{8}$-1 inch long. Hanging down from the under side of rotting tulip logs after rains. July, Sep. Allied to *T. vesicaria.*

* Tremella aurantia. Sch.—Car. Sup. No. 430, 1520.


Forming a thick, compact, brainlike mass, of a dark-brown tint inclining to black, with the habit of *Næmatelia encephala*, marbled within like a truffle; threads waved; spores oblong. No. 5687.

New England, Sprague. Appears rather to be a state of some *Hypoxylon*.


Erumpent, forming little rufous tubercles; flocci erect, dichotomous.

* Næmatelia encephala. Fr.—On oak. Alabama, Peters. No. 6096. No. 4892, from Maine, is apparently a young state.


On stumps; erect, lobed above, orange, dusted with the golden spores. More highly developed than *D. deliquesceens*.


Forming little concave pallid spots, resembling some *Stictis*, surrounded by the cuticle; conidia oblong, curved, sometimes forked at one end. Allied clearly to *D. cinnabarina*, Schwein, which has a similar habit; on willow and mulberry.


With the habit of the last, but tuberculated.


About ¼ inch high, stem cylindrical, rufous, at length slightly sulcate; head brown, gyrose, as in *Helvella esculenta*. A very remarkable fungus.
DAS MOOSBILD OF DR. ERNST HAMPE.

By Robert Braithwaite, M.D., F.L.S., etc.

II.

In reviewing Dr. Hampe's arrangement of mosses given in Vol. i., p. 10, we have first to consider the value of the two sections under which the families are grouped; and these, it will be seen depend on a single character—the condition of the calyptra. The large saccate hood in the three families included in Saccomitria is torn irregularly by extension of the fruit (and, indeed, it is the degree of expansion in the capsule which determines the form of the calyptra in all mosses), but we may question whether this circumstance is deserving of the importance attributed to it, since in all other points they have nothing in common, and we incline to follow the view of preceding authors that Sphagnum in its leaf-structure, arrangement of branches, and internal anatomy of stem, differs so far from all other mosses as to be entitled to represent a subclass. Andreaeæ, notwithstanding its affinity in leaf-structure to Grimmiaeeæ, cannot be allied with them, as some authors have done, but may conveniently remain as the section Schistocarpi. Archidium agrees too closely with Pleuridium in most of its characters to permit of its being separated far from that genus, and both of them appear to have their most natural position as the lowest members of a series comprising Seligeria, Ditrichum and its allies, Dicranella, &c., with Dicranum as its highest form.

In the second section we have a return to some of the old subdivisions characterised by the position of the fruit, and the Cleistocarpous group is maintained, although the learned author was one of the first who broke up the Phascoloid mosses, and distributed them among families containing more highly developed species; as he also was to indicate the importance of the areolation in all mosses, by which in recent years we have acquired such additional facilities in the discrimination of species.

Pottiaceæ and Blindiaeeæ are adopted instead of Trichostomaceæ and Dicranaceæ, because, says the author, it would be barbarous to apply such terms to families which include mosses having no peristome. We do not see the force of this reasoning, but would regard a moss to be Dicranaceous which agreed with the genus Dicranum in its most important characters, and not necessarily that it should have the bicrural teeth of Dicranum; besides, the great genus Dicranum, being the best developed in the group, must stand as the type; and the same applies to genera, for we should have to separate species without a peristome, if the generic name imply that one be present, e.g., Zygodon viridissimus.
In placing Polytrichaceae and Buxbaumiae under Mniaceae, the author reverses the principle previously acted upon; the free lamina of the leaf in Polytrichum has indeed cells like those of Mnium, but we do not find any resemblance in the structure of the peristome. The tall dendroid habit of Polytrichum and the solid structure of the stems entitle the family to a high place in the musciace group; and, as the author points out, Pogonatum cannot be maintained as a genus apart from Polytrichum, for the angular outline of the capsule in some species of the latter genus is scarcely distinguishable.

In the Cladocarpi the fruit is borne at the end of lateral branches, without any specially formed perichaetal leaves, and in Fontinaeae is included Cinclidotus. In Cryphaeaceae is placed the genus Hedwigia, and notwithstanding that Mr. Mitten refers it to Neckeraeae, we must own that we have a leaning to the view that it is Grimmiaceous; but we must remember that both authors have based their opinions on the study of many exotic forms of the group, and they are therefore entitled to the highest respect.

The Pleurocarpi are characterised by lateral fruit, arising from a distinctly lateral bud. The arrangement of the host of species belonging to this section has hitherto proved a difficult task to almost every systematist, owing to the immense number of transitional forms; some, e. g. Prof. Schimper, have attempted to evade it by forming a great number of genera, very good on paper, but not so satisfactory in practise; others, like C. Müller, mass the whole together and break the genus up into sections; perhaps a middle course between the two will prove most advantageous. Dr. Hampe apparently regards the whole as representing one great family, divisible into tribes and grouped in three sections.

1. Brachycarpi, having symmetric capsules, immersed or on a short seta. The Neckeraeae are the chief representatives of this section.

2. Orthocarpi, with symmetric capsules elevated on long setae. Leskea will stand as the type of this group, and to this genus the author refers Pylaiea and Homalothecium as Sciuro-Leskea, Amblystegium subtile and Sprucei as Serpo-Leskea and other species to Drepano-Leskea, Cryto-Leskea and Dendro-Leskea.

3. Camptocarpi, fruit curved, elevated on a long seta. These present the highest degree of development in the Hypnoid mosses, for it appears to be the rule that in a curved or pendulous capsule we find the greatest perfection of peristome. Dr. Hampe regards Hookeria and Hypnum as two genera embracing all the species, much as C. Müller does in his Synopsis; but we have again in Hypnum the singular play with the generic name seen in Leskea. Hookeria is divided into seven groups—Euhookeria, Mniadelphus, Chasidophora, Pterygophyllum, Hypnella, Holoblepharum, and Callicostella.
Many excellent remarks are given on the Hypnaceæ, and the arrangement of the genus is as follows:—

A. Platy-hypnum—
   2. Glossophylla. H. radiculatum, C. M.
   5. Pulchella. H. denrivculatum, L.

B. Serpo-hypnum—
   H. serpens, L.

C. Illecebro-hypnum—
   3. Illecebra. H. illecebrum, L.
   4. Cuspitata. H. cuspitatum, L.

D. Scirpo-hypnum—
   1. Polymorpha. H. chrysophyllum, Brid.
   2. Reptantia. H. reptans, Sw.
   4. Squarosa. H. squarrosum, L.

E. Chryo-hypnum—
   1. Incurvata. H. incurvatum, Schrad.
   2. Palustria. H. palustre, L.
   3. Hamulosum. H. hamulosum, B. & S.
   4. Cupressiformia. H. cupressiforme, L.
   5. Adunca. H. aduncum, L.
   6. Filicina. H. filicinum, L.

G. Rhyncho-hypnum—
   6. Prolonga. H. prolongum, L.

H. Cyro-hypnum—
   3. Tamariscella. H. abietinum, L.

I. Dendo-hypnum—
   1. Flabellaria. H. fasciculatum, Sw.
   3. Neckeroidea. H. alopecurnum, L.

The Amphicarpi have peculiar foliaceous appendages, and their position among the other moss-families has been very unsettled. Gamophylleæ correspond to Fissidentaceæ, and, as the author well observes, the amplexicaul part is not a cleft portion of the leaf, nor an auricle or lamina appended to it, but truly an independent organ or Tegumentum akin to stipules, which has become organically united to the vertical leaf. Heterophylleæ comprise only Schistostega, in which normal leaves are found only on the barren stem, those of the fructiferous stem being regarded as stipular leaves. Hypophylleæ correspond to the elegant frondiform group of Hypopterygiaceæ, which have a series of peculiar stipules attached to the underside of the stem.
CONSPECTUS OF DIATOMACEÆ.
THE GENUS AMPHORA.

Prof. H. L. Smith.

We have just received a further instalment of Professor Smith's New Conspectus,* in which he treats of the genus Amphora. In none of the genera of Diatomaceæ is the structure of the frustule more difficult to understand; owing to the unequal development of the cingulum or connecting zone, the two valves of the frustule are always visible at the same time. Professor Smith's explanation will enable the student to comprehend the peculiar formation of the frustules of the species of this genus.

"Bearing in mind that all diatomaceæ are built after the same type, or are silicious boxes, as I have already indicated in the preface to the 'Synopsis,' a reference to the following diagrams will make the structure of Amphora plain. If we commence with a typical navicula form, as in figure 1, presented in side view, we have the median line (raphe) dividing the valve symmetrically.

Passing to figure 2, we have the typical Cymbella, the median line being nearer to one margin than the other, or dividing the valve unsymmetrically. The more convex margin is termed the dorsum, and the other the venter. Although these are objectionable terms, yet, as they have been extensively adopted, I shall continue to use them. If we pass now to figure 3, we have a more decided departure from the navicula, in the curved raphe, and the more or less curved ventral margin. Let us look at these frustules in front view; a and b are the striated valves, with central nodule, while the dotted lines c d represent the lines of suture (in all the figures the lines are dotted); fig. 5, the end view of the same frustule. While the valves, as seen in figures 4 and 5, are slightly convex, the sutural zone, or hyaline part, which has upon it the sutural lines, is of the same width at the two ends c and d, fig. 4.

and again at the middle of the frustule, as seen at fig. 5. Suppose, now, the sutural zone to become wider at one margin of the frustule when it passes from fig. 1 to fig. 2, and widest at the middle of the dorsal surface, it would now appear as in fig. 6, which is the end view of a Cymbella. We should find the frustule under action of gravity lying upon one of its valves when allowed to fall freely, and so it would present itself generally in side view. Imagine now an excessive development of the sutural zone, as in fig. 7 (which is an end view, as in fig. 6), the frustule would no longer rest upon one of its valves, as in figure 6, but upon the expanding connecting zone between the two dorsal surfaces, and generally we look down upon the frustule from c through to d, in which case both median lines, e and f, would be in view, and if the median line incurved towards c, as it does in many species of the Amphoræ, we would now have the view presented as figure 9."

The connecting zone being almost invariably presented to view, has led some authors to found specific differences upon it, but characters must be received with caution, and very possibly are valueless. Gregory’s group of what he calls complex forms, are frustules, in which from some cause abortive attempts at division have taken place.

Professor Smith divides the genus into two sections.
A with median line incurved.
B with median line not incurved.

These are again divided and subdivided into twenty-three classes. He has only introduced one new species, with the following specific characters:

A. undata, n.s. Doubly lyrate and somewhat angularly constricted at the middle. Nodule distinct, valves with several longitudinal lines, inflexed like the margins of the frustules, and converged at the ends; inner margin of valves slightly curved; connecting zone with longitudinal lines. Marine. Length 0.0017, breadth 0.00075, transversely striate, striae fine, about 55 in. 0.001, dry frustule, straw colour.

In brackish grounds, near New Haven, Conn.

The number (121) of previously described species he reduces to 76. The following are the forms retained:

<table>
<thead>
<tr>
<th>Amphora laevis</th>
<th>Amphora inflexa</th>
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</thead>
<tbody>
<tr>
<td>ocellata</td>
<td>naviculacea</td>
</tr>
<tr>
<td>flexuosa</td>
<td>Donkinii</td>
</tr>
<tr>
<td>undata n.s.</td>
<td>Proteus</td>
</tr>
<tr>
<td>obtusa</td>
<td>spectabilis</td>
</tr>
<tr>
<td>Milesiana</td>
<td>robusta</td>
</tr>
<tr>
<td>Magnifica</td>
<td>augusta</td>
</tr>
<tr>
<td>complanata</td>
<td>ovalis</td>
</tr>
<tr>
<td>pulchra</td>
<td>lyrata</td>
</tr>
<tr>
<td>binodis</td>
<td>angularis</td>
</tr>
<tr>
<td>sarnienus</td>
<td>sinuata</td>
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<tr>
<td>undulata</td>
<td>rimosae</td>
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<tr>
<td>proboscidea</td>
<td>nobilis</td>
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<tr>
<td>oblonga</td>
<td>acuta</td>
</tr>
<tr>
<td>kamorthensis</td>
<td>rectangularis</td>
</tr>
</tbody>
</table>
Professor Smith has, we think, very rightly placed this genus in the family Cymbelleæ, and says he may hereafter consider them as a subgenus at least of Cymbella. They are, in fact, exaggerated Cymbelleæ.

The present paper is a very valuable monograph of the genus Amphora, and every diatomist will look forward with impatience to the future parts of the Conspectus. The author has undertaken a work of considerable labour, and he asks for the sympathy and assistance of all those interested in the study of the Diatomaceæ, and we hope that this request will be heartily responded to.

Norwich.

F. Kitton.

Rabenhorst's Fungi Europæi. Cent. XVI.—This publication contains many new and interesting species of fungi, from England, Germany, Holland, Greece, Italy, and other European countries. Amongst others are specimens of the following species:—Lactarius controversus, P.; Marasmius Wynnei, B. and Br.; M. impudicus, Fr.; Irpex lacteus, Fr.; Hydnum aurantiacum, A. and S.; Polyporus Inzeng, Ces. and De Not.; Merulius molluscos, Somm.; Cyphella endophila, Ces.; Peziza lasia, B. and Br.; P. aspidicola, B. and Br.; P. Chateri, W. G. S.; Heliotium pruinósus, Jerd.; Schizothyrium Ptermeci, Desm.; Sordaria bombar-dioides, Awd.; S. Rabenhorstii, Nssl.; S. tetraspora, Wint.; Anthostoma trabeum, Nssl.; Rossellinia Rosarum, Nssl.; Cucurbitaria varians, Haszl.; Dacrymyces macrorosporus, Berk.; Pleospora phragmidispora, Ces.; P. comata, Awd.; Leptosphaeria suffulta, Nees.; L. culmifraga, Awd.; L. culmorum, Awd.; Stigmella Platani, Fekl.; Rhapidospora erythrospora, Ouds.; Sphaerella bicalcarata, Ces.; Peronospora Chloræ, De By.; Apiosporum Lentisci, Fekl.; Synchytrium aureum, Sch.; Cladosporum Fluggeæ, Thm.; Puccinia heraclei, Grev.; P. helianthi, Schw.; Trichobasis hydrocotylæ, Cooke; Cronartium rubicola, Fischer; Uredo armeriae, Duby; Æcidium glaucis, Rab., and many others. The new species are accompanied by descriptions, spore measurements, etc., and in a few instances by figures of the fructification. To the other specimens are appended descriptive notes, synonyms, locality, date, and the finder's name.

C. B. P.
OBSERVATIONS ON GONNERNANN AND RABENHORST'S MYCOLOGIA EUROPÆA.

By Prof. Elias Fries.

Tab. 1. A. pantherinus is Ag. excelsus!

"" 2. A. Secretani (not Fries) is A. recutitus!


"" 7. f. 2. Small specimen, in no way to be distinguished from A. muscarius.

"" 7. f. 3. A. strobiliformis is A. spissus.

"" 8. f. 1. scarcely differs from t. 1.


"" f. 2. A. asper—absurdly so named, is a monstrous form of A. validus.

"" 10. f. 2. not A. muscaria formosa, but A. magnificus.

"" 11. A. mappa.

"" f. 2. A. solitaria — A. verna.

In Fasciculi 8 & 9, also of Agarics, are many very absurd errors.

A. suaveolens — A. murinaeus is neither Bulliard’s plant nor my own.

LICHENS IN NORTH WALES.

By William Phillips.

The following Lichens deserve mention as occurring in the immediate vicinity of Capel Curig, North Wales:

Calicium byssacium, Fr. On dead alder. This being a recent addition to our Flora, I append its description:

"Thallus obscure, obsolete or scarcely any visible; apothecia very slender; much dispersed; spores nigricant, oblongo-fusiforme, simple, or at length one to three septate. On branches of alder (especially the dead ones), also on Sorbus aucuparia and Cerasus padus.” Nyl. Lich. Scand.

This is an exceedingly minute species, easily overlooked. I have also found it in Shropshire.

Pilophoron fibula, Tuck, on a boulder near the Tan-y-bwlch Hotel. Sphorophoron coralloides, Pers., in fine fruit.


Leconora ventosa, L. Moel Siabod.

Lecidea carnea, Ach. This was in tolerable plenty on old beech trees in the Glyder Wood, where I also gathered a few specimens in fruit of Parmelia physodes, L.

Opegrapha Cherallieri, Leight. On the bone of an animal in the crevice of a stone wall.
STRUCTURE OF THE GILL-PLATES OF AGARICS.

By J. De Seynes.*

Arriving at the gills, the cellular fibres, which have contributed to the formation of the parenchyma of the other parts, take a rectilinear direction, being inflected only outwardly towards the walls, in order to bear the hymenium. They fork and anastomose less than in the pileus; still, in A. cerarius for example, we can see the anastomosed sub-hymenial cells fork frequently, almost reminding us by their delicacy and their general aspect of the mucilaginous tissues of Exidia. This system of cells is not the only one in this Agaric, and stronger cells, filled with a clear yellow liquid, which colours the parenchyma, sustain this delicate trellis-work. Most frequently we see the organs which constitute the hymenium inserted directly upon the fibriform cells more or less inflected in order to sustain them to their extremities; at other times, one, two, three, or four spherical or polygonal cells intervene. As for the hymenium, properly so-called, its study offers numerous points of interest; as for that of the mycelium, it is necessary, in order to find a precise and accurate description, to go back to a memoir of Mons. Léveillé, read at the Philomathic Society, on the 12th of March, 1837, and inserted in the "Annales des Sciences Naturelles." The same name is given to the spore-bearing organs of the Agarics and to those of the Pezizas; certain plates, such as those of the memoir of Dutrochet upon A. crispus, show sufficiently how necessary it was that an earnest study of them should be made. The report to the Philomathic Society upon the memoir of M. Léveillé gives a just idea of its importance.

The hymenium is not a membrane stretched upon the hymenophore; nothing can be better isolated than its cellular elements, which are simply side by side, and in contiguity. It results from this idea, well understood, that, as the organs of reproduction are those which individualise the living being, an Agaric may be regarded as an agglomeration of cellular fibres, varying according to the place through which they pass, and terminating in fructifying organs. Such was also the conclusion which Dutrochet deduced from his observations upon A. crispus.

Three cellular organs compose the hymenium of the exosporous Hymenomycetes. The basidium or formative and nutritive organ, analogue of the thece amongst the Discomycetes; a cell sometimes smaller than the basidium, sometimes of equal dimensions, which appears to me the analogue of the paraphyses; in fine, a cell which varies much in its form and dimensions, named cystidium by M. Léveillé, and of whose functions the celebrated mycologist was unaware, but which he compares to the paraphyses, whilst the other cells are named by him proper cells of the hymenium. These

* Translated from his "Flore Mycologique."
latter, generally considered as simple terminations of the cells of the parenchyma, called by Hoffman sterile cells, and by Corda basiliary cells, have always, for this latter author, the same morphological signification as the paraphyses. Whilst giving them this name of basiliary spores, which would seem to indicate a situation inferior to that of the other organs, Corda has very well shown in his fine plates the real position which they occupy; one might even reproach him with having done it in a more regular and geometrical manner than occurs in nature. We readily establish this situation on the same plan, at the same height as the basidia. The structure is the same as that of the fertile basidia, there are cases even in which they are all transformed into fertile basidia ("Icon. Fung.," p. 46, heft. ii.). There are also Pezizas, amongst which we may show that, at an advanced period of their development, the number of thecae is greater than that of the paraphyses, and in excess of the proportions which these two organs habitually bear towards each other. In the Agaries, among which the hymenium is neither too fertile nor too barren, the basidia are intermixed with the sterile cells, like the thecae in the midst of the paraphyses. Amongst the Discomycetes, the paraphyses become lengthened in such a manner that they seem to lose their analogy with the theca; nevertheless, intermediate stages may be observed, and I have remarked in *Peziza exima* a cell, which had commenced by having the dimensions of a young theca, arrested in its development, and take the attenuated form of a true paraphysis. The paraphyses appear sometimes to "specialise" in their functions, by charging themselves with the colouring principle which gives the hymenium its proper colour; but if the thecae are transparent, it is because they have employed in the fabrication of the spores these same colouring matters, which can be discovered, although very diluted, amongst the latter; *P. aurantia* furnishes us with an example. Thus the paraphyses of the *Discomycetes* have their analogues in the cellules proper, and the sterile cellules of the hymenium, although they are frequently shorter than the fructifying organ, which is not the case with the paraphyses; but this question of size does not appear to us a sufficient reason for neglecting this analogy. "In the hymenium of the *Discomycetes," says the celebrated mycologist of Prague, "the form of the envelope is the primary direction of life, and, therefore it is that paraphyses and the thecae are on the same level; in the hymenium of the basidium-bearing mushrooms, the increase is directed towards the exterior, and therefore the basidium is raised as well as the pollinaire above the mother cells, which replace the paraphyses, and form the surface of the hymenium."

* This consideration, expressed in a somewhat abstract manner, merits further development. If we understand it properly, it amounts to this: among the *Ascomycetes*, one might say a centripetal force retains the spore, and renders it the centre to which everything converges. In effect, the theca envelopes the spore; the paraphyses are raised, and have a tendency to envelope the theca which
Basidia.—The basidia are cells which vary within sufficiently restricted limits; they are in general widened towards the summit, and more or less swollen or slender, rarely of an equal size from the base to the summit. Upon the hymenium of Agaricus cernus we have seen basidia slightly compressed at the centre to take a biventral form, but this form is rare.

The basidia contain a granular liquid charged with little drops of oil, sometimes slightly coloured; this liquid passes through the sterigmata or sporophores, little organs ordinarily four in number, superposed upon the basidia, and from the summit of which the spores originate. It is a sort of hollow funiculus, varying in length, sometimes slender, sometimes wide and funnel-shaped, and joined to the basidium by the wide part, sometimes describing a curve in the form of an ox’s horn. During the early stage of the spore it is seen, as well as the sterigmata, to be filled with the granulations which were accumulated in the basidium. According to Corda, each sterigmata always develops one spore at a time, and sometimes one after another; although direct observation has not yet demonstrated this fact to me, it seems to be very probable, for we see the old basidia, which have employed their granulous contents in the fabrication of spores, present nothing in their interior but a clear and transparent liquid.*

When a basidium bearing ripe spores ready to be detached is found still filled with the granulous plasma intended for the spores, it is to be presumed that it will serve for a second formation, the existing spores being entirely closed, and maintaining only a very feeble connection of endosmose with the sterigmata. We see, besides, some basidia, the plasma of which has been partly used, keep only three-fourths or a half of their cavity filled with granulations, as I have observed, and figured in a section of the gills of Agaricus murinus; this diminution of the contents has very likely a connection with the number of spores formed. If we were able to assure ourselves that amongst the tetraspored basidia there are they surround; the receptacle takes a concave form to envelope the hymenium, and this form subsists among the species with hymenophores exposed on the exterior (Helvella, Morchella, &c.) by the formation of secondary or alveolous cavities.

Amongst the Hymenomycetes, the spore seems, on the contrary, endowed with a centrifugal force which urges it to the exterior of the basidium; the basidium tends to raise itself above the hymenium—at least for the whole height of the sterigmata, and most frequently, for even much more. In fine, the receptacle tends always to bear the hymenium to the exterior, by offering it the convex surfaces of gills with pointed ramifications. The Eritae and the Cyphelae seem to break this law by reason of their concave shape, but it is always verified in the hymenium, and we are accustomed to meet everywhere, in the organic kingdoms, these aberrations of types which seem designed only to concur in a sort of harmonic symmetry, by recalling to us, in certain sections, and among certain groups, forms which belong to others more or less removed from them.

* "Whilst the basidium, fulfilling the function which is deputed to it, gives birth to the spores, it empties itself for their use of the plastic matters which were elaborated or accumulated within it, and, when the reproductive bodies have left it, it is only a colourless cell of an extreme transparency."—(Tulasne, Sur l’Organisation, &c.)
but two generations, each of four spores, that would show another affinity with the thecae of the *Ascomycetes*, which produce, as is known, for the most part eight spores. There is between the theca and the basidium such an analogue as to the terminal situation of the vegetable axis and to the production of liquid, granulous, oily contents, that we cannot but compare them completely, despite the differences in size and even of form, with products which are called upon to fulfil the same physiological function.

**American Ferns.** In the "Bulletin of the Torrey Botanical Club," for March, 1873, Mr. D. C. Eaton describes two new species of the Transatlantic ferns:—*Asplenium Bradleyi* and *Notholama Newberryi* (Eaton). The former of these plants has been found in Massachusetts and in Tennessee, by Prof. F. H. Bradley. In some of its more compound forms it is related to *A. montanum*, from which it differs in its larger size, more membranaceous texture, narrower outline of the fronds, and shorter stalked pinnae. Some of the denser specimens also resemble somewhat *A. lanceolatum* of Europe. *Notholama Newberryi* has been known to Mr. Eaton for some years, but has hitherto been considered either as *Cheilanthes tomentosa* or a white form of *Ch. Eatonii*. There is, however, no trace of an involucre, even in fruiting specimens, otherwise it bears a considerable resemblance to the ferns just referred to, but is whiter and much more tomentose. In Notholama it comes nearest *N. mollis*, Kze, from South America, but is much more delicate, and differs in many other important respects.

**Freshwater Algae.**—The April number of the "Quarterly Journal of Microscopical Science" contains a very interesting paper by Mr. W. Archer, in the form of a translation in abstract of Dr. Veit Brecher Wittrock's memoir of the "Freshwater Algae of Gotland and Oland:" two islands in the Baltic Sea. The original paper, in Swedish, was communicated in 1872 to the Royal Academy of Stockholm, and contained an enumeration of some 190 species, accompanied by four plates illustrating the subject.

**Fries' Epicrisis.**—It is said that Prof. E. Fries has in preparation a new edition of his "Epicrisis Systematis Mycologicii." The first edition of this work was printed at Upsala in 1836-38; since which time numerous and important additions have been made to the species, included under the *Hymenomycetes*, in this, as well as in other countries. The announcement of a new edition would therefore be welcomed by mycologists in all parts of the world.
Mr. W. S. Sullivant.—We regret to learn from the “Journal of Botany” of the death of this eminent American botanist, which took place on the 30th April, at Columbus, Ohio, at the advanced age of 70 years. He was the author of several memoirs on the bryology of the United States, of numerous sets of actual specimens of American mosses, and of the “Icones Muscorum.” His extensive bryological herbarium and library have, we understand, been left to the Herbarium of the Harvard University.

CRYPTOGRAMIC LITERATURE.


Maddox, Dr. R L. Some remarks on a minute plant found in an incrustation of Carbonate of Lime, in “Monthly Microscopical Journal,” No. 52, April, 1873.

Kitton, F. Professor Smith’s Conspectus of the Diatomaceae, in “Monthly Microscopical Journal,” April, 1873.


Venturi, Dr. “Ueber, Orthotrichum Shawii,” in “Hedwigia,” May, 1873.

“Botanische Zeitung” for May, contains—P. Tomaschek, on the Law of Development of Diatoms; B. Hartig, on the Parasitism of Agaricus melleus; A. Geheeb, on Neckera Menziesii and N. turgida.

Nylander, W. Observata Lichenologica, in Pyrenaeis Orient. in the “Flora,” May, 1873.


Braithwaite, Dr. R. Recent Additions to our Moss Flora, part vi., in the “Journal of Botany,” July, 1873.
Geaster Michelianus W.G.S.

Half actual size; section of inner peridium real size. Spores $\times 700$ diam.
**Grevillea,**

**A MONTHLY RECORD OF CRYPTOGRAMIC BOTANY AND ITS LITERATURE.**

**NOTICES OF NORTH AMERICAN FUNGI.**

By the Rev. M. J. Berkeley, M.A., F.L.S.

(Continued from Page 20.)


About ¼ of an inch high; stem cylindrical, grooved, head ovate; nearly even. Clearly allied to the last, but quite distinct. The whole plant is of one uniform tint. Descriptions of both these species from recent specimens are very desirable.


A much larger plant than the original form, and like that exuding a whitish milk when freshly cut. Hydnangium Spraguei, *B.* & *C.* No. 5394. New England. appears to be a metamorphosis of some Agaric, and not a true species.


Volva ovate, but slightly split above; stem independent of the pileus, 1½ inch high; pileus 1½ inch high, truncate at the apex, even.


NOTICES OF NORTH AMERICAN FUNGI.

*Cynophallus caninus. Fr.—On the ground, in grassy places. Car. Inf. No. 2573.


Egg globose, 4/3 of an inch in diameter. Volva bursting in from two to three lobes closely applied to the stem, then stellate; stem 1½-2 inches high, 4-5 lines thick, bright red, coarsely cribrose, attenuated below, above confluent with the receptacle which is somewhat broadly clavate, sometimes conical, but always more or less obtuse, pervious at the apex, sometimes half as long as the stem.


From 2-3 inches high; volva dilated upwards, bifid, stem red, confluent with the conical, obtuse, subtriangular, pitted at the base, where not covered with the brown spores.

* Dictyophora Daemonum. Lév.—Ohio, Lee. No. 281.

* Cyathus Lesueurii. Tul.—Connecticut, Wright. No. 5682. Var. minor, Tul. Brevis crucibuliformis eplicatus extus tomentosus vel subvillosus, sporis subglobosis, ‘0013 inch long. I believe that No. 414, 518 Car. Sup. are the same, but I have not found perfect spores.


Bell-shaped; 1/2 inch high, without any striae; clothed with short tow-like pubescence; spores elliptic, ‘0006 inch long, ‘0004 wide.


Springing from a white thread-like mycelium, which incorporates itself with the soil and its accompanying moss. Globose, externally furfuraceous, splitting very irregularly. Of three species, from Schweinitz Herbarium, one S. Corti, Schwein., is Stictis radiata, S. sparsus, Schwein., is an imperfect Stictis, and S. crustaceus, Schwein., is another Stictis, with very long filiform sporidia. Atractobolus ubiquitarius, Schwein., is a very minute Peziza, with linear sporidia. A. lutescens, Schwein., is the egg of some Acaerus, but not grooved like the eggs of Rhipigynathus.

Stem about three inches high, obtuse below, swelling in the middle where it is $\frac{3}{4}$ inch thick; attenuated within the pileus; floccose, somewhat fulvous, pileus ovate, cinerous, $1\frac{1}{2}$ inch high and wide; membranaceous below, appendiculate; hymenium black; spores minute, globose, even, $0.0002$ inch in diameter. *P*olyangium *vitellinum*, Schwein., is a *Physarum*.


* Batarrea *phalloides.* P.—On sand, about eight miles south of San Francisco. Prof. J. Torrey, No. 6527.

Head about 2 inches across, stem $\frac{1}{2}$ an inch thick.

* Geaster *rufescens.* Fr.—South California, Emory. No. 6398.


* Geaster *limbatus.* Fr.—Alabama, Peters. No. 6053.

* Geaster *fimbriatus.* Fr.—Car. Inf. No. 3025, 3853.

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**TWO SPECIES OF GEASTER.*

By Worthington G. Smith, F.L.S.


On the ground.

Spores $0.0014''$ diameter. When mature, and when the outer peridium bursts, this plant sometimes throws itself 9 inches away from its place of growth. **Plate XIII.**

*Geaster *lagenæformis.* Vitt.—Outer peridium splitting to the middle, in nearly equal acuminate laciniae, inner stratum very thick, evanescent; inner peridium sessile, flaccid; mouth determinate, plano-conic, ciliato-fimbriate, columella rather long, clavate. —Vitt. *Monog.* Lycop. t. 1, f. 2. *Payer.* f. 519, 520.

On the ground.

In infancy the plant strongly resembles an antique jar with a narrow mouth, hence the specific name. Spores perfectly round and sphaerical, thus differing from the majority of Geasters; they measure $0.00012''$ diameter. **Plate XIV.**

* For the use of the figures illustrating this communication we are indebted to the kindness of the Editor of the "Gardener's Chronicle."
AN ABSTRACT OF
M. BORNET'S PAPER ON THE GONIDIA OF LICHENS.*

By W. PHILLIPS.

M. Bornet begins his paper by describing the structure of the thallus in Lichens, as consisting of a colourless filamentose tissue, termed hypha, and a coloured cellular portion, termed gonidia, remarking that for a long time past the great similarity of the gonidia to certain algae had been observed, but that recent researches have thrown much additional light on the subject, tending to show this similarity to be not merely superficial or confined to a few isolated instances. M. Schwendener, in his various papers on the subject, has traced the resemblance of the gonidia to eight types of algae, four of which belong to the group Nostocaceae, and three to Chlorophyllumophyceae.

Different methods have been suggested of accounting for the resemblance thus traced. Some have regarded it as a simple coincidence, others have looked upon the algae which correspond with the gonidia as imperfect or sterile states of true lichens, while a third party have advanced the startling theory that a lichen is a complex structure consisting of a particular kind of fungus living parasitically upon an alga. M. de Bary was the first to suggest this theory, but it was M. Schwendener who gave it shape and threw around it an air of probability. This learned savant states that he saw the filaments of the lichen-thallus (the hypha) penetrate the fronds of different algae (Sirospheon, Nostoc and Glaoocapsa); encompass the gonidia with a network, similar to that with which a spider entangles his prey, and in a certain number of genera (Roccella, Arnoldia, Lempholemma, and Punnaria) unite themselves to the gonidia by an actual junction.

M. Bornet aims at confirming this theory of parasitism, looking upon it as the only one capable of explaining satisfactorily all that has hitherto been observed, and attributes its non-acceptance among Lichenologists to M. Schwendener having failed to dwell, as much as he ought to have done, on the nature of the connexion existing between the hypha and gonidia, and the mode in which it is established. Here appears to be the whole gist of the question. To demonstrate the identity of gonidia with algae is the first point; but it is not decisive, as is proved by the opposite interpretations of the fact by M.M. Famintzin and Baranetzky, who equally with M. Schwendener admit this identity. It is indispensable to show that the relations of the hypha to the gonidia are such as necessarily imply the idea of parasitism, and that these relations cannot be otherwise understood. To this point M. Bornet specially directs his observations, candidly admitting that it is one of the most difficult investigations that can be met with in the whole study of microscopic anatomy.

M. Bornet passes in review the principal genera of the Algae which he meets with in Lichens. In the first place he examines such as contain chlorophyll (Trentepohlia, Phylactidiun, Protococcus), and in the second place those which contain phycochrome (Scytonema, Stigonema, Nostoc, Glaoecapsa).

Algae coloured by Chlorophyll. Trentepohlia, Mart, comprises small algae of the group Confervæ, branched like Cladophora, from which they are chiefly distinguished by not inhabiting water. They are universally distributed on bark, wood, rocks, and mosses, attaining their greatest development in moist and shady places. Their beautiful orange colour, which becomes grey when kept for some time in the herbarium, their odour of violets, or rather of Cantharellus cibarius, which they retain after keeping, make them easy of recognition. The great resemblance of Trentepohlia umbrina to the gonidia of several Graphidæ and Verrucariae has been recognised by M. de Bary. M. Schwendener has confirmed the fact, and mentions moreover the genus Roccella, as offering the same peculiarity. M. Bornet has traced this resemblance in 13 genera of Lichens:—(1.) Roccella tinctoria, Ach., R. phycopsis, Ach., R. fuciformis, Ach. (2.) Lecanora, Ach. (sp. plur.). (3.) Dirina repanda, Nyl. (4.) Cenogonium Linkii, Ehrnb., C. confervoides, Nyl. (5.) Byssocaulon niveum, Montg. (6.) Lecidea lutea, Schaer, L. microspororm, Nyl. (7.) Graphis elegans, Ach., G. contexta, Pers., G. heterospora, Nyl. (8.) Opegrapha varia, Pers., O. herbarum, Montg. (9.) Stigmatidium crassum, Duby. (10.) Arthonia cinnabarina, Wall. (11.) Melaspilea arthouoides, Nyl. (12.) Chio-decton myrticola, Fée., C. nigrocinctum, Montg. (13.) Verrucaria nitida, Schrad.

It would be premature to make a list of species of Trentepohlia found associated with lichens, the species being as yet ill-defined, and the lichens themselves too imperfectly known, as regards this enquiry, to do so with sufficient precision. It is nevertheless certain that different species furnish gonidia to lichens, some of the gonidia having more or less affinity with Trentepohlia umbrina, under which name they may be provisionally placed.

If a section of the bark be made on which grows Opegrapha varia, Pers., selecting the part where the white stain of the thallus is not very conspicuous, the thallus will be seen to be composed of a loosely compacted tissue of filaments and yellow oval gonidia containing red-brown granules. On careful examination the hypha will be seen to extend beyond the apparent thallus, the threads diminishing in quantity, so that isolated fibres may be traced.

In the same part of the bark other filaments may be seen—of a transparent green, much larger than the hypha, formed of cells placed end to end, lightly attached at each articulation. The arrangement of these cells and the mode of their increase show that they belong to Trentepohlia. On the confines of these two vegetations we meet with some spaces where the hypha and the
Trentepohlia are mixed in such a manner that they present themselves in the best condition for observation. The threads of the hypha fix themselves to the alga upon some part, it being perfectly indifferent whether the part be young or old, and put themselves in contact with individual cells. Often one portion only of the algal-filament, or one cell only, is touched by the hypha; but more frequently the hypha applies itself to the surface, follows all the sinuosities of its contour, gradually throwing out lateral branches which encompass, as with arms, portions more or less large of the cells they touch. The vegetation of the hypha is stimulated by contact with the Trentepohlia, the points of contact swelling and extending, and its cells becoming shorter, produce numerous branches, which ultimately surround the alga with a dense network. The threads of the hypha often lie in the spaces where the cells of the Trentepohlia join each other, from which there results a constriction, causing a breaking up of the algal-filaments into fragments of different length. These the hypha transforms into gonidia, exactly similar to those in the adult thallus of the Opegrapha.

There is nothing to be seen in any part of the thallus at any period of its growth to indicate that the Trentepohlia may be produced by the hypha. On the contrary, the extreme irregularity of the first connexion established between them excludes the possibility of such a thing, besides which they vegetate in an inverse way, and it is often the last-formed cell of the alga which is seized on by the hypha.

Verrucaria nitida (Schrad.) and Roccella phycopsis (Ach.) furnish excellent illustrations of the same facts.

Amongst exotic Lichens, Chiodecton nigrocinctum Montg., Lecidea microspora Nyl., Byssocaulon niveum Montg., and Ceiognonium, were examined, and contained gonidia of Trentepohlia, different from those enclosed in our indigenous species.

Ceiognonium Linkii Ehrenb. presents peculiar facilities for studying this subject. The thallus is composed of articulated filaments, of a greyish-yellow in the herbarium, surrounded and held together by a network of colourless and much finer filaments belonging to the hypha. M. Schwendener regards the articulated filaments as those of an Alga allied to Cladophora, but M. Bornet considers them allied to Trentepohlia, and says that he has seen them invaded by the hypha from their base upwards, the lower cells being completely enveloped by a dense network, while the upper ones were free. He has observed also, in some instances, the hypha attacking the algal filament a considerable distance above its base, leaving the inferior cells untouched.

Phylactidium, Kütz., he considers furnishes the gonidia to Opegrapha filicina, Montg., the hypha of the lichen invading the alga at an advanced stage of its development. He also conducted a
series of experiments with *Protococcus viridis*, Ag., on which were sown the spores of *Parmelia puretina*, Ach., with a view of showing that the hypha produced from these spores attached itself to the isolated cells of the alga, or to small groups of them, rejecting other bodies in their vicinity.

M. Bornet, in the second place, takes into consideration algae coloured by phycochrome, which are distinguished from the preceding, not only by their bluish-green colour, but also by the constant absence of a cellulose membrane, properly so called. They are widely distributed, supplying what are known as *glauco-gonidia*, and constituting the greater part of the thalli of *Phycociliens*. Their cells are diffused, grouped in colonies, or disposed end to end in moniliform filaments.

The following are the genera of these algae met with in lichens:—

- *Calothrix*, Ag., furnishes gonidia to *Lichina confinis* and *pygmaea*, Ag. *Scytonema*, Ag., to *Ephebella Hegetschweileri*, Itzigs; *Stereocaulon ramulosum*, Sw. (cephalodia); *Pannaria hypomelana*, Nyl.; *P. triptophylla* var. nigra, Nyl.; *Cocco-carpia molbydea*, Pers.; *Erioderma unguigerum*, Nyl.; *P. Dictyomena sericeum*, Montg. *Lycogala*, Ag., to *Stereocaulon ramulosum*. *Nostoc*, Vaucl., furnishes gonidia to the following genera amongst the gelatinous lichens:—


M. Bornet says he has established the presence of glauco-gonidia in the following 23 genera of lichens:—


In some species of lichens the hypha predominates in the thallus, there being only a thin stratum of gonidia below the cortical layer; while in the others the gonidial element predominates. This difference, M. Bornet thinks, corresponds, as a rule, with the mode in which the alga is invaded by the hypha. In the former, the hypha applies itself rather to the surface of the alga than to the interior, destroying its normal form, and giving the appearance of *Trentepohlia* and *Protococcus*; while in the latter, the hypha is projected
into the frond itself, that is into the interior of the case, or gelatine, which unites the cells together.

Amongst those lichens enumerated, in which the hypha applies itself to the surface of the alga, may be mentioned *Stereocaulon ramulosum*, Sw., the cephalodia of which were found by M. Bornet on dissection to contain long flexuous filaments of the character of *Scytonema*, which had been taken up and encompassed by the hypha; also *Coecocarpia molybdea*, Pers., in the young fronds of which were found moniliform gonidia, disposed in long parallel threads, in which it was impossible to avoid recognizing the similarity to a *Scytonema*, such as were found scattered upon the bark on which the lichen had grown.

Amongst the lichens he mentions in which the hypha penetrates into the interior of the alga, we have only space for one species, viz., *Arnoldia minutula*, Born. (sp. nov.) This lichen is very small, scarcely visible to the naked eye, pyriform or oblong, growing on the ground. On examining a thin section, the chaplets are seen to present here and there (independent of the heterocysts) some cells much larger than others, surrounded by a thick membrane. To each of these cells is fixed a short filament, a part of the general network of the hypha. The modification which these cells experience, shows the contact between them and the extremity of the inserted filament is not accidental, but that the hypha exercises on the gonidia an energetic action. Under its influence the cell becomes much enlarged, and surrounded with a thick membrane, which the ordinary cells do not possess; this is followed by a change in the colouring matter, which separates into a grumous mass in a colourless fluid, and the side of the cell opposite the point of attachment shrivels up, till the gonidium becomes a mere dead membrane. These phenomena begin the moment the extremity of a hypha-filament comes in contact with an algal-cell.

In conclusion, M. Bornet considers he has established the two following propositions:—

1. Every gonidium of a lichen may be referred to a species of Alga.

2. The connexion of the hypha with the gonidia is of such a nature as to exclude all possibility of one organism being produced from the other, and that the theory of parasitism can alone explain it satisfactorily.

M. Bornet's Paper is illustrated with eleven coloured plates of microscopical dissections which assist very considerably the elucidation of his theory.

Woolhope Naturalists' Field Club.—The annual meeting of this Club, which is devoted to Fungology, will be held at Hereford, on Tuesday, 14th October, 1873.
STRUCTURE OF THE GILL-PLATES OF AGARICS.

By J. De Seynes.

(Continued from Page 31.)

Cystidium.—The cystidium is a cell generally larger than the basidium, and which varies much in its forms; originating from the parenchyma at the same level, or a little lower than the other elements of the hymenium, we see it raise itself straight and solitary, sometimes as a simple sterile cell a little larger, sometimes in a cone more or less long or slender, sometimes bearing at its extremity a little sphere (A. melinoides, A. sulcatus), sometimes dividing itself, or again growing rotund, like a leathern bottle. This organ does not exist amongst all the Hymenomycetes and the Agarics, notwithstanding it has been indicated by Corda as being the male organ, the antheridia, and he has given them the name of pollenaires, which has been accepted by Mr. H. Hoffmann, although this author refuses to attribute to them the same signification. It appears to me, in fact, difficult to accept this interpretation. Pretty numerous observations of these organs, some of them undertaken without even knowing the hypothesis of Corda, led me to an altogether different conclusion, and permit me to see, in the cystidia, only organs returned to vegetative functions, by a sort of hypertrophy of the basidium. Following Corda, fecundation is effected by means of a viscous liquid issuing from these organs; but, if we remark that the examples of this kind of fecundation are taken from mushrooms (A. rutilus, viscidus, mucosus), all the vegetative portions of which are viscid, or have a tendency to become so in damp weather, we shall see nothing surprising in the cell belonging to them having the same property and agglutinating like the spores; there is nothing special in this; we should be tempted, on the contrary, to see in it an argument in favour of our thesis, and to suppose from that that the cystidia are always allied to the simple organs of vegetation. Amongst the milky Mycena (A. galopus) which have besides organs of reproduction very different from those of the Lactarii, the cystidia shew themselves identical with those of the Lactarii; amongst the Plutei they take the form of basidia to such an extent, that were it not for their dimensions we should take them for true basidia; divided into short horns at the summit, they seem thus to have preserved the sterigmata. The passing of one of these organs to the other has been very well pointed out by M. H. Hoffmann, and figured in particular in the Ag. albo-brunneus. (Bot. Zeit. 1856, p. 189.) At other times the form of the cystidium approaches that of the cells of the parenchyma; in a new Agaric, Agaricus sulcatus, I have observed the cystidia forming little cylinders with swollen, spherical extremities, and that is exactly the form which the vegetative cells in the pileus and the gills affect; many have the form of simple
bristles. These observations have led me to regard these organs disseminated upon the gills or frequently agglomerated near the margin, as hypertrophied basidia, returned to the functions of organs of vegetation, as we see abnormally a carpet to become a leaf. We are thus brought back to the first idea of Micheli, who called them sterile flowers, proposing only for their usage an interpretation diametrically opposed to his own. The cystidia appear to me to fulfil to the gills, the same office that the ring fulfils between the pileus and the stem; these two organs of the same nature transmit, at their contact, prolongations which bind them together; the gills organs of the same nature, and adjacent, have a tendency to send out prolongations to bind the one to the other. A certain number, obeying this law, are lengthened, and are diverted from their original use; but as the ring may be very much developed or fugacious and rudimentary to such an extent that it seems to exist only as a reminder, or is altogether wanting, so the cystidia may be wanting, or take such a development that they are visible to the naked eye; they fulfil, in certain cases, the functions of trabecules so well, that in separating the gills of Agaricus utramentarius, not entirely expanded, the gills divide into two longitudinal portions, instead of separating the corresponding faces of two different gills. This phenomenon is very apparent, and Delile, who was unacquainted with the cystidia, had noted the existence of fibrous prolongations binding the gills of this Agaric.

It is natural to ask whether we can take advantage of the observation of different forms of cystidia for the classification of the Agarics; M. H. Hoffman concludes not.

We know that there is little agreement between the form of the cystidia (pollenaire, Hoff.), and the greater part of the sections; since they cannot be considered as organs of fecundation, and as their analogy with epidermal productions or organs of simple vegetation is established, one can understand à priori that their importance diminishes.

Nevertheless, if we consider them from the point of view of the dominating form amongst a group, we shall perceive that there are still some comparisons to be effected, and that it is necessary to take account of this element of diagnosis, more especially as the observations made on this subject are still few in number, and, because, on the other hand, the sections more or less in acceptance at the present time amongst the Agarics generally, may very likely not represent their true divisions very faithfully.

Thus regarded, the hymenium, which has not yet offered an organ which we may suppose in reality to be the male organ, is reduced to great simplicity: one sole and self-same organ is the basis of it; according as it experiences an arrest of its development, as it grows and fructifies, or as it becomes hypertrophied, it gives us a paraphysis, a basidium, or a cystidium; in other terms, atrophied
basidium, normal basidium, hypertrophied basidium, these are the three elements which form the hymenium. Does it develop either outside the hymenium, or on the hymenium, at a time or in a part which has not yet been discovered, organs which yield pollen, spermatia, antherozoids, or any other fecundating agent? This is what remains to be discovered.

The mode of the insertion of the basidium, or of the different organs of the hymenium upon the sub-adjacent tissues, conforms to two types; but these differences are less marked in the hymenium of the Basidiospores than in that of the Thecaspores. In these last it is easy to recognise these two types, which present themselves thus. In the first, and that which appears to us the most distributed, the theca, attenuated at its base, appears to have, when it has been isolated, a little pediform swelling, or, if you please, an extremity slightly recurved, provided with a claw, recalling somewhat the form of the crutch-shaped cells of M. H. Hoffman. It is by this little swelling that the theca is implanted upon the sub-hymenial cell. The insertions of this form offer, in section, a certain regularity. In the second type the theca is again attenuated at the base, but it gives place directly to an elongated, fine, tubular cell which loses itself in the cellulous parenchyma of the Peziza. There is then, at the base of the hymenium, a complication which does not present at all the same aspect as the sub-hymenial tissue of the other Pezizas. The paraphyses always conform to the same mode of insertion as the theca to which they are adjacent, and their homology thus receives from it a confirmation.

FUCKEL'S CLASSIFICATION OF THE SPHÆRIACEI.

By Charles B. Plowright.

Many attempts have been made to classify the various forms which are included in this extensive order; since the genus, from which it takes its name was proposed by Haller, more than a century ago. It is not intended historically to enumerate any of these, but it should be borne in mind, that each successive author would naturally tend to adopt, or at any rate be influenced by, those suggestions of his predecessors, the convenience of which experience had demonstrated. We, in England, use almost exclusively the system proposed by Fries, somewhat modified; and so familiar have we all become with it, that many years will probably elapse before we shall desire to change it. Our Continental brethren, however, have of late years introduced a multitude of new genera, many of which have been extensively adopted, and it may possibly not be uninteresting to compare some of the more important of these with our own. With this in view it is proposed

* At least exteriorly, for there is always an internal wall of separation.
to give a brief account of the system employed by Fuckel in his *Symbolae Mycologice,* in which are adopted many of the more important genera of Tulasne, De Notaris, Nitschke, Rabenhorst, etc.

In speaking of the Sphærias generally, Fuckel observes that they all probably pass through various stages of development; in a few instances these are known to consist of the Conidia, Spermogonia, Pycnidia, and the Ascophore. It must, however, be admitted that in very many more cases nothing whatever is known of their earlier conditions, and at present but little help can be derived from this source.

The Sphæriacei are, in the first instance, separated into two very unequal divisions, by the nature of the matrix upon which the individual species subsist, viz., into the *Vegetabilicoli* and the *Fimi-coli,* the former embracing some 64 genera and the latter eight only.

The *Vegetabilicoli* are divided into two nearly equal groups, the Simple and Compound. According to the system commonly adopted in this country,† the 290 species of our Simple Sphærias are divided into 16 genera, about 200 being located in the genus Sphæria, while the remaining 90 are distributed over the other 15 genera.

The Simple Sphærias are divided by Fuckel into 37 genera, which are arranged in six groups, called respectively the *Sphæriacee,* *Ceratostomeae,* *Pleosporaee,* *Lasiosphæriaceae,* *Massarieae,* and *Lophios- tomeae.*

The first group commences with Fries’ genus *Sphærella,* containing nearly sixty members. This is followed by the genus *Sphæria,* composed of 40 species, of which it is remarked that “although it at present contains some very heterogenous forms, yet future investigations into the lower states of their fructification, will probably afford more satisfactory data, on which to base their separation into genera.” Amongst its contents are found such species as *Isothea pustula,* *rythtisoides* and *immunda,* *Sphærella rusci* and *Sphæria corni-suecae.*

The second group, or *Ceratostomeae,* includes *Gnomomia,* a genus of *Epiphyllons* Sphærias characterised by their elongated ostiola; it corresponds with the division *Foliicola* of Fries, and, consequently, contains *Sphæria* fimbriata, tubæformis, setacea and gnomon (= G. vulgaris, De Not). *Linospora* is a small genus, in which *Isothea saligna* (Berk.) is located; *Rhaphidospora,* a genus of Caulicolous Sphærias, answering to the division which has long, thread-like, more or less articulate sporidia, includes *Sp. rubella,* *herpetricha* and *acuminata* (= R. *Carduorum,* Tul.); *Cera- tostoma,* the typical genus of this group, answers to Fries’ division

† The classification here referred to, as well as the nomenclature employed, are those used in the "Handbook of British Fungi."
of the same name, Sp. pilifera and cirrhosa being amongst its most important members.

The third group, or Pleosporaceae, takes its name from the principal genus *Pleospora*, which is made to embrace more species, according to Fuckel's limitation of it, than it is generally regarded as doing. For not only are those species possessing brown, muriform sporidia, placed here (*Pleospora genuina*, of which Sp. herbarum is the type), but also those with fusiform septate sporidia, such as Sp. doliolum, acuta and agnita, which are classed by De Notaris in his genus Leptosphaeria, and in addition to these it contains Sp. arundinacea and culmifraga. A new genus, *Didymosporia*, receives Sp. epidermidis and diplospora.

In the fourth group (*Lasiosphaeriaceae*), the typical genus *Lasiosphaeria*, originally proposed by De Notaris, is now made to embrace only those of the Villose, which have coloured, septate sporidia, such as Sp. racodium, hirsuta and hispida; while in *Leptospora* are placed those with undivided sporidia, as Sp. ovina, strigosa and even Sp. spermoides. A new genus, *Trichosphaeria*, receives Sp. pilosa. *Rosellinia* includes the species, with simple brown sporidia, similar to those found in the genus Hypoxylon, such as Sp. aquila, mammaformis, and pulveracea.

The fifth group (*Massariaceae*) has only two genera—*Enchnoa*, in which are placed Sp. lanata and glis, and *Massaria* proper.

The sixth and last group (*Lophiostomeae*), into which the genera of simple Spherias are classed, commences with the *Lophiostoma* of De Notaris; *Melanomma*, in which the members have small, hard perithecia, such as Sp. pomiformis and pulvis-pyrius; *Teichospora*, with its brown muriform sporidia, may be regarded as being typified in Sp. obducens; *Trematosphaeria*, in some degree answering to the *Pertusa*, and finishes with two genera (*Bertia* and *Bombardia*), containing but a single species in each—*Bertia* moriformis (Sp. moriformis) and *Bombardia* fasciculata (Sp. bombardia).

The division *Compositi* differs from our own, not only in the greater number of genera into which it is divided, but also in containing several specific forms which we regard as simple Spherias.

The first group of genera, *Cucurbitarieae*, contains the genus *Nitschhia*, consisting of three members—*Cucuria* capularis, Sp. tristis, and Sp. exilis. The two first of these plants are, as Fuckel regards them, closely allied, and differ in little else than in the size of the sporidia and in the number of nuclei they contain. It is possible that the first named may be identical with the Sp. tristis* var. Sporidiis Majoribus, of Messrs. Berkeley and Broome. It should be observed that Fuckel is here speaking of the Sp. tristis of Persoon, Tode's plant he regards as Sp. phaeostroma, Mont. A similar view, it will be remembered, was taken in the "English Flora," vol. v., part ii.

The genus *Valsa* is divided into sections after Nitschke:—Entypella, Euvalsa, and Leucostoma. It contains some 35 species, although many members of the old genus Valsa are now located in fresh genera. Thus:

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<tr>
<td>tale-la, Fr.</td>
<td>= Aglaospora taleola, Tul.</td>
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<tr>
<td>lephemia, Fr.</td>
<td>= Cryptospora liphema, Tul.</td>
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<tr>
<td>fenestrata, B. &amp; Br.</td>
<td>= Fenestrella princeps, Tul.</td>
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<tr>
<td>vestita, Fr.</td>
<td>= Thyridium vestitum, Fckl.</td>
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<tr>
<td>detrusa, Fr.</td>
<td>= Diaporthet detrusa, Fckl.</td>
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<td>pulchella, Fr.</td>
<td>= Calospheria princeps, Tul.</td>
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<tr>
<td>quaternata, Fr.</td>
<td>= Quaternaria Persoonii, Tul.</td>
</tr>
<tr>
<td>leucostoma, Fr.</td>
<td>= Valsa Persoonii, Nke.</td>
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The genus *Diaporthet* (Nitschke) partakes in some degree of the characters of Valsa and Diatrype, and also includes a number of the Caulicolous Sphærias, it being the most extensive genus amongst the *Compositi*. In it we find Diatrype pyrhocystis, strumella, inæqualis, Valsa syngenesia, Innesii, Sphæria lirella, pardalota, vepris, and rostellata.

*Cryptosphæria*, the genus originally proposed by Greville, receives *Sp.* millepunctata. Of the species usually included under Dothidea, those found upon living leaves and grasses are placed in *Phyllachora*; *Rhopogaphus* receives *D.* filicina; *Homostegia*, *D.* Piggotii; *Melanops*, *D.* melanops; while the genus Dothidea is reserved for such species as *D.* rose and ribesia. The old genus *Rhizomorpha* is revived, and in it is placed Thammomyces hippotrichioides, with a new species allied to it.

The Fimicoli, or, as they might be called, the *Coprophileæ*, are divided into three groups. In the first the sporidia are without appendages. *Coprolepa*, a genus somewhat analogous to *Hypoxylon*, in possessing a more or less distinct stroma, and *Hypocotra*, have their simple, dark brown sporidia enveloped in a gelatinous coating. In this latter genus is placed Massaria fimeti and *Sp.* stercoraria. Of the other members of this group *Deliteschia* has unisepitate, *Sporormia*, tetrasepitate, and *Pleophragmia*, polysepitate sporidia.

The second group have their sporidia appendiculated at one extremity. It consists of two genera—*Malinvernæ* and *Sordaria*. *Cercophora* is the name given to a new genus, the members of which have their sporidia appendiculated at both extremities. *Xylaria* pedunculata is for some reason not classed with the Fimicoli, although, as Mr. Berkeley has long since indicated, it is closely allied to *Sp.* stercoraria.

The point upon which our arrangement is most open to modification certainly is, the great size of the genus Sphæria, especially with regard to the number of species included under the *Obiectæ*, and as there are few more convenient genera than *Pleospora*, *Rhapidospora* and *Gnomonia*, we can but think their adoption would prove advantageous; while the host of minor genera, which various cryptogamists have from time to time proposed, averaging, as
they do, from one to five members, appear to us, unnecessary. Those generic distinctions too, based upon secondary forms of fructification, however scientifically accurate they may be, and however natural they may appear upon paper, will be found, it is feared, not to work well in practice, because they demand a more intimate acquaintance with the life history of each plant, than it is possible, in the first instance, always to obtain.

Herbarium Mycologicum Economicum.—The second fasciculus of 50 specimens has just been issued by Baron Thuemen. It fully equals in interest its predecessor, and amongst its contents are—Puccinia Apii, Cd.; Asparagi, Link; Cerasi, Cd.; P. coronata, Cd., on the oat; P. Prostii, Duby; on the garden tulip (Tulipa Gesneriana). Uredo Zee, Desm., on the maize. This is probably the uredo form of Puccinia Zee, Pötsch; Uromyces Viciae, Fckl.; Fusarium Betae, Rabh.; Ústilago Sorghi, Pass.; a new species which infests the seeds of the millet (Sorghum vulgare); communicated by Prof. Passerini: Sphaerotheca Castagnei, Lev.; on Hibiscus esculentus, from Greece; Phacidium medicaginis, Lasch.; Òecidium alliatum, Rabh., on the shallot (Allium ascalonicum). A new species of Hypoderma, H. longisporum, Hartig., on fir leaves. Ascochyta Tiliae, Lasch.; Uredo fragariae, Rabh.; Apiosporium Mali, Wallr.; Cladosporium Fumago, P., on vine leaves; Antennatula pinophila, Fr.; Capnodium Persoonii, B. & D., on hornbeam and lime leaves; Corticium amorphum, Fr. In Bohemia this is stated to be very destructive to the young fir trees; the affected trees usually perishing between the twelfth and sixteenth year. Acalyptospora nervisequia, Cast., on elm leaves; Exobasidium vaccinii, Wall., on the cranberry; Torula chrysosperma, Cd., on opium; Merulius lacrymans, Fr., Saccharomyces Cerevisiae Meyen.; S. Mycoderma, Rees.; and several other more or less important species.

The Hollyhock Disease.—During the months of June and July this was reported from different localities in England as having caused considerable damage to Hollyhocks. It is produced by Puccinia malvacearum (Mont.), a fungus not previously observed in this country, which was originally described by Montagne as occurring on the under surface of the leaves of Althaea officinalis. We have also received specimens on Malva sylvestris, from J. Hussey, Esq., of Salisbury; Dr. Paxton, of Chichester; and Mr. E. Parfitt, of Exeter.
TWO SPECIES OF FUNGI RECENTLY OBSERVED IN NORFOLK.

**Puccinia Asteris.** Fckl.—Sori seated upon yellow, then discoloured spots, hemisphaerical, brown; spores brown, ovato-oblong, apiculate; peduncles very long.—Fuckel. Sym. Myc. p. 53.

On both sides of the leaves and on the stems of *Aster tripolium.* Near King's Lynn. July, 1873. In tolerable plenty.

This is a very well marked Puccinia; the hemisphaerical sori are in their early stage surrounded by a yellow zone, and remain covered by the unruptured epidermis for some little time, which gives them a peculiar ashy grey colour. Dr. P. Magnus informs me this is the *P. Tripolii* of Wallroth, but the above name has been adopted on account of its more comprehensive character. Fückel's plant was on the root leaves of *A. amelaeus.* I have a closely allied, if not identical species, on the leaves of some Aster, from Maine, U.S., from the Rev. E. C. Bolles.

**Macrospora scirpi.** Fckl.—Perithecia scattered, covered by the epidermis; ostiolum obtuse, slightly prominent; asci large, stipitate, subclavate, at first inflexed at the apex, then obtuse; sporidia oblong, obtuse, 5-septate, each loculus, except the two terminal, longitudinally divided, slightly constricted, pale yellow.—Fckl. Symb. Myc. p. 140, t. iii. f. 12.


Regarded by Fückel as the *Sphaeria Scirpi* of Fries. A very different plant from *Sp. scirpivola,* D.C., in company with which it was growing.*

Charles B. Plowright.

*I do not think that the above Puccinia can be separated from Puccinia asterina, Schweinitz. Macrospora is an unnecessary increase of genera, and belongs to Pleospora, if that be entitled to rank as a genus.—[Ed. Grev.]*

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CRYPTOGAMIC LITERATURE.

Hoffmann, H.—On **Geaster coliformis,** P. in the “Botanische Zeitung” for June, 1873.

Gronlund, C.—Contributions to the Flora of Iceland (*Hepaticae and Musci*), in “Botanisk Tidsskrift.”

Hansen, C.—On the *Diatoms* found in Slesvig, in “Botanisk Tidsskrift.” Pts. 1 and 2. 1873.


Stirton, Dr. J.—Additions to the Lichen Flora of New Zealand, in the “Transactions of the Glasgow Society of Field Naturalists,” 1873.
Fig. 1  Geaster lagenæformis. Vitt.
Half actual size: section real size: spores $\times 700$ diam.

Fig. 2  Geaster hygrometricus. P.
Half actual size: section real size: (A) plant in dried state. Spores $\times 700$ diam.
Fig. 1. **Geaster coliformis.** P.
*After Sowerby, half actual size: spores × 700 diam.*

Fig. 2. **Geaster fornicatus.** Fr.
*Half actual size: section of inner peridium (A) natural size. (B) tip of lobe. Spores × 700 diam.*
No. 16. [October, 1873.

Grevillea,

A MONTHLY RECORD OF CRYPTOGRAMIC BOTANY AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By the Rev. M. J. Berkeley, M.A., F.L.S.

(Continued from Page 35.)


Outer peridium 2 inches across; reddish, separable into two parts, the upper portion being ultimately lifted up, as in G. fornicatus; inner peridium about \( \frac{3}{4} \) of an inch across, very shortly stipitate, smooth, reddish; mouth silky, as in G. fimbriatus; spores globose, minutely echinulate. The same species occurs in Cuba. No. 873.


About 1½ inch across; subglobose, pallid, very minutely tomentose; capillitium and globose shortly pedicellate even spores, bright brown, spores ·0002 in diameter; pedicels about the same length, soon breaking off.
330. **Bovista stuppea.** *B.—Ellipsoidea sessilis; peridio externo tennissimo albido, interno spadiceo; capillitio stuppeo spadiceo; sporis parcis pedicellatis. Texas, C. Wright. No. 3153.

Ellipsoid, longer diameter 2 inches, shorter, 1 1/2; outer peridium extremely thin, whitish; inner, bright reddish-brown; floccii very abundant, woven into a tough mass; spores few, pedicellate, 0002 in diameter. Unfortunately I have only a single specimen, the peridium, which is thin and papery easily splits and separates from the spongy mass within.


About 3/4 inch in diameter; outer coat leathery, splitting off, leaving a ring-shaped portion at the base, inner furfuraceous; orifice minute, silky; spores globose, even, at length slightly rough, sessile, 00016 in diameter; clay-coloured.


About 3/4 of an inch across, springing from a rooting base; ovate, with a papilliform apex, furfuraceous or minutely warty; threads and the globose even spores about 00016 in diam. clay-coloured.


About 3/4 of an inch across, springing from a short rooting base; globose, rough with echiniform warts, pallid; floccii, and the smooth, globose spores, 00016 in diameter clay-coloured.


Sessile, globose, 3/4 inch in diameter, at first clothed with minute echinate warts, which soon fall off and leave the peridium smooth, with a minute silky orifice. Capillitium and spores 00016 in diameter; clay-coloured, but more inclined to cinereous in two foregoing species.

About 1¼ inch across, springing from a short rooting base, at first clothed with minute echinate warts, which soon drop off, and leave the peridium minutely velvety. Capillitium and even globose spores, 00016 in diameter; clay-coloured. The spores appear at first to be pedicellate, but if so the pedicels soon drop off.


About 1 inch across, obovate, densely shaggy with white echinate pyramidal warts; smooth and plicate at the base; capillitium and spores 00016 in diameter; olive, pedicellate. A very beautiful species.


About 2½ inches across, bare more or less stem shaped 1½-2½ across, spongy, accurately separated as in L. celatum from the capillitium; peridium pruinose-furfuraceous, very delicate, capillitium with the globose even spores, 00016 in diameter yellowish here and there, inclining to pinkish. A very delicate looking species, with a stout base.


About 1 inch across, irregular, subglobose, somewhat apiculate at the base, sometimes wrinkled or areolate, floccose, spores lilac, 0006-0005 in diameter. A singular and very distinct species. Originally gathered by Mr. Drummond in Texas, in whose specimens the spores are dark-brown and wider. I believe, however, that they increase in size after they fall.


A small form, about ¼ of an inch high, with a very short or obsolete stem. The outer peridium breaks up into little areolate patches.


Effused, thin papillose, black-purple; margin thin; threads short, erect, branched; spores oblong, ±0.004–0.00025 long.


Effused, reticulate, pinkish yellow or slightly fulvous; spores globose, ±0.013–0.01 in diameter. *S. licheniformis*, Schwein., is a state of *Didymium cinereum*.


Gregarious, crowded together; external membrane ochroleucous, internal white; columella none; spores black.


Extremely neat, brittle, looking like a little egg, quite even, white, pale rufous within; columella slightly developed; spores jet black.

* **Diderma stellare.** *P.*—On pine wood. No. 2171.


Stem equal, vermilion, as is the globose peridium; spores black, flocci white. The pulverulent matter with which the peridium is clothed soon rubs off.


Stem rufous, nearly equal, springing from an orbicular base, penetrating the globose white granulated peridium; flocci white. In this last character it differs essentially from *D. xanthopus*. 

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Stem nearly equal, or somewhat attenuated, penetrating slightly, even, dark brown; peridium globoso, umber, with a few very minute metallic scales or particles; flocci and spores black. Stem with the head about \( \frac{1}{3} \) inch high.


A minute species, about \( \frac{1}{3} \) inch high. Stem attenuated upwards, yellow; peridium globose, nodding, farinaceous; columella none; flocci few, white; spores even, black-purple.

348. Didymium chrysopelum. B. & C. — Stipite niveo leviter sulcato sursum attenuato et basi orbiculares oriundo; peridio globoso, exterio fufuraceae fulvo, interieo metallico; floccis albis; sporis nigris. On dead leaves. 

Stem snow-white, springing from a little orbicular disc, slightly sulcate, attenuated upwards; head globose, slightly umbilicate, outer coat tawny, furfuraceous, inner metallic; flocci white, spores black.


A minute species, about \( \frac{1}{3} \) inch high; stem dark rufous, slender, attenuated upwards; peridium subhemispherical, umbilicate, rufous, with a white dusty bloom; flocci few, white; spores brown, large.


On leaves of Gonolobus, Texas, Lindheimer. New Orleans, Drummond.

Stem golden-yellow, hyaline, attenuated upwards, springing from a very thin membranous hypothallus; peridium white or lemon-coloured; flocci white, spores black.


Fries's Epicrisis.—A new and revised edition of this valuable work, by its venerable author, has already commenced, and we may hope soon to hear of its publication.
THE GENUS HYDRODICTYON.

By Dr. Horatio C. Wood, Jun.*

The genus Hydrodictyon comprises, as far as known, but a single species, which is common to North America and Europe. It grows in great abundance in the neighbourhood of Philadelphia, especially in the ditches and stagnant brick ponds in the low grounds below the city, known as the "Neck." There it very frequently forms floating masses several inches in thickness, and many feet in extent, so that with the aid of a rake it could be gathered by the bushel. When thus in mass the colour is very generally dingy and yellowish, although the fronds, when in active vegetative life, are mostly of a bright, beautiful green. The plant is in greatest profusion in June and July, after which time it gradually disappears, until in the autumn it is scarcely to be found, but early in the spring it reappears. The very young fronds are minute, oval, cylindrical, filmy-looking closed nets, with the meshes not appreciable to the eye; when growth takes place the fronds enlarge, until finally they form beautiful cylindrical nets, two to six inches in length, with their meshes very distinct, and their ends closed. In the bright sunlight, they, of course, by virtue of the life functions of their chlorophyl, liberate oxygen, which, being free in the interior of the net, and its exit barred by the fine meshes, collects as a bubble in one end of the cylinder, and buoys it up, so that, the heavier end sinking, the net is suspended, as it were, vertically in the water. I know of few things of the kind more beautiful than a jar of limpid water, with masses of these little nets hanging from the surface like curtains of sheen in the bright sunlight. A few cells collected in the fall or early spring, if put into a preserving jar and the water occasionally changed, will multiply, and in a little while become a source of frequent pleasure to the watcher.

As the fronds increase in size they are always in some way or other broken up, so that, instead of being closed cylinders, they appear as simple open networks of less or greater extent. The extreme length to which the frond attains is, I think, very rarely over twelve inches, with meshes of about a third of an inch in length. The construction of the frond is always the same. It is composed of cylindrical cells united end to end in such a way as to form polygonal and mostly pentagonal meshes, the size of which varies with the age of the plant. These cells, which are closely conjoined, but have no passage-ways between them, are capable of independent life, so that the Hydrodictyon may be looked upon as an elaboriate type of a cell-family, one in which cells are conjoined

in accordance with a definite plan, so as to make a body of definite shape and size, yet in which each cell is an independent being, drawing nothing from its neighbours. The cells themselves are cylindrical, with a thickish cellulose wall, and having no nuclei. Their chlorophyllous protoplasm is granular, and is placed in the exterior portion of the cell, forming thus, within the outer wall, a hollow cylinder, in which are imbedded starch granules, and whose interior is occupied with watery contents. The *Hydrodictyon* cell, when once formed, is capable of growth, but not of going through the usual process of cell multiplication by division, so that the adult frond is composed of just as many and, indeed, the same cells as it had in its earliest infancy.

No true sexual reproduction has as yet been discovered in the water-nets. There have been described, however, two forms or methods in which the species multiplies, both of them occurring by means of motile zoosporoid bodies. In the one case these develop immediately into the new plant, whilst in the other, before doing so, they pass through a resting stage. Of the life history of the latter, the *microgonidia*, I have no personal knowledge.

The investigation of the production and development of the *macrogonidia*, however, has occupied considerable of the time devoted by myself to the microscope, and I have seen large numbers of specimens in almost all the stages of development. I have never been able to detect, however, any decided motion in the *macrogonidia*.

They are formed in the protoplasmic stratum already alluded to as occupying the outer portion of the interior of the *Hydrodictyon* cell. The first alteration in this, presaging their formation, is a disappearance of the starch granules, and a loss of the beautiful, transparent green colour. Shortly after this, even before all traces of the starch-grain are gone, there appear in the protoplasm numerous bright spots placed at regular intervals; these are the centres of development, around which the new bodies are to form. As the process goes on, the chlorophyll granules draw more and more closely around these points, and at the same time the mass becomes more and more opaque, dull, and yellowish brown in color. This condensation continues until at last the little masses are resolved into dark hexagonal or polygonal plates, distinctly separated by light, sharply defined lines. In some the original bright central spot is still perceptible, but in others it is entirely obscured by the dark chlorophyll. The separation of these plates now becomes more and more positive, and they begin to become convex, then lenticular, and are at last converted into free, oval, or globular bodies. When these are fully formed they are said to exhibit a peculiar trembling motion, mutually crowding and pushing one another, compared by Mr. Braun to the restless, uneasy movement seen in a dense crowd of people in which no one is able to leave his place. Whilst the process just described has been going on, the outer
cellulose wall of the *Hydrodictyon* cell has been undergoing changes, becoming thicker and softer and more and more capable of solution, and by the time the gonidia are formed it is enlarged and cracked, so that room is afforded them to separate a little distance from one another within the parent cell. Now the movements are said to become more active—a trembling jerking which has been compared to the ebullition of boiling water. There is, however, with this a very slight change of space, and in a very short time the gonidia arrange themselves so as to form a little net within the parent cell, a miniature in all important particulars of the adult *Hydrodictyon*. The primary cell wall now becomes more and more gelatinous, and soon undergoes complete solution, so that the new frond is set free in its native element. As previously stated in my investigations, I have never seen the peculiar motion above described, the newly-formed gonidia simply separating and arranging themselves without my being able to perceive any motion, or exactly how they fell into position.

It is evident that when the species is multiplied in the way just described the birth of the new frond is consentaneous with the death of the old cell. But when the *Hydrodictyon* disappear in the fall, it is months before they reappear in the spring. It is, therefore, evident there must be some other method of reproduction. This slow development of new fronds takes place, according to Pringsheim, by means of little motile bodies which he calls *Dauerschwärmer*, which has been translated in English *Chronispores* (stato-spores, Hicks). M. Braun stated already some years since that, sometimes, instead of the *Hydrodictyon* producing the ordinary reproductive bodies (macrogonidia) there are formed in the cells much smaller and more active bodies, the *microgonidia*. The changes which occur in the production of these are very similar to those already described as happening when the macrogonidia are formed. When the *chronispores* are once formed, however, they, instead of uniting together, escape in a free, distinct condition with the water. They are now small ovate bodies, with a large anterior transparent space, to which are attached a pair of cilia, and their life and history, according to Pringsheim, is as follows. For a few hours they move about very actively in the water, and then, dropping their cilia, and acquiring an outer cellulose wall, pass into a quiescent stage, in which they closely resemble *Protococcus* granules. They are capable of living in this state for a long time, if kept in water. They can also endure dessication if the light be excluded during the process, but, if it be present, they wither and die, and cannot be revivified.

After a longer or shorter period, but never shorter than three months, according to Pringsheim, they recommence their life, provided they be in water. For four or five months after this the chief change consists simply in an increase in size. The dark green protoplasm is arranged around the exterior of the cell, within are the more fluid colourless contents; the whole body still looking
like a *Protococcus* cell. After a size of about \( \frac{1}{10} \)th \( \text{m.m.} \) is attained, the endochrome divides successively into several portions. The external layers of the surrounding wall now give way in some spot, and allow the inner layers to protrude and form a sort of hernial sac, into which the several endochrome masses soon pass, at the same time assuming the well-known characters of true zoospores. From two to five of these bodies are thus produced out of each original microgonidium. They are large, ovate, biciliate, and, generally, soon escaping from the hernial sac, move about actively in the water for a few minutes. Sometimes, however, they settle down within the generative utricle. In either case, after a little time, they become motionless, lose their cilia, and develop into polyhedral cells, which are structurally remarkable for having their angles prolonged into long horn-like appendages. Under favourable circumstances, at the end of a few days, the bright green endochrome of these undergoes similar changes to those described as presaging the production of the microgonidia, and is finally formed into zoospores, which, in from twenty to forty minutes, unite, within the polyhedron or large cells, into a *Hydrodictyon*, which is finally set free by a solution of the cellulose coat of the polyhedron. The network thus formed differs in no essential way from that which arises in the better known way, except that it is composed of much fewer cells. It is generally a closed sac; but when the polyhedron, out of which it is developed, is small, it is sometimes merely an open network. Its after history appears to be identical with that of the ordinary *Hydrodictyon* frond.

See also Micrographic Dictionary, under *Hydrodictyon*—and Hassall’s British Fresh Water Algae, p. 225, plate lviii.

**LABRELLA PTARMICÆ.**

The following is the description of a parasite on *Achillea ptarmica* gathered at Ealing, and sent for determination by G. D. Brown, as probably a species of *Phacidium*, which, externally, it greatly resembles:


**Innate**, black, somewhat shining, rounded or ovate; asci cylin-
drical or subclavate; sporidia minute, ovoid.

On leaves and stems of *Achillea Ptarmica*.

The Rev. M. J. Berkeley observed this many years since on in-
fected plants of *Achillea* which he brought home from France, and cultivated in England; but it was not included in the British Flora, as the fungus was manifestly brought over with its host. This may also be the case in the present instance. *Schizothyrium* is perhaps the most accurate determination, but the fungus is better known as *Labrella*. The former genus is classed with the *Phacidiaceae*. 
SPHÆRIACEI BRITANNICI.

“A Fasciculus of one hundred British Sphærias, collected, named, and mounted by CHARLES B. PLOWRIGHT, King’s Lynn, 1873,” contains the following species:

2 Epiplœe typhina. *Berk.*
3 Hypoorea gelatinosa. *Fr.*
4 Hypomyces aurantius. *Tul.* Dunoon, Scotland.
6 Nectria pulicaris. *Tul.* King’s Lynn.
7 Nectria cinnabarina *Fr.*
8 Nectria coccinea. *Fr.* Dunoon, Scotland.
9 Nectria sinopica. *Fr.* Shrewsbury.
10 Nectria inaurata. *B. & Br.* King’s Lynn.
11 Nectria epispæria *Fr.*
12 Xylaria polymorpha. *Grev.*
13 Xylaria hypoxylon. *Grev.*
14 Xylaria carpopilia. *Fr.*
18 Hypoxylon multiforme. *Fr.* Dunoon, Scotland.
19 Hypoxylon argillaceum. *Fr.* King’s Lynn.
20 Hypoxylon fuscum. *Fr.*
21 Hypoxylon rubiginosum. *Fr.* (?)
23 Entypa flavo-vires. *Fr.*
25 Dothidea ulmi. *Fr.*
26 Dothidea junci. *Fckl.* Dunoon, Scotland.
27 Dothidea graminis. *Fr.* King’s Lynn.
29 Dothidea rosea. *Fr.*
30 Dothidea filicina. *Fr.*
31 Diatrype quercina. *Tul.*
32 Diatrype stigma. *Fr.*
33 Diatrype disciformis. *Fr.*
34 Diatrype bullata. *Fr.*
36 Diatrype strumella. *Fr.*
37 Diatrype nucleata. *Curr.*
38 Diatrype ferruginea. *Fr.*
39 Diatrype frangulae. *Pers.?*
40 Melanconis stilbostoma. *Tul.*
41 Valsa prunastri. *Fr.*
42 Valsa stellulata. *Fr.*
43 Valsa syngenesia. *Fr.*
44 Valsa dissepta. *Fr.*
46 Valsa ambiens. *Fr.*
47 Valsa salicina. *Fr.*
48 Valsa pulchella. *Fr.* Ringstead Downs.
49 Valsa quaternata. *Fr.*
50 Valsa leiphemina. *Fr.*
51 Valsa tiliae. *Tul.*
52 Valsa detrusa. *Fr.* Shrewsbury.
53 Cucurbitaria laburni. *De Not.* King's Lynn.
54 Cucurbitaria elongata. var. simplex. *Grev.* King's Lynn.
55 Cucurbitaria partii. *De Not.*
57 Cucurbitaria cupularis. *Fr.* King's Lynn.
58 Gibbera Saubinetii. *Mont.*
59 Massaria bufonia. *Tul.*
60 Lophiostoma arundinis. *De Not.*
61 Sphaeria aquila. *Fr.*
62 Sphaeria phæostroma. *Mont.*
63 Sphaeria tristis. *Tode.*
64 Sphaeria brassiæ. *Klotsch.* Wellington, Shropshire.
66 Sphaeria spermoïdes. *Hoffm.*
68 Sphaeria pomiformis. *Pers.*
70 Sphaeria mammaæformis. *Pers.*
71 Sphaeria obducens. *Fr.*
73 Sphaeria sporormia. *Cooke.*
74 Sphaeria stercoraria. *Sow.*
75 Sphaeria pulveracea. *Ehr.*
76 Sphaeria myriocarpa. *Fr.*
77 Sphaeria lonicerae. *Sow.*
78 Sphaeria crinigera. *Cooke.* Dunoon, Scotland.
80 Sphaeria apiculata. *Curr.*
81 Sphaeria spiculosa. *Pers.*
82 Sphaeria inquilina. *Fr.*
83 Sphaeria millepunctata. *Grev.*
85 Sphaeria clypeata. *Nees.*
88 Sphaeria acuminata *Sow.* King's Lynn.
89 Sphaeria acuta. *Moug.*
90 Sphaeria derasa. *B. & Br.*
91 Sphaeria sabuletorum. *B. & Br.* Wolferton Beach.
92 Sphaeria pinodes. *Blox.* Shrewsbury.
TWO LICHENS FROM BEN LAWERS.

By Dr. J. Stirton.

The Annual Report and Transactions of the Glasgow Society of Field Naturalists, just published, contains a notice of two lichens from Ben Lawers, collected in June, 1871, which are new to the British Flora.

*Solorina bispóra*, Nyl. (Syn. p. 331). The spores in size and shape are characteristic, as well as the peculiar granular or isidiosé appearance of the thallus in the neighbourhood of the apothecia. This lichen is more allied to *S. limbata* than to *S. saccata*. This is the first intimation of its existence in any other locality than that on the Pyrenees.

*Lecidea didymospora*, Stirton. Nearly allied to *L. sanguinaria*, but differing in having two spores in each ascus, which are, besides, only half the size of those of the latter, and oval in shape instead of oblong. A section of the apothecium shows, also, a perfectly pellucid appearance, instead of the greenish tinge which pervades the hymenium of *L. sanguinaria*, and the thallus is more continuous. The chemical reactions of the hymenium, epispore, and thallus are identical in both. The discoverer remarked, besides, that this lichen is as much entitled to a specific place as *Lecidea geminata*.

*Callithamnion hormocarpum*. Holmes.—Dr. J. E. Gray writes us that in his opinion this is identical with *Callithamnion versicolor*, an identity which Mr. Holmes is not yet convinced of, as far as his experience of the latter plant extends.

The Fungus Meeting of the Royal Horticultural Society at South Kensington, is fixed for the 1st of October, and the Fungus Foray of the Woolhope Club is finally appointed for Thursday, October 23rd, at Hereford. This latter is a correction of the date which appeared in our last number.
Sphagnum Austini.

In May, 1873, Dr. Braithwaite gave excellent figures, with a description of this Sphagnum, in the "Monthly Microscopical Journal," concluding with the observation, "I am indebted to Prof. Lindberg for specimens of this fine Sphagnum, which we may reasonably hope will some day be found in Scotland."

In the "Journal of Botany" for September appears a letter from Dr. D. Moore to the following effect:—"I enclose specimens of Sphagnum Austini, Sullivant, which Dr. Lindberg recognised among a collection of Mosses which I made in the Island of Lewis in 1868. I had supposed the plant to be a remarkable variety of S. cymbifolium, differing so widely from the typical form of the species as to warrant me in making a diagnosis of its characters. It is geographically interesting to find a species not rare in North America inhabiting the Western Isles of Scotland. It grew on extensive flat boggy moors, and forms large hummocks sometimes 18 inches to two feet above the surrounding level.

The following is Dr. Braithwaite's description:—


Dioicus; much resembling Sph. papillosum and the American Sph. Portoricense, more or less ochraceous. Stems frequently dichotomous, dark-brown, the bark composed of four strata of cells, the outer quadrato-hexagonal, without fibres, the inner with very fine fibres and large pores.

Branches closely placed 3 in a fascicle, 2 divergent, attenuated at points, 1 pendent, short, slender, appressed to stem; cortical cells with fine spiral fibres. Cauline leaves, lingulate, obtuse, minutely fringed at apex, the areolation as in Sph. cymbifolium. Ramuline leaves, closely imbricated, ovate-oblong, concave, more deeply coloured at apex, which is also less cuneate, but with cells strongly projecting on the back; cells large, the hyaline filled with fibres, and having several large foramina. The chlorophyllose obtusely trigonous, projecting between the hyaline on the concave surface of the leaf. The internal wall of the hyaline cells, where united to the chlorophyllose, densely crested with prominent papillæ.

Fruit but little exserted; peduncular bracts oblong, convolute, minutely fimbriate at the rounded apex, cells of the lower third, empty, narrow, parenchymatous, above normal, more or less fibrous, with large pores. The adjacent walls transversely s.striate by the large papillæ. Spores ferruginous.


Anthocexos laevis.—During a visit in July to the south-west of Ireland, with Dr. Lindberg, we found this rare species, not before known to grow in Ireland, in one place only near Ventry, co. Kerry.—D. Moore, in Journ. Bot.
CLASSIFICATION OF THE SPhÆRIACEI.

BY THE EDITOR.

The observations of Mr. C. B. Plowright in the last number of "Grevillea," will be interesting and useful to many of our readers, and demand but little comment. It must be expected that different workers will have different views concerning those somewhat elastic terms "Genera" and "Species." Far be it from us to assume dogmatically in this instance, and in others of a similar character, that we are right, and those who differ from us are wrong. Still, there is an observation or two which we would offer on the principles of classification generally, and on this classification of the Sphæriacei in particular that may be worthy of consideration. In the first place, is it true that because a genus, like that of Sphæria, is so large, it becomes a duty to lessen it, by splitting it up into smaller genera? That would seem to be the inference to be drawn from the paragraph on page 46. It seems to us that however inconvenient a large genus may be, some better grounds must be sought for its "modification." Before any attempt is made at the "modification" of a genus, we apprehend that it would be beneficial to have one or two recognized principles upon which to proceed, and, in the classification of the genus Sphæria under new groups, having the value of genera, there seems to be one important feature which should be kept in mind. The form and segmentation of sporidia alone may be of specific, but cannot at the same time be of generic value. Want of attention to this which we hold to be a cardinal doctrine, has given us a host of names for proposed genera of Sphæriacei which serve more to encumber and mystify a difficult subject than any other purpose. It may be useful to recognize groups of species having similar sporidia, as in Raphidiospora, and call those groups by any convenient or characteristic name, so long as they are recognized at their proper, and not invested with a fictitious value. We make these remarks less in opposition to our good friend Mr. Plowright than in extenuation of our own sins in not adopting in the "Handbook" a larger number of continental genera. We cannot accept the majority of genera in Sphæria and Peziza adopted by Fuckel and others, because they are established on insufficient characters, derived solely from the sporidia. Perhaps the genus Gnomonia, including such rostellate species as Sphæria gnomon, claims recognition, but with that exception we do not yet see any good reason to amend the classification we have adopted. The division of Sphæriacei into Vegetabilicoli and Fimicoli, is, we fear, a very weak point in Fuckel's classification.
TWO NEW BRITISH AGARICS.

Described by Professor Elias Fries.

Agaricus Worthingtoni. Fr.—Pileus slightly fleshy, campanulate, then convex, viscid (?), even, golden yellow; stem fistulose, slender, sub-flexuose, turquoise blue; gills adnate, ferruginous brown. Fries in Journ. Bot. (1873), p. 204. A. (Stropharia) albo-cyanus, Saund. & Sm. Myc. Ill., t. 29, f. 1-5 (not Desm.)


Differing from Ag. albo-cyanus, in which the stem is soft, hollow, 3-4 lines thick, and shorter; pileus fleshy, convex, then plane, milky-white, then becoming verdigris-green; gills whitish, then brownish. Spores 0.0027 × 0.0017 in.


Growing on the ground in patches.

Ag. majalis, Fr., differs from this, especially in the slender stature, fistulose stem, membranaceous pileus, which is campanulate on opening, and cinnamon, and in the gills being free, crowded, and crenate.

LEIGHTON'S LICHEN-FLORA OF GREAT BRITAIN, &c.

Being desirous to keep my folio interleaved copy of this work duly posted up with the new species, varieties, and localities continually added to our British Lichens, with a view eventually to a more perfect and comprehensive third edition, or at all events a supplement to the work, I shall feel greatly indebted to lichenists generally if they will obligingly communicate to me, either by loan or gift, characteristic and authentic specimens of any new finds, and any other new information relative to our Lichenology. It is only by this mutual co-operation that anything approaching completeness or perfection can be obtained, and it is confidently hoped that there will be no reluctance, but rather a willing readiness, among my fellow lichenists, to aid and assist with the characteristic liberality of all real scientific students, in every possible way at their command towards this desirable consummation. Any specimens entrusted to me for examination will invariably be carefully and speedily returned to the owners, and I shall myself at all times be most willing in return to supply their desiderata, so far as my duplicates enable me to do so.

Address Rev. W. A. Leighton, Luciefelde, Shrewsbury.

Aug. 25, 1873.

W. A. LEIGHTON.
Spilocœa pomi. Fries.—This fungus has made its appearance this autumn in what would seem to be stronger force than heretofore, threatening some crops with destruction. It appears at first beneath the cuticle of the fruit, then breaks through in circular, often confluent, patches, of a dark brown colour, bordered by the lacerated margin of the cuticle. The microscope reveals a mass of short septate threads, which are simple, and closely packed together, each one terminating in an ovate, caducous joint, which has all the characters of a spore, and ultimately becomes at least uniseptate. The threads and spores are slightly coloured of a smoky-grey tint. From these particulars it will be seen how near Spilocœa pomi approaches to such species of Cladosporium as C. dendriticum, of which it is probably only a condition. In the "Gardener's Chronicle" for Sept. 20th, it is supposed to be a state of Helminthosporium pyrorum. At any rate, mycologists seem to be agreed that it is not an autonomous plant, and is closely related either to Cladosporium or Helminthosporium. From our own examination, we are at present more disposed to refer it to the former than to the latter. Further investigation, at a later period, might, perhaps, modify this opinion, but at present its characters seem to approximate so closely to Cladosporium dendriticum, especially the variety orbiculatum, that we consider the probabilities strongly in favour of that species.—Ed. Grevillea.

CRYPTOGAMIC LITERATURE.

Wood, Dr. Horatio.—A contribution to the Fresh Water Algae of North America, with plates. ("Smithsonian Contributions to Knowledge.")

Langenbach, Dr. Gustav.—Die Meeresalgen der Inseln Sizilien und Pantellaria. Berlin.

Moore, Dr. David.—Synopsis of all the Mosses known to inhabit Ireland, up to the present time, from the "Proceedings of the Royal Irish Academy," vol. 1, ser. 2.

PLOWRIGHT, C. B.—A list of the Fungi known to occur in the county of Norfolk, and

Beverley, Dr. Michael.—On the Edible Fungi found in Norfolk, in the "Transactions of the Norfolk and Norwich Naturalists' Society for 1872-3."


Lindsay, Dr. Lauder.—General Index to Memoirs of the Spermogones and Pycnides of Lichens.
Fig. 1. GEASTER STRIATUS. D.C.
B. C. D, half actual size. Section (A) and mouth (E) real size.
Spores \( \times 700 \) diam.

Fig. 2. GEASTER BRYANTII. B.
Half actual size. Section of Peridium (A) and mouth (C) real size.
Spores \( \times 700 \) diam.
Fig. 1. Geaster limbatus, Fr.
Half actual size. Section of inner peridium real size. Spores $\times 700$ diam.

Fig. 2. Geaster fimbriatus, Fr.
Half actual size. Section real size. Spores $\times 700$ diam.
NOTICES OF NORTH AMERICAN FUNGI.

By the Rev. M. J. Berkeley, M.A., F.L.S.

(Continued from Page 53.)

*Didymium luteo-griseum.* B. & C.—Pennsylvania, Michener, is apparently the same species.


Sessile, obovate, brown, scattered or laterally connate, columella distinct, apparently of a loose texture; flocci white; spores black.


Globose or somewhat reticulated by confluence, attached to a membranous creeping hypothallus, which has some resemblance to that of Physarum connatum; brick-red; minutely granulated; flocci white; spores black.


Sessile, fasciculate, obovate; springing from a yellow cellular hypothallus, somewhat resembling that of the last species; brown, with a yellow pulverulent bloom; spores black.


Stem short, but varying in thickness; dark purple; peridium globose, lilac, together with the abundant flocci. Two forms occur, one of which is smaller and more graceful.

At first forming a yellowish green mucus, which spreads over the surface in patches; 12-18 inches across, interlaced with veins, from which spring the coffee-coloured attenuated stems which penetrate the globose lilac-blue peridia; flocci abundant; yellowish; spores black. Physarum roseum, B. & Br., is much brighter in colour, but nearly allied.


Stem equal, brick-red; head globose, delicate yellow when free from the dark spores; flocci yellowish.


Sessile, globose; somewhat depressed; tawny; the upper part soon breaking off; flocci springing from the base, tawny like the peridium.


Gregarious, minute, shining, yellow, globose, sessile; flocci few even and globose granulated, spores 0006 in diameter, sometimes rather irregular.


Peridia globose, very shortly stipitate, scattered, or more generally crowded; white, wrinkled, so at first to look like a Didymium; flocci white, reticulated; spores 0004 in diameter, somewhat obovate, granulated above, about seven in a group.

*Badhamia utricularis.* B. & Br.—Physarum utriculare. Fr. Penns., Michener. No. 4408. No. 3553, on cherry, from the same locality, is apparently a very distinct species, with a yellow peridium; but the specimens are too imperfect to characterise.

*Badhamia decipiens.* B.—Car. Inf., No. 1333.


About ½ of an inch high; stem compressed, flexuous, brick-red;
peridium oblong, sub-cylindrical, umber, sprinkled with shining orbicular particles, opening with a little orifice; spores minute. A very curious plant, of which I have but few individuals. The margin of the spores is not marked with transverse lines as in \textit{T. pezizoides}, Jungh.


Extremely minute; stem very short; peridium cyathiform; rufous below; margin white. \textit{C. floriforme}, Schwein, is a \textit{Trichia}.

* \textit{C. globosum}. \textit{Fr.}—Car. Inf. No. 3841.

* \textit{Dictygium microcarpon}. \textit{Schrad.}—Car. Sup. No. 60.


Differs from the normal form in the looser network and paler larger spores.


About \(\frac{1}{12}\) of an inch high; stem much attenuated above; peridium nodding; slightly venose at the persistent base, purple; capillitium reticulated; the angles of the network incrassated, purple as well as the spores.


Very minute, \(012\) high; stem short, straight; peridium obovate, not venose below; capillitium loose, not incrassated at the angles.


Stems short, sulcate, fasciculate; peridium oblong, pale, as well as the smooth not echinate threads. Much smaller than any state of \textit{A. flava}.  

\textit{NOTICES OF NORTH AMERICAN FUNGI.} 67


Common stem, thick, sulcate; peridia collected into an hemi-spherical mass; spores pinkish umber, boat-shaped.


Closely resembling *L. fragiformis*, but the spores in that species are globose and minutely echinulate, and ′00028 inch in diameter, while in the present they are shaped as in *Licea stipitata*, ′0002.


Spreading widely, thin, olivaceous, clothed with white meal; spores olive. ′0002 in diameter. A very distinct species.


Effused, black, of a tawny brick-red within; spores globose, ′0003 in diam.

* Lachnobolus cribrosus.  *Fr.*—Car. Inf., No. 419.


Flat, of a tawny yellow, distinctly circumcised at the base; spores fusiform, ′0005 long. Very like *P. populina*, but the spores very different.


Crowded, irregular, angular; flocci bright yellow, minutely granulated; spores globose, then broadly elliptic. This species comes very near to *P. populina*, but appears to be really distinct.


Peridia creeping, flexnous, umber, flocci pale yellow, crenate; spores globose, ′0004 in. diameter.
* Diachea elegans. * Fr.—Car. Inf. No. 1157. * D. leucostyla, Schwein. is the same.


Stem filiform, penetrating to the apex; peridium cylindrical, brown; capillitium very delicate, palld; spores flesh-coloured. A small, delicate species.


* Stemonitis oblonga. * Fr.—Car. Sup., Curtis. No. 244.

* Stemonitis obtusata. * Fr.—Alabama, Peters. No. 6067.


Stem slender, black, shining; peridium globose, shining like a pigeon’s breast; capillitium purple.


Produced under the bark, in which it makes little pustules, at length more or less free, sporophores many times longer than the short, oblong, minute spores. Apparently the same species occurs on tender shoots of Juniperus Virginica. Car. Sup., No. 6468, but the perithecia are more scattered.

THE NATURAL HISTORY OF THE BRITISH DIATOMACEÆ.—(Parts 1, 2, 3.)—By A. S. Donkin, M.D.

London—Van Voorst. 1873.

Perhaps no branch of natural history, particularly that relating to the lower organisms, has occupied the attention of the microscopist more than the Diatomaceæ.

The synopsis of British Diatomaceæ, by Professor Smith, was first, and indeed the only English work in which any scientific arrangement was attempted, and since its publication (20 years ago) very many new species have, from time to time, been published in various periodicals; a new edition of Smith’s work, or a new synopsis, therefore became highly desirable. Dr. Donkin has chosen the latter alternative, and adopts an arrangement of his own. He proposes to divide the work into two portions, viz., the Introduction, which will contain the natural history, classification, structure,
mode of development, and method of collecting. The second division, or synoptical portion, will give an accurate and succinct description of all known British genera and species with their synonyms.

The synoptical portion is to be completed first. The first part commences with the Naviculeæ, which, the author says "are by far the most numerous family of the Diatomaceæ, of which they are typical, both in the structure of the frustule and the peculiar power of motion they display. . . . Two distinct and well marked types of form or development are met with amongst the Naviculeæ; in the first the valve is depressed or flattened, broad or short (in proportion to its width), the convexity being slight and confined to near the margin. In the second the valve is elevated or convex and narrow (in proportion to its length), the convexity being great and extending from the margin to the medium line, where it is most prominent.

"In reconstructing this genus and rearranging its numerous species I have adopted these two types as the basis of classification."

The author follows Kützing and other diatomists in combining Navicula and Pinnularia, and he also refers several species of Stauroneis to the genus Navicula, and he is probably right in so doing.

He retains Professor Smith's term "side view" (S.V.), but abolishes "front view" (F.V.), and substitutes M.V., signifying the view of the frustule exhibiting the median connecting zone and the margin of the valves. This change appears to us to be unnecessary, as the former term was sufficiently intelligible, and has been in use for many years; if any alteration were desirable on account of simplicity, the letters F and V would be all that are required, the former signifying the frustular, and the latter the valvular view.

In the Synopsis of British Diatomaceæ, 83 species of Navicula and Pinnularia are described, 60 of which are figured. In the first three parts of the present work 104 species are figured and described, and probably one or two more parts will be required to complete the genus.

We regret to say that the plates are of very unequal merit—those in Part 2 are particularly unsatisfactory—for example N. cuspidata is represented with much coarser striae than N. fulva, although the former is said to have 36, and the latter only 30 striae in .001. N. serians is unrecognisable, the wavy longitudinal striae, its most characteristic feature, not being shown. (The Author says these longitudinal markings are "plices or folds on the valve;" this, however, is not the case. The peculiar appearance of the longitudinal striae are caused by the granules of which the transverse striae are composed; being placed at irregular intervals, so that the granules in one line of striae are not opposite those above and below it.) A similar arrangement occurs in the large N. rhom-
boides (sporangial form of Dr. Lewis). The curious decussating striae of N. rostellum (in fact, no kind of striae are figured) are not shown. In the description they are stated to be indistinct, 80 in '001; under a power of 500 diameters they are easily resolved, and are certainly not more than 55 or 60 in '001.*

Having thus alluded to the defects in the plates, we proceed to the more agreeable task of calling attention to their merits; excepting those just named, and two or three others, they are far more correct than those in the Synopsis. We would particularly draw attention to the following forms:—N. hebes = N. obtusa, Sm. N. rostrata = N. tumens, Sm. (the figure in the Synopsis is totally unlike the actual form). N. alpina, N. latiuscula = N. patula, Sm., N. nobilis and N. major are all admirably represented. In concluding these brief and imperfect remarks on Dr. Donkin’s undertaking, we beg to express our best wishes for its success, and hope the publication of the parts will now proceed uninterruptedly.

F. Kitton, Norwich.

*We happen to know that the principal cause of the delay in the publication of the parts has been owing to the difficulty of obtaining satisfactory drawings.

ADDITIONS TO THE LICHEN FLORA OF GREAT BRITAIN.

By Dr. J. Stirton.


2. Lecidea botryiza. Nyl. Sp. nova.—Thallus cinereo-virescent, squamuloso-pulverulent, thin (K—C—). Apothecia small, simple or aggregate, prominent, almost spherical, pale-brown to dark-brown; spores 8, colourless, elliptical, simple ('008 X '004 m.m.) ; hymenium colourless, pellucid; paraphyses not discrete, apices colourless; hypothecium thick, dense, brownish-black; gelatina hymenea cæruscent then vinous-red with iodine. Ben Voirlich, 1871.


5. Lecidea subincompta, f. oribata. Nyl.—Ben Lawers, 1871.


Thallus whitish, visible here and there, granular; apothecia at first small and very concave, afterwards flat and expanded as well as enlarged. I am inclined to refer Lecidea scapanaria (Carrington) to this Lichen.

ON THE DESMIDIACEÆ—BY DR. HORATIO C. WOOD, JUN.*

Of all the fresh water Algeæ, with the exception of the diatoms, this family has attracted most attention, owing, not only to the beauty and variety of its forms, but also to their universal presence and abundance, and the ease with which their most wonderful life-histories are observed. They are exclusively, as far as known, denizens of fresh water, and preferably that which is pure and limpid. Although Mr. Raffles states that they never grow in stagnant water, I have often found them in great abundance in such, yet never in that which was actually putrid. The same authority is also too sweeping, at least as far as this country is concerned, in stating they are never found in woods, although they are really most abundant in the open country. My experience has taught me to look for them in brick-ponds, small mountain lakes, springy fens, ditches, and, in the fall, growing among mosses and in the thick jelly composed of unicellular algæ on the face of dripping rocks; or to sum up in a word, they dwell in quiet shallow waters, for I have never found them in rapidly moving or very deep water.

The single cell of which a Desmid is composed is mostly divided into two very marked similar portions, the exact counterparts one of the other, which by some have been asserted to be distinct cells. Their close union and connection, and their inherent oneness are, however, so apparent that it is needless here to spend time in demonstrating that they really are halves of one individual cell. They contain together all the parts found in the typical vegetable cell; an outer cellulose wall, chlorophyllous protoplasm, a nucleus, starch granules and semi-liquid contents. The cell wall, or cytioderm, as it is called in this memoir, varies in thickness and firmness. During life it is mostly, if not always, colourless; but in certain species in the dead empty frond is of a reddish yellow. The markings upon it are various, and are not unfrequently altogether absent; they are such as fine or coarse punctations, granulations of various size, striae, furrows or elevated ribs, tubercles, obtuse or sharp, simple or forked spines, hair-like processes, umbonations, &c. These markings are within narrow limits constant in each species, and more or less peculiar, so that they afford valuable characters to the systematist. The cytioderm itself is mostly composed of cellulose, free from appreciable inorganic matters: but in certain species contains a large amount of silex. Thus, according to De Bary, if Closterium lunula be carefully burnt upon a slide, a perfect hyaline silex cast of the cells is left.

The chlorophyl is variously placed in the cell, sometimes it is arranged in lamina, sometimes in spirals, sometimes in the form of

radii from a central mass. These different methods afford good generic characters, and will be dwelt upon more in detail under the various genera. The colour of the chlorophyl during active life is a vivid green, which, as the vital forces lessen, changes to a faded yellowish tint.

Naegeli and others affirm that there is always a central nucleus in the Desmid, and probably do so with truth, although in many instances I have found it impossible to demonstrate its presence from the size and opaqueness of the frond, crowded with endochrome, &c. In a large number of cases, however, it is very apparent.

As ordinarily viewed under the microscope, the two most striking peculiarities presented by these little plants are the motion of the whole Desmid in the water, and the various movements exhibited within the fronds. The general movement is most apparent in the larger species, which exist free and distinct in the water, especially in the boat-shaped Closteria. It mostly consists of a steady, stately, slow onward movement, with sometimes backward oscillations. By virtue of it, Desmids in a bottle will often congregate in such positions as are most exposed to light. There have been various theories advanced as to the cause of this motion. Ehrenberg believed that he had found foot-like processes protruding from the end of the frond, and giving the motile power. Others, such as Rev. Mr. Osborne and Mr. Jabez Hogg, have attributed the movements to the presence of cilia, but I think have failed so entirely to establish this that their views are more than problematical. That the motion is due to vital actions taking place, especially under the action of light, is as much as can be at present affirmed with any certainty, though it is probable that the immediate agents are endosmotic currents of gas or water.

The movements of the contents within the cells are chiefly of two kinds. Taking Closterium lunula as an illustrative example, there will be found, on examination with an 1/4th objective, a narrow, very transparent, and, therefore, often not very apparent layer or zone lying immediately within the cell wall, between it and the endochrome, and dipping inward in the middle of the frond, so as to communicate with the nucleus. In this zone are protoplasm, watery fluid, and scattered granules. In the ends of the fronds the different portions of this zone, meeting and widening, fill up the whole of the cavity, and, within the space thus occupied by them, there is a globular, sharply defined, still more transparent vacuole. This, some have thought to be a closed sac, with a distinct wall, but it seems really to be a vacuole lying in the midst of the inner protoplasm, which, with a few green granules, occupies more or less completely the transparent zone already described. Sometimes the chlorophyl encroaches upon this zone at the ends so as to, more or less, completely surround the vacuole, within which are always found watery fluid and granules. In the protoplasmic zone, and its vacuole, active movements are probably always present during
active life. Streams of protoplasm appear to be constantly passing to and fro between the nucleus and the ends of the cell along the outer zone, and granules can be always seen passing backwards and forwards with an unsteady motion.

When streams of protoplasm are setting very actively from the centre towards one end, there will often be an accumulation of the protoplasm there, and a consequent decided lessening in the size of the vacuole, which will again expand as the return currents arouse themselves. Within the vacuoles are seen more or less numerous smaller or larger granules in active, busy motion, swarming over and about one another with an unsteady hurrying to and fro.

A form of motion, similar to this in appearance, but probably of different significance, is seen in most Desmids when in an unhealthy, feeble condition. I have seen it most marked in Cosmarium margaritaceum. In such fronds the endochrome has lost its deep green colour, and become shrunken, and lying within it is a great space containing myriads of minute, blackish particles swarming about actively. This peculiar state and appearance is by no means confined to the Desmids, for I have seen it very highly developed both in species of Spirogyra and Edogonium. It appears to be connected with decay. Is it possible that these minute particles are foreign to the plant, vibronic in nature?

In regard to the nature of the movements seen within a healthy Desmid, some have viewed them as exceedingly mysterious, the result of the presence of cilia, &c.; but these views have been so thoroughly exploded that it is scarcely necessary even to mention them here. The movements are, in truth, precisely parallel to the so-called cyclosis of the higher plants. Protoplasmic germinal matter, wherever it exists, be it in animal or vegetable, has, as one of its distinguishing characters, the power of active, spontaneous, apparently causeless movements, and it is simply the carrying out of this power or attribute which has attracted so much attention in the Desmids, because it is in them so readily seen.

There are, in this family, two distinct methods in which the species are multiplied, one with, the other without, the intervention of anything like sexuality. The non-sexual method of increase is really a modification of an ordinary vegetative process, a peculiar cell multiplication by division. In such fronds as those of the genus Cosmarium, which are composed of two evident halves connected by a longer or shorter isthmus, the first step in the process is an elongation of this neck. In a very short time there appears around the centre of this a constriction, and, I believe, an actual rupture of the outer coat. By this time a new wall has formed inside each half of the isthmus, and stretches also across its cavity, forming, with its fellow, a double partition wall, separating the two halves of the old frond. Rapid growth of the newly formed parts now takes place, the central ends become more and more bulging as they enlarge, and in a little time, two miniature lobules have
shaped themselves at the position of the old isthmus. These are, at first, small, colourless, and destitute of all markings, looking, as Mr. Ralfs says, like condensed gelatine. They, however, rapidly increase in size and firmness, their contents assuming a green colour, and their walls taking on the peculiar markings of the species. At last, the parts thus formed having assumed the shape and appearance of the original lobules, the two fronds, which have been developed out of one, separate mostly before the new semi-cells have acquired their full size. What part the nucleus has in the process just described, I have never actually demonstrated, but have little doubt but that it undergoes a division in the very commencement, so that the new nucleus of each secondary frond is formed out of one-half of the old one.

In proportion as the form of the Desmid becomes simpler, so do the peculiarities of its cell multiplication become less. In those species which are simple cylindrical cells, there appears to be nothing peculiar in the method of dividing, which, however, always takes place through the centre of the cell, and subsequent growth occurs, generally, only in the new found part.

True sexual reproduction apparently does not take place as freely in this family as in the former process, for whilst I have seen hundreds of cells undergoing the latter, it has not been my good fortune to meet with conjugating specimens on more than two or three occasions.

The process has, however, been studied very closely by De Bary, Braun, Hofmeister, and others, and appears to consist generally in a rupture of the outer wall of two cells, and the protrusion of delicate processes from an inner, often newly-formed coat, with subsequent union of these, and consequently of the two cells, and afterwards a condensation of the contents in the enlarged connecting passage. The connecting passage between the fronds is really a sporangium in which the spore is perfected, the contents of the cell finally condensing it into a firm globe, and secreting around themselves a thick coat.

The after history of this spore has been very successfully studied by M. Hofmeister, whose observations were made upon *Cosmarium tetraophthalmum*, which he watched conjugating and forming a sort of resting spore, which was perfected early in the month of July. This was composed of a thick outer coat and green endochromes lying within as a distinct ball, nowhere in contact with the investing membranes. In three weeks time this chlorophyllous protoplasm had divided into ellipsoidal masses, or primordial cells, which soon surrounded themselves with cellulose walls, and became distinct free cells in the granular fluid which filled the cavity of the original spore. In August each of these masses was divided into two, and in the month of September the process was repeated, so that out of the original endochromes eight strong flattened primordial cells were produced. Division in some specimens ceased here, and in others took place once more, so that by the following spring all of the
living sporangia contained eight or sixteen green daughter cells, each of them discoid in outline, with a strongly marked central notch. These daughter cells were finally set free by the solution of the spore wall, as Cosmaria of minute size, but agreeing in all other characters with the specific form to which they belonged.

According to Braun, in the larger, more or less lunate Closteria, conjugation occurs in the following method: Two fronds approach one another in such a way that they lie back to back. In the middle of each of them there then appears an annular line or trench reaching through the cell wall, and accompanied by a distinct separation of the endochromes into two halves. Whilst these changes have been progressing there has also formed a new double wall at the position of the trench, so that out of the two Closteria two pairs of separate equal cells have been formed. Near to the larger or central end of each of these now appears a pouting transparent nipple-like process. The corresponding opposing processes enlarging and meeting coalesce, so that the upper half of one Closterium, in the form of a daughter cell, is finally united with the upper half of the other Closterium, and the two lower halves are also joined together. Thus from a single pair of fronds arise two conjugating pairs of cells, and finally two sporangia, in each of which a spore is perfected.

This process does not seem, however, to be universal amongst the Closteria, for in many, if not all, of the smaller species, a pair of fronds produces a single sporangium.

In the genus Palmoglaea, in which I have had an opportunity to study the development of the spores, the process closely simulates that seen in certain of the Spirogyra. The contents of the cells first became broken up and confused, and almost simultaneously the nucleus disappeared, the cells became swollen at one side, and slightly bent backward, so as to form jutting processes, which meeting grew together, became confluent, and developed into a sporangium much larger than either of the parent cells. Into this sporangium the contents of the latter passed, and soon became converted into a thick-walled spore, often completely filling the cavity, and apparently with its wall adherent to that of the latter.

BRITISH GEASTERs.

In the columns of the "Gardener's Chronicle," Mr. Worthington G. Smith has from time to time contributed a synopsis of the British species of Geaster, with illustrations, which, by the kind permission of the editor and proprietors of that journal, we have been permitted to reproduce for the benefit of our readers.

Spores 0.00015 in. diam.

Spores 0.00016 in. diam.

Spores 0.00018 in. diam.

Spores 0.00019 in. diam.

Spores 0.00035 in. diam.

Spores 0.00035 in. diam.

Spores 0.00017 in. diam.

Spores 0.00035 in. diam.


Spores 0.00014 in. diam.


Spores smooth, 0.00012 in. diam.

12. **Geaster saccatus.** *Fr.*—"Gardener's Chronicle," 1873, p. 1275, fig. 266. [Pl. xviii.]

Outer peridium saccate, cleft into many flaccid subinvolute laciniae; interior peridium sessile, crowned with a circular flat disc, and a sharp silky mouth. Spores dark brown, slightly echinulate.

By hedge banks. Truro.

Spores 0.00013 in. diam.

The spores in all the foregoing figures are magnified 700 diameters.
THE MOSSES OF IRELAND.

Bryologists will be very glad to make the acquaintance of such a complete and careful synopsis as Dr. David Moore has recently produced of the mosses of Ireland. This synopsis was first published in the proceedings of the Royal Irish Academy (vol. i., ser. 2, Science), and since issued in a separate form, but as no publisher's name appears on the title-page, and no price is stated, we are not in a position to affirm whether it has been published in the separate form, or only printed for private circulation. The arrangement adopted is lucid and distinct, generic characters are given, with tabular diagnoses of species; these are followed by ample references to full descriptions and figures, with an enumeration of the Irish localities, ending with a copious index. Altogether here are 140 compact 8vo. pages, representing such a mass of work that we should be afraid to compute the time it must have occupied in its production. This is a valuable contribution to our literature of British Cryptogams, and we can only regret that such appear so rarely. There is in Dublin a gentleman with a world-wide reputation in his special subject, who could give us just such a synopsis of the Irish Fresh Water Algae; we are not alone in the hope that Dr. Moore's example may induce him to achieve this new honour for Old Ireland.

PROFESSOR ERSTED.

Dr. R. Brown has read to the Botanical Society of Edinburgh, and it is about to be published in the annual volume of "Transactions," a Biographical Sketch of the late Professor Ersted, of Copenhagen. Dr. Brown was specially fitted for this duty, and has done it with all reverence for the memory of his friend. Professor Ersted was only in the 57th year of his age, and yet by diligence and perseverance he contributed much to Botanical Science. In Cryptogams, his best known researches were amongst the Fungi, on which subject Dr. Brown enumerates thirteen contributions, prominent amongst which are those relating to the connection between Ræstelia and Podisoma. Professor Ersted died at Copenhagen, Sept. 3rd, 1872, after a week's illness from dysentery, having for twelve years occupied the chair of Botany in the University of Copenhagen.

Fungi Britannici.—The Rev. J. E. Vize, Forden Vicarage, Welshpool, announces the publication of a fasciculus of British Fungi, including the following groups:—Pucciniæi, Cæomacei, Æcidiacei, Macedines, and Erysiphei, making altogether 100 specimens, at the price of £1. "As a further help to beginners," he also announces, "a limited set of very good microscopical slides, showing spores, &c.;" which will be prepared on application at 10s. 6d. per dozen.
The Fungus Show at South Kensington this year was fully
equal to, if not in some respects superior, to its predecessors. The
great fault was a want of arrangement, of classification, and even of
names. Still there was a goodly show of interesting species, and
some that were new. Amongst the latter we observed, for the
first time, an English specimen of Rhizina lavigata, Fries, ex-
hibited by Miss Louisa Hubbard, of Horsham. There were also
numerous species of Hydnum, and some very fine Polyporei. An
excellent specimen of Clavaria botrytis arrived late, together with
fresh specimens of Rhizina undulata, Fries. A full account of the
meeting appeared in the "Gardener's Chronicle."

Relation of Fungi to other Plants.—Their most common
colouring matters exactly correspond with those found in the apo-
theicia of lichens, and their more accidental constituents are also
quite analogous to those occasionally found in the apothecia of
particular lichens—for example in those of Cladonia cornucopioideas.
According to the principles adopted in this paper, fungi ought then
to be looked upon not as fronds, but as the fructification of a low
type of plants, and I think that the fact of the colouring matters
alone leading to such a satisfactory conclusion shows that they
must have some important physiological signification. * * * *
Looking upon fungi from this chromatological point of view,
they bear something like the same relation to lichens that the petals
of a leafless parasitic plant would bear to the foliage of one of
normal character—that is to say, they are, as it were, the coloured
organs of reproduction of parasitic plants of a type closely ap-
proaching that of lichens, which of course is in very close, if not
in absolute agreement, with the conclusions drawn by botanists
from entirely different data.—H. C. Sorby, in Proc. Roy. Soc.

Note on Solorina Bispora (Nyl.).

By the Rev. J. M. Crombie, F.L.S.

In recording the occurrence of this lichen on Ben Lawers, as
mentioned in last number of Grevillea, Dr. Stirton is mistaken in
supposing that it has not been gathered elsewhere than on the
Pyrenees. A reference to Continental Lichenology would have
informed him that since the date of "Nylander's Synopsis" it had
been found in the Tyrol by Dr. Arnold, and in North Italy by
Professor Anzi. What, however, is of more consequence, is the
specific value of the plant so named provisionally as a separate
species. Dr. Nylander (Syn. p. 331), in speaking of it, says—
"Forsitan tantum varietas saccatae (limbatæ maxime propinqua);
sed quum transitum nullum vidi, eam seorsim exponere debui.”
Such a transition state, however, may be seen in Anzi “Exs.
Langob.” 46, where the spores are 4-2 nê, and in a specimen from
Killin in my own Herb. s. n. S. limbata, where, however, the thece
are usually 4-spored.  S. bispora, therefore, cannot with propriety
be regarded as distinct from S. limbata (Smrnft.). This latter also,
as it appears to me, has but very slight claims to be separated,
otherwise than as a mere variety from S. saccata (Linn.). Certainly
as seen in the “Herbarium,” and having regard only to the cha-
teracter of the so-called thallus, it seems sufficiently distinct.
An attentive observation, however, of the plant three months ago in
Killin, convinced me that an opinion I had previously entertained
was correct. There it grows, always associated with saccata, and
not only so, but in one and the same specimen occur both the type
and the variety. The former evidently passes into the latter through
the decay or destruction of the proper thallus, and the consequent
growth or protrusion of an alien thallus. This latter, which is of
a gelatinous nature, belongs either to an undeveloped Collema, such
as C. cheileum, or a Leptogium such as L. scotinum (minor), (in
which case it is Lichen spongiosus. (Sm., E. B. T., 1874.). This is
frequently more or less suffused with a whitish lepraria, differing
in character, on a microscopic examination, from the pruina which
occurs on the thallus of the type. This alien thallus gradually
destroyed or takes the place of the proper one, leaving only a narrow
thalline margin around the apothecia, which becomes at length
isidiose or granulose. There can thus, I think, be little doubt that
the species stands thus:—Solorina saccata (Linn.), with thecae
4 spored and membranaceo-papyraceous continuous thallus; var.
limbata (Smrnft.), with thecae 4, rarely 2-spored, and proper thallus
interrupted, and only bordering the apothecia, its place being other-
wise usurped by an alien gelatinous (collemoid) thallus.

CRYPTOGAMIC LITERATURE.

O'Meara, Rev. E. Recent Researches in the Diatomaceae,
Niessl, G. V. Beiträge zur Kenntniss der Pilze (continued)
in “Hedwigia,” No. 9.
Smith, W. G. On Geaster saccatus, with fig., in “Gardener’s
Chronicle,” p. 1275 (1873).
Kitton, F. Strange habitats of certain species of Diatomaceae,
in “Science Gossip,” for October.
Sorby, H. C., F.R.S. On Comparative Vegetable Chromatology
(including Cryptogamia), from the “Proceedings of the Royal
   After Sowerby: spores × 700 diam.

2. Geaster rufescens. Fr.
   Half actual size: section real size: spores × 700 diam.
Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By the Rev. M. J. Berkeley, M.A., F.L.S.

(Continued from Page 53.)

376. Phoma macropus. B. & C.—Subcuticular, peritheciis sparsis; sporophoris flexuosis sporis oblongis 5-6 longioribus. On the white shoots of some shrub. Scattered, tearing off with the cuticle; scattered, collapsed; sporophores waved, 5-6 times longer than the short oblong spores. Nearly allied to the last, but distinct.

377. Phoma Petersii. B. & C.—Erumpens, demum superficiale, hysteriiforme in lignum dealbatum situm, sporis ellipticis, binucleatis. On wood which has been exposed to the weather, and has become bleached. Alabama, Peters. No. 5234.

Scattered, hysteriiform, erumpent, then free; spores elliptic, •0003 long, with two nuclei. Distinct from Phoma epileucum, B., in which the spores are •00015 long, and not so elliptic.


Flat, superficial, sporophores shorter than the fusiform 2-3 nucleate spores, •0008 long.


Scattered, shining, flat; spores minute, oblong, binucleate, •0002-•00025 long.


Growing beneath the cuticle which swells into little hysteriiform pustules; spores oblong, subfusciform, •0005 long.

Growing beneath the cuticle, sporophores equal in length to the spores which are oblongo-fusiform pointed at either end, 0.0002-0.0003 long.

Produced beneath the cuticle, through which it bursts, and by which it is surrounded; spores oblong, 0.0003 long.

Forming little raised hysteriiform spots with a distinct margin. Perithecia black, confluent; spores shortly oblong, 0.0002 long.

Spots broad, red-brown; perithecia minute punctiform; spores attenuated at either end, shortly fusiform, 0.0003 long.

On pear. Car. Inf. No. 4998. Spores subfusiform, 0.0005 long.

Black shining, covered with the bleached cuticle; spores fusiform binucleate, 0.0004 long, resembling those of P. pallens.

Spots definite with a distinct margin reddish brown, perithecia minute; spores shortly oblong, 0.0001 long.


Growing on a pallid spot, subcuticular, shining; spores oblong, 0.0003 long. In No. 5274 the spores are rather narrower and 0.0004 long.

Produced under the bark in which it forms little pustules, at
length free; sporophores about equal in length to the spores which are shortly fusiform, 0.0025 long, mixed with filiform processes, about three times as long, curved at the tips.


Forming brown orbicular spots, in the centre of which are seated the irregular perithecia; spores oblong subcymbiform. 0.004 long.


There are also a great many other forms in the collection which can scarcely be characterised as there are no very distinctive marks in the spores.


In the former the spores are wider at one end, slightly curved, 0.0008-0.0006; in the latter often more curved, and then not dilated at one end, 0.001 long.


over the under surface without any spot; perithecia punctiform; spores oblong; more or less curved, '0008 long.


On bark of Abies. Mountains of New York. No. 4502. Forming little flat pustules, sporophores scarcely half so long as the crescent-shaped spores, '001 long.


On smooth pine bark. New England. Sprague. No. 5270. Forming little flat pustules, sporophores scarcely half so long as the narrow crescent-shaped at length uniseptate spores attenuated at either end, '003 long.


In appearance it approaches Leptostroma, but differs in the more highly developed spores.


398. Sphaeronema echinatum. B. & C.—Peritheciis globosis; collo longo processibus echiniformibus subverticillatis ornatum; sporis filiformibus curvatis.

On twigs of Rhododendron. Mountains of New York. No. 4464. Perithecia minute, globose, with a long neck clothed in a verticillate manner with stiff spines; spores filiform slightly curved.

399. Sphaeronema penicillatum. B. & C.—Peritheciis elongatis ventricosis e basi orbiculari oriundis, collo longo penicillato.

Car. Inf. On dead wood. No. 2134. Perithecia springing from an orbicular base, above which it is first contracted, then ventricose, ending in a long neck which is clothed with loose hairs.

400. Sphaeronema metulaeforme. B.—Peritheciis fuscis metulaeformibus, collo breviore apice penicillato albo.

On Cornus florida with Perichena populina, Fr. Car. Inf. No. 2515. Perithecia ninepin-shaped, brown, base contracted, neck about two-thirds as long, white, with a pencil of articulated threads.


On some Tremella, which runs up the sides of the neck and upper portion of the perithecium, which is globose, gradually passing into the cylindrical neck.
NEW BRITISH HEPATICÆ.

By Dr. Carrington.

Riccia bifurca. Hoffm.

Fronds tumid, flabellate; lobes elliptic-obvate, cuspidate, retuse, or bifurcate; margin elevated, rounded; disc nearly plane, glaucous-green; lower surface sphacelate.


Hab. On limestone rocks by the shore, Barmouth, Oct. 1867! Aberffraw, W. Wilson, 1830! Levens Park, Westmoreland, on limestone rocks, G. Stabler, Feb., 1870! Head of Glen Dole, Fortar, J. Sadler, 1872!

Patches 2 to 3 inches in diameter (pl. 18, f. 1), glaucous-green, margin and underside purplish-black; fronds crowded and frequently imbricated, firmly attached to the surface, but from the tumid margins appearing to stand boldly from it. Like all the Riccia, the individual fronds increase by repeated bifurcations from the terminal lobes, which diverge more or less, so as to assume a pedate, or flabellate outline—not stellate, as usually described by authors. In old tufts, the periphery is found to describe the section of a circle, or series of circles, the centres of which, from the decay of the older fronds, are incomplete, or occupied by newer fronds.

Segments of the fronds, 3 to 6 lines in length, by a line in diameter, contracted at each end, elliptic-spathulate, rarely oblong, cuspidate at the apex (f. 4, 5), or obovate-emarginate, and more or less deeply furcate. Frequently the lobules are separated from each other by a mere chink (f. 2, 3), but near the base of the frond they are patent or divergent (f. 5). Their characteristic feature, however, is the bold, tumid border, most conspicuous near the apex, but surrounding the lobes more or less perfectly, and visible even in dry specimens. The depressed portion is broad and plane, or slightly concave (f. 6), without any defined mid-vein, as in R. sorocarpa. When in a state of fructification, the segments are sometimes contracted or deformed, but generally retain the peculiar boat-like outline. On section the border is found to be permanently thickened, not merely inflexed (f. 7). Cellular tissue solid, homogeneous, upper stratum columnar, intermediate portions darker-green, from the presence of numerous gonial cells. Epidermis of the lower aspect purplish-brown, continued uniformly, or in irregular fascia over the margins.

Rootlets numerous, either capillary and translucent, or papillose within. Sporangia scattered irregularly over the disc of the frond, at length rupturing the epidermis. Spores conspicuous, dark-brown, three-angled, sub-cristate, rounded and reticulate-muricate on the outer surface (f. 8, x. 120).

The margin, in old fruit-bearing fronds, is sometimes irregularly crenate externally, and the purple stratum disposed in spots or bars,
so as to resemble scales. In this state it may be confounded with *R. nigrella*, D.C., a species first discovered by Mr. Ralfs, at Barmouth, and published under the name of *R. lamellosa*. The two species grow near each other, *R. nigrella* on damp banks, and *R. bifurca* on limestone cliffs. The former is smaller in all its parts, with linear dichotomous lobes (pl. 18, f. 9), margin membranous, entire, expanded, and dark-green when moist, but when dry remarkably inflexed, and displaying the dark-purple scales which clothe the inferior surface, and which are rounded and closely incrbricated. In this state the fronds have a peculiar wiry look, quite different from their aspect after rain. In *R. lamellosa*, Raddi, the under side is concolorous, and the scales are pale and scariosse, much narrower, and projecting beyond the margin.

In *R. glauca* the fronds are of uniform colour on both surfaces, texture much thinner, margins plane, acute, or slightly inflexed. From Ross Bay in Ireland, and Penzance, I have received a small var., in which the margin is purple, but not thickened as in *R. bifurca*.

When I first collected this species at Barmouth, I thought it probably a form of *R. glauca*, the fleshy habit of which might depend on the sea air, as in Cochlearia, Silene, &c. Recently, however, I have received authentic specimens from Prof. Lindberg, a drawing of which I give at fig. 4, and which differ in no respect from our own plant, except that the lobes are more oblong.

Pl. 18, fig. 1. *R. bifurca*, natural size. 2, 3, 4, 5 fronds × 16 diam. 6, transverse section. 7, the same × 60 diam., showing the cellular structure. 8, spores × 250 diam. 9, *R. nigrella*, D'Cand. Upper surface when dry and inflexed, showing the lamellate scales.

**Riccia sorocarpa.** Bischoff.

Segments of the frond linear, sub-dichotomous, carinate-sulcate, green on both surfaces; lobes thick and fleshy, oblong, obtuse, or emarginate; margin thin, glabrous, inflexed when dry; fruit scattered along the mid-vein.


R. minima, **Leers Fl. Herborn, p. 252 (not Lindenberg Monog. der Riccieen, p. 67, t. xx., f. 2).**

Hab. Great Doward Hill, near Ross, Hereford; discovered by Mr. H. M. Watkins, growing on limestone rocks, 1862!

Fronds forming shallow strata, divaricate-furcate, crowded and entangled so as to be separated with difficulty; colour pale glauous-green on both surfaces.

Segments one to three lines in length, by $\frac{1}{4}$ to $\frac{1}{3}$ of a line broad, linear, the lobes patent or divergent. Upper surface canaliculate-sulcate, mid-vein distinct, margins expanded when moist (f. 11, 15), except near the apex, where they are thin, membranous, and erect or incurved (f. 13, 14). When dry the involution of the margin is more decided, so as to hide the uppersurface, and impart to the frond a peculiar aspect (f. 16). Ventral surface nearly
of the same colour, obscured in some parts by the fibrillae which proceed from it, and which, as in all of the Marchantia (for, as pointed out by Hoffmúûûster, Riccia is only an angiocarpous section of that tribe)—are of two kinds: simple, translucent, capillary rootlets, and others, which seem dotted, from the presence of peculiar clavate thickenings within the tubules (f. 17); sometimes the rootlets are varicose, or bulbous at the apex.

On section the frond is seen to be nearly trigonous (f. 17), texture solid and fleshy, destitute of lacuna, central stratum chlorophyllose, superficial cells arranged in linear series, conical at the apex.

Pistillíleæ scattered along the carinate base of the lobes, young fruit immersed, at length elevating the epidermis until it ruptures, and allows the escape of the spores.

Spores smaller than in R. bifurca, but not so much so as in the figures (8 and 18), the former of which is magnified to twice the diameter, so as to show the surface markings. Colour, dark-brown, crenate reticulate.

A short notice of R. sorocarpa appeared in the March number of "Grevillea," by Dr. Bratiiuwaitë, so that I should not have recurred to the subject (although I had made drawings at the time with the intention of describing the species), but for the discovery of a nearly allied form, and the difficulty of discriminating such minute species from descriptions only. I trust, therefore, the figures given will facilitate the study of these interesting additions to our Flora, and perhaps lead to the recognition of cognate species.

When the new Riccia was first sent to me by Mr. Watkins, I referred it doubtfully to R. sorocarpa, for, possessing only Lindenberg's monograph, I was misled by the figure and description of his R. minima (under which R. sorocarpa, Bisch., is quoted as a synonym), but in which the lobes are acute, and purple on the under side. This form, although published in Syn. Hepat., p. 601, as a distinct species, appears to me to come very near R. bifurca, of which it may prove only a small variety.

The smaller forms of R. glauca may be distinguished by their much thinner texture, and the absence of the characteristic involution of the margins.

Lastly, from R. nigrella, which it approaches in size, and the linear involute lobes, it may be known by the absence of the row of roundish, purple scales with which that species is clothed externally, and which are met with in no other European Riccia.

Probably R. sorocarpa may be found in other localities; but, except after rain, it is very difficult to make it out, the particles of earth adhering to the marginal rootlets of the inflexed fronds, imparting to it nearly the same colour as the surface on which it grows.

Pl. 18, fig. 10, R. sorocarpa, natural size; 11, 13, 14, 15, fronds expanded × 16. 12, inferior aspect of frond. 16, appearance of the segments when dry. 17, Transverse section, exposing sporangium × 60. 18, spores × 120 diam.
**Nardia revoluta.** (N. ab. E.) Lindb.

Leaves erecto-patent, bidentate, rigid, sub-complicate, round or elliptic-obovate, base narrowed, clasping; sinus and lobes acute, margins revolute throughout. (Fr. ?)


*Jung. atrata*, Mitten, Hepat. of East Indies. (Jour. Lin. Soc., 1859, p. 90.)

Sent to Prof. Lindberg, Aug., 1873, by Mr. David Orr, of Glasnevin, under the name of *Andreae alpina*. Luggielaw, Co. Wicklow, 1851.

*Fronds* densely cespitose, of an intense black colour, sub-lavigate, stoloniferous at the base.

*Stolons* matted together, of nearly the same thickness as the stems, dark-brown, brittle, sparingly radiculous.

*Shoots* ascending, simple, half an inch to an inch long, rigid. Innovations from the apex or axils of the upper leaves, fasciculate.

*Leaves* bifariously imbricated, complicate-concave (f. 22—23), bi-dentate, erect and adpressed when dry, erecto-patent when moist; roundish or elliptic-obovate (f. 21, 25), from a somewhat narrowed base. Near the base of the stem they are smaller and more distant, gradually enlarging upwards, except when innovations are present, when the stem is interrupted, and the upper leaves scarcely exceed it in diameter (f. 25).

*Lobes* equal, acute, cuspidate; sinus deep, equal to about ⅓ of the length of the leaf, angular, but a little rounded at the base from the recurvation of the margin. Margin narrowly but uniformly reflexed, so as to appear thickened under the lens (f. 22).

*Texture* of the leaves dense, polished, scarcely altered when dry, colour pitch-black, deep-brown by reflected light. Cells minute, thick-walled polygonal (f.24), those of the margin sub-quadrate, compressed, 1/750" broad. Cells of the middle of the leaf hexagonal, 1/75" in length, by 1/750" broad; basal cells more elongated (1/750") but not differing in breadth. Trigones small.

This interesting addition to our list of Hepaticæ was collected by Mr. David Orr, as long ago as 1851, but overlooked as a form of Andreae, which it resembles in habit and colour. Himalayan specimens, from Dr. Hooker, differ only in the shoots being sub-falcate, and the leaves more secund.

In size, and the emargination of the leaves, *N. revoluta* is intermediate between *N. emarginata* and *N. Funckii*, but the narrow revolute continuous border will at once distinguish it from these, and all allied species. The leaves of *N. emarginata* are usually reflexed at the base, but the lobes are blunter, and plane at the margin. (Pl. 18, fig. 19-25)

Pl. 18, f. 19, *Nardia revoluta*, natural size. 20, shoots × 16 diam. 21, 23, 25, stem leaves × 30. 22, lateral aspect of upper leaf (involucral ?) 24, portion of the leaf to shew the reticulation and revolute border × 120 diam.
NEW BRITISH LICHENS.


The following new species of British Lichens have been described by Dr. Nylander in the "Flora," 1873, pp. 289-300.

1. **Lecanora fugiens.** Nyl.—Thallus glaucescent, opaque, thin or very thin, unequal, effuse; apothecia whitish flesh-coloured, minute, with entire white thalline margin; spores 8 n., ellipsoid, 0,009-13 m.m. long, 0,005-6 m.m. thick; paraphyses slender; hymenial gelatine (especially the thecae) bluish and then tawny wine-red with iodine.

On dry rocks in the Island of Jersey (Larbalestier). This species belongs to the section of *L. piniperda*, Krb., and has the spermatia arcuate.

2. **Lecanora actaea.** Nyl.—Thallus leaden-greyish, unequal, rimoso-diffract, moderate or thinnish, somewhat bluish and white, fimbriated at the circumference; apothecia blackish, slightly prominent, at length convex, biatorine; spores 8 n., ellipsoid or sub-fusiform, 1-septate, 0,012-14 m.m. long, 0,00045 m.m. thick; epithecium dark-bluish; paraphyses thickish, articulated; hymenial gelatine, bluish, and the thecae at length violet with iodine.

On maritime rocks in the Island of Jersey (Larbalestier). A peculiar species belonging to the section of *Lecanora erysibe* (Ach.).

3. **Lecanora spodophæiza.** Nyl.—Thallus greyish, moderate, granuloso-verrucose, thinly white-fimbriated at the extreme circumference; apothecia badio-reddish, somewhat plane, with sub-entire, scarcely prominent thalline margin; spores 8 n., oblong or fusiformi-oblong, simple, or often subspuriously 1-septate, variable, 0,009-18 m.m. long, 0,004-6 m.m. thick; epithecium faintly brownish; hymenial gelatine at first slightly bluish, and then wine-red with iodine.

On maritime rocks in the Island of Jersey (Larbalestier). This species has the appearance of *Lecanora poliocarpa* or *spodophæa*, but in reality belongs to the section of *L. erysibe*. The spermatia are arcuate.

4. **Lecidea atropurpurascens.** Nyl.—Somewhat similar to *L. atro-purpurea*, Schær, but differing amongst other characters in having the hymenial gelatine intensely and persistently bluish with iodine.

On aged oaks in the New Forest, near Ministeed (Crombie, April, 1868).

5. **Lecidea subsphæroides.** Nyl.—Thallus whitish, thin, areolatorumose, rugulose; apothecia pale-reddish, margined, at length convex, the margin excluded, moderate; spores 8 n., ellipsoid, or oblongo-ellipsoid, 1-septate, 0,014-17 m.m. long, 0,006-7 m.m. thick; paraphyses not discrete; hymenial gelatine bluish and the thecae violet with iodine.
On young beech trees, near Lyndhurst, in the New Forest. (Crombie, April, 1873.) Belonging to the same section as the preceding.

6. Lecidea hemipolioides. *Nyl.*—Thallus greyish-green, thin, subopaque, rugulose, indeterminate; apothecia pale or livid, convex, immarginate, colourless within; spores 8 n, oblong, usually somewhat curved, 3-septate, 0,012-18 m.m. long, 0,0045 m.m. thick; paraphyses not very well discrete, slender, epithecium colourless; hymeneal gelatine, especially the thece, at first bluish, then tawny wine-coloured or reddish with iodine.

On rocks, Jersey (Larbalestier). Distinct from *L. arceutina* hemipola, *Nyl.*

7. Lecidea carneo-glaucia. *Nyl.*—Thallus glaucous-green, thin, opaque, subleprom, whitish, limited at the circumference, K—C—; apothecia sordid, or pale flesh-coloured, convex, immarginate, whitish within; spores 8 n, attenuato-fusiform, 1-5 septate, 0,025-40 m.m. long, 0,0030-35 m.m. thick; epithecium and hypothecium colourless; paraphyses slender, not very well discrete; hymeneal gelatine bluish, and then tawny with iodine.

On siliceous stones, Jersey (Larbalestier). Belonging to the section of *L. luteola.* The spermogones are pale, urceolate, with oblong spermatia.

8. Lecidea scotinodes. *Nyl.*—Thallus dark-greyish, thin, unequal, areolato-rimose, subdeterminate; apothecia black, convex, immarginate, whitish within; spores 8 n, colourless, oblong, simple, or 1-septate, 0,014-18 m.m. long, 0,005-6 m.m. thick; paraphyses moderate, incrassate at the apices, dark bluish-black; hypothecium colourless; epithecium K—, faintly violet; hymeneal gelatine bluish, and then wine-red with iodine.

On micaceous rocks, Craig Tulloch, Blair Athole (Crombie, August, 1871). Allied to *L. scotina* (Krb.) from which it differs by the above characters.

9. Lecidea contiguella. *Nyl.*—Thallus whitish, thin, areolato-rimose, surrounded at the circumference by a black hypothallus, K—; apothecia black, adnate, plane, margined, within concolorous; spores 8 n, colourless, oblong, simple, 0,011-15 m.m. long, 0,0045-55 m.m. thick; epithecium dark-bluish, hypothecium brown; paraphyses moderate; hymeneal gelatine bluish, then wine-reddish with iodine.

On quartzose boulders, Morrone Braemar (Crombie, August, 1872). Differs in the above characters from *L. lactea*, Flh.

10. Lecidea deludens. *Nyl.*—Thallus whitish, firm, thin, rimose, K + pale yellowish, surrounded by a very thin, black hypothallus; apothecia black, innate, circumcised, plane, obtusely margined, concolorous within; spores brown, 1-septate, 0,022-27 m.m. long, 0,008-13 m.m. thick; paraphyses discrete, regular, moderate, clavate, brownish, hypothecium brown; hymeneal gelatine intensely bluish with iodine.
NEW BRITISH LICHENS.

On weathered quartzose stones on the summit of Cairn Gowar, Blair Athole (Crombie, August, 1871). Allied to L. colladens, Nyl.

11. Lecidea subgyratula. Nyl.—Thallus blackish, very thin, opaque, sub-rimose, apothecia black, gyroso-rugose, minute; spores 8 n, 0.012-16 m.m. long, 0.008-10 m.m. thick; epithecium brownish, paraphyses slender, not discrete, hypothecium blackish; hymeneal gelatine pale bluish, and then tawny wine-red with iodine.

On stones on the ground near the summit of Morrone (Crombie, August, 1872). Looks like Lecanora simplex, but is allied to Lecidea umbonatula, Nyl.

12. Lecidea confederans. Nyl.—Thallus scarcely any visible; apothecia black, plane, obtusely margined, verrucoso-congested (verruce composed of 20-30 or more apothecia), within blackish; spores 8 n, oblong, simple, 0.010-11 m.m. long, 0.003-4 m.m. thick; paraphyses moderate or thickish, clavato-incrassate and bluish-black or greenish-blue at the apices; hypothecium thick, brownish black (K purplish).

On quartzose boulders, Morrone, Braemar (Crombie, August, 1872). A very distinct species.

13. Lecidea delimitis. Nyl.—Thallus dark-greyish, verrucoso-granulate or rugose, moderate, hypothallus subfimbriated, infuscate, limiting the thallus; apothecia black, at length convex, immarginate, greyish-suffused, within concolorous; spores 8 n, colourless, oblong, 8-septate, 0.015-18 m.m. long, 0.004-5 m.m. thick; epithecium granulose, paraphyses moderate, soft, hypothecium thick, black; hymeneal gelatine tawny-wine-coloured or somewhat reddish with iodine.

On granite rocks, Jersey (Larbalestier). Looks like an Opegrapha, but belongs to the section of Lecidea premnea.

14. Lecidea subvixidis. Nyl.—Thallus greenish or dark-green, somewhat shining, rugulose; apothecia black, minute, plane, distinctly margined, within whitish; spores 8 n, colourless, oviform, 1-septate, 0.011-16 m.m. long, 0.005-7 m.m. thick; epithecium brown, paraphyses moderate, hypothecium colourless; hymeneal gelatine bluish, then tawny red with iodine.

On siliceous stones, Jersey (Larbalestier). Belongs probably to the section of L. arthoniza.

15. Lecidea lutulata. Nyl.—Thallus yellow-ochraceous, thin, leprous or indistinct; apothecia black, convex, immarginate, within concolorous; spores 8 n, colourless, ellipsoid or oviform, simple, 0.007-9 m.m. long, 0.003-4 m.m. thick; paraphyses not discrete, epithecium bluish, hypothecium thick, brownish-black; hymeneal gelatine bluish, and then tawny wine-red with iodine.

On maritime rocks, Jersey (Larbalestier). Belongs probably to the section of L. dispersa, Nyl.
DR. HORATIO WOOD'S METHOD FOR PRESERVING FRESH WATER ALGÆ.*

There are three or four distinct classes of localities, in each of which a different set of forms may be looked for. These are stagnant ditches and pools, springs, rivulets, large rivers, and other bodies of pure water, dripping rocks in ravines, &c.; trunks of old trees, boards, branches and twigs of living trees, and other localities.

In regard to the first—stagnant waters—in these the most conspicuous forms are Oscillatoriae and Zygnemaceae. The Oscillatoriae may almost always be recognised at once by their forming dense slimy strata, floating or attached, generally with very fine rays extending from the mass, like a long, delicate fringe. The stratum is rarely of a bright green colour, but is mostly dark, dull greenish, blackish, purplish, blue, &c. The Oscillatoriae are equally valuable as specimens at all times and seasons, as their fruit is not known, and the characters defining the species do not depend upon sexual organs. The Zygnemas are the bright green, evidently filamentous, slimy masses, which float on ditches, or lie in them, entangled amongst the water plants, sticks, twigs, &c. They are only of scientific value when in fruit, as it is only at such times that they can be determined. Excepting in the case of one or two very large forms, it is impossible to tell with the naked eye with certainty whether a Zygnema is in fruit or not; but there are one or two practical points, the remembrance of which will very greatly enhance the probable yield of an afternoon's search. In the first place the fruiting season is in the spring and early summer, the latter part of March, May, and June being the months when the collector will be best repaid for looking for this family. Again, when these plants are fruiting they lose their bright green colour and become dingy, often yellowish, and very dirty looking—just such specimens as the tyro would pass by. The fine, bright green, handsome masses of these algae are rarely worth carrying home. After all, however, much must be left to chance; the best way is to gather small quantities from numerous localities, keeping them separate until they can be examined.

Adhering to the various larger plants, to floating matters, twigs, stones, &c., in ditches, will often be found filamentous Algae, which make fine filzy fringes around the stems, or on the edges of the leaves, or perchance one may meet with Rivalarie or Nostocæ, &c., forming little green or brownish balls, or indefinite protuberances attached to small stems or leaves. These latter forms are to be looked for, especially late in the season, and whenever seen should be secured.

In the latter part of summer there is often a brownish, gelatinous

* Extracted from "A Contribution to the Natural History of the Fresh Water Algae of America." Washington, 1873.
seum to be seen floating on ditches. Portions of this should be preserved, as it frequently contains interesting Nostocs and other plants.

In regard to large rivers, the time of year in which I have been most successful in such localities is the latter summer months. Springs and small bodies of clear water may be searched with a hope of reward at any time of the year when they are not actually frozen up. I have found some exceedingly beautiful and rare Algae in such places as early as March, and in open seasons they may be collected even earlier than this. The Desmids are most abundant in the spring, and possibly most beautiful then. They, however, rarely conjugate at that time, and the most valuable specimens are therefore to be obtained later—during the summer and autumn months, at least, so it is said; and the experience I have had with this family seems to confirm it. Rivulets should be watched especially in early spring, and during the summer months.

From the time when the weather first grows cool in the autumn, on until the cold weather has fairly set in, and the reign of ice and snow commences, is the period during which the Algae hunter should search carefully all wet, dripping rocks, for specimens. Amongst the stems of wet mosses—in dark, damp crevices, and little grottos beneath shelving rocks—is the Algae harvest to be reaped at this season. Nostocs, Palmellas, conjugating Desmids, Sirosiphons, various unicellular Algae, then flourish in such localities. My experience has been that late in the autumn ravines, railroad cuttings, rocky river-banks, &c., reward time and labour better than any other localities.

The Vaucherias, which grow frequently on wet ground, as well as submerged, fruit in the early spring and summer in this latitude, and are therefore to be collected at such times, since they are only worth preserving when in fruit.

In regard to Algae which grow on trees, I have found but a single species, and do not think they are at all abundant in this latitude. Further south, they seem to be the most abundant forms.

As to the preservation of Algae, most of the submerged species are spoiled by drying. Studies of them should always, when practicable, be made whilst fresh. Circumstances, however, will often prevent this, and I have found that they may be preserved for a certain period, say three or four months, without very much change, in a strong solution of acetate of alumina.

An even better preservative, however, and one much more easily obtained, is carbolic acid, for I have studied Desmids with great satisfaction which had been preserved for five or six years in a watery solution of this substance. In regard to the strength of the solution, I have no fixed rule, always simply shaking up a few drops of the acid with the water, until the latter is very decidedly impregnated with it, as indicated by the senses of smell and taste.
Almost all species of Algae which are firm and semi-cartilaginous, or almost woody in consistency, are best preserved by simply drying them, and keeping them in the ordinary manner for small plants. The fresh-water Algae which bear this treatment well belong to the \textit{Phycocromophyceae}, such as the \textit{Nostoc}, \textit{Scytonema}, \\&c., the true confervas not enduring such treatment at all. When dried plants are to be studied, fragments of them should be soaked for a few minutes in warm, or for a longer time in cold water.

The only satisfactory way that Algae can be finally prepared for the cabinet is by mounting them whole or in portions, according to size, for the microscope. Of the best methods of doing this the present is hardly the time to speak; but a word as to the way of cleaning them will not be out of place. Many of them, especially the large filamentous ones, may be washed by holding them fast upon an ordinary microscope slide, with a bent needle, or a pair of forceps, and allowing water to flow or slop over them freely, whilst they are rubbed with a stiffish camel's-hair pencil or brush. In other cases, the best plan is to put a mass of the specimens in a bottle half-full of water, and shake the whole violently, drawing off the water from the plants in some way, and repeating the process with fresh additions of water, until the plants are well scoured. At first sight, this process would seem exceedingly rough, and liable to spoil the specimens, but I have never seen bad results from it, at least when practised with judgment. The water seems so to envelope and protect the little plants, that they are not injured.

After all, in many instances it appears impossible to clean these Algae without utterly ruining and destroying them, so that he who despises and rejects mounted specimens simply because they are dirty and unsightly, will often reject that which, scientifically speaking, is most valuable and attractive.

In finally mounting these plants, the only proper way is to place them in some preservative solution within a cell on a slide. After trial of solution of acetate of alumina and various other preservative fluids, I have settled upon a very weak solution of carbolic acid, as the best possible liquid to mount these plants in. Acetate of alumina would be very satisfactory were it not for the very great tendency of the solution to deposit minute granules, and thus spoil the specimens. As every one knows, the great difficulty in preserving microscopic objects in the moist way is the perverse tendency of the cells to leak, and consequently slowly to allow entrance to the air and spoil the specimens.

As I have frequently found to my great chagrin, the fact that a slide has remained unchanged for six months, or even a year, is no guarantee that it will remain so indefinitely. It becomes, therefore, exceedingly important to find some way of putting up microscopic objects that can be relied on for their preservation. Where carbolated glycerine jelly or Canada balsam can be used,
the solid coating which they form around the specimens constitutes the best known protection. Except in case of the Diatoms, however, these substances so shrivel and distort the fresh water algae immersed in them as to utterly ruin them. I lost so many specimens by the old ways of mounting, that, becoming disheartened, I gave up all idea of making a permanent cabinet, until a new cement, invented by Dr. J. G. Hunt, of this city, was brought to my notice. This is prepared as follows:—

Take damar gum, any quantity, and dissolve it in benzole; the solution may be hastened by heat. After obtaining a solution just thick enough to drop readily from the brush, add enough of the finest dry oxide of zinc, previously triturated in a mortar with a small quantity of benzole, until the solution becomes white when thoroughly stirred. If not too much zinc has been added, the solution will drop quickly from the brush, flow readily, and dry quickly enough for convenient work. It will adhere, if worked properly, when the cell-cover is pressed down, even when glycerine is used for the preservative medium. Keep in an alcohol-lamp bottle with a tight lid, and secure the brush for applying the cement in the lid of the bottle.

Its advantages lie in the circumstance that the glass cover can be placed upon the ring of it whilst still fresh and soft, and that in drying it adheres to both cover and slide, so as to form a joint between them of the width of the ring of cement, and not, as with asphaltum, gold size, &c., simply at the edge and upon the outside of the cover. It is readily to be seen how much less liability to leakage must result from this. The method of mounting with it is as follows:—A ring of any desired size is made by means of an ordinary Shadbolt's turn-table, upon a slide, which is then placed to one side to dry. When required for use, the specimen, cover, &c., being all prepared and ready, the slide is again placed upon the turn-table, and a new ring of cement put directly upon the old one. The specimen is immediately placed within the cell thus formed, and the requisite quantity of the carbolated water placed upon it. The cover, which must be large enough to entirely or nearly cover the cement ring, is now picked up with the forceps, the under side being moistened by the breath to prevent adhesion of air-bubbles, and placed carefully in position. It is now to be carefully and equably pressed down with some force. By this any superfluous water is squeezed out, and the cover is forced down into the cement which rises as a little ring around its edge. The pressure is best made with a stiff needle, at first on the centre, and then upon the edges of the cover, which may finally be made slowly to revolve underneath the needle point. The slide may then be put aside to dry; or better, an outside ring of the cement thrown over its edge in the usual manner. Where a deep cell is required, several coats of the cement should be placed one over the other, each being allowed to dry in turn. If time be an object, and only
a shallow cell be necessary, the first ring of cement may be dispensed with, and the whole mounting of the specimen be done in a few minutes. Even with this cement, and the utmost care in mounting, the cabinet should be occasionally inspected, for there will always be some slides into which air will penetrate. When such are found efforts may be made to stop the leak by new rings of cement overlaid upon the old; but very often entire remounting of the specimen is the only satisfactory cure.

**Viennese Fungi.**—The only fungi that I have seen exposed for sale in Vienna are Truffles from France. Dried slices and fragments of *Boletus edulis*—common in every shop at which dry food substances are sold—and in the markets *Agaricus melleus*. I find that *Agaricus campestris* and *Ag. arvensis* are well known and eaten, but I have not seen them during my peregrinations. Bushels of *Agaricus melleus* have been exposed for sale during the past month.—[Ed. Grevillea.]

**Fungus Foray of the Woolhope Club.**—During the third week in October some very pleasant excursions were made in the neighbourhood of Hereford, by the members of this Field Club, and their friends. The meeting being held this year at a more advanced period of the autumn than heretofore, a different class of fungi was consequently met with. On the 23rd the Rev. M. J. Berkeley accompanied the members on an excursion to Holm Lacy, where a profusion of *Geoglossum olivaceum*, P., was found, or rather an interesting variety of this species, in which the stem, although perfectly smooth, was of a bright green colour. It grew gregariously amongst short grass, on a mossy lawn, and will be represented in the forthcoming fasciculus of *Fungi Britannici Exsiccati*. Upon the same occasion were found *Agaricus icterinus*, Fr., *Hygrophorus fornicatus*, Fr., and *Clavaria curta*, Fr., all previously unrecorded as British species. Upon the tables were specimens of the following less common species:—*A. gloiocephalus*, Fr., *Cantharellus umbonatus*, P., *Hygrophorus Haughtonii*, B. & Br., *Lactorius vuilus*, Fr., *Polyporus Schweinitzii*, Fr., *Thelephor a multizonata*, B. & Br., *Hyphomyces toriminosus*, Tul., *Marasmius Hudsoni*, Fr., and many others. On the following day an excursion was made to Moccas Court, where specimens of *Clavaria purpurea*, Müll, *Cl. umbrina*, B., *Hygrophorus russo-coriaceus*, B. & M., and numerous other highly interesting species were found. During the meeting the following papers were read:—Mr. C. E. Broome on "New Genera of Fungi;" Mr. James Renny on "Saprolegniace;" Mr. Wm. Phillips on "The Fungi of Charcoal Beds;" and on "The Fungi of Gerarde's Herbal," by the undersigned

King's Lymn.  

Charles B. Plowright.
Grevillea.

Geaster saccatus, Fr.

(Reprinted, by permission, from the "Gardener's Chronicle.")
Grevillea,

A MONTHLY RECORD OF CRYPTOGRAMIC BOTANY AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By the REV. M. J. Berkeley, M.A., F.L.S.

(Continued from page 84.)


Perithecia punctiform, black; spores shortly elliptic, nearly as broad as long, with a distinct nucleus 0.0003 long. Sometimes two perithecia become confluent.


Spores 0.0008 long.


Erumpent smooth; spores slightly curved, shortly apiculate, with from 2 to 4 nuclei, 0.0006 long.


Punctiform superficial hispid; spores curved enucleate, strongly apiculate, rather broad.


Regular, pezizaæform, hairy, spores curved.


Minute, punctiform, with extremely delicate radiating threads;

* The manuscript of the intervening numbers having been lost in transmission, they must be replaced at a future time.
spores slightly cymbæform, 0.008 inch long, 0.0016 wide, with from three to four nuclei.


Forming broad black patches, with a reticulated radiating border; perithecia minute; spores shortly cymbiform, about 0.0055 long.


Endobotrya. B. § C.—Perithecia Abdita; sporæ clavatae pedunculatæ; episporium reticulatum; endosporium e cellulis globosis nucleatis transversim subseriatis.

457. *Endobotrya elegans*. B. & C.—On branches of beech, Maine. No. 5703. Perithecia concealed by the bark; spores 0.002 inch long, oozing out and forming black orbicular patches, clavate, pedunculate; external coat hyaline at first, continuous, then reticulated; endochrome consisting of globose nucleated, at length separable divisions, which are at first arranged in transverse layers. This is probably a state of some *Sphaeria*, but the structure is so curious that for the present it is left under the name originally proposed.


Pustules at length bursting through the bark, plane above; perithecia with a flat expanded base; spores 0.004 inch long. In the Pennsylvanian plant the pustules are quite concealed by the bark, having probably not arrived at maturity, and the spores are rather longer, 0.005 inch.


Pustules minute, entirely covered by the bark, with the exception of the apex; spores oblong, 0.003 inch long with two nuclei.


Pustules small, piercing the cuticle by the minute apex; perithecia globose; spores oblong, narrower than the last, but of equal length.


Pustules minute, covered by the cuticle; perithecia globose; spores sausage-shaped 0.003 inch long.
462. Cytispora leucophthalma. B. & C.—Pustulis minutis, apice niveo ostiolo atro percurso; perithecii in stromate nigro conditis; sporis minutissimis curvulis.


Pustules minute, bursting through the bark by the snow-white apex, which is pierced by the black common aperture in the centre; perithecia globose or elliptic in a black stroma; spores curved, very minute. The New Jersey plant, which was formerly named C. nivosa, has rather longer spores, but may be considered a variety. C. niphostoma, Mont. is very different.


Pustules minute, subcutaneous; spores short, strongly curved, thicker in the middle.


* Cytispora leucosperma. Fr.—On twigs of various trees, under twenty different numbers, from various localities.


* Micropera Drupacearum. Lév.—On Prunus and Cerasus


Bursting transversely through the bark, reddish within and without; spores thread-shaped, very long, the endochrome here and there interrupted.


Pustules minute, crowded into black effused spots; spores oblong, '0008 long, '00016 wide, without any nucleus.


Pustules scattered hysteriform, slightly curved, here and there dotted with the slightly prominent ostiola; spores pedicellate, oblong, attenuated, slight at either extremity, '0005 inch long; endochrome retracted towards either apex; pedicel as long as the spores.


Pustules small, covered with the cuticle, which is not discoloured, except at the apex; spores '0003 inch long, oblong, '00008 wide; pedicels as long as the spores.


Pustules minute, rather irregular, depressed, covered with the transparent cuticle through which their brown tint is visible; spores oblong, '0003-'0006 long, slightly wider than in the last.


Pustules elongated, depressed, covered with the cuticle, which at length becomes transparent in the centre and bursts; spores sub-elliptic, '0003 long, '00013 wide.


471. Phlyctæna arcuata. B.—Pustulis minutis, epidermide

Pustules minute slightly convex, covered with the cuticle; spores filiform, curved over at the apex, ‘001 long.


Pustules oblong covered with the cuticle, with a narrow brown border; spores oblong, ‘00062 long.


Pustules elliptic covered with the cuticle which splits along the major axis, cellular within; spores oblong with a nucleus ‘00057 long.


Pustules black, surrounded by the cuticle; spores broadly obovate, ‘0008 long, with a minute nucleus.


Pustules free, somewhat truncate above; spores oblong, ‘00016 long, sometimes slightly curved.

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**SORBY’S RESEARCHES ON CHROMATOLOGY.**

Mr. H. C. Sorby, F.R.S., has published, in the Proceedings of the Royal Society, some of the results of his examination of Algae and other Cryptogamia, by spectrum-analysis. We quote the following:

*Connexion of the different Groups of Algae.*

Perhaps I cannot choose a better illustration than that furnished by the different groups of *Algae*—the olive, the red, and the green. They contain at least twelve different colouring-matters, distributed very differently, in such a manner as to connect, and yet to distinguish, the different groups very characteristically. I have not yet made any accurate quantitative analyses, and therefore express
the relative amount of the various substances by the following signs:—

<table>
<thead>
<tr>
<th>Substances</th>
<th>Olive</th>
<th>Red</th>
<th>Green</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue chlorophyll</td>
<td>+</td>
<td>+</td>
<td>*</td>
</tr>
<tr>
<td>Yellow chlorophyll</td>
<td>+</td>
<td>.</td>
<td>+</td>
</tr>
<tr>
<td>Chlorofucine</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Orange xanthophyll</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Xanthophyll</td>
<td>+</td>
<td>.</td>
<td>+</td>
</tr>
<tr>
<td>Yellow xanthophyll</td>
<td>*</td>
<td>.</td>
<td>+</td>
</tr>
<tr>
<td>Fucoxanthine</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Lichnoxanthines</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Phycocyan</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Pink phyceocyan</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Red phyceorythrine</td>
<td></td>
<td>*</td>
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</tbody>
</table>

On inspecting this table it will be seen that the olive Algae are characterized by the relatively large amount of chlorofucine and fucoxanthine, and the total absence of yellow chlorophyll, of xanthophyll, and of yellow xanthophyll. The red are especially distinguished by the colouring matters of the phycocyan and phyceorythrine groups, but also differ from the olive in containing xanthophyll and very little chlorofucine and fucoxanthine. The green are characterized by the presence of yellow chlorophyll and yellow xanthophyll, as well as by the absence of chlorofucine, fucoxanthine, and the substances soluble in water, so characteristic of the red group. Blue chlorophyll, orange xanthophyll, and the lichnoxanthines are common to all. It will also be seen that the red group is intermediate between the olive and the green, and, independent of the red colouring-matters, it differs from each of the other groups far less than they do from one another. It is also still more closely connected with each by other examples. My endeavour has been to extend such a method of comparison to all the leading classes of plants and to some of the lower classes of animals, and to ascertain the order in which they should be arranged, so as, in like manner, to show the most gradual and unbroken passage from one to the other.

Connexion between the lowest classes of Animals and Plants.

Comparing these various groups of Algae with other classes of plants, and with such low classes of animals as Actinia, I found that the whole of the colouring-matters present in green Algae are those most characteristic of all the higher plants, the only difference being that in certain circumstances these latter contain in addition various more or less accidental and unessential substances, belonging to the erythrophyll and chrysotannin groups, some kinds of
which, nevertheless, do to some extent appear characteristic of particular classes. As far as their constituent colouring-matters are concerned, the green Algae are therefore perfectly typical plants. On the contrary the olive Algae differ in a very marked manner; they contain no yellow chlorophyll, nor either of the two kinds of xanthophyll, all so characteristic of the most perfect plants, but contain chlorofucine and fucoxanthine, both of which occur in certain species of Actinie, like Anthea cereus, var. smaragdina. The presence of such colouring-matters, therefore, connects the olive Algae with the lower classes of animals, in the same manner that the presence of blue chlorophyll connects some animals with plants. Such substances, though essential to the growth of plants, are not constant in closely allied species of animals, as though they were of no more importance for the life of animals than the accidental vegetable colouring-matters are for the life of plants. The value of these connexions between plants and animals remains to be determined, but in any case such definite facts must, I think, have some very important signification. If, then, according to these principles, the olive Algae be looked upon as a link connecting the lowest classes of plants with some of the lowest classes of animals, there is a perfect and simple continuity; whereas if they were to be considered intermediate between green Algae and the higher Cryptogamia, there would be two great breaks of chromatological continuity.

Changes occurring in Oscillatoriae.

The olive Algae are also connected in another manner with lichens, through Oscillatoriae. These latter plants are extremely interesting, since they are subject to most remarkable changes, depending on the conditions in which they grow. I have made a series of quantitative analyses, which show this in a striking manner. I may here say that the chief difficulty in the analysis was the determination of the amount of the lichnoxanthines in presence of chlorofucine and fucoxanthine, and therefore the quantities given must be looked upon as only approximate, derived from several different methods, none of which were perfectly satisfactory, though they all agreed in leading to the same general conclusions. In discussing the results of the analyses, it was requisite to take the amount of blue chlorophyll as uniform, since it was the only constituent occurring in any considerable quantity throughout the whole series. To have taken equal weights of the plants themselves would have been almost impossible, and would often have made those which really correspond very closely appear to differ extremely, since the constitution of the endochrome is the important question. Of course by thus calculating the results as if the amount of chlorophyll were the same in all, there appears to be an increase in some of the other constituents in the specimens exposed to the sun, due, however, in reality to a reduction in the relative quantity of chlorophyll.
For comparison I give the following:

I. *Fucus serratus* grown in the shade.

II. The same plant grown in the sun.

III. *Oscillatoria* grown under water, in a cold spring, in a very shady place.

IV. The same plant, in the same spring, where more exposed to light.

V. The same plant, growing in and on the surface of water, where fully exposed to direct sun.

VI. Probably a different species of *Oscillatoria*, growing on a damp wall, completely exposed to the sun.

VII. *Peltigera canina*, slightly shaded, and having much fructification.

VIII. The same plant, where much exposed to the sun.

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<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fucus</td>
<td>I. 100</td>
<td>90</td>
<td>0</td>
<td>3</td>
<td>77</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>II. 100-100</td>
<td>100</td>
<td>0</td>
<td>3½</td>
<td>100</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>III. 100</td>
<td>13</td>
<td>0</td>
<td>1</td>
<td>51</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>IV. 100</td>
<td>19</td>
<td>36</td>
<td>3</td>
<td>55</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>V. 100</td>
<td>trace</td>
<td>67</td>
<td>25</td>
<td>11</td>
<td>9</td>
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<tr>
<td></td>
<td>VI. 100</td>
<td>&quot;</td>
<td>100</td>
<td>77</td>
<td>25</td>
<td>23</td>
</tr>
<tr>
<td>Peltigera</td>
<td>VII. 100</td>
<td>27</td>
<td>32</td>
<td>0</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VIII. 100</td>
<td>&quot;</td>
<td>54</td>
<td>100</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

In this Table are compared together the same or very similar plants growing in different conditions, as connected by the brackets, and also plants belonging even to different classes. On comparing together the amount of the different constituents of the same plants grown in less or more light, it will be seen that some of the differences are in perfect agreement with those already described; but the differences in the *Oscillatoria* are evidently not a mere change in equilibrium, due to the decomposing action of the light, and point unmistakably to a great difference in the constructive force of the plant, depending on increased light. There is a remarkable development of phycoxanthine and orange xanthophyll, and a great decrease in the amount of chlorofucine and fucoxanthine, and the result is that we have a change almost from the type of olive *Algae* to that of certain lichens. When growing in a very shady place the colouring-matters soluble in bisulphide of carbon are all iden-
etical with those in *Fucus* and other olive *Algae*, whereas when grown exposed to much sun there is a great reduction in the amount of those substances which are so characteristic of that group, and at the same time a great development of others which are almost or altogether absent from it, but occur in large quantity in, and are very characteristic of, such lichens as *Peltigera canina*. The olive *Algae* are, however, distinguished from those *Oscillatoriae* which approach them most closely by the absence of the phycocyan; and though these occur in *Peltigera*, it is distinguished by the absence of fucoxanthin from those *Oscillatoriae* which in other respects agree with it. We may also draw another important conclusion from the above facts. *Oscillatoriae* approach most closely to the olive *Algae* when their vegetative energy is the weakest, when so little light is present that they can only just keep alive. This seems to show that the colouring of olive *Algae*, in some way or other, belongs to a lower type than that of the green *Algae*, as indicated by other facts previously described.

*General connexion of different classes of Plants.*

The olive *Algae* are thus connected with the lowest green plants by means of two different groups of the red *Algae*, one leading gradually to the green *Algae* through *Porphyra*, and the other to lichens through *Peltigera*. There is the same sudden break in both, where the phycocyan and phycoerythrine colours cease and yellow chlorophyll and yellow xanthophyll make their appearance—at least I have hitherto met with no good connecting links containing a small quantity of both instead of a normal amount of one or of the other; and if this be really a universal fact, it would seem to show that, in some way or other, the presence of the phycocyan excludes yellow chlorophyll and yellow xanthophyll. Curiously enough this break does not occur between one great natural class and another, but in passing from those red *Algae* which are so closely related to the green series as *Porphyra*, and from *Peltigera* to other lichens. So much remains to be learned of the details that it would be premature to put forward any general scheme with the expectation of its being finally adopted; but at the same time it may perhaps be well to express what is already known, if only as a guide for further research. Of course I refer simply to the distribution of the colouring-matters; and this could hardly be expected to depend upon, or accurately follow, the difference in the development of the reproductive organs; but, on the contrary, it seems to represent something special in the constitution of the plants, for which no name has hitherto been adopted, but which I have called constructive energy. If such be really the case, an arrangement founded on chromatological characters alone would by no means necessarily agree in every particular with a natural system founded on structural peculiarities. Taking into consideration the
various facts described above, the following arrangement expresses every thing so far known respecting the distribution of the different colouring-matters:—

<table>
<thead>
<tr>
<th>Actiniæ.</th>
<th>Oscillatoriæ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthea cereus, var. smaragdina.</td>
<td></td>
</tr>
<tr>
<td>Olive group of Algaæ.</td>
<td></td>
</tr>
<tr>
<td>Red Algaæ.</td>
<td>Peltigera.</td>
</tr>
<tr>
<td>Porphyra.</td>
<td>Lichens.</td>
</tr>
<tr>
<td>Green Algaæ.</td>
<td>Higher Cryptogamia.</td>
</tr>
<tr>
<td></td>
<td>Highest classes of plants.</td>
</tr>
</tbody>
</table>

The colouring-matters found in Actiniæ are very various, and it is only particular species that contain those found in Algaæ. Lichens, as a whole, are characterized by a number of what may be called accidental constituents—such, at least, as occur in one species and not in another closely allied to it. Many of these are almost or quite colourless substances, which easily give rise to colouring-matters when treated with various reagents. This fact, combined with their partial distribution, is taken advantage of in studying lichens as a means for distinguishing closely connected species. Their more constant and apparently fundamental colouring-matters correspond with those found in the higher classes of plants, but differ considerably in relative proportion, the lichnoxanthines usually being relatively more abundant.

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**ON SOLORINA BISPORA.**

*By Dr. J. Stirton.*

By way of reply to Mr. Crombie's note on Solorina bispora (Nyl), perhaps I may be permitted to state the considerations which have weighed and still weigh with me towards the retaining of it as a species.

Since detecting this lichen for the first time in 1871, on Ben Lawers, I have secured it on almost every mountain in Scotland that I have climbed of a greater elevation than 3000 feet. Accordingly, so far as my experience goes, it is more frequent than S. saccata, which is usually found, besides, at much lower elevations—a fact which, in my estimation, ought not to be wholly ignored in the question of specific distinction. In all these instances (four in number) the thecae are 2-spored, without exception. Occasionally, it is true, a one spored theca may be seen, where the spore is larger than usual, viz., as in one specimen (1 x 0.054 m.m.), but, as is well known, especially in the larger spored lichens, such a state is easily accounted for physiologically, although the converse does not hold true.
Again, in S. saccata, two-spored thece are occasionally though rarely seen in this country, mixed with the 4-spored, where such spores approach in configuration and, to a less extent, in size, those of S. bispora, but this fact, so far from militating against the specific value of the latter, is, in my opinion, decidedly in its favour, and is merely a counterpart of what (as we have stated) is seen in its own internal organization. In this way is explained what is described by Anzi, and distributed by him from time to time.

3rdly. S. bispora has not the slightest relationship to S. limbata in the way which Mr. Crombie indicates, inasmuch as the so-called collemoid parasite is not present in any of the examples. The thallus, on being moistened, certainly swells more than that of S. saccata, and the particular parts in the neighbourhood of the apothecia are more isidiose, both of which characters, although apparent enough as well as distinctive, cannot, by any stretch of imagination, be construed into having any affinity with a Collema; besides, the internal organization is entirely that of the genus, and, in all the Scotch specimens, the rest of the thallus is well developed, and continuous with the parts surrounding the apothecia.

I am inclined to give a different interpretation from Mr. Crombie of the occasional gelatinous appearance assumed by S. saccata, and it may be, by S. bispora, and one that does not imply the rather clumsy assumption of the superposition or invasion of either a Collema or a Leptogium. By the way, it is somewhat puzzling to see why he has pitched on L. scotinum as the parasite. C. cheileum is in every respect a better choice; perhaps, however, the cellular appearance of the epithallus has determined him to include samples from both genera.

Some time ago my attention was arrested by seeing in two Stic-time from New Zealand pulpy patches of the central and older parts of their thalli. The microscope revealed the fact that the granula gonima had renewed their life, so to speak, and formed detached groups, which caused corresponding bulgings on the upper surface, while the rest of the thallus had a gelatinous appearance, as if the fibrous element (small in this section in comparison to the extent of the gonimal layer) had been nearly macerated out. In fact the whole presented very much the appearance of Sol. limbata, while the surrounding parts retained their original constitution. Why granula gonima, in contradistinction to true gonidia, should have, in favourable circumstances, this increased, or rather renewed activity, I cannot explain, but the fact is, nevertheless, indisputable, of which any one may convince himself by retaining and keeping moist for a time between glass slips, portions of the thallus of a Pyrenopsis, &c.

During the summer of this year, while at Killin, I noticed, as Mr. Crombie has done, a greater prevalence of the form S. limbata, and always with deeply urceolated and accordingly old apothecia, as if the life of the plant had been on the decline, while the generally
wet season had served to stimulate the conglomerated gonidiac granules into renewed activity, and produced (along with the consequent maceration) the modified thallus in question.

Had time and space permitted, I should have liked to have enlarged somewhat more on this subject; meanwhile, I shall content myself with describing a genuine parasite on S. bispora, viz:—

Lecidea epiphorbia, Stn.—Apothecia resemble, externally and internally, those of L. Parmeliarum, except that the paraphyses are neither thickened nor darker coloured at their apices, the spores are colourless, or present in a few instances, a faint tinge of yellow, and the reaction on the gelatina hymenia by means of iodine, shows a deep vinous red without any preceding caerulescent tint, instead of being negative, as in L. Parmeliarum. This lichen bears the same relationship to L. Parmeliarum that L. solorinaria does to L. oxyspora.

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BRITISH FUNGI.

By the Editor.

(Continued from Page 176.)

The number of species of Fungi found in this country since the conclusion of our series of descriptions in the last volume of this Journal has rendered it incumbent upon us, in fulfilment of promise, to continue the descriptions of these additions as a supplement to the “Handbook of British Fungi.”

Agaricus (Leptota) granulosus. Batsch. var. Carcharias. Fr.


On grass under old Scotch firs.

Agaricus (Armillaria) aurantius. Schaff.


In pine woods. Forres, N. B.

Varying a good deal in the nature and frequency of the scales.

Agaricus (Clitocybe) tuba. Fr.

White, pileus fleshy, thin, convex, then plane, umbilicate, moist, shining with a whitish silky lustre, margin even; stem equal, soon hollow and compressed, naked above, gills attenuated and decurrent,
broad, much crowded, white, growing pallid.—Fries Epicr., p. 72.
Amongst leaves. Epping Forest.

**Agaricus (Clitocybe) ericetorum.** Fr.
White, pileus fleshy, convex, then plane, or concave (sub-turbinate) smooth, shining when dry; stem stuffed, short, tough, smooth, attenuated downwards, gills decurrent, broad, connected by veins.—Fries Epicr., 73. B. & Br. Ann. N.H., 1338. Bull, t. 551, fig. 1.
On heathy places. Sept.
Pileus, 1-2 in. broad; stem 1 in. long, 2-3 lines thick.

**Agaricus (Clitocybe) gangraenosus.** Fr.
Pileus fleshy, convex, then obtuse, at the first covered with white powder, then naked, variegated or virgate; stem solid, spongy, sub-bulbous, soft, striate; gills sub-decurrent, arcuate, crowded, dingy-white.—Fries Epicr. p. 56. Batt. t. 20, f. m. Smith, Jour. Bot. (1873), 355.
In woods. Street.
At length turning jet black.

**Agaricus (Clitocybe) subinvolutus.** Sm.
Pileus plane, fleshy; margin subinvolute; gills broad, decurrent; stem stuffed, sub-bulbous; whole plant cream-coloured, every part at length becoming spotted.—Smith in Jour. Bot. (1873), p. 336.
In woods, &c.
Always smaller than A. geotrupus, Fr., with a stem one-third the length. It is, moreover, never umbonate, and the fruit is different.

**Agaricus (Collybia) succineus.** Schäff.
Pileus rather fleshy, convex, then expanded, at length somewhat depressed, even; stem fistulose (not rooting), pallid-rufous, quite smooth; gills obtusely adnexed, broad, rather thick, serrulate, somewhat distant, whitish.—Schäff Icon., t. 45. Fries Epicr., p. 91. B. & Br. Ann. N. H., No. 1339.
Amongst grass. Coed Coch.
Stem 1-2 in. long, 1-2 in. thick; pileus 1 in. broad.

**Agaricus (Collybia) aquosus.** Bull.
Amongst moss. Coed Coch.

**Agaricus (Collybia) tylicolor.** Fr.
Pileus rather fleshy, convex, then plane, somewhat umbonate, even, smooth; stem fistulose, equal, even, pulverulent; gills free, distant, plane, greyish.—Fries Epicr., 98. Sys. Myc. i., 132. B. & Br. Ann. N. H., No. 1341.
In woods. Coed Coch.
NEW DIATOMS.

The following New Species of Diatoms are described by Mr. F. Kitt, in the "Monthly Microscopical Journal," for Nov., 1873. Chiefly exotic.

Aulacodiscus superbus. Kitt.—Valve with a large central heptagonal depression, processes placed on the margins of the seven cuneate inflations. The heptagonal area marked with large hemispherical elevations, less conspicuous on the remainder of the valve, the surface of which (with the exception of a small central smooth space) is covered with distinct radiant moniliform striae; striae about 18 in .001 in.; diameter of valve .0050 in.; length of sides of heptagon, .0033 in. [M. M. J. pl. xxxviii., fig. 1.]

Clark's Cliff, Barbadoes.

Stictodiscus Crozieri. Kitt.—Valve with numerous irregularly undulating costae, which become very delicate as they approach the centre, within a short distance of the margin they divide, the spaces between the costae distinctly punctate, central puncta large, scattered, diameter of valve .0064 in. [M. M. J., pl. xxxviii., f. 2.]

Plentiful in a gathering made by Capt. Crozier, in the Mauritius. Rare in scrapings from a Haliotis shell, West Indies.

Isthmia? vitrea. Kitt.—Frustules trapezoidal, the opposite corners of the ends more or less produced, hyaline, valves oval or suborbicular. [M. M. J., pl. xxxviii., f. 3.]

Shell scrapings, Sandwich Islands. (R. M. Browne.)

Nitzschia ventricosa. Palmer.—Frustules linear, lanceolate; apices obtuse; valve with ventral margin convex; dorsum straight or slightly convex; apices very much produced, awn-like; keel submarginal, punctate, puncta reaching to the extremities of the awn-like ends; striae faint, distant, about 13 in .001 in. [M. M. J. pl. xxxviii. f. 5.]

Hong Kong (Palmer). Rio de Janeiro and Bahia (Capt. Perry).

Nitzschia decora. Kitt.—Valve linear, elliptical, somewhat deeply constricted at the centre; ends subacute; keel marginal, punctate; length .0055 in.; striae moniliform, distinct, about 36 in .001 in. [M. M. J., pl. xxxviii. f. 6.]

Bahia (Capt. Perry).

Tryblionella conspicua. Kitt.—Valve elliptical, with central constriction, ends broadly rounded; one of the margins punctate, puncta conspicuous, about 12 in .001 in.; centre of valve with a longitudinal elevation gradually sloping towards the margins; striae obsolete. [M. M. J., pl. xxxviii. f. 7.]

Scrapings from Tredacua shells, West Indies.
SPHAGNUM MOLLE.

Dr. R. Braithwaite has recently described, and figured in the "Monthly Microscopical Journal" this species as an addition to the British Flora, and to this communication we must refer for the full synonymy and bibliography of the species.

Sphagnum molle. Sullivant.—Monoicous; in very soft densely cushioned tufts; whitish-green above, pale brownish below. Stem pale-green, slender, 2-5 in. high, usually divided, with 2-3 layers of non-porose cortical cells. Branches densely crowded, 2-3 in a fascicle, nearly alike, erecto-patent, the porose cortical cells elongated, with the apices somewhat recurved. Cauline leaves very large, closely set, minutely auricled, ovato-spatulate, patent and deflexed, the hyaline cells almost free from fibres; apex with three teeth and a few minute ones at sides; margin involute, very narrowly bordered. Ramuline leaves oblong-ovate, concave, convolute above, very narrowly margined, the apex truncate and with 5 or 6 irregular teeth; hyaline cells angulato-fusiform, very prominent and confluent at the back, with annular and spiral fibres, and a few large pores; chlorophyll cells slender, triangular, projecting between the hyaline at the concave surface of the leaf.

Male amentula short, thick, violaceous, placed in the coma, the bracts oblong, obtuse. Capsules in the capitulum or upper fascicles, perichaetium not separating, upper bracts broadly oblong-ovate, convolute with 2-3 teeth at apex, cells below elongate hexagono-rhomboid, above normal, free from fibres or pores. Spores ochraceous.

Var. β. Mulleri.—Ramuli 3-4 in a fascicle, 1-2 patulous, the rest longer, slender, and pendent. Stem leaves more elongated, the hyaline cells with fibres and pores; perichaetial bracts lanceolate, acuminate at apex, with a broad margin, wider toward apex, cells of upper part with fibres and pores.

Hab.—By moorland streams, forming dense hassocks. Fr. August.

The typical form is American, and the variety β only is found in Europe. In Britain, Darnholme, near Whitby, Yorks (Anderson, 1853, Crouch, 1871). Ben Lawers (Mac Kinlay), Brickhill Heath, Bucks (Rev. J. F. Crouch).

Fuller particulars, with plate xl., will be found in the "Monthly Microscopical Journal," vol. x. for November, 1873.

CRYPTOGAMIC LITERATURE.


Willet, H. Lichens collected by the United States Expedition, under Dr. F. V. Hayden, to the Yellowstone Region, in 1872.


Rabenhorst, Dr. L. Index to L. Rabenhorst's "Algarum Europaearum exsiccatarum." Nos. 1 to 2350. Dresden, 1873.

Smith, Prof. H. L. The siliceous shelled Bacillariae or Diatomaceae, in the "Lens," for August, 1873.

Briggs, S. A. A contribution towards a list of Rhode Island Diatomaceae, in the "Lens," for August, 1873.


Witt, Otto N. über Südsee Diatomaceen.

Winter, Geo. die Deutschen Sordarien, 5 plates. Halle, 1873.


Oudemans, C. A. J. A. Aanwinsten voor de Flora mycologica van Nederland.


Ahles, Dr. Wandtafeln der Pflanzkrankheit. Regensburg, 1873.

Thuemmen, Baron. Fungi Austriaci exsiccati, cent. vii., viii.


Braithwaite, Dr. R. On Bog Mosses. No. 5, with plates, in "Monthly Microscopical Journal" for Nov., 1873.
Agaricus (Tricholoma) macrocephalus. Schulzer.

Sub-gregarious, very large; stem solid, ventricose, delicately granulated, whitish, ochraceous below, produced into a fleshy root; pileus compact, fleshy, convex then plane, somewhat depressed; cuticle at first smooth, at length broken up in a tessellated manner, ochraceous, darker when old; gills deeply emarginate, nearly free, attenuated behind, scarcely crowded, pallid.—Schulzer, Icon. Hym. Hung., t. 3. Smith, Jour. Bot. (1873), p. 336.

In grassy places. King's Lynn.

Very large, emulating Ag. colossus. Odour very powerful, like Lilium auratum; stem long, subterranean; flesh firm, slightly yellowish; taste unpleasant; spores irregularly globose, .006 m.m.


In woody places. Crystal Palace.

Agaricus (Entoloma) Saundersii. Fr.

(Grevillea, ii., p. 63.)

Growing on the ground in patches.

Agaricus (Entoloma) Wynnei. B. & Br.

Pileus at first plane, fuliginous, velvety, then convex, squamulose, hygrophanous; margin striate, often undulating; stem fuliginous, blue, compressed; base cottony; gills broad, transversely ribbed, pallid, margin crenulate; having the odour of bugs.—Ann. Nat. Hist., No. 1842.

In fir woods. Coed Coch. Sept.

Allied to Ag. costatus, with which it agrees in size.

Agaricus (Nolanea) mammosus. L.

Pileus sub-membranaceous, conical or campanulate, papillate, striate, hygrophanous, when dry isabelline, silky; stem fistulose,

Pileus tawny; stem elongated, fragile.

Agaricus (Nolanea) icterinus. Fr.

In woods, &c., near Hereford. Oct.
Colour yellowish, or greenish yellow.

Agaricus (Pholiota) Arrhenii. Fr.
Pileus fleshy, thin, campanulate, expanded, smooth; stem fistulose, rigid, fibrous or strigose, and cracking, pallid above, ring entire, distant; gills adnate, then seceding, ventricose, narrow behind, becoming yellowish.—Fries, Epicr., p. 161. Smith, Journ. Bot., 1873, p. 336.

In a wood yard among chips. N. Wootton.
A totally different plant from A. mycenoïdes. Slender. Stem 3-4 in. long, 1\(\frac{1}{2}\) in. thick; pileus 1\(\frac{1}{2}\) in. broad.

Agaricus (Hebeloma) relicinus. Fr.

Under pines. Stannage Park.
Colour fuliginous, without any perceptible odour.

Agaricus (Hebeloma) Clarkii. B. & Br.
Pileus campanulate, white, silky; stem nearly equal, flocculose, stuffed; gills adnexed, white, marginate.—Ann. Nat. Hist., No. 1345.

In shady places. Street. Oct., 1871.
Allied to A. sindonius. Pileus \(\frac{3}{4}\) in. across, 1 in. high; stem 1\(\frac{1}{2}\) in. high, 2 lines thick; slightly incrassated at the base.

Agaricus (Hebeloma) truncatus. Fr.
Pileus compact, convex, then plane, undulated, or flexuose, smooth, rather dry; stem solid, stout, equal, entirely pruinose with white; gills emarginate or free, crowded, dry, whitish, then flesh-coloured, at length ferruginous.—Fries, Epicr., p. 181. Schäff., Icon., t. 251. B. & Br. Ann. N. H., 1346.

Pileus 1\(\frac{1}{2}\)-2 in. across, plane, rigid, slightly viscid, rufous, depressed in the centre, smooth, margin crisped, inflexed, the extreme edge pruinose; stem 2\(\frac{3}{4}\) in. high, \(\frac{3}{4}\) thick, claviform at the base,
stuffed, fibrilloso-striate, pale, rufous, less deeply coloured below; gills narrow, adnerved with a tooth. Smell raphanoid.

**Agaricus (Flammula) astragalinus. Fr.**


On pine stumps. Aviemore, N. B.

Taste nauseous and disagreeable, like *A. melleus*. A most beautiful species, resembling in colouring *Cortinarius cinnabarinus*.

**Agaricus (Flammula) inauratus. Smith.**

Pileus fleshy, 1 in. or more across, moist, smooth, furnished with a distinct veil; gills broad, adnate, with a decurrent tooth, pale yellowish clay colour, stem incurved, sub-hollow, clothed with in-nate scales; taste mild, insipid; whole plant sulphury-yellow.— *Sm. in Journ. Bot.*, 1873, p. 336.


Allied to *A. flavidus* and *A. Junonius*.

**Agaricus (Flammula) juncinus. Smith.**

Pileus fleshy, 1 in. across, hemispherical, sulphury-yellow, with a rich brown disc; veil none, gills broad, very thin, red-brown; stem elongated, thin, 4 in. long, attenuated downwards, clothed with a few fibres; taste nauseous and disagreeable, somewhat bitter.— *Sm. in Journ. Bot.*, 1873, p. 336.

On dead bullrushes in an old clay pit. N. Wootton (C. B. P.).

Allied to *A. mixtus*.

**Agaricus (Naucoria) pusiolus. Fr.**


On the ground. West of England.

Stem 1 in. or more, rather viscid, lemon-yellow. Pileus 3 lin., tawny-yellow.


Pileus convex, ochraceous, delicately punctulate; margin furfuraceous; stem incrassated above or equal, furfuraceous, fistulose; ring appendiculate; gills pallid, adnate, plane.— *B. & Br. Ann. N. H.*, 1348. *Ag. dispersus, Pers.*


Pileus 3-4 lines across; stem ½-1 in. high, 1 line thick; margin of gills white.

**Agaricus (Stropharia) Worthingtoni. Fr.**

(*Grevillea, ii.,* p. 63.)

In pastures.
Agaricus (Psalliota) inunctus. Fr.


In grassy places. Ely. Epping.

Agaricus (Psalliota) merdarius. Fr.


In a grass field. Sibbertoft.

Cortinarius (Inoloma) traganus. Fr.


In pine woods. Forres.

Taste strong, not unpleasant, odour very powerful, like that of the larva of the goat-moth (Cossus.)

Cortinarius (Phlegmacium) triumphans. Fr.

Large, splendid; pileus fleshy, convex, then plane, obtuse, regular, when moist viscid, crystalline, yellow or ochraceous, when dry yellow, disc spotted with minute adpressed scales, or naked; margin even; stem solid, firm, ovate-bulbous at the base, attenuated upwards, striate, white, then yellowish, with tawny scales disposed in rings; veil partial; flesh compact, white; gills emarginate, crowded, with a decurrent tooth, whitish, then clay-coloured. Fries, Mon. Hym., ii., p. 4. B. & Br. Ann. N. II., No. 1350.* C. sublanatus, Hussey, Myc. Illus.

In moist woods. Oct.

Stem 3-5 in. long, \( \frac{1}{2} \) in. and more thick. Pileus 3-5 in. broad. Gills 3 lin. broad.

Cortinarius (Phlegmacium) porphyropus. Fr.


Stem 2-4 in. long, 3 lin. thick, fragile, externally and internally violaceous, growing pale, then whitish. Pileus 1\( \frac{1}{2} \)-3 in. broad, livid yellowish or clay-coloured.
Cortinarius (Dermocybe) cinnabarinus. Fr.

In beech woods. Street. Oct.

An elegant species. Stem 1½-2 in. long, 3-4 lin. thick; fibrillosc or striate; pileus 2-3 in. broad, campanulate, then plane, silky, or obsoletely squamulose, vermilion, flesh firm, paler; gills adnate, subdecurrent; 3 lin. broad, connected by veins, edge unequal, darker.

Cortinarius (Dermocybe) orellanus. Fr.

In woods. Epping Forest, &c.

Cortinarius (Telamonia) helvolus. Fr.

In woods. Coed Coch. Sept.
Pileus 2-3 in.; stem 2-3 in. long, 2-4 lin. thick.

Cortinarius (Telamonia) armillatus. Fr. (Handbook No. 526, except reference to Hussey.)


In woods. Coed Coch.

Cortinarius (Telamonia) haematochelis. Bull.

In woods. Coed Coch.

Cortinarius (Hygrocybe) decipiens. Fr.


Pileus infundibuliform, pallid; margin undulated, deflexed; stem dilated, fibrilloso-striate; gills distant, decurrent, branched, pallid.


Cinereous, stem often white, pileus thinner, margin at length striate.—Smith, Journ. Bot., 1873, 336.

In grassy places. Largo, N.B.

Hygrophorus livido-albus. Fr.

Pileus fleshy, obtuse, even, smooth, viscid, livid, of one colour; margin naked; stem stuffed, equal, firm, nearly equal; gills thick, distinct, distant, white.—Fries, Epicr., 324. Fl. Dan., t. 1904, f. 2. B. & Br. Ann. N. H., 1357.

In woods. Street. Oct.

Hygrophorus Clarkii. B. & Br.

Fragile; pileus convex, sub-umbonate, livid, cinereous, viscid; margin even; stem concolorous, hollow; gills broad, distant, thick, adnate, white.—B. & Br. Ann. N. H., 1358.

In woods. Street. Oct.

Gills in large specimens nearly \( \frac{1}{2} \) in. wide.

Hygrophorus fornicatus. Fr.


In mossy places, near Hereford. Oct.

Pileus obsoletely umbonate, 1 in. broad, when broadly expanded nearly 2 in. broad. Stem 2-3 in. high, 4 lines thick.

Hygrophorus metapodius. Fr.


In pastures. Street. Oct.

Stem 1-2 in. long, \( \frac{1}{2} \) in. and more thick; pileus 1\( \frac{1}{2} \)-3 in. broad.

Hygrophorus Houghtoni. B. & Br.

Pileus convex, bright coloured, at length depressed in the centre, striate, tawny yellow as well as the stem, transversely undulate, very viscid; gills decurrent, thin, grey.—B. & Br. Ann. N. H., 1360.


Pileus 1\( \frac{1}{2} \)-2 in. across; stem 2 in. and more high, \( \frac{1}{4} \) in. thick, sometimes tinged above with blue; odour foxy. The gelatinous coat is extremely thick, and at length separates and forms a cup in the centre.
Lactarius exsaccus. Smith.


In pine woods, &c.

Smith observes that this plant can no longer be considered a mere variety of L. vellereus. The fruit of the two plants, as well as the general habit is very different.

Lactarius minimus. Smith


Russula subfætens. Smith.

Pileus bullate, subviscid, disc fleshy, margin submembranaceous; gills thick, distant, and branched; stem not so stout as in R. fætens, smaller, odour somewhat disagreeable; taste slightly acrid.—Smith, Journ. Bot., 1873, p. 337.

On the ground.

Smith observes that this is the plant referred to by Fries in Sys. Myc., i., p. 58, as a variety of R. fragilis, but that plant has crowded, thin, and generally entire gills, whilst those of the present plant are thick, distant, and branched. It is much nearer R. fætens.

Nyctalis caliginosa. Smith.

Pileus very fleshy, white when dry, flocculoso-pruinose, when wet marked with colours (as in Ag. butyraceus); margin involute, slightly exceeding the gills, gills thick, branched, decurrent; stem solid, flocculoso-pruinose, base naked; odour and taste rank and disagreeable (like Polyporus squamosus). Smith, Journ. Bot., 1873, p. 337.

Amongst earth and dead leaves. Highgate.

Closely allied to N. parasitica, but at once distinguished by its truly decurrent gills and other characters.

Marasmius terginus. Fr.


Pileus ½ in. broad, faintly striate, of a pale reddish brown, darker in the centre; stem about 3 in. high, ½ line thick, smooth, pale-brown, satiny; gills reddish-ochre, adnate by a tooth, but sinuated, moderately distant.
DIE DEUTSCHEN SORDARIEN.*

Those who have followed the vicissitudes through which the species and genera of ascomycetous fungi have passed, during the last few years, will welcome this monograph, if it be only because, in it they find, a series of plants grouped together which previously were scattered over several genera. It is not purposed to discuss the advisability or otherwise of accepting the genus Sordaria, suffice it to say that we have here, a number of species possessing many characters in common beside that of their general fimicolous origin, and that they are arranged in a systematic manner, so that in reality it matters but little, whether they be collectively called Sphaeria or Sordaria. The author includes 22 species in this enumeration, which previously were scattered over the following genera:—Sphaeria, Podospora, Malinvernia, Hypocopra Coprolepa, Sordaria, and Ixodiopsis.

The work commences with a history of the literature of the subject, from which it appears that the first author to mention a Sordaria was Persoon in his "Synopsis," p. 64, where we find two varieties of Sphaeria fimeti described. Herr Winter regards Sowerby's Sphaeria stercoraria as a Sporormia. This we venture to think an error. The specimen of S. stercoraria in the Hookerian Herbarium at Kew possesses simple dark-brown sporidia,† and it was determined by Rev. M. J. Berkeley,‡ who had the opportunity of seeing Sowerby's original specimen. Césati and De Notaris were the first to employ the genus Sordaria, but since then almost every author has limited it in a different manner. The Morphology of this genus is treated of in some very interesting remarks, upon the Stroma, the Perithecia, and the Fructification.

The genus itself Herr Winter thus defines—

"Stroma suberoso crustaceum, vel plurumque nullum, perithecia membranacea, pellucida, asci cylindracei vel ampli, 4—128-spori, paraphysibus obvallati, sporidia continua non septata, opaco-nigro-fusca."

Although usually found upon dung, it is added, these plants may grow upon other vegetable substances; one is described on wood, another on blotting-paper, and a third upon the lees of wine. The perithecia may be scattered, or crowded, superficial, immersed in the matrix, or imbedded in a stroma, of various shapes, membranaceous, and often diaphanous. The sporidia, simple, round or ovate, brown, opaque, surrounded or not by a glistening envelope, or appendiculated. The genus is for convenience divided into three subgenera—

1. Coprolepa = possessing a stroma.
2. Hypocopra = without any stroma, but having the sporidia involved in mucus.
3. Eusordaria = having appendiculated sporidia.

Appended is a list of the species, with their synonyms. Each species is fully described, and is accompanied by a figure of its fructification, and what we consider equally important, a sketch of the perithecia. The illustrations are original, and taken in most instances from authentic specimens in the author's extensive herbarium.

**Sordaria. Winter.**

**Subgenus Coprolepa.**

1. *Sordaria merdaria* (Fr.) Awd.
2. *Sordaria equorum* (Fckl.) Winter.

**Subgenus Hypocopra.**

10. *Sordaria fermenti*. (Fckl.) Awd.

**Subgenus Eusordaria.**

   Fckl.
20. Sordaria anserina (Rabh.) Winter.
   Syn. Spharia fimiseda. (De Not.) Fckl. (Fung. Rhen.)
   Forma coronata. Winter.
   Fckl.
   Forma aloides. (Fckl.) Winter.
   Syn. Sordaria aloides. Fckl.

Charles B. Plowright.

LICHENOLOGICAL MEMORABILIA, No. 4.


On the Gonidial-Zoospores of Lichens.

Much attention has been of late devoted, and is still devoted, to the subject of the Gonidia of Lichens. Two theories or opinions have sprung from these researches, which are respectively supported by great and learned savans. Those whose studies are chiefly physiological maintain that the filamentous tissue of the thallus of lichens is a fungus which grows parasitically on an alga, which it envelopes and carries on with it in its growth so as to constitute the gonidia. On the other hand, true lichenologists, whilst admitting the apparent similarity of gonidia to certain algae, do not consider them as such, but as special organs of multiplication or propagation of lichens.

Without offering any opinion as to the merits or demerits of these two theories, the solution of the question certainly appears important, not only as regards lichenology, but botany generally, and, consequently, the least research which tends towards this end cannot but be regarded as interesting and instructive in a scientific point of view.

Five years ago Famintzin and Baranetzky published their discovery of the existence of zoospores which issued from the gonidia of Physcia parietina, (L.), but this fact has not been since verified.
by others, and has been even wholly neglected and overlooked, and that with contempt, by many savans.

To determine what becomes of the zoospores after their issue from the gonidia, M. Woronine has during two successive years (1870-1871) carried on researches on the gonidia of Physcia pulverulenta, (Schreb.), and in a paper in the Ann. des Sc. Nat., ser. 5. Bot., vol. xvi., p. 317, illustrated by tab. 14, has published the results.

M. Woronine freed the gonidia from the thallus of this lichen, and cultivated them on a stage of a microscope, and kept them moistened daily with pure water. At the end of five days he saw the nucleus and the great lateral vacuole found in every gonidium to disappear, and the entire contents of the gonidium become very finely granular, and transformed into a considerable number (thirty, forty, or more) of small, round, irregular protoplastic bodies, which are the future zoospores. During this time the gonidia increased considerably in size, and on a certain part of their surface a small protuberance arose, indicating the point whence the zoospores would issue. When the zoospores were fully formed, this protuberance increased very quickly; the membrane of the gonidium became in that point thinner and thinner, and ultimately absorbed, and an aperture formed, from which issued the entire mass of zoospores surrounded with a very delicate membrane. This membrane quickly disappeared, and the freed zoospores dispersed themselves throughout the circumambient water.

These zoospores are oblong and fusiform in shape, generally more or less attenuated at one extremity, which is furnished with two cilia, by means of which they move about with great rapidity. At the end of five or six hours this movement ceased, and the zoospores lost their cilia, took a perfectly round form, became covered with a membrane, their contour more definite, and their size enlarged. In about three more days these small spherical bodies assumed a decided green tint, and in each of them a small but very distinct central nucleus was observed. In fact, these small spherical bodies assumed the form of small gonidia, precisely identical with those contained in the large gonidia. In four or five days more these young gonidia, obtained from the transformed zoospores, became enlarged in size, and eventually began to multiply themselves by the usual process of reiterated and successive division. During the following five or six days these young gonidia grew considerably, but ultimately perished, probably from deficiency of nutriment.

These experiments he repeated several times, and always with the same results, and he thence deduces that the zoospores produced from gonidia vegetating externally to the thallus, never produce either filament or hypha, but continually give existence to new colonies of young gonidia.

Such are the results of M. Woronine's researches, which appear to carry the previous researches of physiologists one step further, viz., in witnessing the conversion of the zoospores into gonidia again.
But now comes the question, what function do the zoospores exercise? We know that zoospores or spermatozoids do exist in ferns, mosses, hepaticce, algae, and probably fungi, and that they exercise in some—as yet unascertained—mode an influence in the fertilization and fecundation of the plant. Now, as the laws which the Divine Creator has imposed on organic matter are never excited into action but with some definite object, and the production of a definite result, we may conclude that these zoospores, issuing from the gonidia of lichens, exercise a definite function on these lichens. But what that action is remains to be ascertained by future experiments and researches. As yet we are simply in the dark. But will analogy justify us in judging it to be in some way connected with fecundation? Very possibly.

In Ann. des Sc. Nat. ser. 5, Bot. xv., p. 198, illustrated by tab. 8, M. Janeczenski publishes a very interesting paper on the structure and development of Ascobulus furfuraceus, (Pers.), in which he shows that in the tubercular body formed on the mycelium, and which eventually develops into the cupula, there is engendered in the lower portion a series of larger cells assuming a curved, worm-like contour, which he terms Scolécite, and that from one only of the cells of this scolécite (possibly fertilized by zoospores) issue certain filamentary processes which progress upwards into the young hymenium, and there expand their extremities into young asci filled with protoplasm, which finally developed itself into perfect spores.

Now, though it be but jumping to a conclusion, still we may in some measure reason by analogy that as assuredly zoospores in other tribes tend to promote or further fecundation, which takes place in the early life of the plant, as in ferns, so also these zoospores in lichens do possibly fertilize, by their movements and contact, one or more gonidial cells, and that the gonidia so fertilized give birth to the asci and paraphyses of the hymenium. At all events, the matter is worthy of consideration, although it be non proven.

But then another question arises. If this be so, what are the spermogones and pycnides of lichens? and what their functions?

Pycnides are very rare, and are regarded generally by many as parasitic fungilli. More than one kind of spermogonium has been observed on the thallus of some lichens, and it is in such case difficult to say which is the true allied one. Nor have the contents of the spermogonium, the spermatia, been ever observed to exercise any fertilizing process on the apothecia, even in a young state, and moreover they also co-exist with the mature apothecia. Are, then, these spermogonia the male or fertilizing organs of lichens, or are they parasitic fungilli in an incipient or imperfect state, i.e., having free spores not included in asci? And is fertilization not effected by them or their spermatia, but rather by the zoospores proceeding from the gonidia? Who will decide?
THELOCARPON INTERMEDIELLUM. Nyl
IN BRITAIN.

By W. Phillips.

The locarpon intermediellum, Nyl. The following are the characters of this minute lichen, given by Dr. Nylander, in "Flora," 1865, p. 260. "Extus simile praecedenti (Th. Laurerii, Flot.), sed globuli paullo majores (diam. 0.2 millim.). Thece myriospore, spora oblongae (long 0.0035-0.0050 millim., crass. 0.0020 millim.). Vulgo medio obsolete tenuiores et utroque apice obtuse incrassatulae, paraphyses nulla. Gelatina hymenia iodo vinose fulvescent, thecae dilute caeruleoscentes."

"Ad lignum alni putrescentis in Finlandia media (Novvlin)."

"A Th. Laurerii differt magnitudine paullo majore, sporis aliiis et defectu paraphysium. Adsunt filamenta ostiolaria brevia gracilia fasciculata in supera parte cavitatibus perithecii (omino sterigmata simulantia spermogonii)."

To this I would add the following details from our British specimens:

Thallus thin, yellowish-green, but evanescent. Apothecia scattered, occasionally crowded or adnexed, yellowish-green, small, globose-depressed and umbilicate, when mature pierced with a minute pore (fig. d.). In a careful section under the microscope, I saw the spores escaping by the pore with a jerking motion. The peritheciurn is externally crustaceous in texture, and very firm, preferring to divide at the base when crushed, and so allowing the asci to escape downwards. The inner walls of the perithecium are clothed with minute branched threads (fig. g), which I take to be the "filamenta ostiolaria" of Dr. Nylander, but which are not confined to the immediate vicinity of the ostiolum. The asci, when perfect, are large, ventricose, attenuated in the upper part, and also at the base, and have innumerable sporidia (fig. e). They adhere so firmly to the hymenium, that if a group be pressed they spread in a radiate manner from a common centre, when the young asci can be seen in all stages of growth—bluntly clavate, cylindrical, fusiform, and as above described. The sporidia (fig. h), are very minute (0.0035-0.0050 × 0.0020 millim., Nyl.) oblong, hyaline, obtuse at the ends, appearing to have a septum in the middle, but only apparently so, being in reality as described by Nylander, thinner in the middle portion and thickened at the apices. There are no paraphyses, a character which distinguishes this from the other species of the genus.

I have tried in vain to obtain the blue reaction with iodine in the asci, which Dr. Nylander has observed in this species, and can offer no reason for my want of success, as I use a solution strictly according with his formula. The only reaction I see is the "vinose-fulvescent" colour assumed by the asci, as the result of their large
absorption of the solution, which indeed can hardly be called a reaction, being merely an instance of mechanical mixture.

This rare and interesting lichen, which has been hitherto found in Finland only, occurred near Shrewsbury, Dec., 1873, on the surface of old leather—the sole of a shoe—lying exposed in a fallow field. On showing it to my friend, the Rev. W. A. Leighton, he at once recognised it as *T. intermediellum* of Nylander, and afforded me every facility for comparing it with other species in his valuable herbarium. The fact will be known to British Lichenists that we owe to Mr. Leighton the discovery in this country of the only two species as yet recorded in our Flora, namely—*T. Laureri* (Flot.), and *T. epithallinum*, Leicht., out of the nine species at present known in the genus. I am much gratified to be able to add *T. intermediellum*, Nyl., to the list of British species.

**EXPLANATION OF PLATE XXI.**

b. Apothecium side view, much enlarged.
c. Upper surface of the same.
d. Section of the same with asci in situ, sporidia escaping by the pore.
e. Asci filled with sporidia, others immature.
f.g. Filaments growing from the sides of the interior of the perithecium.
h. Sporidia much enlarged.

**FRUITING OF MASTIGONEMA.**

Dr. Wood has described, in his new and interesting work on the Fresh Water Algae of the United States, a new species of *Mastigonema*, which he calls *M. fertile*. His remarks upon this species are of interest to Algologists. He says—"I found this plant in a stagnant pool in 'Bear Meadows,' forming a filamentous, feltly mass, with *Edogonium echinatum* and other algae. The variously curved and interlaced flexible filaments are always simple, and of uniform, or nearly uniform, diameter through their whole length; excepting that, in some instances, there are small, local, bulbous enlargements of the sheath. Though the ends of the filaments, in all the specimens I have seen, are abruptly truncate, it is very possible that in the young trichoma the apex is prolonged into a long hair, as in most of the *Mastigonema*. The inner filament is sometimes very distinctly articulated, often, however, it is not at all so. The sheaths are firm, not at all lamellati, and generally project beyond the inner trichoma. The spores are cylindrical, yellowish, with a pretty distinct, although very close coat. They are always enclosed in distinct cells, and are mostly several in a filament, placed at intervals in its length."

This is the first instance, at least that I know of, in which a species of this genus has been found in fruit, and it is interesting to note the resemblance of the spores to those of the more commonly
FRUITING OF MASTIGONEMA.

At the same time the peculiar arrangement of the spores is remarkable, and if the other species of *Mastigonema* should be found to have the more common exclusively basal arrangement of spores, I think it would afford good ground for considering *M. fertile* as the type of a new genus. Moreover, the filaments are not united into a distinct thallus, and also want the apical hair of *Mastigothrix*, so that it is very probable that they represent an undescribed genus. Until, however, the fructification of the European species is elucidated, it seems best to forbear multiplying names.

HUNGARIAN FUNGI.

The species figured in the first part of the new work by Kalchbrenner, called "Icones Selectae Hymenomycetum Hungariae," are—

<table>
<thead>
<tr>
<th>Ag. (Amanita) aureola. K.</th>
<th>Ag. (Collybia) plumipes. K.</th>
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<tr>
<td>Ag. (Amanita) cygnea. Sch.</td>
<td>Ag. (Collybia) rancidus. Fr.</td>
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<tr>
<td>Ag. (Leptota) nympharum. K.</td>
<td>Ag. (Mycena) castiellus. K.</td>
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<tr>
<td>Ag. (Leptota) Schulzeri. Fr.</td>
<td>Ag. (Omphalia) cyanophyllus. Fr.</td>
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<tr>
<td>Ag. (Tricholoma) macrolephalus. Sch.</td>
<td>Ag. (Omphalia) reclinis. Fr.</td>
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<tr>
<td>Ag. (Tricholoma) psammopus. K.</td>
<td>Ag. (Pleurotus) sapidus. Sch.</td>
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<tr>
<td>Ag. (Tricholoma) aeryrius. K.</td>
<td>Ag. (Pleurotus) pardinus. Sch.</td>
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<tr>
<td>Ag. (Tricholoma) centurio. K.</td>
<td>Ag. (Pleurotus) superbiens. Sch.</td>
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<tr>
<td>Ag. (Tricholoma) tumulosus. K.</td>
<td>Ag. (Annularia) Fenzlii. Sch.</td>
</tr>
<tr>
<td>Ag. (Clitocybe) trullaeformis. Fr.</td>
<td>Ag. (Pluteus) patricius. Sch.</td>
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<tr>
<td>Ag. (Collybia) atramentosus. K.</td>
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The figures are well executed, and published at Pesth, by the Athenæum press.

TORTULA INCLINATA. II. & Gr.

In the last number of the "Journal of Botany," Mr. Henry Boswell gives the description of this moss, together with a plate, reproduced from the "Bryologia Europaea." It was recorded by him in 1872, as found in Oxfordshire, and he expresses surprise that it has not been met with elsewhere.

*Barbula inclinata*. Schweg.—Dioicus; broadly tufted, tufts plane, condensed. Stem short or taller, densely leafy. Leaves elongate-linear, undulated in the margins, the nerve whitish on the back, excurrent into a mucro; the perichetal longer, narrower, erect, with a looser areolation. Fruit stalk flexuose, often spirally twisted; capsule yellowish or fuscous, cernuous, oval-oblong, more or less incurved and gibbous at the base.

*Habitat.*—Gravelly and sandy ground near river banks, or dry hills and subalpine calcareous situations. The short stems rarely attaining an inch in length, the shorter, broader, and less curving
leaves, and the shorter cernuous capsule, readily distinguish it from B. tortuosa. (Schimp. Syn. p. 178.)

For some further particulars, as well as for the analytical plate, we must refer Bryologists to the "Journal of Botany" for January, 1874.

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Grevillea,

A MONTHLY RECORD OF CRYPTOGRAMIC BOTANY AND ITS LITERATURE.

ON THE SPECIES OF TIMMIA.

By S. O. Lindberg, M.D.

[Translated, with the Author’s permission, from “Öfversigt af K. Vetenskaps Akad. Förhandlingar,” 1864, No. 6, by R. Braithwaite, M.D., F.L.S.]

**Timmia.** Hedw.

Stirp. Crypt. i., p. 83 (1787).

1. **Timmia Austriaca.** Hedw.

Diocious; yellowish above, not easily softened; with a tall dense-leaved stem; the leaves of equal length, solid, somewhat appressed when dry, from a rufescent sheathing base, erecto-patent, abruptly narrowly lanceolate, acute, rather obtuse at apex, plicate, serrate at back on the uppermost part of the nerve; bracts slightly shorter; seta slender, 2-3 inches long; capsule oval, horizontal, slightly striate, lid hemispherical mammillate, large; annulus rolling back; inner teeth whitish, without appendages; antheridia narrowly cylindric, with a short, thickened, bulb-like filament.

**Timmia Austriaca.** Hedw. Sp. Muse., p. 176, tab. 42, fig. 1-7 (1801).


*Mniium austriacum.* P. BEAUV. Prodr., p. 74 (1805).

Habit. On rocks covered with earth in the mountain regions of Europe, up to the southern part of the island of Spitzbergen, but everywhere rare, and sparingly fruitful.

Female plant ferruginous below, yellowish above. Leaves rigid, straight, pellucid, when dry slightly incipient or subarcuate, rather glossy, broad at base, channelled, above convolute-concave, with two longitudinal plaits, margin straight, never undulated,
unequally coarsely serrate, the nerve vanishing in the extreme apex; cells of base linear, upper quadrate, incressate, almost empty; very minutely papillose on the upper part of back of leaf. Bracts of perichaetium longly longly sheathing. Vaginula longly and narrowly cylindric. Capsule sulcate when dry. Lid hemispherical or very shortly conical. Annulus broad, triple. Teeth of outer peristome rugulose at apex, and densely papillose, those of internal strongly papillulose. Spores rufous-yellow. Calyptra long; narrow, membranous, cleft above the middle, straw-coloured, brown at apex, quite smooth.

Male plants either forming separate tufts or growing in the same with the female, very like the female, but with the leaves patent divaricate. Androecium terminal, perforate from the growing point of the stem as in Polytrichum (sometimes eccentric); bracts very like the leaves, but patent; antheridia 6–10 times longer than the thickish filament, equalling the paraphyses.

Obs. This plant in habit is almost like Polytrichum juniperinum or P. commune, and is erroneously stated by authors to be monocious, for we have always found the male organs in separate plants.

2. Timmia Bavariaca. HESSLER.

Autoicous; green above, softened with great difficulty; with a rather tall dense-leaved stem; the leaves of equal length, solid, curling slightly when dry, from a scarce semi-vaginant yellowish base, whitish and glossy when dry, patenti-recurved, gradually lineari-lanceolate, very acute, scarcely plicate, the back of the nerve smooth; bracts slightly shorter; seta slender, about 1 1/2 inches long; capsule oval or elliptical horizontal, smooth; lid hemispherical, most frequently impressed at the centre, and mammillate; annulus rolling back; inner teeth pale yellow, spinuloso-appendiculate; antheridia cylindric, from somewhat shorter to one half longer than the longly obconical filament.

Hypnum foliis lanceolatis, falcatis, setis alaribus, capsula ovata, inclinata, operculo mammillari. HALLER, Hist., stirp. indig., Helv. iii., p. 37, n. 1779 (1768).


T. viridis. BRID. MSS. pp. ex ejus Bry. Univ. ii., p. 70 (1827).


Var. $\beta$, salisburgensis. Larger and taller, with leaves less dense, acute and recurved, their cells one half larger, less chlorophylliferous, subhyaline; bracts of androecium more shortly acuminate; antheridia twice longer than the filament. Timmia salisburgensis. Hopp. MSS. ex auct. Laur., in op. cit., p. 295.


T. austriaca. Var. $\beta$, alpina. Hüb. l. c.

Habit.—In the damp shady fissures and holes of stones and rocks in the mountain regions of Europe, as in Switzerland, Austria, Central Germany, and Scandinavia, often associated with T. Austriaca, this plant grows commonly, fruiting freely, but appears to prefer more elevated localities. Collected also in the peninsula of Kamtschatka by Tilesius. Var. $\beta$, has been observed in the Alps of Southern Europe.

Plants with the habit almost of Polytrichum gracile, or the small forms of P. formosum, ferrugineo-fuscous below, green above; leaves rigid, scarcely pellucid, opaque when dry, the base yellowish or pale brown, scarcely broader and appressed to stem, deeply channelled; the margin straight, often lightly undulate below, unequally coarsely serrate, nerve vanishing in the extreme apex, glossy when dry; cells of base linear, upper twice smaller than those of the preceding species, quadrate, slightly incissate, quite filled with chlorophyll, very minutely papillose on the upper surface of the leaf, smooth on the back. Bracts of perichaetium semi-vaginant, vaginula short, lanceolate-ovate; capsule horizontal or subnutant, sometimes very slightly oblique, striate when dry; annulus narrow, double; teeth of outer peristome strongly strongly rugulose at apex, slightly papillose, those of the inner one nearly smooth; spores greenish; calyptra as in the preceding species; androecium axillary among the innermost bracts of the perichaetium, often stipitate, its bracts about 16, very broad, unequally serrate, of lax texture, outer obtuse, suddenly longly acuminate, with the nerve disappearing in the acumen, inner more gradually acuminate; antheridia equalling the oboconical filament, or one-half longer, equal to the paraphyses.


Autoicous; pale green, very readily softened; stem short, distant leaved; leaves accrescent, fragile, curled when dry, from a scarcely semi-vaginant yellowish base, erecto-patent, gradually more narrowly lanceolate, rather obtuse, not plicate, with the back of the nerve smooth; bracts almost twice longer, linear-lanceolate, acute; seta stoutish, about an inch long; capsule obovate-oblong, oblique, cernuous, passing almost gradually into the seta, smooth; lid hemispherical, with the centre impressed and mammillate;
annulus persistent; internal teeth yellow, spinuloso-appendiculate; antheridia cylindrical, with a very short indistinct filament.


Var. β, norvegica.

Taller; leaves when dry cirrhate-crispate, the lower most frequently fuscous-brown at base; the comal yellow-green, erect, lanceolate-linear with the base sometimes narrower.


_Habit._—Wet turf places among Carices and Fissidentes, near Malchin. First found by Timm in Mecklenburg-Schwerin. North America.

Var. β, in rocky grassy places in the subalpine region of Central Norway; at Tjdtjak in Lapland, and Rothwand in Bavaria; also Ben Lawers, Scotland.

Plant with the habit almost of _Atrichum undulatum_. Stem branched or simple, strongly radiculose below; leaves thickish, not pellucid, the base scarcely broader, and oppressed to stem, channelled; the margin straight, often lightly undulate below, unequally coarsely serrate, the nerve vanishing in the extreme apex, and usually giving off fuscous radicles; cells of base linear, tuberculoso-papillosé at back, the upper twice the size of those in the preceding species, rounded-quadrato, incrassate, almost empty, papillosé on the upper surface. Bracts of perichaetium semi-
vaginant at the rather broader base; the upper surface of cells, especially on the nerve, strongly papillose, but on the back smooth, except on the uppermost part of the nerve. Vaginula very short, ovate. Capsule wide-mouthed (almost with the form of Funaria calcarea, Wahl. — F. hibernica, Hook), when dry slightly rugulose. Annulus narrow, simple. Teeth of internal peristome less appendiculate, otherwise quite smooth. Spores rufous-brown. Calyptra as in the preceding species. — Andrcecium axillary among the innermost bracts of the perichætium, stipitate; bracts 12, very broad, very shortly acute, unequally serrate, of lax texture, the nerve disappearing below the apex; antheridia shorter than the paraphyses, with the filament scarcely thickened.

Var. β, norvegica. Leaves, especially on the back of the base and on each surface of the nerve, with more elevated papillæ; cells twice larger, more empty, and subhyaline; comal leaves (bracts of perichætium?), with close and long articulated threads (paraphyses?) interposed, the cells one-half larger than those of the leaves, more chlorophyllose, and with more elevated papillæ. The plants hitherto have always been found sterile; nor are either male or female organs to be detected on any of my specimens.

BRITISH FUNGI.

By the Editor.

(Continued from Page 119.)

Boletus inunctus. Krombh.

Pileus pulvinate, depressed, fleshy, quite smooth, sub-umbilicate, pale cinnamon or yellowish brown, shining when dry, margin obtuse, tubes long, olive or greenish, free, orifice somewhat irregular, brownish, unequal, minute; stem obconic ochraceous above, finely reticulated, white and tomentose at the base, solid, flesh white, immutable.—Krombholz, t. 76, f. 10, 11. B. & Br. Ann. N. H., 1362.

Amongst moss. Ascot, &c.

Boletus sulfureus. Fr.

Pileus compact, convex then plane, silky or tomentose with innate flocci, stem firm, ventricose, even, smooth, sulphur coloured; tubes adnato-decurrent, short, minute, sulphur coloured, at length becoming greenish.—Fries, Epicr., p. 413. Smith, Journ. Bot., 1873, p. 337. Fries, Mon. Hym. Suec., p. 249.

Amongst sawdust in dense clusters. Aviemore, N.B.

Closely resembles B. pachypus var. amarus in general aspect, but in reality different. Taste mild and pleasant, colour golden sulphur. Spores oval.
Boletus radicans. Fr.


In woods. Staplehurst, Epping, &c.


In grassy places.


Pileus convexo-expanded, closely tomentose or floccose-scaly, opaque tan coloured, becoming brownish, flesh compact, white, dark blue when broken; stem stuffed with a spongy pith, then hollow, ventricose, villoso-pruinose, of the same colour, constricted above, even, white; tubes free, minute, round, white, then yellow.—Bull, t. 369. B. & Br. Ann. N. H., 1363.* Saund. & Sm. Illus., t. 47. Barla., t. 37, f. 1-7. Fries, Epicr., 426.

Meadows and woods. East Budleigh.

The floccose coating which encloses the whole plant when young is very curious. The degree in which the flesh becomes blue is variable.

Polyporus (Merisma) frondosus. Fr.


In woods at base of trunks. Berkshire, Oct. [Esculent.]

Polyporus (Anodermei) mollis. Fr.


Polyporus (Placodermei) carneus. Fr.


On an old stump. Welshpool, Nov.

Dædalea mollis. Sommf.

Resupinate, determinate, submembranaceous, pallid, at length

On alder and birch. King’s Lynn (C. B. P.).

**Hydnum compactum. Fr.**

Pileus corky, compact, undulated or tuberculose, not zoned, olivaceous grey or tawny, commonly covered with a whitish tomentum, internally blue, variegated, stem very short, irregular, brownish or tawny, spines becoming tawny, pallid at the tips.—Fr. Epicr., 507. B. & Br. Ann. N. H., 1367. Krombh., t. 50, f. 12.

In heathy places Forres, N. B.

**Hydnum aurantiacum. A. & S.**


In pine woods. Forres, N. B.

**Hydnum ferrugineum. Fr.**


In pine woods. Reading.


On trunks. Epping.

At first snow white, but gradually acquiring a pale ochraceous tint; imbricated, confluent behind; aculei long; pileus rough, with abortive prickles.

**Corticium lacunosum. B. & Br.**


On branches? Aboyne, Sept.

Spreading for several inches, and looking like a thin sponge from the numerous lacunae.

**Cyphella catilla. Smith.**

Sub-membranaceous, expanded, margin crisped and undulated, hymenium veined, ½-in. broad, grey, often imbricated.—Smith, Journ. Bot., 1873, 337.

On moss and dead leaves. King’s Lynn (C. B. P.).

Allied to C. galeata.

**Cyphella pallida. B. & Br.**

Cups at first orbicular, at length irregularly lobed, plane, tomentose, or hairy, sessile; hymenium at length rugose, pallid,
BRITISH FUNGI.


On old stems of Clematis vitalba.

Cups ¼-1 line across, sometimes proliferous. Differs from C. Curréyi in the colour of the hymenium, which is rugose, like that of Cantharellus mucigenus and its more irregular form. It appears also not to be erumpent as that species often is, but is seated on the bark of wood. Spores 00025-00035 in. long, elliptic.

Cyphella dochmiospora. B. & Br.


On sticks. (?) Batheaston, Oct.

Resembles externally Peziza villosa, but the hairs are not granulated. Spores 0035-0006 in. long.

Clavaria rufa. Fr.


In grassy places. Hereford (W. G. S.).

Clavaria curta. Fr.


In grassy places. Hereford (W. G. S.).

Approaches C. fastigiata, but different in stature and colour.

Dacrymyces macrosporus. B. & Br.

Gelatinous, tuberculate, rosy; fæcci septate, apex sporiferous; primary spores oblong, 3-5 septate, articulations constricted; secondary spores elliptical, apiculate at either extremity; conidia concatenate.—B. & Br. Ann. N. H., No. 1374, t. 7, f. 1.


Forming irregular gyrate and tuberculated masses of a rosy colour, about ¼ in. long; parasitic on old Diatrype stigma. The mass of gelatine consists of delicate branched septate threads, mixed with shorter threads bearing oblong 3-5 septate primary spores 0015-002 in. long, 00034-0004 in. wide; these at length fall off, and produce shortly stipitate secondary spores, one from each division; secondary spores elliptic, 0005 in. long, more prominent on one side, pointed at either end. The cells of the primary spores are empty after the production of the secondary spores. Other threads break up into much branched chains of conidia 0002 in. diam. The parts of the gelatinous mass where these are produced acquire a paler tint. It preserves its rosy tint when dry.

Hydnangium carneum. Wallr.

Subglobose, irregular, smooth, flesh-coloured; cells pale flesh colour, immutable; basidia prominent; spores spherical, echinulate; spinules long, slightly coloured.—Tulasne Hypogæi, p. 75, t. 21, fig. 3.
About the roots of Eucalypti. Edinburgh (Dr. Dickson).
Sporidia ‘013–014 m.m. diam.

**Lycoperdon echinatum.** Pers.
In woods. Berks.
Sporides echinulat 0002–00025 in. diam.

**Scleroderma geaster.** Fr. (Grevillea, i., p. 40).—B. & Br., Ann. N. H., 1375.*
Spores 0003–0005 in. diam.

**Geaster saccatus.** Fr. (Grevillea, ii., p. 77, t. xx.)
By hedge banks.

**Perichæna quercina.** Fr. (Grevillea, i., p. 40.)
External peridium crustaceous, becoming whitish; internal very thin, brownish-yellow, marked with impressed arcolæ; flocci few; spores yellow, globose, rough.—B. & Br., Ann. N. H., 1376.
On ash. Batheaston, Shrewsbury.
Sporides 0005 in. diam.

**Perichæna picea.** B. & Br.
Peridium dark brown, hemispherical, at length circumscissile; spores sub-globose, tawny and even, as well as the flocci.—B. & Br. Ann. N. H., 1377.
On dead wood. Shrewsbury.
Looks at first like a Perisporium. The colour of the spores approaches that of those in the section Hyporhodii of Agaricus.

**Sphaeronema aemulans.** B. & Br.
Epping Forest. Feb.
Perithecia o06 in. long; spores 0001–0003 in. dia. Possibly a pyenidiiferous state of some Melanospora.

**Uromyces Behenis.** Lev. (Grevillea, i., 102.)

**Puccinia Asteris.** Fkld. (Grevillea, ii., p. 48.)
On Aster tripolium.

**Puccinia Malvacearum.** Corda.
Hypophyllous, sori scattered, hemispherical, at first veiled in the centre by the persistent epidermis, circumference naked, umbilicate beneath; spores densely crowded, ovoid-oblong, brown, even, somewhat constricted in the middle, obtusely acuminate, on very long hyaline pedicels.—Mont. Syll., p. 314. Corda Icones, vi., p. 4, t. i., f. 12. Grevillea, ii., p. 47.

**Monosporium saccharinum.** B. & Br.
Hyphasma gelatinous, coffee-coloured; flocci short, erect, sub-
clavate; spores obovate, fixed by the truncate base, pallid.—*B. & Br.* *Ann. N. H.*, No. 1379, t. 7, f. 3.

Growing on decayed substances under glass. Batheaston. Feb. Spores 0.0004-0.0005 in. long. Sometimes the tips of the threads have an articulation, and possibly form a second spore.

**Helminthosporium exasperatum. B. & Br.**

Flocci flexuous, nodulose above, fructiferous; spores oblong, obtuse at each end, triseptate.—*B. & Br. Ann. N. H.*, 1380, t. 7, f. 4.

On Sweet William. Sibbertoft.

Flocci knotted above, each knot bearing an oblong spore, 0.0012-0.0018 in. long, 0.0004-0.0005 in. wide.

**Dactylium implexum. B. & Br.**


On the inside of a willow. Hereford.

Spores 0.001-0.0012 in. long.

**Dactylium melleum. B. & Br.**


On decayed *Polyporus* or *Stereum*. Feb.

Spores 0.0005 in. long. Approaching *Diplocladium minus*, of Bonorden.

**Dactylium Rennyi. B. & Br.**


On stumps. Hereford.

Very near *Diplocladium minus*, Bonorden, but the spore-bearing ramuli are obtuse above, slightly clavate, and attenuated.

**Peronospora ficaria. Tul.**


**Peronospora lamii. De By.**


Tufts dense, forming grey spots on the under surface of the leaves.
**Peronospora hyoscyami. De Bry.**

Fertile threads thick, 5-8 times dichotomous, branches patent, attenuated, straight or slightly curved, the ultimate forming a very obtuse angle, divergent, short, subulate, straight, acute; conidia small, ellipsoid, very obtuse, epispore pale violaceous.—*De Bary in Ann. des Sc. Nat., xx., p. 120* (1863). *B. & Br. Ann. N. H., No. 1401.*

On common henbane. Market Deeping.

**Verticellium agaricinum. Bon. (Grevillea, i., p. 184.)**

On decayed Agarics.

[Plate 22, fig. 9. *a*, Upper portion of fertile thread. *b*, Spores. × 320 diam.]

**Verticillium aspergillus. B. & Br.**

Flocci simple below, or rarely divided, attenuated above, repeatedly furcate at the tips.—*B. & Br., Ann. N. H., 1834, t. 8, f. 7.*


Threads 0.005 in. high; spores 0.001 in. long. The threads are occasionally divided below, in which case each branchlet is forked at the tip. The habit is that of *Chlonostachys araucaria*, Corda. It is worth enquiry whether this may not be a state of *Hypocreus farinosa*.

**Polyactis galanthina. B. & Br.**

Flocci above shortly branched, tawny; ramuli incrassated above; spores obovate, sessile; springing from elongated spicules.—*B. & Br., Ann. N. H., 1835, t. 8, f. 8.*

On bulbs of Snowdrop.

Spores 0.006-0.007 in. long.

**Edocephalum roseum. Cooke. (Grevillea, i., p. 184.)**

On old paper and rags.

[Plate 22, fig. 8. *a*, Fertile threads magnified. *b*, Spore further magnified.]

**Oidium microspermum. B. & Br.**

Pulvinules regular, ochraceous lemon-colour, flocci radiating, furcate; spores subglobose, concatenate.—*B. & Br., Ann. N. H., 1837.*


Spores 0.002 in. dia. Differs altogether from *O. aureum* and *O. fulvum* in the shape and size of the spores. Pulvinules at length confluent.

**Helicomyces roseus** *Link.*

Tufts effused, rosy.


On rotten trunks.
NEW BRITISH LICHENS.

Communicated by the REV. J. M. CROMBIE, F.L.S., &c.

The following new species of British Lichens have been recorded by Dr. Nylander, in the "Flora," for 1874, No. 1.

1. Lecidea perobscura. NyI.—Thallus black, sub-opaque, thin, or very thin, effuse; apothecia concolorous, or brownish-black, slightly convex, immarginate, greyish within; spores 8næ, colourless, ellipsoid, small, 0,006-8 m.m. long, about 0,0085 m.m. thick, paraphyses not discrete, epithecium brownish-inspersed, hypothecium colourless; hymeneal gelatine bluish with iodine.

On old fir pales near Killin (Crombie, August, 1873), but sparingly gathered. This species seems allied to L. uliginosa, from which, however, it is sufficiently separated by the above characters.

2. Lecidea spodiza. NyI.—Thallus dark-greyish, thin, minutely granulated, or inspersed with greyish-green minute granules, K C + tawny-red; apothecia livid-grey or livid-pale, slightly convex, immarginate, colourless within; spores 8næ, oblong, 0,011-17 m.m. long, 0,0025-35 m.m. thick, frequently subcurved, and sometimes obtrusely or spuriously 1-septate, epithecium sordid, paraphyses not very well discrete, hypothecium colourless; hymeneal gelatine bluish with iodine.

On old fir pales about Killin (Crombie, August, 1873). Allied to L. denigrata, but distinct.

3. Lecidea botryiza. NyI.—Thallus whitish-green, thin, minutely areolato-rimulose (thence appearing as if minutely appresso-squamulose), K—C—; apothecia brown, superficial, somewhat prominent, conglomerated and verucose, dark within; spores 8næ, colourless, ellipsoid, simple, 0,006-9 m.m. long, 0,0035-45 m.m. thick, paraphyses not discrete, epithecium colourless, hypothecium brown; hymeneal gelatine tawny wine-red with iodine.

On micaceous rocks of Ben Voirlich (Dr. Stirton). Allied to L. botryocarpa, NyI., from which it is distinguished by the spores, hypothecium, and other characters.

4. Lecidea caligans. NyI.—Thallus fuliginous-black, thin, rugose, diffract, indeterminate; apothecia blackish, plane, obtusely margined, within pale; spores thinly acicular, 0,030-35 m.m. long, 0,0015 m.m. thick; epithecium colourless, paraphyses not distinct, hypothecium colourless (perithecium somewhat brownish above), hymeneal gelatine wine-red with iodine.

On maritime rocks, in the island of Alderney (Larbalestier), very sparingly; allied to L. egenula, but a very distinct species.

5. Arthonia astroidestera. NyI.—Nearly similar to A. astroidea, but having the apothecia more distinctly astroid, brownish, spores 3-5-septate, usually 4-septate, 0,021-26 m.m. long, 0,007-8 m.m. thick.

In addition to these, Nylander has also described another new British species in his Obs. Lich. Pyr. Or, p. 70, viz.:

6. *Pertusaria urceolaria*. Nyl.—Thallus whitish, thin, areolato-rimose, subpapilloso-exasperate, on the surface effuse, K + at first yellow, then orange-red; apothecia black, urceolato-depressed; spores 1-4nec, blackish, 0,100-0,140 m.m. long, 0,050-0,140 m.m. thick, K + violet.

On walls, La Moye, Jersey (Larbalestier, June, 1873). This interesting species is allied to *P. spilomantha*, Nyl.

A new subspecies is also recorded in the "Flora," l. c., p. 16, viz. :

*Lecidea subincompta* oribata. Nyl.—Thallus greyish-brown, thinly subgranulosos-verrucose; spores 3-5 septate, 0,023-0,040 mm. long, 0,003-0,040 m.m. thick.

On the ground, Ben Lawers (Dr. Stirton).

HUNGARIAN FUNGI.

In your notice of Messrs. Schulzer and Kalchbrenner's plates of Hungarian Fungi, p. 127, you particularize one plant as *Agaricus (annularia) Fenzlii*. Sch. This plant comes under my subgenus Chamæota, as originally published by me in the "Journal of Botany," vol. viii., p. 213, and where I refer *A. xanthogrammus*, ces. to it. Messrs. S. & K. must be aware that the mere manuscript name ("Mpt. p. 1079") of Schulzer's cannot, by any law of priority, stand, and it is the more inexcusable from the fact of Messrs. S. & K. actually referring to my remarks published under Chamæota. *Agaricus Fenzlii* must in future stand as *A. (Chamæota) Fenzlii*, and this becomes more important as the many new Agarics are day after day described from different parts of the world. Professor Fries also informs me that *A. macrocephalus*, Schulzer, has already been described by Lasch, No. 240.

WORTHINGTON G. SMITH.

AGUE PLANT.—American Botanists are of opinion that the plant found in marshes by Dr. Bartlett, and which is considered to be intimately associated with Ague, belongs to the genus *Botrydium* ("Grevillea," pl. 7.), the *Hygrogastrum*, of Rabenhorst.
THE AGUE PLANT.

Dr. Bartlett has recently read before the Chicago Society of Physicians and Surgeons a communication on the Ague Plant, already noticed by us ("Grevillea," vol. i., p. 95), and of which he has given the following more minute description:—

Safford's plant consists of body and what would appear to be a root. The body, or globe, consists of a wall enclosing a cavity. The layers of this wall are two; an internal structureless envelope of a dull white color, like the retina in the cadaver, and an outer green wall, apparently resting upon the first as a basement membrane, which is much more complicated. It is composed of a great number of green cells; these are circular, and enclose green contents. The contained material seems to be divided by lines running across the cell, which do not, however, display any definite arrangement. At this point of development the cells furnish the observer no indication as to the granular or cellular condition of their contents. When injured they appear to discharge other very small and greenish cells of a simpler construction. The green wall cells do not adhere very tenaciously to the white membrane. They are readily detached from the latter by gentle friction and maceration, and float off on to the root or other adjacent body. Of the construction of the cavity of the plant within the white membrane I have no knowledge. It seems to be a simple sac. The globe of the plant, at maturity, collapses, the upper circumference falling in upon the lower in such manner as to leave to the view a cup, in place of a sphere. At first glance it would seem that the upper hemisphere of the globe had been thrown off, and that the observer was looking into the concavity of the lower hemisphere. More careful examination will show that the globe has collapsed, its contents escaping, and the upper half of its wall falling down upon the lower. The collapsed plant generally presents the cell wall unbroken. Occasionally the upper depressed half is slit open through its centre; frequently, along the margins of the cup, at the junction of the depressed and stationary portions, there are lacerations of the wall. When the soil containing the plant is removed from its natural bed and placed in different conditions, the collapse of the globe seems to be precipitated. The walls, examined immediately after having fallen in, appear of a darker colour, as if moistened. The cavity of the plant contains a colorless fluid, which, it is presumed, is spontaneously evacuated when the globe collapses. It is forcibly ejected if the plant be punctured. I have never had an opportunity to examine it with a higher power than 200; I can therefore say nothing of its composition; it is probably simply nutritive. Under certain conditions, as when an attempt is made to preserve the plant in glycerine, the green wall, losing entirely its cellular character, becomes rumpled up, and massed upon the inner tunic.
The root, or what seems to serve as such, is, in length, about six times the diameter of the plant. The trunk of the root soon puts forth a number of branches which seem to terminate in points, the latter becoming bulbous when soaked, as in glycerine. The root is white and translucent; not smooth, but having an appearance as if the surface were covered with granules. It is hollow, the fluid sometimes seen within giving the shaft the appearance of a glass tube containing water. It seems continuous with, and similar in structure to, the white wall membrane; or rather, this membrane appears to be an expansion of the root material. Dr. Safford regards the cavity of the root and body as continuous; he thinks he has seen the green cells of the wall within the hollow of the root. I have never observed such an appearance. The green cells of the globe wall were often seen floating upon, under, and about the root, and massing together in its branches. In such specimens, however, it has been easy to recognize the fact that these cells have been washed from the body of the plant—the spot on the globe from which they have been removed being readily detected by the bald appearance of the denuded white membrane.

The plant varies greatly in size; perhaps the average diameter of the mature globe would measure $\frac{1}{16}$ of an inch. They are, of course, occasionally so small as not to be detected without a lens; the largest specimens measure $\frac{1}{14}$ of an inch. The cellular character of the green wall may be detected by a good lens, this coat appearing granular under such a power.

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**HERBARIUM MYCOLOGICUM ÆCONOMICUM.**

The third fasciculus of this publication contains, amongst other fungi, the following interesting species:—*Puccinia straminis*, Fekl., placed side by side with the *Puccinia graminis* of Persoon. An interesting species of *Tillitua*; *T. lavis*, Kühn, for a full description of which see "Hedwigia," No. 10, 1873, p. 152-3, where we learn that Herr J. Kühn first detected this species in a sample of wheat from Lower Silesia; since 1867 he has cultivated it in the Botanic Garden at Halle, and has been successful in reproducing it (by direct infection) upon numerous varieties of wheat. *Ustilago cra- mori*, Könnieke, on *Setaria Italica*, *Depazea betacola*, D.C., on *B. cicla*, *D. brassiccecola*, *D. prunicola*, Op., on *Prunus domestica*, and *D. rubicola*, D.C., on the red currant. *Uromyces phaseolorum*, Tul., *Puccinia endiviar*, Pass., *P. alii*, Cast., *Uromyces trigonella*, Pass., on *Fænumgræcum officinale*, *Peronospora Schachtii*, Fekl., on *Beta vulgaris*, *Sclerotium rhizodes*, Awd., on *Poa pratensis*, *Uredo pisi*, D.C., *Exoascus deformans*, Pass., on peach leaves, *Asteroma vini-perda*, Blm., on vine leaves, smaller branches, and grapes, *Cladosporium fumago*, Link., on gooseberry, hazel, and birch leaves,

C. B. P.

**CRYPTOGAMIC LITERATURE.**


**Magnus,** P. Zur Morphologie des Sphæclariæen, 4 pl., Berlin, 1875.

**Sauter,** A. E. Flora des Herzogthums Salzburg, v. die Flechten, vi. die Algen, in "Verlag. der Ges. für Salzb.," xiii. band, 1873.


Grevillea,

A MONTHLY RECORD OF CRYPTOGRAMIC BOTANY AND ITS LITERATURE.

NYLANDER ON THE ALGO-LICHEN HYPOTHESIS, AND ON THE NUTRITION OF LICHENS, &c.


Dr. Nylander, in noticing in the "Flora," 1874, No. 4, two recent pamphlets by Dr. Weddell, makes the following very opportune observations on several most important matters relating to Lichenology, which with several additional notes, he has requested me to translate for insertion in "Grevillea." The pamphlets under review are:


Since what I have elsewhere written is true, "that truth itself consists in the continual demolition of errors," I have always believed that it tends very much to the interests of science to oppose fanciful or erroneous opinions; nay, it may legitimately be considered to be one's duty to point out and refute such opinions, for the progress of science depends not a little upon their subversion. Nothing, indeed, as is evident, is more readily received and propagated than erroneous opinions, and, consequently, there is so much greater difficulty in opposing their propagation, though we may not on that account depart from the duty.

The two writings, whose titles are given above, forsaking on certain points the truth and exactness of science, present a handle for some animadversions, of which the following are, I think, especially useful and opportune where they touch upon modern controversies.

I.

Here, in the first place, we find (p. 5) these words—"Recent observations introduce to our notice singular relations which exist between Lichens and Alge," &c. From this it would appear that the author, in his own way, assents to the Schwendenerian hypo-
thesis. Those, however, who have promoted it have brought forward nothing confirmatory of it, but only anatomical reasons long ago well known (they have introduced nothing). The absurdity of such an hypothesis is evident from the very consideration that it cannot be the case that an organ (gonidia) should at the same time be a parasite on the body of which it exercises vital functions; for with equal propriety it might be contended that the liver or the spleen constitutes parasites of the Mammifera. Parasite existence is autonomous, living upon a foreign body, of which nature prohibits it from being at the same time an organ. This is an elementary axiom of general Physiology. But observation directly made teaches that the green matter originally arises within the primary chlorophyll—or phycocrom—bearing cellule, and consequently is not intruded from any external quarter, nor arises in any way from any parasitism of any kind. This, in a note "Upon the Gonimic Evolution of the Collemaeei" ("Flora," 1868, p. 353), I have already enunciated, and in vain can it be denied. The cellule at first is observed to be empty, and then, by the aid of secretion, green matter is gradually produced in the cavity, and assumes a definite form. It can, therefore, be very easily and evidently demonstrated that the origin of green matter in Lichens is entirely the same as in other plants. What need is there then of any fuller refutation of the but too notorious hypothesis of Schwendener?

In a note under this paragraph, Nylander adds—"To those desiring somewhat longer explanations upon this subject, I may transcribe the following observations which I have elsewhere made:—" In this place may be noticed the hypothesis, or singular conjecture, which, confirmed by no certain observations, and depending upon no valid grounds, amongst other statements, exhibits Scytonemata insinuating themselves into the thalli of Pterygium (erroneously termed Pannaria in Schwend, Erörter, in "Flora," 1872, t. 4). Those Scytonemata are explained as 'Algae,' which, in a most wonderful manner, are parasitic in Pterygium." But did not the author in conceiving such a theory know that the Scytonemata are (as is proved by the genus Gonionema), rather Lichens than Algae; so that he was by no means treating of the parasitism of an Algal on a Lichen, but of a Lichen on a Lichen. Moreover, the Scytonemata present a gonimic vagina much firmer than the Scytonemoid syngonimia of the Pterygia, and consequently the Schwendenerian assimilation is entirely erroneous. In opposition to the affirmation of this author, I may also add that no free Scytonemata are to be seen in the specimens cited as received from Tuckerman, and which I also have received. And if there were any truth in his seeing anything of the kind, we would reason from it that Lichens would grow best and occur most abundantly in places where Scytonemata and other "Algae," regarded as "parasitical" gonimic, or gonidial elements of Lichens, abound, and
would then be there observed crammed with these elements. The case, however, is far otherwise; for, on the contrary, such stations are avoided by Lichens, and are not inhabited, except sparingly by Collemacei and a few others, which are not always well developed; nor do those which occur contain any parasites of that kind in their texture. Elsewhere I have adduced that the gonidia and gonimia of Lichens constitute a normal organic system necessary, and of the greatest physiological importance, so that around them we behold the growing (or vegetative, if we may so term it) life chiefly promoted and active, as for example creating colorific matter. On the contrary, those portions of the thallus remote from the gonidia and more advanced in age, as best appears in incrustate crustaceans lichens, having lost their life, become entirely tartareous, forming, as it were, but "thickened deposits." Thus the life is collected chiefly in the parts around the gonidia (in the thin superficial stratum). Moreover the lower, and but little gonidiose lichens, such as often occur amongst the Thelotremata, Graphides, Verrucariae, Mycopora, have but a shorter life, and consequently are frequently found with the apothecia either not rightly developed, or dead, and thus in this respect manifesting an analogy with and verging towards the fungi. It would be most inconsistent to admit that parasitic plants discharge the function of organs within the plant which they invade. Other and additional arguments against the parasitic hypothesis of Schwendener may be seen in Caspary, "Ueber, die neueren Ansichten in Betreff der Flechten, monach diese Schmarotzer seien in Schriften der physik. ökon. Gesellschaft in Könisberg, 1872, Abth. ii., p. 18." I add nothing here concerning the hymenial gonidium, which, without any "hyphae," and the hyphae of fungi have certainly nothing common in structure with the "hyphae" of lichens *, normally occupy the pyrenocarpous thallium, which are destitute of paraphyses, between the thecae of many species, and nothing of the Friesiads or the gonimia of cephalodia, which similarly constitute normal organs, and afford constant characters of different species (not only in Stereocaulon and Pilophoron, but also in Peltidea, Placopsis, Lecidea paneola, &c.). It certainly seems superfluous to delay longer in refuting an hypothesis of that kind. But even though the gonidia of lichens should show an analogy with the gonidia of "Algae" (and what is clearly known of the full development or fructification of those algae treated of?), this circumstance would present nothing marvellous, and certainly would not confirm any subversive theories. But it is not to be overlooked, that under the name of Algae are received by authors plants wholly ambiguous in their nature, and such, indeed, as are very near to

* Here the author adds in my copy—"The anatomical filamentose elements of lichens are distinguished by various characters from the hyphae of fungi. They are firmer, elastic, and at once present themselves in the texture of lichens. On the other hand the hyphae of fungi are very soft, they possess a thin wall, and are not at all gelatinous, while they are immediately dissolved by the application of hydrate of potash, &c."
lichens in a gonidic or gonimic respect. Nay, I have pointed out the presence of apothecia in true Chroolepi (constituting the thalli of Verrucaria melathelia and Arthonia chroolepida), and not a few thalli occur with chroolepoid gonidia of a violet scent (as for the first time I have shown in "Flora," 1870, p. 52). So far, then, are what are called "Algae," according to the turbid hypothesis of Schwendener, and regarded as the "nourishers of the parasites of fungo-lichens," from constituting true algae, that on the contrary it may be affirmed that they have a lichenose nature, whence it follows that these "algae" (or more correctly pseudo-algae) are in a systematic arrangement to be referred rather to the lichens, and that the class of algae hitherto so vaguely limited, should be circumscribed by new and truer limits." Xyl., Obs., Pyr. Or., pp. 45-47. The boundary of lichens has also by my aid in this sense been enlarged, for to it I have annexed such genera as Cora, Dichonema, Scytonema, Sirosiphon. In "Hedwigia," 1852, p. 3, Cohn, in a paper on Protococcus, already indicates "the existence of zoospores, not only in the Algae, but also in the lichens (developing themselves in their gonidia) as a possible thing." The origin of the Schwendenerian hypothesis seems to be as follows:—In Th. Fr. "Stereoc.," p. 16, are mentioned, "Cephalodia composed of gelatinous fibres, intricately congested and blackish." I have shown that the author, led astray by his inexperience, took the common and widely-distributed Sirosiphon saxicola, Næg., which is to be found on so many different lichens, for the cephalodia of Stereocaulon denu-datum. Then is devised the Friesian algo-lichen dispute. Sirosiphon, willing or unwilling, is intruded in the cephalodia. The gonimia of cephalodia become "parasite algae," according to the discovery of the writer of Upsala. With respect to these, I have written in "Lich. Lapp. Or." p. 117, "If the various gonimia in cephalodia are to be assumed to be algae, all gonidia must be declared to be such parasites;" which immediately afterwards Schwendener declared to be the case. But more recently Norman (in an article on Moriola), has made known observations somewhat analogous, but much newer, more wonderful and worthy of attention—observations which so far from sustaining the hypothesis of Schwendener, on the contrary, quite weaken it.

On the same page of Dr. Weddell's paper already cited, we read—"It has been repeatedly stated that lichens live exclusively, or nearly exclusively, at the expense of the atmosphere; but it is apparent that the rain-water which periodically impregnates them, and which serves as a vehicle for many diverse substances, whether organic or mineral—substances which a crowd of accidental circumstances brings upon the localities—contributes at least an equal part of their nutrition." Also, p. 6—"It would be very difficult in many cases to explain without the concurrence of rain-water the presence, so general, of lime in the thallus of crustaceous lichens, which has without doubt penetrated in the condition of soluble carbonate." Whence does the author obtain such an exact know-
ledge of these, even in their proportions (an equal part)? I should certainly suppose that anyone teaching that lichens draw their nourishment from the atmosphere, by no means understands by the term "atmosphere" only dry air, but chiefly rain-water with all the different substances which it may contain and bring with it. Or who has affirmed, who ever would affirm, that lichens can derive all the parts constituting their organisation from pure air (oxygen, azote, carbonic acid)? And who, also, would affirm that rain-water is the same as the distilled water of the chemist's laboratory? But we may correctly say that pure or naked air (if the expression may be allowed) is by no means adapted for the food of lichens, but by drying them up cheeks and represses their nourishment; though at the same time they do not love places which are not open to salubrious air. It is manifest that the air does not directly nourish them. So far, however, as relates to the manner in which lichens draw their nourishment (aerial, solid, and in solution) from water or by means of water (atmospheric or other), it can very easily be shown that it chiefly penetrates through the surface of the thallus (the cortical stratum). And how far the nature of the substratum is indifferent to them is evident from the circumstance that very many of them occur promiscuously on the most diverse substrata. Thus the same lichens occur on the hardest rocks, on dry wood (even indurated by dryness), or on dead bark; from all of which they assuredly could not extract similar aliment, if, indeed, they were able to annex even any particles to themselves. What, for example, is to be derived from the old sapless bark of a pine? or what analogous from a quartzose rock? But the same Lichens grow alike on both. Nor is it to be overlooked that many of the same are at the same time muscirole, and often only loosely affixed—which very dissimilar stations, nevertheless, would seem to present similar food, for these plants remain most similar in all; nor is the substratum lying under them (under the thallus, hypothallus, or gomphus) ever observed to be worn or comminuted. From all these reasons, then, we may conclude that the substratum is scarcely of any importance, so far as nutrition is concerned. But, in addition to this, lichens are so formed that foreign elements usually could not, or could only with difficulty, arise from the substratum. The crustaceous thalli, indeed, not rarely exhibit under the cortical gonidial stratum a tartareous medulla, or thick deposit, not readily permeable, and nearly dead, and often a hypothallus conglutinating the lichen closely to the stone, and this also but little pervious.* But by a very simple and easy experiment the

* Here the author adds, in a note in my copy—"The same is observed in terrestrial or muscirole fruticulose thalli, for their lower part next to the substratum is destroyed and seen to be dead, when the upper parts only of the lichen are in full vigour. The life thus being lost in the part contiguous to the substratum, nothing through it can arise from the substratum. The nutritious elements, indeed, in these lichens, as in the others, are received through the external and upper parts."
case is proved in fruticulose thalli, which, immersed in water by the gomphus (that is, which are affixed very solidly to the substratum by means of a conglutinating hypothallus), or at the lower part, are by no means penetrated by this upwards; whence it is abundantly shown that the entrance to the nourishing moistures by no means lies open from the substratum. On the contrary, it is everywhere seen that immediately the thallus externally (or on the surface looking towards the light) is moistened it promptly imbibes water, and at once becomes vegetous. Thus, for example, Usnea submersed at the base of the thallus remains dry (except only the very part which is submersed), but should water be sprinkled over it it very greedily absorbs it, and presently softens and revives. This experiment may be regarded as more than sufficient to demonstrate that the atmosphere directly, by means of rain-water (from the clouds or dew, &c.), transfers nourishing matter to Lichens, and that these can scarcely enter into their texture from the substratum, unless sometimes in crustaceous thalli (received as if mechanically, and not as the result of nutrition properly so called), e.g., iron and lime, which in solution are drunk up, and remain in drying, whence the ferrose and calcareous states of Lichens derive their origin.* Besides this, the active life, having its seat chiefly around the gonidia, and putting forth young parts (lobes, lacinia, branchlets, isidia), and being manifested in the vital function of the apothecia and the spermogones, it is apparent also that in these superficial parts the nourishing humours necessary for all the actions of life are especially and directly poured upon them. For this reason, we see that the thalline surface delights in an anatomical texture which assists such absorption, and that similarly the apothecia and the spermogones are observed well filled with a very hygroscopic lichenine gelatine, and draw to themselves water, the primary condition of life, and receive nourishment through the medium of water from the clouds, from rain, from fountains or rivers, or even (in the case of maritime Lichens) from the sea.†

Moreover, in p. 6, it is observed—"Silicicole Lichens, which occur exceptionally upon calcareous rocks of sufficient hardness, but never upon organic substrata. For example, Leccanora gibbosa, Lecidea geographica, Lecidea contigua, &c." This does not seem quite consistent with the words of the author in the same page—"The attentive observation which during several years I have been able to make of a great many of these vegetables in the most varied conditions of existence," for it is very evident, and has been published over and over again in Lichenological literature, that these, in addition to many other silicicolous ones, occur also upon dead bark or old wood. That "never," therefore, is to be deleted. Nor

* In primary limestone neither calcareous states nor calcivorous apothecia scarcely occur.
† In a note by the author in my copy, he says—"In the Collemacei, in which the entire thallus is perfused with lichenine (or Lichen gelatine), all its parts are observed to be very hygroscopic.
would there be wanting other observations in regard to that division of Lichens which the author admits, and upon which subject he has neglected many more recent documents.

In the same place Dr. Weddell says, in a note—"The oxalate of lime constitutes . . . one of the essential characters of this class of plants." This is an error, for the occurrence of oxalate of lime in octahedral crystals is not to be regarded but as a character in doubtful cases, distinguishing the thallus of a lower Lichen from those Fungi which it resembles. But oxalate of lime is especially peculiar to certain medullae (vid. Nyl. Syn., p. 11); on the other hand, it is entirely absent—for example, in the Collemacei, as is shown in every microscopical drawing of their thalli yet published, and which is altogether elementary. Elsewhere I have indicated (Nyl. Obs. Peziz. Penn., p. 37), under Peziza amentacea, Balb., "The hypothecium contains crystals of oxalate."

II.

With respect to the Lichens of the public garden of Blossac compared with my note concerning those of the garden of the Luxembourgh, at Paris, I may observe that my intention in it was only to show what Lichens might be found in the midst of a very large city,* which can in no way be compared with the vegetation of a town which entirely presents the vegetation of the neighbouring rural tracts. Concerning chemical re-agents, we find it laid down—"The truth is, an experience of many years permits me to affirm that there are some things in the new method to accept and some to reject." We may expect to learn from the experience of the author, what, in his judgment, are to be rejected, and what, on the contrary, are to be approved of or retained. Also the incomparable writer of Upsala, thinking in former publications, "the reactions fallacious and variable," and "of little or no importance," lately confesses and kindly concedes, that "he does not entirely despise this character, sometimes as auxiliary" (that is nearly sub-auxiliary) "Scand.," p. 60; nevertheless, he expounds no better character in his writings, and most eagerly addsuces the chemical characters indicated by me, than which none others are indeed more constant. He looks down upon them, but he lays hold of them.† The naked truth is ("la vérité est") that the

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* Not a single Lichen, and scarcely even the trace of any thallus, are to be perceived in any of the public parks of London.—J. M. C.

† In the same place there occur these words—"It would be incongruous if lichens and not also other plants could be distinguished in this way." But the opinion may rather be regarded as incongruous, which would maintain that lichens in this respect are of an identical nature, for they show a nature altogether peculiar. Nor may it be overlooked that in Th. Fr. "Scand.," p. 187, there is openly announced "a new discovery." The author declares that he has employed acetic acid as a reagent, "with great success." He may not, therefore "despise" this lucky acetic acid, but happily use it. The next time he will no doubt reveal wonderful things effected by the help of this acid, and what splendid successes he has obtained.
chemical characters are entirely similar, and of similar value with the other characters; all are auxiliary, but the former excelling in simplicity and perspicuity, are at the same time very easy and necessary. Accordingly in the present state of Lichenography, we may not neglect them, or if we do neglect them, the whole of Lichenography would become worthless and profitless. But it is of the greatest importance that those as well as the other characters should be rightly and accurately observed; for, if badly and unskilfully employed, they lead to errors; as happens through any defect of dexterity and sound judgment in matters relating to science, and nowhere is expertness and judgment more necessary.

In p. 16, we read, "I have seen in some apothecia of this variety, or of the following, the normal spores of Lecanora subfuscæ replaced by the spores in equal number of an entirely distinct physiognomy—spores twice as large, brown, 1-septate, without apparent change in the other portions of the apothecium. M. Nylander, to whom I submitted pieces, has hesitated to pronounce upon the possible causes of such an anomaly." Here the experience of the author by no means shines forth. He had, indeed, submitted to me heterogeneous apothecia, growing mixed with the apothecia of a certain "Lecanora subfuscæ," saying on a label, "apothecia L. subfuscæ, bearing different spores (brown, 1-septate)," an absurdity unworthy of any lichen whatever, or any other plant. I answered, "this is something marvellous; I have known nothing so prodigious." This the author does not seem to have understood, nor very faithfully rendered. "Nylander has hesitated, &c.," when on a more attentive examination, the wonderful knot could easily be solved. Manifestly it relates to two lichens occurring conjointly, as is every day seen, with the thalli so intermingled that the different apothecia appear as if sitting on the same thallus.* Examining to-day those apothecia which were sent, it was at once evident that the apothecia with the brown spores belonged to Physcia aipolia. Accordingly, Lecanora subfuscæ was growing mixed with this Physcia, which was the "wonder." It may be added that, in no respect, either external or anatomical, do the apothecia of both present any likeness.†

* This is equally the case, and perhaps even more frequently so with the spermogones, which it cannot be doubted are as constant in their character in the different species as are the apothecia. Inattention to this has led Dr. Lindsay to propound his very erroneous theory of the "Polymorphism of Spermogones."—

J. M. C.

† It may be observed that lichens occurring without any thallus, or as parasites of other lichens, are of a very low order; the inferior Lecideæ (nearly Patellaria, scarcely any Biatoræ), Opegraphæ, Arthonia, Melaspileæ, Verrucariae, Endococci, Mycopens. Some Biatoræ, which seem to occur as parasites, and as if atthalline, yet are not entirely destitute of traces of a thallus (thus, for instance, gonidia are observed amongst the apothecia of Lecidea Heerii, Hepp., on the thallus of Peltigera (Nyl., in my copy.) I may here notice also that Lecanora sophodes, var. pictavia, Wedd., p. 17, is certainly nothing new. Elsewhere I may adduce the names formerly received.
NOTICES OF NORTH AMERICAN FUNGI.

By the Rev. M. J. Berkeley, M.A., F.L.S.

(Continued from Page 101.)

476. Melanconium oblongum. B.—Pustulis elevatis late conicis tectis; sporis oblongis.

On Juglans cinerea. Massachusetts. No. 3380. Alabama, Peters. No. 5250: spores '0008 long, with an oil globule, one side curved. A very different plant from Stilbospora ovata, which also occurs on walnut.


At first entirely concealed by the bark, then sending out the black oblong triseptate spores, the breadth of which is one-third of the length.

478. Stilbospora pinicola. B. & C.—Soris oblongis erumpentibus; sporis oblongis, utrinque obtusis triseptatis, articulis uninucleatis leviter constrictis.

On the under side of pine leaves. No. 4791.

Forming little oblong hysteriform spots, at first surrounded by the cuticle; spores oblong, '0008 long, '0002 wide, constricted slightly at the joints, each of which has a single globose nucleus.


Forming little erumpent pustules; spores oblong, obtuse at either end, triseptate, '0006 long, about ¾ as much broad, seated on long hyaline pedicels. No. 3339, on chestnut from the Virginian Mountains, is either the same or very closely allied, but the spores are attenuated at the base, and I have not seen the same elongated pedicels.


480. Coryneum Negundinis. B. & C.—Pustulis minutissimis;
sporis brevibus biseptatis e pedicellis crassiusculis furcatis reticulatisque oriundis.
Pustules extremely minute; spores pallid, oblong, very slightly attenuated at either end, biseptate, about half as wide as long, springing from hyaline, rather thick pedicels, which are forked or reticulated.

Pustules raising the cuticle by which they are closely surrounded; spores elongated, slightly curved, pluriseptate, the endochromes at length divided by one or sometimes two septa. The spores are of the same form as those of *C. Kunzei*, but are distinguished by the vertical divisions of the septa.

482. *Coryneum irregulare*. *B. & C.*—Pustulis elevatis distinctis; sporis obovatis 4-6 septatis; endochromatibus verticaliter divisis; pedicellis tenuissimis.
Pustules distinct, raised; spores large, 0.02 long, obovate, attenuated below, 4-6 septate, the lower divisions very narrow, and gradually passing into the short, very slender stem, the endochromes divided vertically, each division containing a single globose nucleus.

Pustules completely inclosed, except at the rather mealy flesh-coloured apex. Joints of the spores elliptic, not so elongated as in *Seiridium marginatum*; interstices cylindrical.


Also with *Discosia ocellata*, *B. & C.*, on *Magnolia grandiflora*. Car. Inf. No. 5011.

I cannot distinguish from these latter, No. 4482, on *Rhododendron Catawbiense*, Mountains of Car. Inf., or No. 1370, on the fruit of roses, Ravenel. These two, perhaps, may properly be considered varieties of *P. Guepini*. 

NOTICES OF NORTH AMERICAN FUNGI.


Pustules extremely minute, situated on the grey fibres of the exposed wood; spores oblong, slightly attenuated at either end, .001 long, very pale.


Pustules very minute; spores swollen in the middle, with two septa, exclusive of those which separate the highly developed crest and the short pedicel. The dark part, .0006 long and almost as much wide.

486. *Pestalozzia torulosa.* B. & C.—Pustulis parvis, sparsis, vel e macula nigra oriundis; sporis biseptatis torulosis.


Pustules minute, scattered, or springing from a black spot; spores with two septa, exclusive of those which separate the crest and pedicel, strongly constricted at the articulations, .001-.0015 long, the upper and lower joints sometimes brown.

487. *Pestalozzia hysteriiformis.* B. & C.—Pustulis minutis e macula arida decolorata oriundis; sporis breviter fusiformibus; biseptatis pedicellis hyalinis elongatis.

On leaves of *Quercus nigra.*

Pustules minute, springing from greyish discoloured concentrically divided spots; spores shortly fusiform, biseptate, with long hyaline slender pedicels.


Pustules distinct, elevated, perforated in the centre; spores narrow, oblong, triseptate, brown. The spores resemble those of the varieties of *P. Guepini* mentioned under *P. funerea.*

489. *P. stellata.* B. & C.—Pustulis stellatis e macula alba oriundis; sporis subdoliiformibus biseptatis.

On leaves of *Ilex opaca.* Car. Sup. No. 4921.

Pustules stellate, seated on a circular white spot surrounded by a black line; spores short, swollen in the centre, biseptate; pedicels about the same length, attenuated downwards.


Pustules punctiform, perforated in the centre, covered with the cuticle, and surrounded by a black ring, springing from a large marginal white spot with a brown border; spores fusiform, bi-
triseptate .002 long, with a pedicel of the same length, attenuated downwards. Quite distinct from the last species.

* Pestalozzia Laurina. Mont.—The spores slightly shorter than in an authentic specimen.


491. Pestalozzia concentrica. B. & Br.—Pustulis concentricis e macula pallida oriundis; sporis triseptatis, utplurimum monochaetis.


Pustules concentrically arranged in the more typical form on a pallid or white spot; spores rather variable in form, about .001 long, with, in general, a single oblique process at the apex, more rarely with a three-threaded crest. The process is sometimes quite horizontal. Nearly allied to P. monochaeta, Desm.

492. Cheirospora Micheneri. B. & C.—Soris elevatis, minutis; sporis longe pedicellatis globosis vel irregulariter obovatis, fuscis e cellulis globosis indefinitis membranâ tenui circumdatis.


Forming little elevated pustules; spores with long slender hyaline pedicels, which are sometimes forked, brown, globose, or irregularly obovate, consisting of a number of cells contained within a thin membrane.


* Nemaspora aurea. Fr.—Michener. No. 3819.


Pustules gregarious, elevated, distinctly pruinose, irregularly cellular within; spores extremely minute, subelliptic.


On branches of Magnolia. No. 4555.

Pustules irregular, depressed, black cellular within; spores extremely minute, subglobose, endowed with Brownian motion.


On bark, which is soon covered with the spores, so as at first sight to look like Corticium viscosum. Sulphur Springs. Car. Sup. Ravenel. No. 1519.

Pustules completely concealed by the bark, sending out innumerable very short linear, slightly curved, yellowish spores, which spring from pedicels rather longer than themselves.


Pustules prominent, closely surrounded by the bark, except at the apex, brown pallid within, spores hyaline, 0006-0005 long, obtuse at either end, about \( \frac{1}{4} \) wide.


Pustules gregarious, almost covered by the pallid cuticle; spores fusiform, rather oblique, 0005-0004 long, seated on pedicels of the same length.


On birch. No. 4899.

Pustules prominent, black, truncate above; spores elliptic or elliptic-oblong, about 0006 long, but rather variable in size, about half as much wide, green, granular within, springing from slender hyaline elongated pedicels.


On bark. No. 2647 bis.

Pustules scattered, obtuse, free; spores about 0006 long, half as much wide, reniform.


On twigs of roses. No. 3188.

Pustules minute, gregarious, covered with the thin cuticle, depressed, with a single row of globose cells within, the walls of which are covered with extremely minute, shortly oblong spores.

**REHM'S ASCOMYCETEN.**

No mycological student of the present day need complain of any lack of published specimens to assist him in his researches. Since the publication of Fries' *Scleromycetes Sueciae*, Mougeot and Nestler's *Stirpes Cryptogamicae*, etc., this method of diffusing a knowledge of the science has found much favour amongst fungologists. Each year brings into existence some fresh series of "Exsiccati." There are in course of publication at the present time, amongst many others, collections representing the mycological flora of Austria, of Great Britain, of the European Continent, and we believe, one is in contemplation which will include species from all parts of the world. Dr. Rehm, of Windsheim, has undertaken the illustration, by actual specimens of the *Ascomycetes*, a class of
fungi to which this mode of representation is especially applicable on account of the facility with which they can be dried, so as to retain their microscopical characters unimpaired. Each fasciculus contains fifty specimens, which are carefully arranged and very richly represented—


The occurrence of the following new species in localities other than those which have already been published may, perhaps, be interesting to British bryologists:—

**Barbula sinuosa.**—On a stone in a hedgebank in a limestone district, near Totnes, Devon; Leigh Woods, near Clifton, Bristol, on limestone; Buckingham, on the exposed roots of trees, and at the base of their trunks, growing with *Tortula latifolia*, on oolitic soil; Hanwell, near Banbury, on a damp oolitic limestone wall; Oxford, on a tree stump by the side of the canal; Dunton Green, in a wood on the chalk.

In the moist state it occurs generally in small dense tufts which resemble *T. vinealis* in appearance, but have the peculiar colour of *Grimmia pulvinata*. When growing in dry places, or on the tops of limestone walls, as at Plymouth, it is of a somewhat brownish-green colour. When dry it resembles *Tortula nitida*, but the nerve is not glossy, and each stem appears separated from its fellow, although united below by tomentum.

Under the microscope it is readily known by the fragile tips of the leaves, of which the young and more perfect ones are seen to have two or three irregular teeth at the apex.

**Dicranum montanum.**—Abbey Wood, Kent. On the stumps of chestnut trees (*Castanea vesca*) which have been cut down, but which have sent out a new growth; the soil is sandy. It grows intermixed with *Tetraphis pellucida*, and occurs in densely compacted tufts of a deep green colour, in appearance resembling *Weissia cirrhata*, but with the leaves rather more erect. It also resembles that plant when dry. Under the microscope, however, it is readily distinguished from it by the margins being serrated as well as the back of the nerve towards the apex of the leaf. The leaves are also distinctly papillose.

**Stereodon canariense.**—Near Buxton (Mr. E. George). The specimen I have received is a dense flat tuft in which the stems are about ½ inch long, and erect; it has a more rigid appearance than *H. cupressiforme*. The district in which it occurs is limestone.

**Pottia cavifolia.**—I have only seen this plant growing on oolitic soil, and believe it to be confined to that soil and magnesian limestone. On the oolite it is extremely abundant, the mud-capped walls being brown with its capsules.

**Amblystegium confervoides.**—On limestone rocks, in Leigh Woods, near Clifton, Bristol. In fruit August, 1873. It grows in thinner tufts than *Hypnum serpens*, and is of a darker, almost blackish-green colour in old specimens, and is in young fruit in July, and the beginning of August.
**Tortula sinuosa, in Oxfordshire.**—A few days ago Mr. F. Westell forwarded to me a specimen of this beautiful moss, gathered by him near Witney during the present month, and in the note accompanying it he states that Mr. H. Boswell has also gathered it near Oxford. I have not specimens from Mr. Boswell, but there can be no question about the Witney Moss, and from Mr. Boswell's well-known character as a Bryologist, his word is quite sufficient. We have thus another county for this moss, in addition to those already recorded of Sussex (Davies), Cornwall (Boner), Devonshire (Holmes), and near Bangor (Wilson). It is figured in "Journ. of Bot.," vol. ix. (1871), p. 289, pl. 120, fig. 6.

Chas. B. Hobkirk.

British Mycologists will regret to learn that Mr. A. Jerdon, of Allerton by Jedburgh, N.B., is deceased. For many years he was an assiduous collector of Cryptogamia, and was instrumental in augmenting our Flora with several very interesting species, some of which bear his name.

**CRYPTOGAMIC LITERATURE.**

Cunningham, Dr. D. Microscopic Examinations of Air. Calcutta, 1874.

Smith, H. L. The Siliceous shelled Bacillaria or Diatomaceae, in the "Lens." Dec., 1873.


Nylander, W. Addenda Nova ad Lichenographium Europaeum, in "Flora."


Seynes, M. De. Observations sur le developpement des spores du Penicillium glaucum et de l' Aspergillus candidus. (Congres de Bordeaux, 1872.)

Rabenhorst, Dr. L. Fungi Europae exsiccati. Cent. 18.
NEW BRITISH MOSS.
**Grevillea,**

A MONTHLY RECORD OF CRYPTOGRAMIC BOTANY AND ITS LITERATURE.

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**BRITISH FUNGI.**

*By the Editor.*

(Continued from Page 139.)

**Puccinia Bistorta.** *D.C.*

Spots none; sori scattered, minute, numerous, rufous, hypophyllous, suborbicular, spores ovoid or oblong, obtuse, rounded, bright brown, stem very short.—De Can., *Flor. Fr.* v. 61. Corda *Icon. iv.,* f. 61. Libert. *Exs.,* No. 91. *Puccinia vivipara,* Grev., MSS.


**Uromyces excavata.** *D.C.*

Spots none or yellowish; sori scattered, surrounded by the inflated epidermis; spores brown, obovate, shortly pedunculate and sessile.—*Uredo excavata,* *D.C., Fl. Fr.,* vol. ii., p. 227. Berk. *Exs. No. 119.* *Caesoma excavum,* Lk. *sp. ii.,* p. 34.

On *Euphorbia exiqua,* in company with *Æcidium Euphorbie.*

King’s Cliff, Norths.

Omitted in Berkeley’s “Outlines” and Cooke’s “Handbook,” through oversight.

**Æcidium Parnassiae.** *Graves.*

Hypophyllous, spots pallid, cups laxly disposed in subrotund tufts, yellowish-brown, urceolate, margin thick, nearly entire, spores pallid.—*Graves, in Duby. Bot. Gall.,* ii., 904.

On leaves of *Parnassia palustris,* Near Glasgow. (Dr. Greville.) This will follow No. 1626 in the “Handbook of British Fungi.”

**Synchytrium.** *De Bary.*

Cellules often numerous, aggregated, involved in a common membrane, forming sori, endochrome orange, delicately granulose; zoogonidia globose, rarely oval or oblong.—*Rabh. Algae Europ.,* ii., 284.

Entophytal, with the habit of *Uredo,* seated in the parenchyma of terrestrial plants.
Synchytrium taraxaci. De By. & Wor.
Cellules variable, seated beneath the cuticle of living leaves.—
On leaves of common dandelion. Batheaston.
Zoogonidia 00013 m.m. diam.

Synchytrium mercurialis. Fuckel.
Tubercles confluent on the nerves of the leaves, hemispherical, 
greenish, depressed above, unbilicate; sori oblong, grey; zoo-
spores globose, uninucleate, hyaline.—Fuckel F. Rhen., No. 1607.
On leaves of Mercurialis perennis. Batheaston.
April.
Spores echinulate, 0012-0015 in.

Synchytrium anemones. Wor.—Schroet in Cohn Beitr., p. 40.
On leaves and petals of Anemone nemorosa.

Spilocaea pomi. Fr.
Spots often confluent, at first covered by the thin cuticle, which 
is soon broken and evanescent; spores densely adnate, subglobose 
or oval.—Fries Sys. Myc. iii., 504. Grevillea, ii., p. 64.
On apples.
Doubtless only a condition of Cladosporium.

Mitrula alba. Sm. (Grevillea, i., p. 136, t. x., fig. 7.)
Amongst submerged leaves.

Vibrissea Margarita. White.
Simple, head orbicular, orange-red, margin hisped, stem cylin-
drical, hirsute with black articulated hairs, internally white. Ascii 
and sporidia?—Buchanan White, in "Scottish Naturalist" for Jan., 
1874.

Rhizina laevigata. Fr.
Oribcular, even, brown, margin prominent, granulose beneath, 
fibrils pallid; asci cylindrical; sporidia broadly fusiform, acumina-
Octospora rhizophora, Hedw. Musc. Frond, ii., t. 5, f. 3.
On stumps,
[Plate 22, fig. 1. Ascus with sporidia and paraphysis. b, 
sporidia x 320.]

Peziza (Aleuria) isabellina. Sm. (Grevillea, i., p. 136, t. ix., fig. 1-4.)
On decayed coniferous wood.

Peziza (Aleuria) undata. Sm. (Grevillea, i., p. 136, t. x., figs. 1-6.)
On tree-fern stems.

Peziza (Humaria) Chateri. Sm. (Grevillea, i., p. 120, t. viii.,f. 1-2.)
Peziza (Mollisia) Bullii. Sm. (Grevillea, i., p. 120, t. viii., f. 3.)
Peziza (Dasyscypha) lasia. B. & Br.
Cups globose, erumpent, orange, at length opening with a torn, 
dentate mouth, externally gummy; asci elongated; sporidia fusi-


Cups smaller when on bark; sporidia ·0005 in. by ·0001 in.

[Plate 22, fig. 2. a, paraphysis; b, ascus with sporidia; c, sporidia; d, tip of paraphysis.—B. & Br.]

Rhyparobius. Boudier.

Cups very minute, scarce conspicuous to the naked eye, waxy, marginate, sessile; disc plane; ascii prominent; when dry margin inflexed, rounded; paraphyses rare, short, septate; ascii minute but broad, polysporous, dehiscing with a convex operculum; sporidia very minute, hyaline.—Boudier, Mem. Asc., pp. 47.

Rhyparobius dubius. Boud.


On rabbit's dung. Bathford.


On dog's dung. Batheaston.

Rhyparobius argenteus. B. & Br.

Very minute, silvery white, ciliated with soft hairs; ascii short; sporidiferous cysts elliptic, seated towards the apex; sporidia fusiform; paraphyses furcate.—B. & Br. Ann. N. H., 1394, t. 9, f. 11.

On rabbit's dung; for the most part attached to filaments of Mucor.

Cups ·004 in. across; asci ·004 in. long; sporidia normally 64 in each cyst ·0007 in. long, ·00025—·0003 in. wide. Scarcely visible to the naked eye; ascii opening with a little lid, which splits vertically. Comes near to R. felinus, B., but has soft hairs, and is of a pure white; tips of paraphyses slightly enlarged.

[Plate 22, fig. 3—a, asci with cyst; b, paraphysis; c sporidia.—B. & Br.]

Rhyparobius woolhopensis. Renny.

Minute, scattered, at first pure white, then dingy; cups with a thick stem-like base, which is tuberculate, covered above with close-set hairs which fringe the margin, at length expanding, the hairs disappearing with age; substance of base vesicular; paraphyses simple; asci clavate; sporidia fusiform (normally 64).—B. & Br. Ann. N. H., No. 1395, t. 9, f. 12.

On bird's dung, mixed with filaments of Mucor.

Cups $\frac{1}{2}$ line (·041 in.) high; sporidia ·0007 in. long; cells of base often ·0015—·0018 in. long.

[Plate 22, fig. 4—a, ascus with cyst; b, sporidia.—B. & Br.]

Bulgaria purpurea. Fckl.

Receptacles as in Bulgarla sarcoides, but larger and more robust;

On rotten wood. Epping.

Sporidia (0.0007 in.) 0.02 m.m. long, whereas in *B. sarcoides* they are only half that length. The cups exceed 1 inch in diameter.


The description of the fruit in the work above quoted is erroneous, as I find upon re-examination. It should be as follows:—

Asci elliptical; sporidia biseriate, broadly fusiform, straight or curved, 3-5 septate, constricted, with a short apiculus at either end, amber-coloured, 0.0014 in. long.

*Nectria citrina-aurantia*. Leer.


On sticks. Batheaston (C. E. Broome).

Remarkable for the exceedingly minute perithecia.

*Sphaeria (Pertusae) paedida*. B. & Br.


On beech. April.

Quite superficial, confluent; sporidia 0.0005-0.0006 in. × 0.0002-0.0003 in.

[Plate 22, fig. 5—a, ascus with sporidia; b, sporidia.—*B. & Br.*]

*Sphaeria (macropora) Scirpi*. Fckl. (Grevillea, ii., p. 48.)

On Typha. May.

*Sphaeria (Immerseae) nigrofactae*. Cooke.

Gregarious, on blackened spots. Perithecia globose, opaque black, rough, immersed or semi-immersed, ostiola thick, prominent, sometimes alone appearing above the surface of the matrix; asci cylindrical, tetrasporous, sporidia linear, multisepate, yellowish. Paraphyses slender, hyaline, simple.


Allied to *Sphaeria bacillata*, C., but perithecia nearly double the size, the sporidia are not much more than half as long (0.0045 in.) and appear to be always limited to four in an ascus.

*Schizothyrium. Desm.*

Perithecia sessile, simple, rather fleshy, rounded or ovate, flattened or slightly convex, minute, punctiform, dehiscing by a longitudinal fissure; nucleus gelatinous; asci fixed, erect; sporidia ovoid.—*Desm. Ann. Sci. Nat. (1849)*, xi., 360.

*Schizothyrium Ptarmica*. Desm.

Innate, black, somewhat shining, rounded or ovate. Asci cylin-
Sphinctrina coremioides. B. & Br.

Sporidia ·00025 in. ·006 m.m. diam., forming chains at the tips of the elongated pedicels of the asci, which are soon absorbed.

Phacidium radians. Rob.

Sporidia (·00035 in.) ·01 m.m. long.

Chaetomium rufulum. B. & Br.

On a paper box under a bell glass. April.
Sporidia when young, ·0004–·0005, mature, ·0007 in. Perithecia globose, with a pointed apex, composed of about three rows of coarse cells, of a pallid ochre at first, attached by a few threads. Ostiolum (if any) very inconspicuous; asci mostly curved, obtuse at either end, the narrow base soon losing all signs of attachment and floating freely in the perithecium; sporidia spherical, strongly granulated, of a pale-brown tint, containing a small nucleus.

[Plate 22, fig. 6.—a, b, asci; c, sporidium.—B. & Br.]

Asci linear; sporidia globose, uniseriate, smooth, (·0005 in.) ·0127 m.m. diam.—B. & Br. Ann. N. H., No. 1397,* t, x., fig. 13.

On the same matrix Lycoqala parietinum occurs, and we have little doubt that it is a mere state of the Chaetomium. The asci are mixed up with yellow threads, and it is probable that, as in other Chaetomia they are often absorbed, leaving the sporidia free, and thus appearing to be the spores of a Myxogaster.

[Plate 22, fig 7.—a, asci with sporidia and paraphyses; b, sporidia.—B. & Br.]

Ailographum vagum. Desm.
Receptacles innate-superficial, amphigenous, scattered, elliptic, ovate, or linear, simple or furcate, black, opaque, lips closely con.

On dry coriaceous leaves, as holly, ivy, &c. Epping. Perithecia scarcely visible to the naked eye.

A WORD MORE ON THE "AGUE PLANT."

By Wm. Archer.

The appearance of a further notice of the "Ague Plant," so-called, in the preceding number but one of this Journal (No. 21, March, 1874), recalls attention to the former record of it communicated by Dr. Bartlett (No. 6, Dec., 1872, p. 95), and it, at the same time, reminds me of the Editor having been so good as to forward me, shortly after that occasion, some specimens of this supposed dreadful form of vegetation, bringing home to me as well the fact that, owing to many and various avocations, I had left over communicating to him the result of an examination, until, indeed, the matter had at last altogether escaped me.

Meantime I perceive by the number referred to (p. 141) that its identity has since been made out, and quite correctly, as simply Botrydiun argillaceum (Wallr.), or perhaps better, Hydrogastrum granulatum (Linn.), Desv. Indeed, on reading over the original account of the "Ague Plant," as given from Dr. Bartlett in this Journal (p. 95, Dec., 1872), I could not but suspect that this was in fact the very plant (though he called it a "fungus") in which Dr. Salisbury believed he had discovered the "malarial essence," though I fancy there are few European observers who would not be disposed to acqint the little Hydrogastrum of being the "caus of the ague."

Nevertheless I might be excused some little trepidation and misgiving on opening the little package containing the specimen, all the way from Iowa, fearing that concentrated within might be imported a very unwelcome visitant. It was, no doubt, a relief, and I certainly must own to have been quite reassured, even upon a mere inspection by the unaided eye, when I did summon courage to open the little box, to see the poor little Hydrogastrum sure enough, as I had previously conjectured, showing its little withered, depressed, and collapsed rounded fronds, dotted over the surface of the dry mud. With very little compunction I placed a specimen with some water under the microscope, and found it, as indeed the majority of the examples proved to be, in the condition described by Reinsch, of which I gave an extract in this Journal ("Grevillea," No. 7, Jan., 1873, p. 107), following Mr. Parfitt's communication on this plant (l. c., p. 108), that is showing the cell, here making up the whole "plant," densely filled with rounded, rather thick-
walled daughter-cells, due to the breaking up of the contents of
the original individual, and destined themselves to produce young
plants "in the following spring" (and to perpetuate the "ague")
Indeed, the examination with a hand lens showed certain of the
examples which had burst at the top filled with these rounded
germs (like so many little eggs in a nest).

I would at once have communicated to the Editor the result of
my examination, but that I had seen a reference to a paper pub-
lished in the Regensburg "Flora" of 1868, purporting to contain
a demonstration by Dr. Itzigsohn that Hydrogastrum after all
was not an Alga, but a Lichen, or at least that its nature was
debateable, as one was to gather from the title: "Botrydium
argillaceum, Wallr., ob Alge oder Flechte?" and I desired to
know what Itzigsohn had to say upon our plant, ere sending for-
ward a note of what the "Ague Plant" had turned out to be. It
will be borne in mind that Itzigsohn's statements could scarcely
have had any reference to the new views as to the nature of
Lichens propounded by Prof. Schwendener, lately discussed at
considerable length, a résumé of which has appeared, and is being
continued, in the "Quarterly Journal of Micros. Science." But
the "Flora" was not then, and has only lately been, available in
Dublin.

From his paper (l. c., p. 129), we are to gather that, the Hydro-
gastrum being so common in his region, Dr. Itzigsohn had long
looked rather down upon it on that account, and had taken its
structure for granted, by, as he mentions, merely squeezing the
examples out upon a slide, in place of making sections; still the
examination he had previously given had shown him the formation
of zoospores, his record of which is quoted, by Rabeuhorst in his
"Flora Europæa Algarum Aquæ duleis," etc. (p. 265), and which
seems to be confirmed by Parfitt (l. c.). It would seem, indeed,
for so far Itzigsohn had this very plant in view, and that his fore-
going statements about it are correct.

But Dr. Itzigsohn desired to repeat his previous observation as
to the occurrence of zoospores in Hydrogastrum, and having re-
ceived some examples of what he supposed to be this plant from
Dr. Ruthe, obtained from another locality, he submitted them to
examination. He now made vertical sections, and of these he
gives a description, but no figures, promising a more enlarged
account on a future occasion; but I am not aware if he ever ful-
filled that intention. From that description it appears indeed
abundantly manifest it was now not Hydrogastrum at all which he
had before him, but a true lichen, though from an outward resem-
blance he at once comes to the conclusion that Hydrogastrum
(Botrydium) must be no longer accounted an alga, but a lichen. A
vertical section through the rounded plant itself indeed gave him
an outward cortical or epidermoidal layer, composed of very delicate,
distinctly organised rotundato—6-angular parenchymatous cells,
followed by a "chlorogonimic" gonidal layer enclosed in a spongy indistinctly cellular mass, whilst further inwards towards the middle there occurred an irregularly interwoven fibrous layer, some of the threads of which ended blind towards the hollow centre of the "Botrydium-plant." He went further, and amongst those examples of a chestnut-brown colour he detected apothecia, with 8-spored thecae, paraphyses none, spores colourless, filled with delicate plasma, elongato-elliptic; furthermore he found spermogonia, with spermata. But these examples did not satisfy Itzigsohn, and he obtained, through friends, from Frankfort and Eichstädt, examples fully developed, which, he says, satisfied him at last that the plant passing at home with him as Botrydium was but the undeveloped state of Thalloidima vesiculare (Hoffm.) Massal; (Lecidea vesiculare, Auct.). Still, he adds, he would reserve his final judgment until he succeeded in obtaining fresh material for the more exact examination of the common Botrydium form, though he could entertain but little doubt but that "the undeveloped Thalloidima is perfectly identical with the plant figuring amongst phycologists as Botrydium Wallrothi."

It appears, then, that Itzigsohn's statements were after all, in the present case, scarcely worth waiting for; it cannot be doubted that, though possessing some amount of outward resemblance, these are two plants essentially distinct—it would seem pretty certain that not even a Schwendener would claim Hydrogastrum as the "gonidia-former," in any modified manner, of "Lecidea vesiculare;" but whether Itzigsohn ever investigated the matter any further is unknown to me.

On reading over the more recent description of the "Ague Plant" communicated by Dr. Bartlett to the "Chicago Society of Physicians and Surgeons" (see "Grevillea," No. 21, March, 1874, p. 142), one sees how fairly it tallies with the known characters of Hydrogastrum (see also Parfitt in "Grevillea," No. 7, January, 1873, p. 103), but it is undoubtedly surprising how he and the American observers of the Society referred to (loc. cit.) failed to perceive the identity of the organism in question, one which finds a place in so many botanical text-books, both by figure and description, as well as on lecture-diagrams, as a noteworthy example of a single-celled independent plant, and at the same time endowed with the power to become copiously ramified, so to speak, "root," "stem," and aerial portion combined in one "cell" only.

I venture to think it hardly less surprising to find this seemingly so passive and inert little chlorophyllaceous alga, met with, in suitable situations, all over Europe, gravely tried and found guilty, on so slender evidence, of being the atrocious "cause of the ague."

In the mud-samples so kindly forwarded by the Editor, there occurred some fragmentary examples of a plant wholly different from the foregoing—so small in quantity as to be quite invisible to the unassisted eye—but which disclosed itself amongst the débris
taken up along with the Hydrogastrum. This was a Chthono-
blastos, Kütz. (Microcoleus, Harvey), and was most probably the
same as Ch. arugineus, Kütz. Just where one of these algae
would be found it would not be very surprising to meet with the
other. Can this latter be chargeable with being the "cause of the
ague?" It is wholly a different kind of alga from Hydrogastrum,
without any point of homology or affinity therewith, except, perhaps,
their common love for the damp clayey substratum afforded by the
partial drying of the swamps, near which, unfortunately, from some
occult cause, the "ague" is prone to hover.

ON TORTULA BREVIROSTRIS. (HOOK. AND GREV.)

By E. M. Holmes.

While looking over some mosses, collected in the neighbourhood
of Buxton by my enthusiastic bryological friend Mr. E. George,
my attention was attracted by a specimen amongst them, evidently
belonging to the aloid group of the Tortulae, but which had a very
short conical operculum, and upon further examination proved to
have synoicous flowers, and, therefore, to belong to T. brevirostris,
Hook. and Grev. Having reported the occurrence of this species
as a British species to Mr. Mitten, he kindly pointed out that it had
already been established as a British species, and as one new to
science, in "Brewster's Edin. Journ. of Science," vol. i., p. 289,
and that an excellent figure of it was given in the 2nd ed. of the
"Musc. Britt.," Suppl. tab. ii.

The history of this interesting little moss is a curious one. It
appears to have been first collected in 1799 by Swartz, by whom
specimens were sent to Messrs. Turner and Smith under the name
of T. rigida. His specimens were described by them, in 1804, as a
variety of T. rigida having a short operculum. In 1824 Drs.
Hooker and Greville having received specimens, which they con-
sidered to be identical with those of Swartz, from D. Stewart, Esq.,
collected on an old wall near Edinburgh, they established the moss
as a new species under the name of T. brevirostris, and described
and figured it in "Brewster's Edin. Journ. of Science," as above
quoted. It was afterwards described, and an excellent figure given
of it, in the 2nd ed. of the "Muscologia Britannica." Wilson,
however, omitted it from the "Bryologia Britannica," published in
1855, referring Stewart's specimens to T. rigida, Schultz, and his
statement has hitherto passed unquestioned.

Thinking, however, from the occurrence of this species in Derby-
shire that Wilson might possibly have been mistaken, and having
ascertained that Greville's original specimens were in existence, I
obtained, through the courtesy of Mr. J. Sadler, permission to
examine the original specimen from which the drawings in the "Muscologia" and "Brewster's Journal" were taken.

The packet I received was labelled on the outside, in Dr. Greville's handwriting, "T. brevirostris," and contained two smaller packets, one of which had Dr. Greville's original drawing inside, and was labelled outside, "T. brevirostris, on an old wall opposite Parson's Green, Edinburgh, D. Stewart, Esq.;" and the other was labelled also, in Dr. Greville's handwriting, "T. brevirostris," but was marked inside "T. rigida, Jackdaw Crag, Durham, R. Spruce."

The specimen from Parson's Green consisted of a few immature setae, one of which only was sufficiently advanced to show the short operculum. On this one I found synoicous flowers, which proved it to be the right species, and not T. rigida, Schultz, as stated by Wilson.

The specimens in the other packet from Spruce were T. rigida, Schultz, having dioicous inflorescence. The operculum was, however, rather shorter than usual in that species, which probably led Dr. Greville (to whom the synoicous inflorescence of T. brevirostris was not then known) to label it "T. brevirostris."

Hence it is probable that Wilson, owing to the meagreness of the specimen from Parson's Green, did not examine it, and taking for granted that the other specimen from Jackdaw Crag was rightly named by Dr. Greville as T. brevirostris, and, therefore, identical with the Parson's Green specimen, referred them both to T. rigida, Schultz. The honour of separating T. brevirostris as a distinct species, and of discovering it as a native of Britain, is, therefore, due to Drs. Hooker and Greville.

The description given in "Brewster's Journal," and in the 2nd ed. of the "Muscologia," states that the operculum is half the length of the capsule; while Br. and Schimper, in the "Bry Eur.," state that it is only one-third the length of the capsule. The plate in the "Muscologia" does not, however, correspond with the description in the text, the figure being excellent, and representing the lid as less than one-third the length of the capsule. The figure was drawn, as above stated, from the Parson's Green specimen, which accounts for its correctness; the description may, however, have been modified by the remembrance of the supposed T. brevirostris from Jackdaw Crag.

The character of the Derbyshire specimens, which agree well with the figure in "Muscologia," may be thus expressed:

**Tortula brevirostris**, Hook. and Grev. Plants small, subgemmi-form, in scattered patches; lower leaves roundish, ovate, obtuse, upper leaves lingulate; nerve thin; seta reddish, about \( \frac{1}{3} \) inch long; capsule elliptical; lid obliquely conical, \( \frac{1}{4} \) the length of the capsule; annulus broadish; teeth of the peristome twice twisted.

For the purpose of easily distinguishing the allied species, the following arrangement may perhaps be found useful:

*T. rigida*, Schultz. Lid long subulate; dioicus.

Capsule cylindrical—*T. ambiqa*, Br. & Sch. Capsule erect; dioicus.

*T. aloides*, Br. & Sch. Capsule inclined; dioicus.

*T. brevirostris* appears to prefer old moss-covered limestone walls; *T. rigida*, mud-capped walls in oolitic or magnesian limestone districts; *T. ambiqa*, rubble heaps in chalk pits; *T. aloides*, clay banks; for it is in these localities that the species are respectively found to grow most luxuriantly.

For the excellent drawing accompanying this notice I am indebted to Dr. R. Braithwaite, whose kind assistance on this and former occasions I take this opportunity of gratefully acknowledging.

A full account by Mr. Mitten of the history of the group of *Tortulae* to which *T. brevirostris* belongs will be found in the "Journal of Botany" for this month.

**Explaination of Plate xxiii.**


**Lichenological Memorabilia, No. 5.**

By The Rev. W. A. Leighton, B.A. Camb., F.L.S., F.B.S. Ed.


Our venerable and venerated confrère, the Rev. M. J. Berkeley, in one of his excellent papers in the "Linnean Transactions," xxii., p. 149, remarks that "The illustrious Mycologist, Elias Fries, on more than one occasion expresses the far greater pleasure that he has experienced in ascertaining with complete certainty a single synonyme of the earlier writers than in discovering new species—a sentence which will meet a responsive echo in the approbation of most true lovers of science. There is indeed a great satisfaction in clearing up a point hitherto obscure."

This excellent remark was forcibly recalled to my mind on examining some specimens of *Opegrapha grumulosa*, Duf., from the walls of the old Nunnery in Alderney, which had been determined by Dr. Nylander, and sent to me by Mr. Chas. Larbalestier, who has been the fortunate and acute discoverer of so many novelties in our Lichen-Flora, in the Channel Islands and elsewhere. This lichen is in general external character and aspect very similar to
Lecidea Dilleniana, (Ach.), and has been often confounded with it in the published continental "Exsiccati." Attention, however, to the chemical reaction of the thallus and the size and form of the spores enables us distinctly to distinguish the two plants. In L. Dilleniana the reaction of the thallus is K yellow, C orange-yellow, and the spores are large, aciculari-fusiform, acute at the apices, and 3-septate (see fig b.). In O. grumulosa, on the contrary, the reaction of the thallus is K very faint yellow, C decided red, and the spores less than half the size of those of L. Dilleniana, oblongo-fusiform or lineari-fusiform, obtuse or rounded at the apices, 3-septate (see fig. d.).

When describing L. Dilleniana in my "Lichen-Flora of Great Britain," &c., p. 332, I had never seen or examined a specimen of O. grumulosa, which at that time (1871) had never been detected as a British lichen, except in Jersey, by Mr. Larbalestier. Consequently whilst giving in the Lichen-Flora the proper reaction to L. Dilleniana, I mentioned in a note that the "Exsiccati" of Anzi Ven, 82 and 83, and Zwackh, 142 (respectively labelled as L. Dilleniana), and Scher., 580 (labelled as Lecidea epipodia), had a different reaction, viz., K yellow, C red. The present examination of authentic specimens of O. grumulosa now enables me to refer these to their proper place, viz., to O. grumulosa, and not to L. Dilleniana.

Much has been written time after time by various writers against chemical tests and their supposed variability, and this apparent diversity has no doubt resulted from similar circumstances with the above. But the above fact appears to my mind as an additional confirmation of their real value and constancy. In these investigations it will be advisable to bear constantly in mind the caution—a caution which cannot be too often repeated—which Dr. Nylander gives in "Journ. Linn. Soc." ix., p. 365, note :-“The analyses of lichens made by chemists often fail through the neglect of an exact determination of the species, and probably not less often by the mixture of specimens confounded together, and incorrectly assigned to one single species. For the chemist, no less than for the physiologist, it is of the greatest importance to know exactly what is the plant we have under observation; that is, to have well determined the plant which we are studying.” In other words, he must not place implicit confidence on the attached labels merely, from however great soever authority resulting, as indicating undoubted accuracy, nor on his own preconceived notions of the particular diagnosis; but by careful observation and comparison thoroughly satisfy himself that the plant under review is really that which the label indicates it to be. Then apply the chemical test, and doubt will be exchanged for certainty.

It affords no trifling pleasure to my own mind to acknowledge and correct the error into which, through ignorance and imperfect knowledge, I had fallen, and at the same time to adduce a confirma-
tion of the value of chemical reagents in accurately determining the species of lichens.

The following additions to the synonymy may be useful:—

*Lecidea Dilleniana* (Ach.) (K yellow, C orange).

**Geog. distrib.:**—Sweden, Italy.

**Exs.**—Leight, 336. Mudd, 199.

*Opegrapha grumulosa*, Duf. (K faint yellow, C red).

**Exs.**—Zw., 142, 9, 144. Anzi Langob., 404. Anzi Venet, 82, 83. Scharr., 580.

**England.**—New Red Sandstone Rock, South Devon! *Prof. G. Dickie.*

As details of the two lichens have not been published, it may be advisable to introduce them here:—

**Explanation of Plate xxvi.**

*Lecidea Dilleniana* (Ach.).—

*a.* Section of apothecium. 6. Spores magn. 1,200 times.

*Opegrapha grumulosa*, Duf.—

*c.* Section of apothecium. d. Pore magn. 1,200 times.

**SOME CRYPTOGRAMS FROM PIEDMONT AND NICE.**

With a view to draw tourists’ attention to new ground, the following slight notice of a few rarities is given, as the habitats of some do not appear to be localized. Collected in a hasty journey, one is induced to believe other noteworthy plants would be found in this region, the beauty of whose scenery and climate ought alone to induce a visit.


On elm and walnut, Cuneo (Coni) to Robillante. I have received this (Saxicole) from Mr. Joshua, Cirencester. Professor Anzi, in his *"Neosymbola Lich. Rarior. vel. nov. Italie Superioris*, Milano, 1866, gives following habitats for this:—

“On limestone and dolomite in the Grisons Valleys, Lanzada Poschiavo.”


A dense species, occurring on the Limone side of Col di Tenda, forming patches like the dense state of *Brachythecium Collinum*, B. E., fertile June, 1873, in turfy hollows, wet with snow water, although the Col is only some 6000 feet high.

**Desmatodon obtusifolius.** D. N. Epilogo, *p* 576. *D. flavicans*, B. E. “In Montibus di Tenda, secus viam, Julio, 1839, legit celeb. cesati.” What appeared to be this, but old and barren, was by road side on south-west side of summit of Col. Being out of season, one could only judge from the obtuse leaves that resemble the American specimens of true *D. flavicans*. 


Grimmia Tergestina. Tommasini.

Rocks, Val di Tenda. This beautiful plant, so well marked by its membranous perichaetial leaves, is, as De Notaris well remarks, "ad Grimmiam leucophaæam, quadrantenus accedens, distinctissimus," a new habitat.

In the vicinity, on the rocks, were Thalloidina mamillare, Gonan, and the charming Fabronia pusilla, Raddi, investing the chinks of the rocks with a delicate lining, and the bases of the rocks lined for miles with a dense mat of Adiantum capillus veneris, while about Cineraria maritima was extremely common.


Cited by Dr. Braithwaite as same as Tortula nitida, Ldbg., but the locality cited by both authors, "Shoreham, Sussex, Nowell," yields only Trichostomum flavovirens, B.E., and Tortula squarrosa, D. N., both of which Nowell gathered with the writer. Trichost. diffusum, Mitten, does not occur in Sussex. Rocks, Val Sant Andrea, near Nice, furnish the veritable species, identical with specimens from Plymouth, Devon, where it is extremely common. At Val S. Andrea it grows near Trichostomum crispulum and Gymnostomium calcareum.

Grimmia crinata. B.E.

Extremely common on walls, valley of the Paglione, Nice.

I am much indebted to Mr. Baker, of Kew, for, in the kindest manner, helping me as to names of Collemata.

Brighton, March, 1874.

Geo. Davies.

Tortula sinuosa, in Warwickshire.—It may interest Bryologists to know that I find this moss in Warwickshire. On the mortar of a brick bridge, near Wootton Warven; in this habitat small, apparently starved; also near Fenny Compton, on an old tree stump, the plants in this locality being robust; in both habitats, however, barren. Pottia cavifolia is not confined to oolitic soils, as I find it abundantly on mud-capped walls, at Harbury, Fenny Compton, Kineton, Wilmecote, and on marly banks at Bearley; all these localities are on the lias and are all in South Warwickshire. The form I find at Wilmcote seems to be typical, whilst at Harbury and the other localities the piliferous form appears to prevail.

J. Bagnall.
CALLITHAMNION HORMOCARPUM.

By E. M. Holmes.

A note having appeared in this journal stating that Callithamnion hormocarpum should be referred to Callithamnion versicolor, it may perhaps be well to point out the difference between Callithamnion hormocarpum and the nearly allied species.

Through the kindness of Prof. Agarh, who has sent me authentic specimens of C. versicolor, I have been enabled to examine that species, and find that it is entirely distinct from C. hormocarpum, which is much more nearly allied to C. roseum, byssoidenum, and Seirospora Griffithsiana.

In C. versicolor the plumules are distinctly and repeatedly forked, the pinnules ending in two short, equal, and nearly parallel cylindrical cells. In appearance the plumules are truncate and penicellate, owing to the densely corymbose branching at the tips. It seems to be merely a variety of C. corymbosum, having a more marked central rachis to each frond.

In Callithamnion hormocarpum the plumules are not forked, but alternately pinnate, and the tips never end in equal forks, but the pinnæ are pinnate, with a slightly flexuous rachis, which gives the pinnules the appearance of being distantly forked, as in Seirospora.

In appearance the plumules are never truncate or penicillate, but have a lanceolate outline, and are distantly branched.

C. roseum.—The plumules are much more densely clothed with pinnæ, and have a somewhat truncate, but never penicellate, appearance; the pinnules are longer and less branched, and are without the peculiar cells on the joints, and the tufts of seirospores, present in C. hormocarpum.

C. byssoidenum.—The plumules are much more densely tufted than in C. hormocarpum, and the pinnules are corymbose and more slender.

Seirospora Griffithsiana has the seirospores always on the tips of the plumules; C. hormocarpum always on the rachis of the plumules, never at the tips, and I have not observed in Seirospora the peculiar cells on the joints which are present in C. hormocarpum. In some specimens of C. hormocarpum which I have recently examined, these marginal cells appear to have split longitudinally into four parts, but not in a tripaltrite or cruciate manner as is usual with tetraspores.

British Hepaticæ.—The announcement that the first part of Dr. Carrington's long-promised work is ready, will be gratifying to some of our readers. It is uniform with the last edition of Sowerby's "English Botany," and is issued by the same publisher (Hardwicke).
**Hypoxylon marginatum.** Schm.—A singular illustration of the wide distribution of some species of fungi was discovered the other day in examining two fragments of *Hypoxylon* on some bark from Lagos, W. Africa. One of these was the above-named, which occurs in Britain, the United States, Venezuela, Cuba, and now in West Africa. The other very characteristic species appears to be undescribed.

**Peziza vesiculosa.** Bull.—Dr. Rehm has issued in his “Ascomyceten” specimens of a *Peziza* which he calls by this name, but which is evidently quite different from Bulliard’s species. It is unnecessary to enumerate here all the differences between this, which we have named *Peziza Tarzetta*, and the much larger, more sessile species found in this country; meanwhile, we note the correction.

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**CRYPTOGAMIC LITERATURE.**

Quelet, L. *Les Champignons de Jura et des Vosges.* 2nd part. Paris, 1873. [It is much to be regretted that the plates are so indifferent.]

Braithwaite, Dr. R. *On Bog Mosses,* No. 4. *Sphagnum acutifolium,* Ehr., and its varieties, with two plates, in “Monthly Microscopical Journal,” for April, 1874.


Rabenhorst, Dr. L. *Fungi Europæi,* Cen. xviii.—species enumerated in “Hedwigia,” No. 3, 1874.


BRITISH FUNGI.
BRITISH FUNGI.
NOTICES OF NORTH AMERICAN FUNGI.

By the Rev. M. J. Berkeley, M.A., F.L.S.

(Continued from Page 157.)

   Cylindrical. Bursting through the bark with its globose head, pruinose with minute conidia, punctate below; spores oblong, 0007-001 long.

402 (bis). *Sphaeronema radula*. B. & C.—Erumpens conicum compressum; apice truncatum; sporis brevibus fusiformibus hyalinis uniseptatis vel endochromate utrinque retracto.
   Erumpent conical, compressed, often truncate at the apex, which is of a pale rose colour from the shortly fusiform hyaline uniseptate spores, or with the endochrome retracted at either end.

   On twigs of *Ampelopsis quinquefolia*. Mountains of Virginia. No. 3316.
   Bursting through the bark by means of its delicate ostiolum, and at length throwing it off entirely, so as to leave a little patch of perithecia; spores oblong, minute, seated on pedicels of about the same length.

   Bursting through the bark by its spiniform often inclined ostiolum, covered with a thick bark; spores globose, very minute.
404. **Sphaeronema Rhoidis.** B. & C.—Peritheciis sparsis vel congestis minoribus subcyllindricis erumpentibus.
Much resembling the last, but very much smaller, and with the perithecia often crowded. Unfortunately no fruit has been found.

404 (bis). **Sphaeronema macrosorum.** B. & C.—Subcyllindricum basi parce dilatatum; sporis longis filiformibus flexuosis, 7-8 septatis coronatum.
Perithecia cylindrical, slightly thickened at the base formed of elongated cells, crowned with the radiating thread-like curved 7-8 septate spores.

405. **Sphaeronema seriatum.** B. & C.—Peritheciis majoribus subcylindricis transversim seriatis apice collapso; sporis filiformibus et strato pallide brunneo oriundis.
Bursting transversely in rows through the bark; perithecia rather long, collapsing above, outer walls red-brown under the microscope, lined with a pale brown stratum, from which spring the hyaline slender-waved spores which are three times as long as the pale brown sporophores.

405 (bis). **Sphaeronema Robiniae.** B. & C.—Peritheciis liberatis subglobosis ostiolo brevi truncato primum pruinose; sporis hyalinis oblongis utrinque obtusis.
Perithecia at length free, subglobose, with a short truncate ostiolum, at first pruinose; spores oblong, hyaline, 0.006 long, obtuse at either end.

406. **Sphaeronema nitidum.** B. & C.—Peritheciis conicis truncatis; sporis oblongis vel clavatis hic illic uno apice attenuatis binucleatis.
Perithecia conical, truncate, bursting through the cuticle, sometimes surrounded by a dark line, resembling those of a *Sphaeria* of the tribe Pertusae; spores oblong or clavate, 0.004 long, binucleate. In many respects resembling the last, but the spores are different.

406 (bis). **Sphaeronema populi.** B. & C.—Peritheciis conicis quanquoque congestis; sporis breviter fusiformibus hyalinis.
On bark of *Populus monilifera*. No. 5872.
Perithecia conical, scattered, or congested, more acute in the last, but sometimes cylindrical; spores hyaline, shortly fusiform, 0.004 long.

407. **Sphaeronema subtile.** B. & C.—Hysteriforme; sporis minutis oblongo ellipticis.
Perithecia minute, hysteriiform, obtuse; spores oblong, .00025 long, under a high magnifier surrounded with a broad hyaline border.


Spores extremely minute, with molecular motion.


Sporophores with a few short branches above; spores minute, shortly oblong.


Gregarious, or occasionally almost connate, erumpent; perithecia conical, widely truncate, with thick walls, pulverulent. Immature; allied to the last.

408. Sphaeronema Sambuci. B. & C.—Peritheciis sparsis erumpentibus obtusis; sporis minutis oblongis curvulis; sporophoris ramosis.


Perithecia erumpent, scattered, obtuse; spores minute, sausage-shaped, sporophores branched as in Sphaeronema glomeratum. No. 5040. Car. Sup. appears to be a smaller form.


Perithecia superficial, scattered, minute hemispherical; depressed, minutely granulated; spores obovate, .013 long, springing from hyaline pedicels which are simple or forked below. In one case the spore was lemon-shaped, and in a young spore the endochrome was retracted to either end. Clearly allied to S. placenta, B. & C. Linn. Journ., x., p. 352.


Perithecia almost entirely concealed by the cuticle forming little papillae; spores exactly elliptic, \(0.01-0.13\) long, hyaline. There are multitudes of specimens from various quarters which either belong to one common species or are mere conditions of *Diplodia vulgaris*, Lév. All are no doubt mere states of *Sphäria* or allied ascomycetous genera, the spores varying slightly in size. It is not thought worth while enumerating them.


Perithecia at first quite concealed, then partially exposed by the splitting of the cuticle, at first presenting a pallid disc; spores elliptic or oblong elliptic uninucleate, \(0.0025\) long, about half as much wide, with a central nucleus.


On some *Hypoxylon*, of which perhaps it is a mere condition. Cotoosa springs, Ravenel. No. 1745.

Perithecia minute, scattered papillaeform; spores elliptic, brown, with two nuclei, \(0.003\) long, about half as much wide.


Perithecia minute, hysteriiform, shining; forming little linear patches, the fibres of which are bleached; spores elliptic, with one side less arched, \(0.01\) long, hyaline, rather more than half as much wide.


Perithecia papillæform, surrounded by the cuticle, which gives them a pale appearance; spores obovate, \(0.006\) long, about half as much wide, hyaline.


Perithecia minute, gregarious papillæform, surrounded by the cuticle, the bright black apex only penetrating; spores oblongo-obovate, \(0.01\) long, with one or sometimes two nuclei. *Sphaeropsis stenosporas*, B. & C., on peach, Pennsylvania, Michener, No. 4233, may be considered as a variety. The spores are the same, but rather darker.


On twigs of *Gleditschia.* Car. Inf. No. 3414.

Perithecia scattered or collected in groups, mammilliform surrounding the cuticle; spores oblongo-ovate, hyaline, *0006* long, about $\frac{3}{4}$ as much broad; perithecia much larger than in the last, but the spores are smaller and narrower.


412 (bis). *Sphaeropsis elongata.* B. & C.—Peritheciis minutis nitidis sparsis ostioli brevi emergentibus; sporis subfusiformibus enucleatis; sporophoris sursum attenuatis.


Perithecia minute, piercing the cuticle by the distinct ostiolum; sporophores attenuated upwards, spores oblong, subfusiform, *001-0008* long, without any nucleus, $\frac{1}{6}$th or $\frac{1}{6}$th as much wide.

413. *Sphaeropsis macrospora.* B. & C.—Peritheciis in massam communem congestis; sporis elongatis subfusiformibus.


Perithecia crowded into a common mass, which is flattened above; spores elongated, subfusiform, with one side less curved, or slightly clavate, as in No. 4606, enucleate, *001-0016*. In No. 4305 *0015.

413 (bis). *Sphaeropsis fusiger.* B. & C.—Peritheciis sparsis apice lateritis; sporis subfusiformibus enucleatis.


Perithecia scattered, covered at the emergent apex with red granular matter; spores fusiform, with one side less curved, *0015* long, enucleate. The spores closely resemble those of the last species, but the habit is quite different.


On leaves of *Yucca.* Car. Inf. No. 6134.

Perithecia scattered, concealed by the cuticle, which is black on them by translucence, but white in the centre; spores narrow, fusiform, *001* long, about $\frac{1}{6}$th or $\frac{1}{6}$th as much broad.

414 (bis). *Sphaeropsis cymbæspora.* B. & C.—Peritheciis sparsis obtusis epidermide cinctis; sporis cymbæformibus endochromate utrinque retracto.


Perithecia scattered, slightly projecting, almost covered by the cuticle, very obtuse; spores cymbæform, *006* long, pale green, the endochrome retracted to either end.
REMARKS ON A PAPER PUBLISHED (JAN., 1874) BY DR. W. NYLANDER, IN THE "FLORA," AND LATELY RE-ISSUED IN "GREVILLEA."

By H. A. Weddell, M.D., F.M.L.S.

Few among those who have passed some part of their life in botanical pursuits, and more especially in the study of Lichens, can boast of having committed even but a small amount of errors. I for one have to confess many such, but I may candidly say that I have always felt grateful to fellow botanists who have advised me of them, provided they have done so in a friendly or courteous manner. So much à propos of a Latin article, from the pen of the celebrated lichenologist, Dr. W. Nylander, translated some weeks since into this Journal.* Shortly after its appearance in the "Flora," it was handed over to me by a friend of mine and the author's, and as it struck me that some passages quoted in it from my two last lichenological brochures† had been misunderstood by my learned critic, or wrongly dealt with, I took the liberty of writing to him on the subject, fully expecting then to hear no more about the matter. Dr. N. having, however, thought proper, notwithstanding, to have his paper re-edited for the readers of this Journal, I have on my part thought it expedient to lay before them some of the remarks which its perusal had suggested to me, noticing by the way that they are, for the most part, extracted from the letter above alluded to.

I.—Lichens du Massif Granitique de Ligugé.

1°. (Nyl. l. c., p. 57.) Hic primo invenimus, p. 5, hoc verba: "Recent observations, by introducing to our notice the singular relations which appear to exist between Lichens and Algae," etc.—Dr. N. takes occasion from these words to develop his opinion on Schwendener's Algo-Lichen theory, taking it for granted I must be, meo modo, an adherent to it. The truth is, that in the face of many facts lately adduced, especially by M. Bornet, it is difficult to deny that many Lichens during the first stage of their life are connected parasitically with some of the inferior Algae. At a later period, however, when the Alga, assuming the form of Gonidia, becomes included within the tissue of the Lichen, the connection,

* It is scarcely necessary to state here that, in writing these and the following lines, I have not had the slightest pretension to put my experience in lichenology (hardly of six years' standing) upon a parallel with that of Dr. Nylander, whom the Rev. W. A. Leighton, in one of his late publications, has called the "facile princeps of modern microscopic botanists." I cannot, though, refrain from saying how deeply I regret that one whom I had been accustomed for so many years to consider as a friend, and look up to as a master, should have thought it needful, on account of some variance of opinion on scientific matter, to treat me so much like an enemy, and oblige me to act in self-defence.

† "Lichens du Massif Granitique de Ligugé," and "Nouvelle Revue des Lichens du Jardin public de Blossac, à Poitiers."
DESCRIPTION OF DR. NYLANDER'S PAPER.

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if still kept up, can hardly continue to be considered as parasitical.*

2°. (Nyl. l. c., p. 58.) Eadem pagina legimus: "It has been repeatedly stated that Lichens live exclusively, or almost exclusively, at the expense of the atmosphere; but it stands for itself that the rain-water which periodically impregnates them, and which serves as a vehicle for very many diverse substances which a crowd of accidental circumstances may have brought upon the spot, contributes at least an equal part of their nutrition."—Udél (exclaims Dr. Nylander) auctor haecce sic exacte (et quidem proportionibus cognita habet? Now, if my eminent censor had read the above quoted paragraph with due attention he would easily have convinced himself that it contained no mention whatever of "exact proportions;" it merely expresses that Lichens derive a greater proportion of nutriment from rain than from the naked air. And the words "it stands for itself" imply clearly enough that, in my conception, those who had spoken of the atmosphere as the main instrument of Lichen nutrition must necessarily have comprised "rain." My very reason for insisting upon the importance of rain-agency was for the purpose of making it understood that rain-water and dew served likewise as vehicles for very many organic and inorganic substances brought by "accidental circumstances" within the proximity of the plant subject to be impregnated by them.

3°. (Nyl. l.c., p. 61.) Porro, p. 6, animadvertatur: "Silicicole Lichens which occur exceptionally upon calcareous rocks of sufficient hardness, but never upon organic substrata." The word "never" used in this sentence is evidently rather too strong. I ought to have said, "never, or almost never." Be it however remarked, that this assertion was not founded on my personal experience alone, but also on that of several classical authors, whose books were before me; such, for instance, as Acharius, Fries, Nylander, and others. Now, as no one of these authors mentions the circumstance of Lecidea contigua, for instance, growing on an organic substance, I thought it not unreasonable to assume that it was not to be found there. Dr. N., however, tells us that it is, as well as other species mentioned by me along with it.† The rarity of the fact alluded to is, however, almost tanta-

* When Mr. N. says (l. c.): Fieri nequit organum (gonidia) simul esse parasitam corporis, cuius partes vitales agit," he seems as if he thought Schwendenerists considered the Alga (gonidia) as living parasitically on the substance of the Lichen; whereas they believe, I fancy, just the contrary. As regards Dr. N.'s special objections to an Algo-Lichen hypothesis, I do not see that they are in any way conclusive, not one of them really coming to the point. They prove undoubtedly the importance of gonidia as instruments (I dare not say organs) of lichen nutrition, but do not, I find, in any manner demonstrate that true Gonidia are not Algae. Dr. N. very correctly remarks, on the other hand, that there has been in more than one instance a confusion made between genuine Algae and plants that bear more or less resemblance to them. also with what he calls Pseu-do-Algae; all which, according to his investigations, ought more appropriately to be referred to the class of Lichens.

† Lecidea geographica has, I know, been gathered once or twice in the Pyrenees, on the stem of Rhododendron ferrugineum.
mount to its non-occurrence, and does not, I believe in any way interfere with the differences I have pointed out as being observable in the natural stations of saxicole lichens.

49. (Nyl. l.c.) *Ibidem in nota adest:* "Oxalate of lime constitutes . . . one of the essential characters of this class of plants." *Error est hocce,* etc. I must here beg leave to observe that, owing to the curtailing of the passage quoted from my brochure, I am made to endorse the responsibility of an opinion which is not mine, and which I have nowhere expressed as such. The quotation ought to have been given as follows: "constitutes, according to several modern authors, and according to Dr. Nylander, one of the essential characters," etc. My motive for especially mentioning here Dr. N.'s name, arose from a very natural interpretation of the following paragraph of his *Synopsis Method. Lich. omn.,* p. 4: "Les Lichens possèdent en outre, parmi leurs principes immédiats, un élément caractéristique, facile à reconnaître, l'oxalate de chaux, dont les cristaux octoédriques se trouvent, à ce que je crois, dans tous les thalles."

II.—*Nouvelle Revue des Lichens du Jardin public de Blossac.*

50. (Nyl. l.c.) *Quoad Lichenes horti publici "Blossac," comparatos cum notula mea circa hortum "Luxembourg,"* etc.—Dr. N. here objects to my comparing the Lichen-flora of the public garden of Blossac, in Poitiers, to that of the Luxembourg, in Paris, on the ground that the vegetation of the former of these localities is too analogous to that of the rural tracts bordering upon it. This difference in the relative situation of the two public walks had appeared to me, on the contrary, to be precisely what was suited to give some interest to the comparison of their respective florae, and I may add that it was for the very same reason that I compared the Luxembourg garden, as respects lichens, to that of the more central Tuileries; these, again, to the London parks; and, lastly, the side of the garden of Blossac which is hemmed in by dwelling-houses, to that which adjoins the open country.

60. (Nyl., p. 62.) *Circa reagentia chemica invenimus:* "the truth is, an experience of many years permits me to affirm it, that there are some things in the new method that are worth keeping, and others that may be laid aside." *Expectemus et experientia auctoris discamus,* etc. In this part of Dr. Nylander's paper, I am found fault with for not having more precisely stated what I considered to be the defects of the very useful and practical method of diagnosis for which we are indebted to this laborious and acute lichenist. The reason I have to give for the omission, if it be one,* is, however, a very simple one, and I am surprised Dr. N. did not

* For, while combating, in my brochure, what I think exaggerated criticisms of Dr. N.'s method, I nevertheless clearly acknowledge the existence of "a certain number of dubious results."
at once detect it—for my wish was to defend the method, as far as I deemed it practicable; and therefore it could scarcely be expected that I should set forth arguments that would have produced a contrary effect.

7th. (NyI. l. c.) P. 16, legitur: "I have seen in some apothecia of this variety or of the following, the normal spores of Lecanora subfusca replaced by spores in equal number of an entirely distinct physiognomy, etc. M. Nylander, to whom I submitted the parts, hesitated to pronounce upon the possible causes of such an anomaly." Hic experimentia auctoris minime splendescit. Mihi quidem submisierat, etc.—I have nothing to object to this, being quite confident that I committed the blunder attributed to me. The so-called anomalous apothecia were undoubtedly, as Dr. N. states, nothing else but those of a Physcia accidentally intermingled with those of the Lecanora, and seeming to arise from the same thallus. I cannot, however, omit remarking that, as regards Dr. N.'s answer to my letter on the above case, his memory must certainly have failed him, for his translation of the passage concerning it, by the words: "Hocce miraculum est, nihil tam prodigiosum novi," is anything but fidissima. Indeed my conviction is, on again perusing his letter,* that, for the time being, he was somewhat taken in also. . . . . . . Nor did his memory serve him, I am sorry to say, a bit the more faithfully, when he wrote the following (l. c., p. 62): "Mihi quidem submisierat apothecia heterogenea cum apothecis 'Lecanora subfusca,' cujusdam immixta crescentia," etc.—The fact is that I only sent Dr. N. a few "halves" of isolated apothecia, all with fuscous spores, the existence of which I had taken care to ascertain by a microscopical examination of the halves corresponding. How is it, then, that, being under the impossibility of making any comparison whatsoever between the apothecia of the two species, from the inspection of "my" specimens, the learned author should have thought himself authorised to conclude his pamphlet with such a precise affirmation as the following:—"Addatur, quod nullo respectu, nec externo nec anatomico, apothecia ambarum similitudinem quandam offerunt?"

* Here is the passage alluded to of Dr. Nylander's letter:—"Vous avez assurément fait une bien singulière découverte en dénichant des apothécies du Lecanora subfusca dont les thèques contiennent des spores brunes biloculars. Qu'ont ces spores hétérogènes à faire dans cette galère? Un cas tératologique ou miraculeux de cette force ne m'était pas encore connu." Be it observed that this was written on the 22nd of March, 1873, that is almost a year previous to Dr. N.'s writing (l. c., p. 63): Examinatis quidem "hodie" apothecis illis missis non paluit, apothecis sporis fuscis predicta pertinere ad "Physcia aiptaian."
NEW AND RARE BRITISH FUNGI.

By Wm. Phillips and Charles B. Plowright.

(with plates 24 and 25.)

We propose in this and subsequent papers to record the occurrence of such species of fungi not hitherto found in Britain as may come under our own immediate notice; also the occurrence in new localities of some of the rarer British species, which have already appeared in the invaluable series of papers by Messrs. Berkeley and Broome, in the "Annals and Magazine of Natural History."


6. Ascobolus atro-fuscus, n. s. (A. viridis, Boud. Ann. Sc. Nat., 1869. x., t. 5, f. 4.) Sessile, crowded or scattered, blackish-brown, concave, then plane, margin crenulate, externally furfuraceous; asci clavate; sporidia broadly elliptical, obtuse, hyaline, then purple, at length brown, epispore granulated or verrucose; paraphyses linear, occasionally branched. Sporid. 0,001 × 0,0005. On a charcoal bed, the Wrekin, Shropshire. July, 1873.

We have little doubt of this being the same plant as that referred by M. Boudier (l. c.) to A. viridis, Curr.; it differs, how-
ever, so much in sporidia, colour, and habitat, from Mr. Currey's species that we venture to consider it distinct.

Plate 24, fig. 1. a. plants nat. size; b. section of one enlarged; c. ascus and paraphyses magnified; d. sporidia.


This differs from the normal form in its dirty-orange or orange-flesh colour, rather smaller size, paraphyses always colourless, and growing on rabbits' dung. Sporid. *0006 × 0004.

Near Shrewsbury, Dec., 1873.


**Pycnidia. Cenangium bullatum.** Alb. and Schw. Conspr., p. 344.

*Pinastri, b. monstrorum, Fr. Sys. M. ii., p. 184.*

Cupula round, closed, then perforated, black, rugulose, stylospores long, filiform, slender, curved.


Scattered or cæspitose, as in *Cen. Pinastri*, but totally black; ascii filled with spermatia-like corpuscles.


*Plate 25, fig. 2. a. plant magnified; b. ascii and paraphyses, more highly magnified; c. sporidia separated from the ascus with their mucus envelope.*

*Sphaeria (Sordaria) conica*. *Fekl.*

These two species have been united by Herr Winter in his monograph of *Sordaria*, as species and variety *(coronata)* of De Bary's *Sordaria curvula*. Not having seen authentic specimens, we think it best simply to record their occurrence without binding ourselves to any generic name. It is worthy of remark, however, that the presence or absence of one or both the appendages, even in the same perithe- 
cium, is liable to considerable variation. **Appended is a list of refer-
10. *Sphaeria carbonaria.* n.s.
Crowded, globose, semi-immersed, having an obtuse rugulose ostiolum, clothed at the base with branched septate hyaline threads; asci cylindrical, commonly truncate at the apex; sporidia almond-shape, dark-brown, with a very short hyaline tail, uniseriate; paraphyses linear. Sporid. \(0.0009 \times 0.0003\).
On burnt ground, near Shrewsbury, 1873.
This appears to be allied to *S. rotula,* Cooke.
*Plate 25, fig. 3.* a. perithecia in the ground, magnified; b. asci and paraphyses; c. sporidia; d. mycelium clothing the base of the perithecia.

Amphiginous, black, at first covered by the epidermis, then somewhat free, scattered, depresso-globose, pierced with a simple minute pore; asci obovate-oblong, attenuated at the base into a short stem, sporidia 8, subtriseriate, oblong, rounded at the ends, straight, uniserate, not constricted at the septum, epispore thick, 17 \(\times\) 4-5 mic.
On dead leaves of *Iris pseudacorus.* Near Shrewsbury, Nov. 1873.

Perithecia immersed, spherical, black; ostiolum elongated, cylindrical, tuberculose, rugulose, frequently somewhat curved; asci cylindrical, octosporous. Sporidia involved in mucus, uniseriate, black-brown, elliptical.
On rabbits' dung. North Wootton, Dec., 1873.
The perithecia are completely immersed in the matrix, only the tip of the ostiola being visible. The sporidia are at first greenish-yellow, then clear brown, becoming eventually almost black, when young surrounded by a gelatinous envelope, which subsequently disappears. They exhibit a tendency to fall in halves at the septum, 0.003 in. long by 0.001 in. wide (0.062 m.m.-0.028 m.m.).
Dr. George Winter, to whom specimens were submitted, considers it distinct from all its allies, and adds, "it approaches nearest to *D. chetomoides,* Karst., Fungi Fennici. Exs.
*Plate 25. a. perithecia enlarged; b. ascus and sporidia; c. three sporidia.

On dead stems of *Solanum dulcamara,* in company with a *Hendersonia,* which doubtless bore some connexion with it, as a secondary form of fructification.
King's Lynn, Jan., 1874.
On charcoal beds, the Wrekin, Salop, 1873.
*Plate 24, fig. 2,* asci, paraphyses and sporidia, magnified.
The hymenium when wounded exudes a purple juice. The tips of the asci become blue with iodine. Sporidia \(0.0006 \times 0.0003\), with two or more nuclei.

This species is of very rare occurrence; one specimen only was found near the Wrekin, Salop, July, 1873.

Plate 24, fig. 3. Nat. size of plant with section; fig. 2 f., ascus, paraphyses and sporidia.

GLYPHOMITRIUM DAVIESII.

Several years ago I took a deep interest in this moss and its distribution in Scotland. As the fruiting period occurs in May and June, I wish to draw the attention of bryologists more immediately to it.

In Wilson’s “Bryologia” three stations were recorded—one each in England, Scotland, and Ireland—all of which were in the neighbourhood of the sea. Since then a considerable addition has been made to the Scotch habitats. The original station of Hooker and others had been either overlooked or neglected at Bowling. At the suggestion of Mr. Roger Hennedy, Lecturer on Botany to Anderson’s University, Glasgow, we visited and found the station in May, 1863. An inspection of the place led to similar localities in the West here being visited with very satisfactory results, proving that it is much more widely distributed than was at first supposed. Our stations are now as follows:

1.—Bowling, May, 1863, Messrs. Galt and McCartney.
2.—Whangie, New Kilpatrick, May, 1863, Messrs. McKinlay and Shaw.
3.—Killin, Perthshire, Mr. Alex. McKinlay.
4.—Ardun, Mull, May, 1864, Mr. Donald Black, Iona, by request of Messrs. Galt and McCartney.
5.—Skye, 1864, Mr. G. E. Hunt, Manchester; and again in 1866 by Dr. John Shaw.
6.—Blairlogie, Stirlingshire, June, 1865, Mr. Geo. Thomson.
7.—Craigallion, Stirlingshire, March, 1868, Messrs. Thomson and Galt.
8.—Crags, near Strathblane, Campsie Hills, March, 1868, by Messrs. Thomson and Galt.

This interesting moss has thus been found in the counties of Dunbarton, Argyle, Inverness, Perth, and Stirling. The attention of bryologists in other parts of the country should be specially directed to fallen basaltic rocks, and more immediately to those bared ones that are not overrun with other mosses.

Walter Galt.
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