

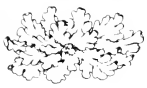


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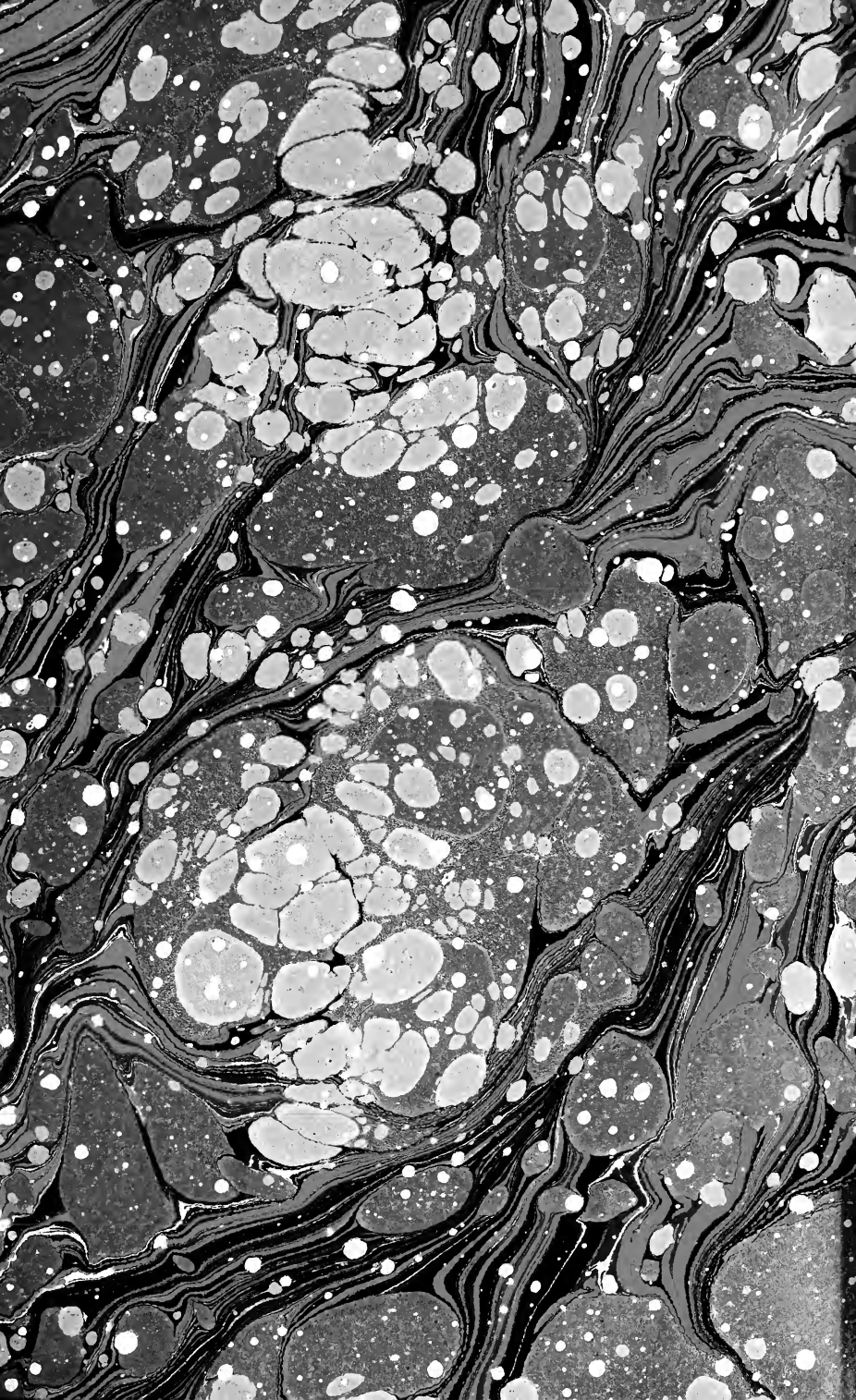

Grevillea,

A QUARTERLY RECORD OF

CRYPTOGAMIC BOTANY

AND ITS LITERATURE.

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Author of "Handbook of British Fungi," "Fungi, their uses." &c., "Rust, Smut, Mildew, and Mould," &c., &c.

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Grevillea,

A QUARTERLY RECORD OF CRYPTOGAMIC BOTANY AND ITS LITERATURE.

PERSONAL NOTICE.

Subscribers are requested to excuse delay in this number. The unfortunate, sudden, and severe illness of the Editor was the cause, and his temporary loss of the use of the right arm, added to the condition of the head, made it quite impossible to obviate the delay. It is hoped that he will be able to resume with the next number.

ON MIMICRY IN FUNGI.

By Charles B. Plowright.

The subject of mimicry in the various kingdoms of Nature is one of great interest, especially since the evolutionist has shown its importance to the well-being, or even perhaps almost to the existence of certain specific forms. It may be that the more striking manifestations of protective mimicry are to be found in the animal kingdom, but all mimicry is not protective, neither is it by any means confined to the animal kingdom.

Few, and comparatively feeble, have, up to the present, been the attempts made by mycologists to unravel the mysteries of these phenomena, as they are presented to us in the vast range of species which are included under the name of fungi. At any rate, however, so important is the subject of mimicry to the philosophical naturalist that almost any attempt to indicate the more important instances of it, as presented by these low forms of vegetable life, can hardly fail to be interesting, however clumsy may be the effort.

In working upon such a subject, as the one before us, it is exceedingly difficult to avoid being led away by the imagination beyond the limits of reason, to fancy forms which do not exist, and to see similarities where there are none.

Mr. W. G. Smith, in the *Gardeners' Chronicle*, and Dr. M. C. Cooke, in *Grevillea*, have both written papers upon this subject, but

the remarks of these writers bear chiefly upon the mimicry of one species of fungus by an other (interfungal mimicry). This only touches the fringe of the subject, and rather trenches upon the question of what is entitled to rank as a species, and what as a variety. Now this is a highly important question, especially to the fungologist, for he labours amongst a group of organisms so extensive that no one man can ever hope to master them as individuals. They are forms of organic life to which the most rabid opponents of evolution have never yet suggested the possibility of applying the test of hybridization for the differentiation of species. Perhaps there is no group of organisms more calculated to shake one's belief in the permanency of species than the one under consideration. But to return to the subject of mimicry.

In the whole range of species included in the *Agaricini*, in only a few instances do we find species protecting themselves by mimicking the plants and objects upon or amongst which they grow. Of the hundreds of agarics which grow amongst grass, in pastures, on lawns, or by road sides, two and two only have a green colour, viz., *Agaricus æruginosus.* Curt., and *Agaricus odorus*, Bull. ; and it is noteworthy that these are almost the only two bright green agarics known, the total number of agarics, with any shade of green about them at all, being very small. Now in the first named species (*A. æruginosus*) the green colour is not permanent, for it disappears *pari passu* with the maturation of the plant. Young specimens have a vivid enough colour, it is true, but then it is relieved by dead white floccose scales, which are, however, evanescent, and have all disappeared by the time the fungus has assumed its whitish yellow hue of maturity. One can hardly say, then, that this species has been very successful in mimicking its grassy surroundings, if even it would by so doing gain any advantage in the struggle for existence. With the other agaric (*A. odorus*) it is quite different, for it more closely simulates its surroundings. Its colour is not æruginous, but a much quieter shade of green, and it has the odour of "new mown hay," *i.e.*, of *Athoxanthum odoratum.* It is worth noting that of these two green agarics, one is edible and the other poisonous. The other instances of agarics, simulating their surroundings, are found principally amongst the *Derminii*, especially amongst the *Hebelomæ*, where the humbler shades, brown, grey, or black, are common. The great majority of agarics, however, on the contrary, contrast strikingly with their surroundings, white, red, yellow, pink, violet, orange, and indeed almost every imaginable hue, excepting green. One cannot but be struck with this fact, and conclude that the fungi must derive an advantage from it in some way analogous to flowering plants. Unfortunately this is only a surmise, as we know almost nothing of the physiology of the reproduction of the *Hymenomycetes;* and hitherto attempts made by experimentalists at growing these fungi from their spores have been failures. Mr. W. G. Smith, however, has pointed out the strong probability, to

say the least, of the existence of a bisexuality in the hymenia of agarics, in which he regards the spores as the female element, and cystidia as the male. Now if subsequent observation should confirm this important discovery, which no one has as yet disproved, or even seriously called in question, we at once obtain a clue to the advantages likely to accrue to fungi from the visits of insects and the consequent interchange of reproductive elements. If insects can carry pollen from the anthers of phanerogams, they can assuredly carry the spores or spermatia of cryptogams.

But in the event of the sexuality of the *Hymenomycetes* being disproved, there remains another fact in connection with the germinative energy of fungus spores, and the vitality of certain species which must be born in mind. On the first appearance of a fungus in a new locality, it often grows with great vigour, and occurs in great abundance, but in the course of a few years it gradually declines, and may disappear altogether. To take a recent example, *Puccinia malvacearum*, Corda, was described and figured by Corda,* in 1854; and also by Montagne,† in 1856, from Chili. In June and July, 1873, it appeared for the first time in this country, and in the course of a short time devasted our hollyhocks, and also spread to our common species of *Malva* to such an extent that in the autumn scarcely a plant of *M. sylvestris* could be found without its foliage being destroyed by the fungus. At the present time it is by no means so common a fungus, and our gardeners have ceased to dread it as "the hollyhock disease." *Puccinia Apii*, Corda, is another instance. This fungus appeared first in this country in the autumn of 1866-7, on the cultivated celery, causing much mischief to the plant. We never see it now upon the celery in gardens, although it is occasionally met with upon the wild celery (*Apium graveolens*).

It is well-known to practical brewers that by using yeast over and over again its efficacy becomes impaired to such an extent that it becomes useless. Under these circumstances, according to an established custom of the trade, an exchange of yeast with some other brewery is effected. Why a yeast which is languid in one place should in another, where it is apparently grown under exactly the same conditions, become active, it is difficult off-hand to say, but the fact remains that a change of locality does invigorate the growth of fungi.

Although instances of agarics, simulating their surroundings, in appearance are comparatively few, yet many of the larger *Peziza* do this. In turning over the plates of Cooke's *Mycographia* I was struck by this. Now the *Peziza*, compared with agarics, enjoy a great immunity from insect depredation, and the manner in which the *Elvellacei* disseminate their spores seems to be connected with this. The sporidia of the larger *Peziza* are expelled by

* "Corda Icones," vi., p. 4, t. i., f. 12.
† "Montagne Sylloge.," p. 314.

the rupture or sudden opening of the upper end of the asci, which seems to be induced when their tension has attained a certain point—the bursting strain. As each ascus ruptures, it relieves the tension of the whole hymenium to an extent equal to its own diameter, the next ascus does not give way until the requisite tension has been regained. Of course the integrity of the cup forms an important element in the production of this tension, hence the advantage to *Peziæ* of availing themselves of protective mimicry to guard against external injury. This seems further borne out by the fact that the only markedly odouriferous *Peziza* amongst our British species (*P. venosa*, Pers.) has the concavity of its hymenium broken by prominent ridges.

The honey secreted by the flowers of phanerogamous plants is, of course, the source of attraction to insects, but this inducement does not exist in fungi. The advantages which are derived by flowering plants from fertilization by pollen from another individual of the same species are probably equalled by an interchange of reproductive elements amongst fungi, and we here find an explanation of many facts that are otherwise inexplicable. Although there is no honey to be obtained from fungi, still there are advantages to be gained by the visiting insects. The larger *Hymenomycetes* are well calculated to afford abundant food to insect larvæ, and the rapidity with which the fleshy species disappear before the voracious appetites of their numberless tenants shows that insects fully avail themselves of this source of nutriment for their offspring. But larvæ do not feed on all fungi with equal avidity. The majority of agarics are so attacked; some species, such as *Agaricus rubescens*, can hardly ever be found without their burrows somewhere about it, either in the pileus, in the stem, or especially in the bulb. Most of the *Russulæ* are greedily devoured—even such acrid species as *R. emetica* and *fragilis*. The *Lactarii*, on the other hand, enjoy a comparative immunity from insect depredation compared with other fungi. Insects find their way even into subterranean fungi. I have frequently raked up *Hymenogasters* and found them full of active larvæ. Messrs. Berkeley and Broome,* speaking of *Tuber bituminatum*, B. and Br., say—"Some of the specimens were attacked by worms (larvæ ?), the flesh of which became quite black when dry." *Tuber cibarum* is often preyed upon by a species of *Liodes*,† to which fungus *Anisotoma cinnamonea* is also said to be attached.

Many beetles live in the larger *Polyporei* and in *Scleroderma*—*Cis Boleti* for example. Dr. T. A. Chapman has described‡ the life history of a small beetle—*Abdera bifasciata*, Marsh—which

*"Berkeley and Broome Annals." Nat. Hist. Series, ii.; vol. vii, No. 581.

†"Berkeley English Flora," vol. v, part 2, p. 228.

‡Chapman, T. A. "Transactions of the Woolhope Club," 1869; p. 161; "Entomological Monthly Magazine," vol. vi, p. 259.

seems to be exclusively attached to *Corticium quercinum, Fr.* This gentleman, to whom I am indebted for much valuable information, says in a letter to me—"The *Coleoptera* and *Diptera* attached to fungi would probably amount to two hundred species of each. Then you would find a contingent nearly as large of the ichneumons and other parasites on these, and the predaceous beetles (chiefly *Staplylimes*) that devour them."

The hymenium in the *Phalloidei* is moist and gelatinous, and Mr. Berkeley says "it affords a welcome food to multitudes of flies." * It is difficult to see how the spores of these fungi become disseminated of their own accord. The spores of our three principal British species measure 5 mikromillimeters in length by about 2 mk. in width; they are, in fact, very small spores, smaller than the *Bacillus anthracis* which Koch says "may be as long as 20 mk., and as thick as 1 to 1·25 mk." † Every one who has seen any of the *Phalloidei* growing must have noticed the cloud of flies that are always attracted to them, and there can be little doubt that the flies here act the part—to a great extent, at any rate—of spore diffusers.

Many species of *Ustilaginei* are confined to the interior of the ovary, or to the seeds of plants such as *Tilletia caries*, Tul.; *Ustilago receptaculorum*, Fr.; *U. utriculosa*, Tul.; *U. urceolorum*, Tul.; *U. olivacea*, Tul.; *U. montagnei*, Tul.; *Sorosporium saponariæ*, Reed; *Thecaphora hyalina*, Fing., &c. Most of these have extremely small spores, which could be carried as easily as pollen grains by insects from an infected to a healthy plant. Anyone who has watched bees must have observed how they visit flower after flower, and that they will light upon flowers which appear to us to have passed long since their honey-bearing stage. One is almost tempted to ask how else could the anthers of *Silene* and *Lychius* become affected with *Ustilago antherarum*, Fr., unless the spores be implanted upon them by insects, when every other part of the plant appears to be perfectly healthy.

We have seen, then, that insects visit fungi *(a)* to deposit their eggs, where the young larvæ shall find suitable and abundant food; *(b)* for the purpose of obtaining food themselves.

Let us now see what attractions fungi offer insects as inducements to visitation. These appear to be of two kinds—(1), external appearances; (2), odours, agreeable and otherwise. The outward appearance of the larger fungi is, as we have already seen, usually in contrast with their surroundings, as anyone who has gathered mushrooms in a meadow will readily admit; but, more than this, there are many instances in which fungi mimic other objects with great felicity, especially objects from the animal kingdom, either parts of animals or animal excrements.

* "Berkeley Introduction to Cryptogamic Botany," p. 347.

† "Koch on Traumatic Infectious Diseases." Translated by W. Watson Cheyne; New Sydenham Society, 1880, p. 58.

Vegetable Semblances.—There are some few vegetable mimicries that it will be convenient to take first, as they are not numerous. If Mr. Fitche's figure of *Balanophora involucrata*, Hook.,* can be relied upon to the extent his figures usually can, a more striking resemblance to *Agaricus muscarius*, Linn., can hardly be imagined. The colour of the pileus, with the white warts upon it, the white stem and volva of the fungus, here find their counterparts so accurately delineated that the uninitiated can hardly be persuaded he is not looking at the representation of a specimen of *A. muscarius* which has just burst its volva, until the letterpress be referred to.

Of *Hygrophorus calyptræformis*, B. & Br., Mr. Berkeley † says —"The young pileus has a great resemblance to the internal bractea of an artichoke just before expansion."

The young plant of *Hydnum coralloides*, Scop., bears considerable resemblance to a cauliflower, as was long ago pointed out by Persoon. ‡

Tremella moriformis, Berk., receives its name from its likeness to a mulberry, which is heightened by its communicating a violet stain "to whatever the plant touches."

Exidia glandulosa, Fr., especially in damp weather, mimics most accurately of all the *Tremellæ*—the common Nostoc. Anyone who has seen *Licea fragiformis*, Fr. (*Tubulina cylindrica*, Bull.) just before maturity must have been struck by its resemblance to a ripe strawberry.

Animal Semblances.—It is unnecessary to do more than indicate the semblance which the name of *Cynophallus* implies; but it is worthy of notice that, although flies feed greedily upon its hymenium, it rarely if ever falls a prey to their larvæ. The peculiar structure of the stem is not totally unlike the *Corpus cavernosum* of the anatomist. It is remarkable amongst the *Phalloidei* for being nearly scentless.

Clathrus cancellatus, Mich. When Mr. Broome found this fungus in an advanced state in Italy, he was struck by the resemblance it bore to the entrails of some animal. He says in a letter to me—"It was when in a state of decay the meshes appeared to elongate, and to form an intricate fœtid mass. I forget the circumstance of the flies hovering over it but no doubt they did so from its horrible odour."

Nœmatelia encephala, Fr., Mr. Berkeley ‖ says, "looks like the brain of some animal," and anyone who is acquainted with it will agree with him.§

* "Berkeley Outlines of British Fungology," pl. ii, fig. 8.

† "Berk. Annals Nat. Hist," No. 3; May, 1838, p. 199, No. 63.

‡ "Persoon Synopsis," p. 564.

‖ "Berkeley Outlines," p. 290.

§ A striking resemblance to brain matter amongst the cryptogamia is found in *Dasyglœa amorpha*, Berk. This curious Nostoc-like Alga, is not uncommonly found in this country, and has been brought to me with the

The well-known *Fistulina hepatica*, Fr., affording, as it does, one of the best instances of animal mimicry amongst fungi, is peculiarly interesting, from the fact that, at different periods of its growth, it mimics two separate animal structures with great fidelity. In its young state, soon after it has made its appearance, it is light red in colour, and has the shape, size and colour of the human tongue; and, moreover, it has its upper surface studded with numerous darker, prominent papillæ, exactly as the before-mentioned organ has. Here the external likeness ceases; but if a section be made, the alternately darker and lighter lines which radiate and diverge from its base recall to the anatomist's mind the fasciculi of the genio-hyo-glossus muscle of the above organ. As the fungus approaches maturity, it increases in size and loses its light red colour, becoming darker, and at length reddish brown. Its upper surface gradually gets less firm in consistency, while from its under side are exuded drops of a red fluid. It now looks exactly like the liver of some animal from which blood is dripping.

Peziza leporina, Batsch, bears some resemblance to the ear of a rabbit or hare, especially is this the case with a variety which grows in fir woods. I have gathered this condition more than once near King's Lynn.

The resemblance of *Morchella Smithiana*, Cooke, and other morells in a less marked degree, to a mass of honey comb, both in form and colour is considerable, and it is not lost until the size of the cells be taken into account. These fungi are especially subject to insect depredation.

Thamnomyces hippotrichioides, Ehrb. resembles a tangled mass of black horse hair.

Excrementitious Semblances. Many instances of these are afforded by the *Myxomycetes* in their young state. For example, *Æthalium septicum*, Fr. (*Fuligo varians* Somm.), looks very like a small portion of recent human odoure, as do the earliest stages of some of the *Trichiæ*. Immature specimens of *Reticularia maxima*, Fr. (*Brefeldia maxima*, Fr.), and *spumaria alba*, Bull, have a decidedly fæculent appearance. The most striking resemblance to dung amongst the *Myxomycetes* is, however, afforded by *Lindbladia effusa*, Fr., to patches of cow dung. So remarkable is this similarity that upon one occasion when I was directed by an eminent Scottish mycologist to search for this fungus upon the sawdust at Rothiemurchus, and told its similarity, yet when I arrived at the spot I actually passed over several specimens of *Lindbladia*, carefully avoiding them, thinking they were cow droppings.*

query, "What Tremella is this? Or is it the brain of some animal?" The likeness is enhanced by the presence of bands of thickened tissue, which one might take for pia mater, intersecting, as they do, the opalescent semi-gelatinous structure of the plant.

* It is a curious coincidence that upon both *Lindbladia effusa* and upon cow dung two *Stilba* occur (*S. globosum* and *S. fimetarium*), which bear much resemblance to each other in form and colour, but not in size.

Scleroderma vulgare, Fr. is very like, at first sight, lumps of horse dung.

Fungoid Odours. Before speaking of the odours of various substances that are mimicked by fungi, it is advisable to make a few remarks upon the subject generally. In the first place there are many persons who are to a greater or lesser degree odour blind. Neither is there any means of accurately measuring, either the extent or quality of odours. To some persons an odour may be intensely offensive, while others can hardly appreciate it, or may indeed, question its existence altogether. Again, odours which are unpleasant to some persons are to others agreeable. The power of smell is possessed, as is well known, much more perfectly by some of the lower animals, for by it the *Carnivora*, track their prey in a manner totally beyond the ability to do so possessed by any human being. Hence, although we may be unable to detect an odour in any particular fungus, it by no means follows that that fungus is odourless. In the same way some sounds are inaudible to certain ears, for example, some persons cannot hear the cry of the bat which is heard readily enough by most persons. Having no standard by which fungous odours can be accurately compared, mycologists have adopted the following, among many other, arbitrary terms for indicating the observable presence or otherwise of odours in fungi : odour strong, odour unpleasant, odour offensive, and the like. When a number of persons are asked to liken the odour of any fungus to some known smell, the most diverse similitudes are often given. The majority of persons unaccustomed to smelling fungi for diagnostic purposes will say it smells "like a fungus" or else "like a mushroom." A specimen of *Agaricus gliocephalus*, Fr. was once sent to an eminent British fungologist who compared its odour to that "of rotting broad beans." Another *Agaricus ameides*, B. and Br. is said by Messrs. Berkeley and Broome "to resemble a mixture of orange flower water and starch,"* while Mr. Berkeley says, *Agaricus alcalinus*, Fr., has "a pungent odour like fermented or putrid walnuts."† From these complex comparisons it is clear that the difficulty of correctly and concisely describing the odour of many fungi is very great.

Of the 452 species of *Agaricus* included in Cooke's "Handbook of British Fungi," 83 species or 18 per cent. have their odours mentioned for diagnostic reasons, but it does not follow that the remainder are without smell, for such marked odoriferous species as *A. campestris*, Linn. ; *A. meleagris*, Sow ; *A. rimosus*, Bull., &c., are passed over without any allusion being made to this character. In the genus *Lactarius*, the percentage is 12, while in *Trametes* it rises to 75, but this is an exceptional genus. Of the 20 species of the *Hypogei* 40 per cent. are mentioned as odoriferous, while in the *Tuberacei* it rises to 55 per cent. To illustrate the manner in

* Berkeley and Broome, "Ann. Nat. His." 1865, No. 999.
† "Berk. English Flora," vol. v, pt. 2, p. 58.

which the odours of fungi are indicated the subjoined extracts from the Handbook will be useful.

Hypogæi (20 species). Odours noticed in eight species as under :—

1045* The smell is just like the pungent odour of some *Ichneumon* or small bee.
1046 The smell was slight.
1048 Abominable smell, which resembles that of assafætida.
1050 Smell at first like of that of some *Hypericum*, then exactly that of a decaying puff-ball.
1052 The smell is very much like that of 1048 when old, but when young it has an acid smell like that of sour ham.
1054 Smell very slight.
1060 Smell like that of *Lactarius theiogalus.*
1061 Smell like that of *Lact. theiogalus.*

Tuberacei (27 species). Odour noticed in fifteen species :—

2237 Odour strongly alliaceous.
2238 Odour bituminous and very strong of horse radish.
2239 Odour faintly aromatic.
2241 Smell at length rather disagreeable.
2242 The odour is said by Vittadini to be strong and nauseous.
2243 Odour, when recent, nauseous.
2244 Odour of the radish.
2245 With little odour.
2246 Had a very strong odour.
2248 Smell in some specimens like that of an agaric, in others strong and nauseous.
2249 Has a strong smell like that of rotting seaweed.
2251 The smell is very strong and disagreeable, resembling that of 1048.
2255 Smell strong.
2258 Odour faint not peculiar.
2259 The smell is very powerful.

No mention is made of the smell of *Tuber æstivum*, which is very peculiar and penetrating, especially after it has been kept in a close atmosphere for a few hours.

The above list contains several examples of fungi, mimicking the odours of various substances, such as sour ham, radishes, assafætida, insects and the like. The question naturally presents itself, of what use can these odours be to the fungi? These subterranean species are protected by the mode of growth from many accidents to which other fungi are liable, yet they are at a considerable disadvantage on the score of spore dissemination. It is quite true that many of them are not absolutely subterranean throughout the whole course of their existence, but for every single individual found above ground at least a score are

* The numbers are those of the species in Cooke's "Handbook of British Fungi," p. 355 to 363 and p. 738 to 750.

found buried some inches below it. A fungus which lives and dies below ground has but a very poor chance of scattering its spores compared to other fungi. It is true that insect larvæ are constantly found it these fungi, but the chance of a volant insect emerging from a hypogean fungus and carrying with it spores that still retain their power of germination can be but slight. But we do find these subterranean species eagerly sought for by animals notably by pigs, and also by the smaller rodents.

Mr. Broome has found *Hypogæi** gathered up by one of the field mice. He did "not see the animal, but it was evident from the runs (underground), which converged to the store that the animal had collected them." It was not unreasonable to suppose that the spores of these fungi should retain their power of gemination after having passed through the intestinal canal of these animals, when we consider how abundantly mushrooms are produced upon horse dung. In fact some fungologists go so far as to say that the spores of *Agaricus campestris* will not produce active mycelium unless they have been subjected to this treatment.

Fungal Odour-mimicry.—Not only do the vast majority of fungi possess peculiar and in many instances characteristic odours of their own, but we find them mimicking the odours of other vegetables, of animals, and also of other substances.

Confining ourselves to British species we have the following examples. These, although perhaps now collected for the first time are not mere fanciful similitudes jotted down on the spur of the moment, but are almost all of them given in our standard text-books of fungology, and have been recognised as long as the species themselves have.

Vegetable Odour-mimicries.—The odour of melilot (*Melilotus officinalis*, Linn.) is possessed powerfully and persistently by *Lactarius camphoratus*, Fr.; *Hydnum graveolens*, Dell; and *Hydnum tomentosum*, Linn.

The odour of aniseed (*Pimpinella anisum*) is possessed by *Agaricus fragrans*, Sow.; *Trametes suaveolens*, Fr.; *T. odora*, Fr.; *Polyporus salicinus*, Fr.; and *Hydnum suaveolens*, Scop.

The odour of field-mint (*Mentha arvensis*, L.) is possessed by *Lentinus Vulpinus*, Fr.

The odour of tarragon (*Artemesia dracunculus*, L.) is possessed by *Agaricus euosmus*, Berk.

The odour of peppermint (*Mentha piperita*, Huds.) is possessed, as well as the taste, by *Hygrophorus aromaticus*, Berk.

The odour of garlic (*Allium sativum*) is possessed by *Marasmius porreus*, Fr., and *M. scorodonius*, Fr.

The odour of radishes (*Raphanis sativus*) is possessed, as well as the taste, by *Agaricus purus*, Pers. *Tuber puberulum*, B. & Br., has the same odour.

* *Octaviania asterosperma*, Vitt., the quotation is from a letter Mr. Broome sent me on the subject.

The odour of horse radish (*Cochlearia armoracea*, L.) is possessed by *Tuber bituminatum*, B. & Br.

The odour of cucumber (*Cucumis sativus*) is possessed by *Agaricus (Naucoria) Cucumis*, Pers.

The odour of ripe apricots (*Prunus armeniaca*) is possessed by *Cantharellus cibarius*, Fr.

The odour of rotting pears (*Pyrus communis*) is possessed by *Agaricus pyriodorus*, Pers.

Pilacre Petersii, B. & Curt., and *Hysterangium nephriticum*, Berk., in its young state, smell like "some *Hypericum*."

Agaricus frumentaceus, Bull., and 15 other species of the genus *Agaricus*, enumerated in the "Handbook," smell like new meal or flour, or have a farinaceous odour.

Animal Odour-mimicries.—*Agaricus incanus*, Fr., has the odour of mice (*Mus musculus*).

Agaricus (Nolanea) pisciodorus, Cés.) has the odour of putrid fish (rancid herring).*

Hygrophorus russo-coriaceus, B. & Br., has the odour of Russian leather.

Rhizopogon rubescens, Tul., "has when young an acid smell like that of sour ham."

Hygrophorus cossus, Fr., has the smell of the larvæ of the goat moth (*Cossus ligniperda*).

Lactarius quietus, Fr., and *L. cyathula*, Fr., have the odour of the common house bug (*Cimex lenticularis*).

Odours of Chemical Compounds.—*Agaricus sulfureus*, Bull., and *A. lascivius*, Fr., have the odour of gas-tar water.

Agaricus radicosus, Bull., has the odour of hydrocyanic acid (HCN).

Peziza venosa, Pers., has the odour of nitric acid (HNO_3).

Agaricus alcalinus, Fr., *A. nidorosus*, Fr., and *Hygrophorus nitratus*, Fr., have odours closely resembling a dilute state of nitric oxide (NO).

Marasmius fœtidus, Fr., has exactly the odour of Cacodyle † ($C\ H_3|_2\ As.$).

What advantage it should be to a fungus to stimulate the smell of such poisonous substances as prussic and nitric acids it is very difficult to imagine, unless it be for protective purposes. But the fact that they do so is well known to all mycologists. The other odours—namely, of vegetable and animal

* This it has in common with *A. nigripes*, Trog., a species not yet recorded in Britain. *A. pisciodorus* is by no means an uncommon species, but it is often confounded with *A. cucumis*, from which it differs both in the colour of its spores and in its smell.

† Cacodyle or Arsendimethyl is an extremely poisonous substance, which is prepared by heating arsenious oxide with potassium acetate. It has a most disagreeable garlic-like smell. I have never yet come across any other fungologist who was acquainted with this compound, but the odour of it, to my mind, exactly resembles that of *Marasmius fœtidus*.

substances—are most probably attractive to insects, for Sir John Lubbock, with whom I communicated on the subject, was kind enough to inform me that "there can be no doubt that insects possess the power of smell;" and I believe the same opinion is held by other entomologists.

Luminosity.—Dr. T. A. Chapman tells me "there are some 160 species of the *Dipterous* family, *Mycetophilidæ*, many of which live in rotten wood, or rather on the mycelium in it, as many beetles do." Now, there is a well-known property of some mycelia which they possess in common with certain insects—viz., luminosity, the the advantage of which to the fungus is very difficult to perceive. That this is advantageous to myceliophagus insects is obvious, but it would seem rather detrimental than otherwise to the mycelium. It is possible, however, that the depredations of myceliophagus insects are more than compensated for by the advantages accruing to the fungus possessing luminous mycelium from the visits of non-myceliophagus insects bringing with them a fresh stock of germinating or re-vivifying spores. Whether subsequent observation will bear out this suggestion or not, the fact remains that certain fungi and certain mycelia especially possess the property of luminosity in common with certain insects.

That flies are able to transport the spores of fungi, if it has not yet been actually demonstrated, is rendered exceedingly probable from their ability to convey other low forms of vegetable life. The terrible disease, anthrax, has long been known to occasionally originate from the bite of a fly, and it has always been supposed the fly must previously have visited some diseased or putrefying animal matter. Virchow and Bourgeois consider that the infection may be communicated by their soiled wings and feet, although mostly it is held that a puncture by the fly's probosces is necessary. The last named gentleman (Bourgeois) has seen the disease produced by the puncture of a gadfly, which came out of a fleece of wool.*

The recent researches of M. Pasteur have demonstrated that anthrax is due to the presence in the blood of *Bacillus anthracis* (an organism, be it remembered, that sometimes attains a length four times greater than that of the spores of *Phallus impudicus*). A fly settling upon the body of an animal recently dead from this disease, or sucking the blood from one yet alive suffering from it, would constitute a most effectual means of transmitting it to the next animal or man which it punctured with its probosces.†

Interfungal Mimicries.—There are several well-marked instances of this, the mere enumeration of which will recall them to mycologists; such as *Agaricus atratus*, Fr., and *Cantharellus car-*

* Aitken, "Science and Practise of Medicine," 1863, Vol. i, p. 689.

† M. Pasteur has still more recently shown that earth-worms are capable of transmitting *Bacillus anthracis* from the buried bodies of infected animals to the surface of the ground, and that sheep feeding upon the place contracted and died from anthrax.

bonarius, A. & S.; *Agaricus naucinus*, Fr. and *Agaricus cretaceus*, Fr. The branched *Clavariæ* and *Lachnocladium*, the club-shaped *Clavariæ*, and *Geoglossum* or *Torrubia*, *Podaxon*, and *Coprinus*.* *Scleroderma geaster*, Fr., mimics the Geasters, while conversely an unexpanded specimen of *Geaster coliformis*, P., looks so exactly like a washed specimen of *Scleroderma vulgare*, Fr., that I once had such an one in my possession for more that a week without discovering what it was.

I have no special remarks to make on the present occasion upon these curious resemblances, leaving what I may have to say for a future communication; but a very remarkable series of mimicries exists which must be mentioned—namely, that which exists between many edible and poisonous fungi. The number of accidents which have happened from eating poisonous, in mistake for edible fungi, many of which have been followed by a fatal result, shows that this mimicry is not a mere figment of the imagination. These lamented accidents have cast an opprobrium upon the whole fungus kingdom as articles of food, which is quite unmerited. The subjoined table shows at a glance, these mimicries, although there may be some species included with the poisonous species whose toxic qualities enthusiastic fungophagists may take exception to on the ground that they have never yet caused death:—

Edible Species.	Poisonous Species.
Agaricus cæsarius, *Scop.*	Agaricus muscarius, *Linn.*
Agaricus ovoideus, *Bull.*	Agaricus phalloides, *Fr.*
Agaricus rubescens, *Fr.*	Agaricus pantherinus, *D.C.*
Agaricus procerus, *Scop.*	Agaricus rachodes, *Vitt.*
Agaricus ostreatus, *Jacq.*	Agaricus euosmus, *Berk.*
Agaricus campestris, *Linn.*	Agaricus melaspermus, *Bull.* Agaricus fastibilis, *Fr.* Agaricus Taylori, *Berk.*
Lactarius deliciosus, *Fr.*	Lactarius torminosus, *Fr.*
Russula lepida, *Fr.*	Russula rubra, *Fr.*
Russula alutacea, *Fr.*	Russula emetica, *Fr.*
Cantharellus cibarius, *Fr.*	Cantharellus aurantius, *Fr.*
Marasmius oreades, *Fr.*	Marasmius urens, *Fr.*
Fistulina hepatica, *Fr.*	Polyporus quercinus, *Fr.*

It is not assumed that any of these species copy each other so accurately as to present any difficulty to the scientific botanist in discriminating them, but in most instances so close is the resemblance that the fungi must be gathered, and the colour of the spores and other characters noticed, before a definite opinion can be given. Of course objection will be taken to *A. rachodes* being included with the poisonous species, as there are persons still living who have eaten it. It is generally admitted, however, to be greatly inferior to *A. procerus*. Mr. Berkeley holds that "it is not

* See M. C. Cooke on Mimicry in Fungi, "Grevillea," Vol. ix, p. 151; and W. G. Smith on Mimicry in Fungi, "Gardener's Chronicle," 10th Feb., 1877, and 16th Nov., 1872.

so good for food as the last (*A. procerus*), if really wholesome."* Fries, too, in his latest book, says, "Vix edulis."† Of the imitators of the common mushroom three only are given; none of them are very accurate copyists, but as most of the accidents which happen to the general public in this country arise from mistaking other fungi for *A. campestris*, it is clear it has mimickers. *Agaricus fastibilis* is given on the authority of Mr. W. G. Smith.‡ *A. melaspermus* is one of the closest mimics, even to the dark ring and separable cuticle. *Lactarius torminosus* and *L. deliciosus* frequently grow in company with each other, and I have often pointed out to my friends the impossibility, with some specimens, of saying which was which without gathering them. *Fistulina hepatica* and *Polyporus quercinus* would not have been included in this list had not the mistake occurred in Mrs. Hussey's family of gathering and cooking the latter for the former. The error was only detected by the intense bitter taste of the *Polyporus* and the brilliant yellow colour it assumed after salt had been sprinkled upon it.§

Summary.—Instances of mimicry are not rare amongst fungi. They are more frequently attractive than protective mimicries. They may be of vegetable, of animal, or of excrementitious substances, either as regards external appearance or as regards odour. The main object of these mimicries is the attraction of insects, the advantages of which to the plants are—(1) Either fertilization of hymenomycetous spores by co-specific spermatia from other individuals, or by the transportation of spores from the hymenium of one fungus to that of another, or perhaps increased germinative energy to the spores is obtained by the admixture of other co-specific spores without the element of sexuality; (2) the diffusion of fungus spores by insects as well as by the larger animals.

King's Lynn, 7th July, 1881.

THE CRYPTOGAMIC SOCIETY OF SCOTLAND.

The Seventh Annual Conference will be begun at Salen, Island of Mull, on Tuesday, August 30, 1881. Fellows who purpose being present may learn further on application to the Secretary after August.—F. Buchanan White.

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* Berkeley, "Outlines," p. 92.
† Fries, "Hymenomycetes Europæi," p. 29.
‡ Smith, "Gardeners' Chronicle," 16th Nov., 1872.
§ Hussey, "Illustrations of British Mycology," Series I., pl. 52.

ALGÆ AMERICÆ BOREALIS EXSICCATÆ.

Farlow, Anderson, and Eaton.

Contents of Fasciculus IV.

131. Dasya subsecunda, *Suhr.*
132. Polysiphonia subtilissima, *Mont.*
133. Polysiphonia Harveyi, *Bailey.*
134. Polysiphonia secunda, *Zan.*
134. bis. Polysiphonia villum, *J. Ag.*
135. Polysiphonia variegata, *Ag.*
136. Bostrychia Montagnei, *Harv.*
137. Bostrychia calamistrata, *Mont.*
138. Bostrychia Sertularia, *Mont.*
139. Delesseria Hypoglossum, *Lam. x.*
140. Delesseria alata *Lam. x.*
141. Delesseria decipiens, *J. Ag.*
142. Gelidium rigidum, var. *radicans J. Ag.*
143. Rhabdonia tenera, *J. Ag.*
144. Hypnea musciformis, *Lam. x.*
145. Hypnea spinella, *Kütz.*
146. Rhodophyllis Veprecula, *J. Ag.*
147. Chondrus canaliculatus, *J. Ag.*
148. Constantinea Sitchensis, *J. Ag.*
149. Catanella opuntia, *J. Ag.*, var. *pinnata.*
150. Chrysymenia uvaria, *J. Ag.*
151. Spyridia filamentosa, *Harv.*
152. Nemastoma Californica, *Farlow.*
153. Callithamnion byssoideum, *Arn.*
154. Callithamnion heteromorphum, *J. Ag.*
155. Callithamnion Pylaisaei, *Mont.*
156. Callithamnion floccosum, *Ag.*
157. Chantransia virgatula. *Thuret.*
158. Padina Durvillaei, *Bory.*
159. Taonia Schroederi, *Ag.*
160. Taonia Lennebackerae, *Farlow.*
161. Dictyota fasciola, *Lam. x.*
162. Castagnea Zosteræ, *Thuret.*
163. Mesogloia Andersonii, *Farlow.*
164. Sphacelaria cirrhosa, *Ag.*
165. Cladostephus verticillatus, *Ag.*
166. Desmarestia ligulata, *Lam. x.*
167. Myriotrichia filiformis, *Harv.*
168. Ectocarpus littoralis, *Lyngb.*
var. *robustus, Farlow.*
169. Caulerpa plumaris, *Ag.*

170. Caulerpa crassifolia, *Ag.*
var. *Mexicana*, *Ag.*
171. Valonia utricularis, *Ag.*
172. Anadyomene flabellata, *Lam. x.*
173. Monostroma orbiculatum, *Thuret.*
174. Monostroma crepidinum, *Farlow.*
175. Chaetomorpha Linum, *Kütz.*
176. Lyngbya aestuarii, *Liebm.*
var. *ferruginea*, *Kütz.*
177. Oscillaria princeps, *Vauch.*
178. Spirulina tenuissima, *Kütz.*
179. Polycystis pallida, *Thuret.*
180. Gloeocapsa crepidinum, *Thuret.*

NOTES ON THE DISCOMYCETES.

By Dr. Geo. Winter.*

(*Translated by* W. Phillips, F.L.S.)

Being at the present time engaged in the investigation and critical observation of the *Discomycetes* for my *Fungus Flora*, I collect a number of notes, which, as they would claim too much space in my work itself, I will publish here. I unite with this preliminary publication, as I did with the first on the *Uridines*, a request to Mycologists to convey to me any casual difference of opinion, in order that precision and reliability may be thereby given to my work. Living specimens of *Discomycetes* are also much desired.

I.—While in the *Ustilagos* and *Uridines* no special difficulties existed, in the majority of cases, in recognising the species of older authors, in the *Ascomycetes* and particularly in the larger *Discomycetes*, there is much more difficulty, nay, in many cases an impossibility, of forming a safe opinion as to what the older Mycologists meant by their species. This unsatisfactory state of things is attributable to different facts.

In the next place it is a sufficiently well-known circumstance that the older authors had not sufficient regard to the internal structure (asci, sporidia and paraphyses) and did not make use of it for distinguishing species. That this is of the greatest importance in the *Discomycetes* is now generally recognised.

Again, the difficulty of recognising the older species is often increased through the very imperfect description and figuring, as it also is by the fact that many authors have described a smaller specimen as a new species. Truly does Fries say (" Syst. Myco.,"

* " Hedwigia," May, 1881, p. 69.

ii., p. 51), "Sæpius inter Pezizas, non species, vix varietates, sed individua describunt auctores."

A third difficulty is this—that young specimens, in a partially developed state, are really different in form, size, and colour, from old specimens of the same species, in the groups *Cupulares*, *Cochleatæ*, &c. These differences continue till the ripening of the sporidia, and after, but when the sporidia were not formerly considered, it may have often happened that young specimens, destitute of sporidia, were described as typical species, from which the older and riper specimens considerably differed.

Finally, if we give up descriptions and figures, and resort to original specimens we are met by an impediment which makes the value of original specimens illusory. The larger *Discomycetes*, when dried and pressed, are often useless for recognising form and colour. Every one may convince himself that descriptions so made are almost worthless if he will compare fresh living specimens with dried and pressed specimens of one and the same species. Still form and colour are important characters, if, moreover, the original in question is gathered too early, not yet containing ripe sporidia, it is then simply useless, in which case the hairiness, or the like, become very characteristic—but the chief point lies in the following: it often happens that two or more species of *Peziza* are externally very similar, so that without examining the internal structure, they may be looked upon as the same species, and were so looked upon in early times. It may thus happen that if an example consists of several pieces of earth, each piece may pertain to another species, or that different species similar, as a rule, may grow on the same piece. I will give an example.

There often grow, intermixed on our "Molasse-sand," three *Pezizæ* (in the old sense of that term) *Peziza umbrosa*, Fckl. (Cooke, "Mycographia," 138), *P. trechispora*, B. & Br. (l.c., 129), and *P. miniata*, Fckl.—the latter small specimens, but quite typical. The three are each red in colour, equal in size, similar in form, and clothed with brown hairs. On more accurate examination the length and distribution of the hairs certainly appear different, but this can easily be overlooked. Hence, it happens that all three growing together on a small space of earth, and which, without microscopical examination, might be easily taken to be identical, are readily referred to different species by the aid of the sporidia. Admitting that Fries, in establishing his *Peziza umbrosa*, had such a piece of earth before him, and stored it up as the original of this species, and that it has now to be established which red *Peziza*, with brown hairs, Fries intended by his *Peziza umbrosa*—the task would be impossible.

If, now, we comprehend all the situation here set forth, the difficulties which often oppose us in recognising the species of *Discomycetes* in the older authors, the result is very discouraging and perplexing and "guter Rath theuer."

Perhaps the following propositions will tend to the harmonising

of Mycologists, and may, perhaps, serve, in some measure to remove the difficulties.

Treating on the larger, fleshy *Discomycetes*, which are difficult to preserve, with which it chiefly deals, we possess a work which is justly known and may be commended as excellent, namely Cooke's "Mycographia." Still this work is naturally not without mistakes (what human work is ?), but everyone who has used this work, and in addition, has tried to agree with it, will concur with me when I point to it as useful in the highest degree as a labour performed in a scientific spirit, and with great knowledge of the subject.

The greater part of the species, represented and described, are either original specimens, or specimens purchased in published dried collections. The latter especially, allow a judgement as to the accuracy and reliability of the descriptions ; I have up to now seldom had occasion in this respect to make corrections, yet on this point just one word.

My view is that *Cooke's work will be universally considered as the groundwork of our further investigations and observations in the department of the Discomycetes with which it deals, and that Cooke's drawings will be regularly quoted*, especially in dried collections, as also in exchanges and in descriptions, and lists of *Discomycetes*. Anyone will be able, easier than heretofore, to render a species intelligible ; each individual Mycologist will by this means be in the position with any species he may find to refer to a generally accessable—I might call it—scheme of reference (Schema zurückzuführen) which, without recourse to anything further, will be intelligible to all.

Should my proposition meet the concurrence of Mycologists, the claim on them will occur to all to perfect Cooke's work by contributing to the correction of any errors, which would be to the general benefit. I will make a beginning here, on my part, after the example of Herr Dr. Rehm, who, in a praiseworthy and successful manner, has some time since taken the lead.

In the first place, it may be allowed me to remark that the statement in many places of the size of the sporidia is to be regarded as the average size. Also that the sporidia of the *Discomycetes*, like those of *Ureda*, are variable in size, and modified in outline. I shall give the extreme measure in my work, such as I practically find on examination, the same as I have already done in my work on the *Ustilagina* and *Ureda*. Still some of Cooke's statements must depend on erroneous observations.

Peziza fusispora, Berk. (Rabh., "Fung. Europ.," 1812) has sporidia from 24-26 mm. long, 9-10 mm. broad. *Peziza convexula*, Pers. (Fuckel, "Fungi Rhen.," 1875) the sporidia are narrowed at both ends, while Cooke shows them broadly rounded. *Peziza Chateri*, Smith (Rabh., "Fung. Europ." 1517) has sporidia from 16 to 17 mm. long, 10 mm. broad. The characteristic clothing of hairs (represented well by Cooke) renders this always easily known, as with the specimens of the species found at Berlin. *Peziza pilifera*,

Cooke (" Rehm. Ascom.," 54) has altogether a different sporidium than Cooke shows, presuming that I have before me the right species in my description (in the " Flora," 1872). My description states there " sporidiis subdistichis, *oblongo-lanceolatis*, continuis, 4 guttulis oleosis, hyalinis, 24-36 mik. lang, 7-9 mik. crass." Cooke represents the sporidia as elliptical, uniseriate, and gives their size as 20 mm. long, 9 mm. broad. Perhaps two distinct species were growing intermixed.

With regard to *Peziza mirabilis*, Borsze, the great similarity of this fungus to the figure of *Peziza protracta* in " Gon. and Rabh. Myco. Europ.," Tab. i., Fig. 2, strikes every one. After all the information communicated by Borszcow respecting his fungus, there is no essential difference shown between it and *Peziza protracta*. *Sclerotinia baccata*, Fuckel (" Symb.," p. 331), and *Microstoma hiemale*, Bernst., are also indentical with these (" Acta. Acad. Leopold. Carol.," 1852), so that this fungus has been described four times as new ! The figure of *Peziza leucomelas*, Pers., by Cooke, is not particularly successful ; that in Sturm's " Deutschl. Flora," is far more correct and beautiful ; there may be found, also, a figure of this species in Persoon's " Mycologia Europæa," iii., Tab. 30, Fig. 1, a, b, c, without, it is true, a corresponding, account in the text.

A great confusion still prevails, especially in reference to *Peziza reticulata*, *venosa* and *aucilis*. In April of this year I found *Peziza reticulata* in different places about Zurich, and have also received it from other places in Switzerland, so that about 30 living specimens lie before me. The species is, in reference to size, form, and folds, extraordinarily variable. I found five specimens growing near each other measuring from 89 to 158 mill. across, strikingly differing one from the other in form. While the largest specimen nearly answered to the upper figure of " Greville. Scott. Crypt." Flora. iii., Tab. 156. Another was about the shape of an umbrella, that is, the cupula was strongly convex, its margin inclined downwards, the stem very long and thin, the disc furnished with delicate, scarcely noticable, wrinkles. One specimen from Stein, on the Rhine, had very much the form of Greville's lower figure, being about 150 mill. long, and nearly the same breadth, with extraordinarily prominent narrow ribs. I found one near Zurich altogether similar, only smaller, with stout projecting ribs, in the midst of others which were quite smooth. Also the odour, which Cooke makes particularly prominent, is throughout absent ; it is found present in mature specimens only ; I could observe no trace of it in about ten specimens gathered when young. The species is, under all circumstances, notwithstanding their variable forms and sizes, easily known by the following :—The exterior of the cupula, particularly near the margin, is clothed in a more or less distinct manner with numerous triangular-form pale brown scales, which, though often washed off, were always recognisable on mature uninjured specimens. Moreover, the sporidia (which in the specimens

collected by me uniformly measure 20 to 22 mik. long and 12—14 mik. broad) show at each pole short but broad protoplasmic granules, which, as a rule in living specimens, are easily recognised, the paraphases are occasionally branched from the base, somewhat thickened above. *P. ancilis*, Rhem. "Ascomyc." 402, which Cooke regards as a form of *P. venosa*, is habitually similar. Saccardo describes it as a new species ("Michilia" i, p. 544), which he calls *P. Rehmiana*, and I must confess I cannot possibly regard this form as belonging to *P. venosa*. Persoon himself quotes ("Synop.," p. 638, not p. 618 as given in "Myco. Europ.," and Fries' System) the figure of Wulffen in "Jacquin Miscellanea ii., p. 112, Tab. xvii., Fig. 1, or rather he describes the figured specimen there as he had evidently never seen the species itself. This specimen, however, is altogether sessile, while Rhem's *ancilis* has an undoubted, sometimes stout stem. Neither is Rehm's species *P. reticulata*, the sporidia and paraphyses are altogether different. I regard it as a distinct species altogether different. As regards the example of *P. venosa* given by Cooke under No. 228, it corresponds rather to the figure of Wulffen. I cannot decide this as my specimen in Cooke's "Fung Brit." i, p. 557 is destitute of asci and sporidia. Passing on finally to *P. ancilis*, Pers., neither can I agree with Cooke in his interpretation of this species. Persoon's description, in fact, is very good of this species. Now *Rhizina helvetica*, Fuckel ("Symb. Myco. Nacht." ii, p. 66) is identical with this, of which I lately received living specimens from Morthier, the discoverer of the species, which convince me that this is exactly the *Rhizina helvetica* of Fuckel. How Fuckel alighted on the notion of referring this fungus to *Rhizina* is unintelligible to me. His description agrees exactly with Morthier's specimens.

2. Rabenhorst publishes, under No. 2,315, in "Fung. Europe," a new *Ombrophila, O. Kriegeriana*, which I gathered this spring rather frequently near Zurich. I remark on this species as follows:—In the first place, Rabenhorst's statements with regard to the size of the asci and sporidia require correction by the aid of completely matured specimens, as in living specimens the asci are 130-150 mik. long, 10·5-12 mik. broad; the sporidia 14-17 mik. long, 5-7 broad. Much as these descriptions differ from those of Rabenhorst, still my fungus belongs to the aforesaid species, as all the other points agree, particularly the extremely characteristic clothing of hairs on the outside of the cupula. The hairs stand parallel, are jointed, and the membrane is peculiarly striped or wrinkled obliquely; moreover, it is in the highest degree probable to me that this *Ombrophila Kriegeriana* is no other than *Peziza elatina*, Ab. and Schw. ("Conspect," p. 330, Tab. ii, Fig. 3.) True, the clear green colour of the last-named species is more intense than I have seen in *Ombrophila*. Meanwhile, the colour designated "olivacea" in the conspectus is rendered almost too intense a green; as, for example, in *P. rufo-olivacea*, which I have not found so intense a green as is represented. The description of *Peziza*

elatina agrees so capitally that I can scarcely doubt the correctness of my opinion.

3. After having received, through the goodness of Morthier, living specimens of *Peziza pithya*, I have arrived at the opinion that this, in fact, is the true species of *Persoon* which Nees represents. ("Sys. der Pilze," Tab. xxxviii, Fig. 287.) Neither is *Peziza Leineri*, Rabh. ("Mycology Europ.," Tab. v, Fig. 6; and "Badische Kryptogamen," 648) itself any other than *P. pithya*. It agrees in every particular with the above.

4. In "Albertini and Schweiniz," Conspectus, p. 65, Tab. iv, Fig. 6, is described and figured a *Xyloma herbarum*, which grows on *Cerastium vulgatum* and *Potentilla norvegica*, and, indeed, is found on the living, blossoming plant. This fungus is evidently identical with *Peziza Cerastiorum*, Wallr., and *Peziza Dehnii*, Rabh., respectively, with one of these two species, which may be easily perceived by the sporidia. Yet neither of these can bear the name of *Albertini* and *Schweintz*, as there is already a *Peziza herbarum*, Pers. ("Synop.," p. 664.) It is only by a further division of the old genus, *Peziza*, that one of these species—the one on Potentilla is the best—can bear the specific name of "herbarum" (Alb et Schwz).

5. I might call the attention of mycologists to a *Peziza* which is, perhaps, not so rare as it would appear, but which I do not ever find described. I first received it about eight years ago, from Schulzer of Müggenburg, as *P. adusta*, Schulzer. As Herr Schulzer had the goodness to communicate to me, it is indeed not yet described by him, but was published under the above name in the "Verhandl. d. Zoor-Bot. Ges, zu Wien," Band xvi. (1866), p. 62. During the last winter, through the kindness of Herr Professor Caspary, I was allowed the use of a splendid collection of drawings from Nature, and descriptions of Discomycetes of Eastern Prussia. In this collection I found the drawing of a Peziza which I at once recognised as identical with Schulzer's *P. adusta*.

There lie before me, both from Herr Professor Caspary and from Herr Schulzer, very excellent and sufficient descriptions that I shall make use of in my work. I give below only a preliminary diagnosis of the fungus in question, to elicit some further communications from other mycologists upon it.

Peziza adusta, Schulzer (*ad interim!*), fortasse Synon: *P. fusco-cana* Alb et Schwein. ("Conspect," p. 312, Tab v, Fig. 2.) Cupula campanulæformis, demum magis aperta, margine sæpe revoluto, inciso undulatoque, extus cinerio-fusca vel umbrina, pruinosa vel subtomentosa, intus obscurior, fere atra. Cupulæ diam. 2-8 centim. Stipes 1-5 centim. longus, sursum in cupulam dilatatus, plerumque subcompressus et parum sulcatus, cinereo-fuscus, basin sæpe nigrofibrillosus. Asci longissime cylindracei, apice truncata et incrassata, basin versus attenuati, 8-spori, 400 bis 500 mik. longi, 14-25 mikr. crassi. Sporæ monostichæ, oblongæ, enucleatæ, hyalinæ, 22-33 mikr. long., 10-13 mikr. crassæ. Paraphyses

ramosissimæ, septatæ, ramulis apice attenuatis. In silvis ad terram vel ad ramos putridos, vere. Probably this *Peziza* is identical with *Peziza fuscocana*, Alb. et Schw.; still the description of this species does not altogether agree in several points.*

In conclusion, mention may be made of yet some discoveries of Discomycetes in this region. A large heap of town rubbish that had been undisturbed for years furnished me with *Peziza vesiculosa*, and, more rarely, *carnea: Peziza rubra* ("Mycogr,," i, Fig. 152.) *P. ascoboloides*, Mont. (Cooke, Fig. 292). On our "Molassa-sand" is often found *Peziza sepiatra*, Cooke, acknowledged by Phillips himself as this species; further, I have found in former autumns, in a young pine wood, *P. umbilicata*, Karst, sufficiently agreeing with "Karstens Fung. Fennici," 729, and "Cooke Mycogr.," fig. 259. Lastly, I one day obtained from the Canton *Thurgau Peziza Duriæana Tulasne* ("Sel. Fung.," Carp. iii, Tab. xxii, Fig. 20-24), on a sclerotium parasitic here on *Carex stricta*.

NEW BRITISH LICHENS.

Communicated by THE REV. J. M. CROMBIE, F.L.S.

Since my last record in "Grevillea," Vol. 8, pp. 112-114, the following *new species* of Lichens discovered in Great Britain have been recorded by Nylander in the "Flora."

1. **Lichiniza Kenmoriensis,** (*Holl,*) *Nyl. in Flora*, 1881, p. 6.

Thallus consisting of minute, deformed, adnate, chestnut-brown squamules, on which darker globuli or subglobose papillæ are prominent. The texture is almost as in *Lichina*, but cellulose, more confused and thinner, the gominia being sordidly yellowish, arranged in the thalline globules radiately through continuous moniliform series. Apothecia and spermogones not seen. Probably a genus allied to *Lichina*.

On micaceo-schistose boulders at Kenmore by the shores of Loch Tay (Dr. Holl, 1869).

2. **Lecanora albo-lutescens,** *Nyl. in Flora*, 1881, p. 177.

Thallus white, thin, subfarinaceous, somewhat scattered; apothecia orange, slightly prominent, subbiatorine in appearance, thickly margined, the margin externally (thalline) whitish, and above orange; spores placodieine, 0·015-18 mm. long, 0·007-10 mm. thick (the loculi large), epithecium unequal.

Allied to *L. pyracea*, but larger and with larger spores, probably descending from *L. Turneriana*.

On quartzose rocks at Stocksfield, Northumberland (Rev. W. Johnson).

* Schulzer's fungus is not a true *Peziza*, but a species of *Urnula*, not distinct from *Urnula craterium*. I very much doubt its identity with *P. fusco-cana*, A. & S.—ED. GREV.

3. **Lecanora umbrinofusca,** *Nyl. in Flora,* 1880, p. 389.

Thallus macular, umbrine-brown or umbrine-blackish, thin, subcontinuous or obsoletely rimulose, usually surrounded by a lead-coloured subphumoso-radiating hypothallus; apothecia black, lecideoid, minute, adnate, submargined, spores 8 næ, brown, ellipsoid, 1-septate, 0·010-11 mm. long, 0·006-7 mm. thick, epithecium brown, hypothecium colourless.

Apparently allied to *L. grisco-fusca*, Nyl., but differing in the character of the thallus, the smaller spores, &c.

On siliceous stones at Thetford, in Sussex (Larbalestier).

4. **Lecanora rhagadiza,** *Nyl. in Flora,* 1881, p. 178.

Thallus dark olive-greyish, continuous, unequal, variously rhagadiosely fissured; apothecia reddish flesh-coloured, innate, concave or plane; thecæ myriospored, spores oblongo-bacillar, about 0·0035 mm. long, about 0·0010 mm. thick, paraphyses slender, hymenial gelatine tawny wine-red with iodine.

A peculiar species, allied to *L. rufescens* (Borr). On moist sandstone rocks at Whitehaven in Cumberland (Rev. W. Johnson).

5. **Pertusaria spilomanthodes,** *Nyl. in Flora,* 1881, p. 179.

Thallus greyish, rugoso-unequal, rimoso-diffact (K + yellow and immediately rusty saffron-coloured); apothecia blackish, rugoso-deformed, innate in the thalline areolæ, subincolorous within; spores 8 næ, olive-blackish, 0·090-0·130 mm. long, 0·055-85 mm. thick: the thecæ especially bluish with iodine.

Allied to *P. spilomantha*, Nyl., but differing in the greyish thallus and the 2-spored thecæ.

On granitic rocks at Ennerdale, Cumberland (Rev. W. Johnson).

6. **Lecidea rhypodiza,** *Nyl. in Flora,* 1881, p. 5.

Thallus brownish-black, thin or very thin, subgranulated, indeterminate, apothecia concolorous or subblackish, plane, margined; spores 8 næ, colourless, oblong, 1-septate, 0·014-16 mm. long, 0·005-6 mm. thick, epithecium and perithecium brown, paraphyses moderate, clavate and thickened at the apices, hypothecium colourless; hymenial gelatine bluish and then red wine-coloured with iodine.

Belongs probably to the section of *Lecidea lenticularis*, though in the absence of the spermogones this is somewhat uncertain.

On micacco-schistose rocks on the summit of Craig Calliach (Crombie).

7. **Odontotrema firmatum,** *Nyl. in Flora,* 1881, p. 188.

Subsimilar to *O. subintegrum*, Nyl., but more robust, with black, larger, somewhat prominent apothecia; (spores fusiform, 3-septate, 0·020-24 mm. long, 0·006-7 mm. thick).

On the wood of a decorticated felled pine on Ben Lawers (Crombie).

In addition to these Nylander, l.c., 1881, pp. 188-189, describes the following form and subspecies:—

1. **Stigmatidium circumscriptum** *f.* **dendrizum,** *Nyl.*

Apothecia punctiform, dendriodeo-subcontiguous and seriated;

spores brown, 5-7 septate, 0·018-23 mm. long, 0·006-7 mm. thick; hymenial gelatine tawny wine-coloured with iodine.

On quartzose rocks in Jersey (Larbalestier).

2. **Endococcus erraticus* microphorus.** *Nyl.*—

This differs from the type in the smaller spores (0·004-7 mm. long, 0·002-3 mm. thick).

On various crustaceous Lichens in nearly the whole of Europe—(sometimes also parasitic on their apothecia!). N. Wales, Cardiganshire (W. Joshua).

OBSERVATIONS ON *PARMELIA OLIVACEA* AND ITS BRITISH ALLIES.

By THE REV. J. M. CROMBIE, F.L.S.

There had been considerable confusion amongst lichenists as to the species belonging to the interesting subsection of *Parmelia olivacea*. Hence various plants totally distinct, both in external and internal characters have either not been distinguished at all or have been regarded as mere varieties of one or two accepted types. We owe it to the critical skill and accurate observations of Nylander that such clear light has now been thrown upon all the known plants of this subsection, that we can now with facility assign to them their proper position, whether as species or as varieties. It will therefore be of service to British lichenists that I should here indicate generally the leading characteristics and the general distinction of the different species and varieties, according to their Nylanderian conception, which are known to occur in this country.

1. **Parmelia olivacea,** *Ach.*

This species has very seldom been rightly understood by lichenists, and though they have given the description of Acharius quite accurately, yet in published Exsciccati, they have usually issued specimens which do not at all agree with that description. It may, however, be easily distinguished by the rugose thallus and the entire or nearly entire margin of the apothecia. It is essentially a boreal species, which is met with only very rarely in the Scottish Highlands, although like several other subarctic or alt-alpine lichens, *e.g.*, *Stereocaulon paschale*, *Usne aplicata*, *Platysma sæpincola*, it is spoken of as being common in Leight. Lich. Fl. Ed. 3. According to Nylander, in M. Richard's *Cat. Lich. Deux Sevr*, p. 16, it had not yet been met with in France.

2. **Parmelia aspidota,** *Ach.*

This is closely allied to the preceding species, of which it has generally been regarded as a variety. It is, however, well distinguished externally by the papillato—exasperate thallus and the verrucoso-papillose margin of the apothecia, while internally the medullary reaction with *Ca. Cl.* is +, and the spores also are smaller and the spermatia longer. It is the *Lichen olivaceus* of

older authors *pro max. p.* To it are referable Mudd. Exs. n. 72, Leight, Nos. 263 and 356, and it is not uncommon in Great Britain and Ireland. The specific name *aspidota* Ach. Meth. (1803), p. 214 (ut var. *P. olivacea*) has priority to that of *exasperata* Ach. L. U. (1810), p. 645 (*Collema exasperatum*).

3. **Parmelia subaurifera**, *Nyl.*

Although distinguished as a variety by Dillenius in Musc. t. 21 f. 77c, this well marked species was very strangely overlooked by authors till it was definitely indicated by Nylander in Flora 1873, p. 22. It may at once be recognised by the yellow medulla and the small yellowish soredia with which the thallus is efflorescent. The medulla in our specimens, as in all more southerly regions where it occurs, is less distinctly yellow than those from Scandinavia, and the apothecia are extremely rare. The spermatia are shorter than in the two preceding species. It is apparently a somewhat local plant in Great Britain.

4. **Parmelia prolixa**, *Ach.*

Though usually regarded as a variety of *P. olivacea*, in the older and inaccurate conception of that species, this is well entitled to be regarded as distinct, on account of the character of the laciniæ and the much smaller spores. It is apparently a rare British plant, occurring chiefly in W. England, and sparingly amongst the N. Grampians of Scotland. To it is referable Leight. Exs. n. 365.

5. **Parmelia prolixa* Delisei**, *Dub.*

This is distinguished, though most probably only as a subspecies, by the paler thallus, the broader laciniæ, and by the reaction of the medulla with *Ca. Cl.* being at length +. To it is referable *P. olivacea*, var. *aquiloides*, Linds., and it is represented by Leight. Ays. n. 291 prop. Apparently it is a rare and local plant in Great Britain and Ireland.

var. isidiascens, *Nyl.*

This is characterised by the peculiar crowded verrucæform isidia, with which the thallus is sprinkled. Like the type, it is a rare British plant, having been detected only in W. England and Central Scotland. It is represented by Leight. Exs. n. 291 prop.

6. **Parmelia prolixa* sorediata**, *Ach.*

This is distinguished by the smaller thallus, which is sprinkled towards the centre with whitish or brownish-white verrucose soredia. In other respects it agrees with *P. prolixa*, so that it is scarcely to be regarded as a distinct species. It is apparently of extremely rare occurrence in the Highlands of Scotland.

7. **Parmelia fuliginosa**, *Fr.*

From all the preceding this may readily be recognised by the peculiar isidia with which the thallus is densely clothed.

In addition to this the re-action of the medulla with *Ca. Cl.* sufficiently entitles it to be regarded as a distinct species. It is probably not uncommon in the mountainous regions of Great Britain on rocks, trees, and old pales.

var. lætevirens, *Flot*.

This is distinguished by the thallus being greenish—olive or greenish-brown. To it is referable *Parmelia fuliginosa, f. olivacea*, Leight. Lich. Fl. Ed. III., p. 123, which in Ed. I. Suppl., p. 479, was strangely regarded as a variety of *P. Borreri*. It has been seen only from a few localities in England and the Scottish Highlands.

In addition to these, further search will most likely detect in our islands *P. glabra* Schær (erroneously recorded by me as British in "Journ. Bot.," 1876); and also *P. exasperatula* Nyl., which I believe I have seen on the smaller branches of larch trees in Braemar. Both of these belong to this subsection, the former having its nearest ally in *P. olivacea* and the latter in *P. aspidota*.

NOTE ON PARMELIA REDDENDA *STRN.*

By THE REV. J. M. CROMBIE, F.L.S.

Some two years ago I was favoured by Mr. Leighton with the sight of an authentic specimen of *Parmelia reddenda* Strn., so labelled by the author himself. Both in the character of the thallus and in the absence of any chemical reaction of the medulla, it entirely agreed with specimens in my own herbarium and in that of Mr. Bloxam, which I regarded as being merely "*young* states" of *P. Borreri*, not sufficiently evolute for the reactions to become manifest. It so happened that in the beginning of the present year Dr. Nylander in writing upon other matters incidentally mentioned that, running out one wet day in the neighbourhood of Paris he gathered some small juvenile specimens of *P. Borreri*, with the view of demonstrating the reaction to his pupils. In these, however, he next day found no reaction at all. They were therefore *P. reddenda* Strn., and consequently this is nothing autonomous, but merely an accidental state of *P. Borreri*, growing probably like my own specimens in damp shady habitats.

NATAL FUNGI.

Collected by J. M. WOOD, Inanda; *determined by* M. C. COOKE; *and Hymenomycetes by* REV. C. KALCHBRENNER.

Hemileia Woodii, *K. & C.* (No. 28.)
Hexagona polygramma, *Mont.* (No. 169, 201.)
Xerotus nigrita, *Lev.* (No. 189.)
Bovista lilacina, *B. & M.* (No. 408.)
Agaricus (Psalliota) arvensis, *Schff.* (No. 409.)
Agaricus (Stropharia) olivaceo-flavus, *K. & M.O.* (No. 415, 502.)
Coprinus ephemerus, *Fr.* (No. 423.)
Agaricus (Tricholoma) ustalis, *Fr.* (No. 428.)

Agaricus (Psilocybe) atrorufus, *Schff.* (No. 507, 508, 522.)
Agaricus (Omphalia) rusticus, *Fr.* (?) (No. 509.)
Hygrophorus coccineus, *Fr.* (No. 510.)
Agaricus (Psathyrella) pronus, *Fr.* (No. 499, 511.)
Agaricus (Flammula) alnicola, *Fr.* (?) (No. 512.)
Agaricus (Panæolus) caliginosus, *Bull.* (No. 472, 515.)
Agaricus (Pleurotus) limpidus, *Fr.* (No. 518.)
Hypoxylon rubiginosum, *Fr.* (No. 523.)
Coprinus curtus, *Kalch.* (No. 526.)
Thelephora pedicellata, *Schwz.* (No. 532.)
Agaricus (Pholiota) aurlcellus, *Fr.* (No. 533.)
Trametes occidentalis, *Fr.* (No. 535.)
Cephaleuros virescens, *Kze.* (No. 539.)
Dothidea perisporoides, *B.* (No. 541.)
Dothidea repens, *Corda.* (No. 543.)
Agaricus (Collybia) dryophilus, *Bull.* (No. 548.)
Agaricus (Mycena) corticola, *Fr.* (No. 550, 484, 492.)
Graphiola phœnicis, *Poit.* (No. 554.)
Agaricus (Mycena) hiemalis, *Fr.* (No. 555, 498.)
Agaricus (Mycena) clavicularis, *Fr.* prox. (No. 147, 478.)
Clavaria Kunzei, *Fr.* (No. 148.)
Agaricus (Lepiota) Africanus, *Kalch.* (No. 417.)
Agaricus (Omphalia) micromeles, *B. & Br.* (No. 477.)
Hydnum ochraceum, *Pers.* (No. 479.)
Agaricus (Psalliota) sylvaticus, *Schff.* (?) (No. 480.)
Agaricus (Collybia) extuberans, *Fr.* (No. 485.)
Agaricus (Collybia) velutipes, *Fr.* prox. (No. 486.)
Geaster fimbriatus, *Fr.* (No. 489.)
Agaricus (Psathyrella) disseminatus, *Fr.* (No. 490.)
Agaricus (Tricholoma) melaleucus, var. **porphyroleucus,** *Secr.* (No. 495.)
Trametes rigidus, *Fr.* (No. 496.)

Imperfect or insufficient for determination, Nos. 413, 420, 473, 491, 497.

Lenticels on *Rhus.* No. 475.

DR. CARPENTER ON LICHENS.

TO THE EDITOR OF "GREVILLEA."

Sir,—I cannot but regret that Doctor Carpenter, whom I, as an amateur microscopist, am proud to call "master," has, in the last edition of "The Microscope and its Revelations," treated the subject of the nature of the Lichens. On page 392 he says: "The microscopic study of this group has latterly acquired a new interest for the botanist from the remarkable discovery announced in its complete form by Schwendener in 1869 (and now accepted by the highest authorities), that instead of constituting a special type of

Thallophytes parallel to Algæ (with which they correspond in their *vegetative* characters) and Fungi (to which they are more allied in fructification), they are really to be regarded as composite structures, having an algal base, on which ascomycetous fungi have sown themselves and live parasitically."

Then follows a page and-a-half on the subject, but not a word, not a hint, that these views are not accepted by at least a respectable number of cryptogamic botanists, including some of whom many of us, Dr. Carpenter notwithstanding, are inclined to regard as among the "highest authorities."

Doctor Carpenter further says the Lichens "do not furnish objects of interest to the ordinary microscopist." I venture to say that few objects better repay study, and that the peculiar density of their structure, which he says renders their minute examination more than ordinarily difficult, should not deter any one from entering into a field where workers are especially needed.

Yours obediently,

RICHARD B. CROFT,

Hon. Sec. Hertfordshire Natural History Society.

NEW ZEALAND DESMIDIEÆ.*

By William Archer, F.R.S., Hon.F.R.M.S.

This is an interesting contribution to our knowledge of Desmidian forms, and lends aid to sustain the assumption that very many of these are cosmopolitan; it is possible, however, that some of the author's identifications of certain species may not be thoroughly correct.

Whilst it may probably be the more correct course to relegate Aptogonum-species to the genus Desmidium, the difference being only the so-called foramen, that is to say, the lenticularly-shaped open interval between the constituent joints of the filaments, at least *Aptogonum undulatum*, Maskell, is a highly remarkable form. The joints appear to be triangular, two of the aspects alike, and different from the third, causing the end view to appear asymmetrical. Amongst all the Desmidieæ there appears scarcely a similar case, if we except *Cosmarium obliquum*, Nordstedt, an inconspicuous and very unattractive form of great rarity, and otherwise altogether unlike Mr. Maskell's plant: it appears undoubtedly quite distinct from *D. Desmidium*, or *D. Baileyi*.

Sphærozosma vertebratum, *S. excavatum*, and *S. filiforme* all occur in New Zealand. It is curious to note that *S. excavatum* is rare in New Zealand. It is exceedingly common in these countries, and, as at the Antipodes, it is "excessively fragile," that is, the

* "Contributions towards a List of the New Zealand Desmidieæ," by W. M. Maskell, F.R.M.S. (Read before the Philosophical Institute of Canterbury, 7th Oct., 1880.)

filaments are very prone to break up into their constituent joints. The author is in error in supposing that *S. filiforme* does not occur in Britain : it does, but it is rare.

The author experiences difficulty, it would appear, in discriminating between *Micrasterias rotata* and *M. denticulata*: there should not be any. Besides the distinctions long since pointed out, these two species have extremely distinct zygospores. The former, *M. rotata*, has an orbicular zygospore, covered by elongate, subulate, acute spines (thus not very ornate), the latter, *M. denticulata* has a zygospore forming one of the most striking of (large !) microscopic objects, being beset with not so elongate spines, scarcely tapering, and beautifully branched. It resembles thus the zygospore of *Micr. papillifera*, but smaller, and of a brighter green. It is perhaps more difficult to distinguish between *M. denticulata* and *M. angulosa*, Reinsch., on the one hand, and *M. Thomasiana* (which appears only probably to occur in New Zealand) on the other; but both these latter appear to be good species. The author's *M. ampullacea* comes very close indeed to *M. Hermanniana*, Reinsch; the main differences seeming to be the whole of the margins of the lobes being serrated in Mr. Maskell's form, whilst in *M. Hermanniana* the serratures seem to be absent from the lower portions of the sinuses, and its side view also is much more inflated; it seems, however, to be quite distinct from the forms with which the author contrasts it.

Micrasterias (Holocystis) *incisa*, as depicted by the author, does not appear to be "identical," as he says, with Wallich's Indian form, but it is absolutely so with that of Cleve (in Lundell's "De Desmidiaceis," Tab. i., Fig. 7), and called *M. decemdentata*, Näg., *β Upsaliensis*. In fact, if the two figures were made by the two authors from one and the same example, they could not more completely accord. It is probable, therefore, that we might be safe in regarding this as a good species, and it should, presumably, stand as *M. Upsaliensis*, Cleve (the name of course would merely indicate that by Cleve at *Upsala* it was first detected and discriminated).

Mr. Maskell's Euastrum, Fig. 26, seems a truly distinct thing, and ought to have its own name, though he would appear inclined to make the names *E. binale* or *E. elegans* do duty for yet one more besides the several not uncommon forms they already are made to include.

Coming to his Cosmarium-forms, and judging by his figures, 27, 28, and 29, it seems probable that none of the three forms that for a considerable time in these countries had been confused together under the name *Cosm. margaritiferum*, are really (as he supposes to be the case) depicted by him, but that the figures represent rather forms which are notably larger, and probably more akin to *Cosm. biretum*, *C. latum*, *C. Brebissonii*, *C. rotundatum* (? ? ?). The author does not pourtray the appearance of the verrucæ, still less their arrangement; hence the identity of the three figures given remains in considerable doubt.

Staurastrum avicula must be accounted to be wrongly figured in

Ralf's Br. Desm. ; it is apparently not a smooth species, but rough ; the author's figures, 31, 32, hardly accord with the form met with in these countries, and may possibly represent a distinct form.

The author accepts the genus Didymocladon as distinguished from Staurastrum, but there appears to be no tenable grounds for this course ; those Staurastrum-species with two arms or processes, one vertically superposed over the other, at each angle, need no more a separate genus than those other Staurastra likewise with superposed processes, *two* over one, but those divergent at each side, or those again with two processes only at each angle, but placed side by side on the same horizontal line. The author's *Didymocladon stella* seems to be doubtless *Staurastrum sexangulare*, Bulnheim, a species not very aptly named, for, as a rule, the examples occurring in these countries (at least in Ireland) are but five-angled, and here is a New Zealand form with seven angles ; also, four, five, six, and seven angled forms occur in Sweden. Mr. Maskell's plant appears, notwithstanding, on the whole rather smaller, however, than the European form, and the rays rather more slender—whether a minute submarginal series of granules in the sinuses seen in end view occurs in the New Zealand examples does not appear. The beauty of this fine and rare form is somewhat marred by the density of the mucous envelope that usually accompanies it, at least in Irish specimens. It has been lately found by Mr. Wills in North Wales.

The author's *Docidium dilatatum* is doubtless the same thing as *Docidium ovatum*, Nordstedt, first found in collections from Brazil ; it is very interesting to find it reappearing in New Zealand.

Triploceras bidentatum, Maskell, is a very noble new species, and seems very distinct indeed.

So also is the remarkable *Closterium selencæum*, Maskell, a form unique in its shortness and plumpness, and in its relative proportions and its curvature. It is a pity the author colours his figures with so much uniformity—doubtless this fine Closterium will present more or less of the Closterium-fashion in the arrangement of the contents, but it is figured in this respect with a homogeneous green colour, and evenly distributed amylaceous (?) granules, precisely similar to the uniform mode incorrectly shown for the Docidium, the Staurastrum, and the Cosmarium forms, all which are really, in this regard, mutually very diverse ; nor is the shade of green employed that of the grass-green of most Desmidieæ ; but the outlines are without doubt very true to nature.

Touching *Closterium setaceum* and *Cl. rostratum*, these appear distinguishable as they occur with us, but the distinction between the former and one or two of de Brébisson's (*C. elegans*, *C. Kützingii*) do not appear so decided.

Both the forms of Ankistrodesmus recorded, but not named by Mr. Maskell, occur in these countries ; one, that in which the cells forming the bundle stand parallel, but not apposed, in groups, seems well marked ; it is not at all common. Neither these forms,

nor those appertaining to Scenedesmus and Pediastrum, belong, however, to the Desmidieæ.

Doubtless a more prolonged search in the New Zealand localities will eventually add many accessions to the list already enumerated by the author in his interesting communication. He mentions that few zygospores (upon the characters and specialities of which sometimes a good deal depends) have met his observation; as the climate of New Zealand so much on the whole resembles our own, it is probable that the conjugating period may be at the corresponding season of the year to that with us—that is in the spring and early summer—during which the majority of zygospores are met with, although one may alight on an isolated case of conjugation in one or other species at different times of the year. There are, however, very many forms, and indeed the greater number, never yet seen conjugated by any observer; and, again, amongst the species whose zygospores are known, it is not unfrequently the case that the most common and widely diffused forms are those most rarely found conjugated.

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The publication in continuation of these two enumerations is unavoidably postponed on account of the illness of the Editor.

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COOKE, M. C. Illustrations of British Fungi, Part iv.

No. 54.] [December, 1881.

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A QUARTERLY RECORD OF CRYPTOGAMIC BOTANY AND ITS LITERATURE.

ON THE RELATIONSHIP OF ÆCIDIUM BERBERIDIS, Pers., TO PUCCINIA GRAMINIS, Pers.

By Charles B. Plowright*

There are not many more important questions in the whole range of vegetable physiology, than those connected with the entwickelungsgesschichte of the fungus which causes the mildew in wheat. The magnitude of the issues at stake have been forcibly brought before us, who reside in the large corn growing country of Norfolk during the last few weeks, where acres of wheat which, within a month or three weeks of harvest gave promise of an abundant yield, were in less than a fortnight blighted to such an extent that in some instances considerably less than half a crop only was produced.

In the month of May of the present year (1881), I performed some experiments with the view of convincing myself one way or the other upon the connection said to exist between *Æcidium berberidis* and *Puccinia graminis* ; but owing to my non-acquaintance with the proper method of performing them, they resulted in failure. I then wrote to my esteemed friend, M. Max Cornu, who immediately, in the most kind manner, gave me full and explicit directions as to the proper mode of procedure. On the 18th June I commenced a second series of experiments, which have been continuously carried on until the end of September, in which 176 plants of wheat have been employed. I propose laying before you a detailed account of each experiment, in order that you may be enabled to form your own opinion as to their results. But before doing this, I may be allowed to say that they were commenced and conducted, as far as it is possible to do so in such cases, with my mind unbiassed one way or the other, either for or against the theory of heterœcism. For upon the one hand I had a feeling that this theory was, to say the least, very remarkable ; while upon the other, there was the fact of its acceptance, almost without

* Read at the Woolhope Fungus Meeting at Hereford, Oct., 1881.

question, by the majority of continental mycologists, by men whose acumen is undoubted, and who justly rank in the fore front of scientific botany. My mind was in a state of "expectant attention," but I had no other feeling in the matter, having never committed myself to an opinion either *pro* or *con*.

Before detailing these experiments, there are some circumstances that have certain weight, both for and against, which should be fairly stated, in order that a more just opinion may be formed than would otherwise be the case. In the first place it may be thought that the connection, as different states of the same fungus, between an *Æcidium* and a *Puccinia* is too wonderful to be true. We may readily enough accept the numerous other instances of polymorphism afforded by the fungus kingdom, and yet be unable to credit that a parasitic fungus can commence its life on one plant and finish it upon another, especially when the host plants are so far removed from one another, that the one is an exogen and the other an endogen. But this alternation of generation is well known to exist in other departments of the organic world, amongst organisms far higher in the animate scale than cryptogams. To take a well-known example afforded by the *Entozoa*, the *Tenia mediocanellata* (Küch.) commences its existence in the flesh of the ox, as *Cysticercus bovis*, and finishes it in the alimentary canal of man; or *Tenia solium*, Linn., which commences its existence as *Cysticercus celluosæ* in the flesh of the pig, and finishes it in the same situation as the first mentioned cestode.

There exists a widely spread superstition amongst agriculturists, which was credited far more extensively by the past generation of farmers than it is now, that the presence of a barberry bush was connected with the occurrence of mildew in wheat. So much was this the case that in most parts of Norfolk the barberry (*Berberis vulgaris*) has, to a great extent, been exterminated. Now nothing tends more to render a statement incredulous to people in general and to scientific minds in particular than to brand it with the title of superstition. We dislike above all things to be thought superstitious, it is derogatory to our intellectual status. Without entering upon the question generally, of whether most superstitions have not a strain, however meagre, of truth underlying them, this sentiment has not been without considerable influence in rendering us chary of accepting the heterœcism of *Puccinia graminis*. It must, however, be borne in mind that the connection of barberry bushes with mildewed wheat presumably arose, as a matter of observation on the part of our forefathers, when they suffered from the pest.

Leaving these subsidary considerations and for the moment discarding the element of heterœcism, let us consider whether there be any impossibility in the *Æcidia* generally being the earlier states of certain *Pucciniæ*. It is presumed that no one now doubts the connection of the majority of *Uredines* with *Pucciniæ*, and it must be borne in mind that a much greater difference existed in

form, colour and spore structure between *Puccinia* and *Uredo* than is the case with *Æcidium* and *Uredo*. The free spores of many species of *Æcidium* cannot be distinguished from the spores of many *Uredines*. *Æcidium* as a genus differs from *Uredo* principally in the possession of spermogonia, of a peridium, but more particularly in producing its spores in chaplets. All *Æcidia*, however, do not possess spermatia, for of the thirty-two species enumerated as British in the "Handbook," the presence of spermogonia is only noted in four; while certain *Uredines* are provided with them, *e.g.*, *U. suaveolens*, Pers., *U. orchidis*, Mart., *U. gyrosa*, Rebent, *U. mercurialis*, Link., *U. Euonymi*, Mart., and *U. pinguis*, D.C.*

Sir John Lubbock, in his address to the British Association at York, last August, has very pertinently said, "Naturalists are now generally agreed that embryological characters are of high value in classification," the truth of which assertion is daily becoming more and more accepted by students of Natural History.

Now when we cause the spores of *Æcidia* to germinate under circumstances in which we can watch the process, we find they do so in exactly the same manner as *Uredo* spores, namely, by the protrusion of a hyaline tube through the epispore. This hyaline tube gradually elongates, and into it are emptied the contents of the spore, which are passed onwards until they eventually reach the end of the tube. This tube (or tubes, for there may be more than one) undergoes in both instances the same spiral movements, and, unlike the tube produced by the germinating *Puccinia* spore, it does not, as a rule, produce secondary spores.

The association of *Æcidium* with *Uredo* (in some state or other, either as *Uredo*, *Puccinia*, *Uromyces*, or *Coleosporium*) upon the same plant, often upon the same individual, and even upon the same leaf, is a fact well known to practical mycologists.

Of the thirty-two species of *Æcidium* enumerated in "Cooke's Handbook of British Fungi," this association exists in twenty species. In some cases we find in nature this exists very closely, *e.g.*, *Æc. ranunculacearum*, D.C., and *Uromyces ficariæ*, Lev., *Æc. epilobii*, D.C., and *Puc. epilobii*, D.C. *Æc. compositarum*, Mart., and *Puc. compositarum*, Sch., are often found upon the same leaf; while *Puc. sparsa*, Cooke, is expressly said by Dr. Cooke to be "only found amongst or near the exolete pustules of *Æcidium Tragopogonis*, Pers.†

There is, however, a much wider question broached when we come to associate the *Æcidium*, known only to exist upon an exogenous plant with a *Puccinia* confined to endogenous plants. In order to convince reasonable minds, the evidence must be unimpeachable and complete. No mere coincidences, however

* Tulasne—"Second Mémoire sur les Médinées et les Ustilaginées." "Ann. des Sciences Nat.," 4 series, vol. ii., p. 116.

† Cooke—"Handbook of British Fungi," p. 498.

numerous, can *per se* be taken as conclusive. It was in the hope that reliable evidence one way or the other could be obtained, that the following series of experiments have been, during the past five months, carried on, and which I now venture to place before you :—

Experiment I.—On 18th June, 1881, seven healthy young wheat plants, about 6 inches in height, were infected with the spores of *Æcidium berberidis*, which were mixed with water, and freely applied to both surfaces of the leaves, and particularly to the angle which the blade forms with the stem. The pots containing the infected plants were covered by a large bell glass, and plunged, with great care, into the ground. At the same time 18 precisely similar wheat plants, grown from the same seed, were placed in the ground in a pot, and covered by a bell glass, to be kept as check plants. The *Æcidium* was obtained from North Wootton, distanced $3\frac{1}{2}$ miles, and the spores were used for inoculation within two hours from the time they were gathered. A number of them were at the same time placed upon a drop of water on a glass slide, and kept in a damp atmosphere for 48 hours, when they were found to have germinated freely, which was proof positive of their vitality, and that they had not been injured by removal. Both groups of plants were watered from time to time, which was done by raising the edge of the bell glass covering them, an inch or two. At the end of 10 days the bell glasses were removed, and the plants examined daily. On the 25th day a single spot of *Uredo* was observed upon one of the infected plants; the others all remaining free. On the 30th day this leaf was removed and examined, and found to be veritable *Uredo linearis*. On the 32nd day two more of the infected plants had *Uredo* upon them, but it was now found upon the check plants : that is, in 22 days from the time they were uncovered. On the 43rd day the experiment was concluded, when the whole of the seven infected plants had *Uredo* upon them, as well as 16 out of the 18 check plants.

Experiment II.—On the 2nd July three wheat plants, about the same size as those used in the previous experiment, were infected with the spores of *Æcidium berberidis*, obtained from the same source, under similar conditions to those of the former experiment. Three similar wheat plants, grown from the same seed, were kept as a check experiment. Both groups of plants were covered by bell glasses. The vitality of the *Æcidium* spores were proved by their germinating freely in 20 hours. On the 10th day the bell glasses were removed. On the 15th day a yellow spot was seen upon one of the infected plants; and on the 17th day all the infected plants had undoubted *Uredo* upon them; the check plants remaining healthy. On the 23rd day the experiment was concluded, and the whole of the plants taken up. All three infected plants had abundant *Uredo* upon them; but the check plants remained free from it.

Experiment III.—On the 5th July two plants of wheat were

infected with *Æcidium* spores from the same source, and three plants kept as checks; both were covered by bell glasses. The infected plants were, however, kept covered a few days longer than the check plants. The *Æcidium* spores germinated freely in 22 hours. On the 13th day *Uredo* appeared upon one of the check plants, and on the 14th day upon another; the infected plants remaining healthy. The experiment was terminated on the 31st day, when both check and infected plants were found to have *Uredo* upon them.

Experiment IV.—On the 9th July one wheat plant was infected with *Æcidium* spores from the same source, and a similar wheat plant kept as a check. The experiment was conducted in the same manner as the others. The germination of the *Æcidium* spores was tested by placing some upon a glass slide in a drop of water, and keeping them in a damp atmosphere. They did not germinate for 48 hours, and then only very feebly. I noted at the time "Very faint attempts at germination have taken place; the contents of the slide were placed at 10 a.m. to-day (July 11) on the leaves of the infected plant. I think this experiment must fail, so weakly have the spores germinated." Notwithstanding this, however, by the 26th day both the infected and the check plant had *Uredo* upon them.

The hope of demonstrating unequivocally the truth of the heterœcism of *Puccinia graminis* had by this time become so seriously imperiled that I determined upon varying my method of procedure. One hardly ever sees every individual plant in a state of nature, infected with the same parasitic fungus, and it occurred to me that by keeping my check plants covered by bell glasses they were debilited, and so rendered unduly liable to be attacked by the *Uredo*. I therefore determined to grow my check plants naturally, and only to cover my infected plants for as short a time as was compatable with the period necessary for free germination to take place in the *Æcidium* spores; after they had been placed upon the leaves. My supply of *Æcidium berberidis* now failed, and I had to procure the fresh spores from Narborough, distanced about nine miles by rail, where several barberry bushes grew about a mile from the station.

Experiment V.—On the 26th July ten wheat plants were infected with *Æcidium berberidis* spores from Narborough, and ten similar wheat plants, grown from the same seed, selected as check plants. These latter were never at any time covered by any bell-grass, and were planted about six inches apart, some 30 yards from where my other experiments had been performed. On the 16th day three of the infected plants had *Uredo* upon them; on the 25th day the experiment was concluded. Five of the infected plants had *Uredo* on them and nine of the checks.

Experiment VI.—On the 26th July seven wheat plants (two of which were only half an inch high with unexpanded blades) were inoculated with *Æcidium* spores from Narborough, and seven wheat

plants selected for check plants which were never covered. The *Æcidium* spores germinated freely upon a glass slide. On the 17th day *Uredo* appeared on the five oldest of the infected plants. On the 24th day the experiment was concluded. There were then five infected plants with *Uredo* upon them, the two youngest having escaped and seven check plants with *Uredo* upon them.

Experiment VII.—On the 29th July five wheat plants were inoculated with *Æcidium* spores from Flitcham (distanced 8 miles), and a similar number of check plants selected. On the 12th day *Uredo* was observed on the five infected plants, and upon two, possibly upon three of the checks.

Experiment VIII.—On the 29th July four wheat plants were infected with *Æcidium* from Flitcham, and a like number of check plants selected. On the 9th day all the infected plants had *Uredo* on them, as had three of the check plants.

Experiment IX.—On the 1st August four plants were infected with *Æcidium* from Narborough, and four plants selected as checks. On the 22nd day three of the infected plants and three of the check plants had *Uredo* upon them.

I now determined upon asking my friends to grow the check plants for me, as I came to the conclusion that my garden was saturated with the spores of *Uredo linearis*.

Experiment X.—On the 19th July some foreign wheat was planted, and a portion of the same seed wheat sent to Mr. Phillips, at Shrewsbury, with the request that he would plant it in his garden, and in due time select six check plants to be kept against six which I would inoculate in Kings Lynn. This Mr. Phillips kindly consented to do, and upon the 1st August I duly inoculated my six plants with spores of *Æcidium berberidis* from Narborough. I kept my plants almost continuously covered until the end of the experiment. On the 7th day *Uredo* appeared upon two of my infected plants, on the 8th day upon three more. As soon as I observed my plants had developed the *Uredo* I pulled up each affected plant so that it might not infect the others. On the 15th day Mr. Phillips wrote me word that all his six plants were attacked by *Uredo*. I had still one of my infected plants which remained healthy ; this, however, on the 19th day developed the *Uredo* and the experiment was terminated.

Experiment XI.—A sample of wheat was divided between my friend, the Rev. J. M. Du Port, of Mattishall, near East Durham, and myself, and the experiment conducted in the same manner as the preceding, excepting that Mr. Du Port sowed his wheat in two patches, Nos. 1 and 2, in two different parts of his garden. Patch No. 2 being sown three days later than No. 1, there being eight plants in each patch. On the 8th August I infected eight plants with *Æcidium* from Narborough, which were covered by a bell glass for 12 days. It was then removed for 48 hours and replaced on the 14th day. On the 15th day three of my infected plants had *Uredo* upon them, on the 25th day one more, on the 28th

day two more, on the 31st day one more. At this time the experiment ended, and Mr. Du Port reported that patch No. 1 had three plants in it with *Uredo* upon them, but that patch No. 2 had not a single sound plant in it.

Experiment XII.—15 wheat plants grown in my garden from one of the best samples of last year's wheat that had been offered in the Lynn Market, were on the 11th August infected with *Æcidium* from Narborough. I purposely kept this *Æcidium* 62 hours in a damp atmosphere in my study, and used the water upon which the spores had abundantly fallen, as well as the spores themselves, for infecting the wheat plants. On the 17th day three plants developed *Uredo*, on the 20th day six more, on the 22nd day one more, on the 23rd day two more, making a total of 12 infected plants out of 15, which developed the *Uredo* in the course of 23 days. Of the 15 check plants seven only were diseased.

Experiment XIII.—The thirteenth and final experiment was conducted upon a totally different principle. The seed wheat was poisoned by steeping it in a solution of cupric sulphate; and the ground in which it was planted was watered with a solution of carbolic acid in water. Two bell glasses thoroughly disinfected with carbolic acid and the copper solution were placed over both the patch to be used as check plants, and over the pots containing plants to be infected. These bell glasses were never touched until the plants were large enough to infect. On the 20th August six were inoculated with *Æcidium* spores from Narborough. A few days later, purposely choosing a day when there was no wind, the check plants were reduced to six. The bell glasses were not again removed until the 20th day, when both patches were rapidly but thoroughly examined and found free from *Uredo*. The glasses were replaced, and the plants re-examined on the 30th day. These were then finally removed and the plants thoroughly examined, but no trace of *Uredo* found upon either the infected nor upon the check plants.

The result of these 13 experiments may be thus summarised :—

Seventy-eight wheat plants were infected with the spores of *Æcidium berberidis* and 98 similar wheat plants kept as check plants against them. Of the infected plants 76 per cent. developed *Uredo* in an average of 24·4 days. While in the same period 70 per cent. of the uninfected plants became spontaneously attacked by *Uredo*. One experiment only (No. 2) out of the 13 was wholly in favour of the theory, and that lasted only 23 days. Still 6 per cent. more of the infected plants took the *Uredo* than of the uninfected. This is a very small portion, far too small in my humble opinion to constitute convincing evidence. I believe, however, that it can be accounted for by my own negligence in not thoroughly cleaning the bell glasses before using them to cover fresh plants. Had the last experiment (No. 13), however, proved favourable to the theory I should have regarded it as being much more worthy of acceptation than I can now do. It is only after

TABLE OF EXPERIMENTS.

Number of Experiment.	Date.	Number of Plants infected.	Number of Check Plants.	Day on which *Uredo* first appeared upon infected plants.	Total duration of experiment in days.	Number of infected plants with *Uredo* when the experiment was concluded.	Number of Check Plants with *Uredo* when the experiment was concluded.	REMARKS.
I.	18 June	7	18	25	43	7	16	Check plants covered for about 8-10 days.
II.	2 July	3	3	17	23	3	0	,,
III.	5 July	2	3	13	31	2	3	,,
IV.	9 July	1	1	26	26	1	1	,,
V.	26 July	10	10	16	25	5	9	Check plants never covered.
VI.	26 July	7	7	17	24	5	7	
VII.	29 July	5	5	12	12	5	3	
VIII.	29 July	4	4	9	9	4	3	
IX.	1 Aug.	4	4	22	22	3	3	
X.	1 Aug.	6	6	7	19	6	6	Mr Phillips kept Check plants.
XI.	8 Aug.	8	16	15	31	7	11	Rev. J. M. Du Port kept Check plants.
XII.	11 Aug.	15	15	17	23	12	7	
XIII.	20 Aug.	6	6	—	30	0	0	Protected throughout from accidental infection.
	Total	78	98	Average 15·1 days	Average 24·4 days	Average 76 per cent.	Average 70 per cent.	

much patient work and careful consideration that I felt myself bound to differ from the eminent botanists abroad who do accept the heteræcism of *Puccinia graminis* as established beyond question.

There are two other experiments not included in the above thirteen which were performed by me that I think worthy of notice.

Experiment No. 36.—On the 2nd August one oat plant with 10 leaves upon it was inoculated with *Æcidium berberidis* spores. A very large quantity of ripe *Æcidium* spores was used—on the 15th day *Uredo* appeared upon the oat plant. On the 9th September (38th day) these *Uredo* spores were examined and found to be the *Uredo* of *Puccinia coronata* Corda. Now had this experiment been carelessly performed the inference would have been that the *Æcidium* spores had produced the *Uredo* of *P. graminis*.

Experiment No. 40.—Six wheat plants were infected with the spores of *Uredo linearis* at 4 p.m. on the 13th August. On the 24th they all were simultaneously affected with *Uredo* showing that the *Uredo* had reproduced itself in 11 days.

NEW BRITISH FUNGI.

By M. C. Cooke.

(*Continued from Vol.* ix, *p.* 126.)

Agaricus (Tricholoma) ori-rubens, *Quelet.*

Pileus fleshy, convex, fragile, *smooth, grey*, brownish in the centre, clad with blackish fibrils; stem solid, fibrous, white, streaked with rose at the base; flesh white, odour mealy; gills emarginate, undulated, white with the edge rose; spores oval, white. *Quelet, Champ. du Jura et des Vosges*, p. 327.

On the ground. Near Hereford, 1881.

Agaricus (Clitocybe) catinus, *Fr. Hym. Eur.*, p. 99.

White, becoming discoloured; pileus fleshy, thin, plane, then infundibuliform, flaccid, dry, smooth; stem stuffed, elastic, erect, somewhat attenuated upwards; gills decurrent, rather crowded, white. *Fr. Icon.*, t. 51, f. 4.

Among dead leaves. Near Ludlow, 1881.

About the size, or rather larger than *Agaricus infundibuliformis*, and similar in habit.

Agaricus (Clitocybe) difformis, *Pers.*

This species, inserted in Cooke's "Handbook," No. 105, in succession to Berkeley's "Outlines," p. 112, must now be excluded. The figure of Bolton (t. 17) is undoubtedly *Agaricus pithyophilus*, and this is the only slender evidence on which it has been assumed that *Ag. difformis* is found in Britain. As this notice includes both "Outlines" and "Handbook," it may be added that the Rev. M. J. Berkeley concurs.

Agaricus (Clitocybe) tumulosus, *Kalchb. Icon.*, t. 5.

Cæspitose. Pileus fleshy, conical, then expanded, umbonate, even, smooth, umber, growing paler; stem solid, floccose-pruinose, pallid; gills slightly emarginate and decurrent, crowded, white, then cinereous. *Fries Hym. Eur.*, p. 92.

In woods. Near Hereford.

Found and drawn by Dr. Bull some years ago; again found in Oct., 1881.

Agaricus (Clitocybe) subinvolutus, *Batsch.*

Pileus tan-coloured or testaceous, smooth, depressed, margin involute; stem stout, erect, longitudinally rugose with elevated veins, rather tomentose at the apex, somewhat tinged with flesh colour; gills rather broad, nearly of the colour of the pileus, decurrent. *Batsch. Consp.*, t. 204.

In woods, chiefly of *Coniferæ*.

Found also by Rev. M. J. Berkeley, who agrees in regarding it as quite distinct from the species figured under this name by Saunders and Smith, and the true species of Batsch.

Agaricus (Entoloma) Persoonii, *Du Port.*

Pileus campanulate, squamose-tomentose, shining white; stem rather long, somewhat bulbous at the base, fibrillose, whitish; gills crowded, slightly adnexed, fleshy red. *Agaricus sericeus, Pers. Icon. et Desc.* i., t. 6, f. 4.

On the ground. Near Dereham.

Stem sub-bulbous and solid at the base, hollow above, rather slender, 2½ lin. thick, pilose-squamulose; pileus shining, silky, convex, obtusely umbonate, white, then pallid, substance rather fleshy, fragile; gills crowded, 2 lin. broad, slightly adnexed, fleshy red. *Persoon.*

The Rev. M. J. Du Port found three or four specimens answering to the figure given by Persoon, but as this is not the *Agaricus sericeus* of Fries, that gentleman proposes for it the name above given.

Agaricus (Hebeloma) nudipes, *Fr. Hym. Eur.*, p. 242.

Pileus fleshy, convex, then plane, obtuse, even, nearly smooth, slightly viscid; margin thin; stem solid, equal, pelliculose, smooth, naked, white, fibrillose at the base; gills emarginate, crowded, dry, clay-coloured. *Kalchb. Icon.*, t. 14, f. 4; *B. & Br. Ann. Nat Hist.*, 1868.

In woods. Coed Coch, 1880.

Stem 1½in. long, 4-5 lines thick. Pileus 2 inches broad, tan-coloured, becoming pallid. Odour faint, not unpleasant.

Agaricus (Hebeloma) firmus, *Fr. Hym. Eur.*, p. 238.

Pileus fleshy, *campanulate*, then expanded, *umbonate*, viscid, *brick-red*, discoid; stem solid, firm, pallid, attenuated downwards, everywhere clad with *floccose scales;* gills rounded, crowded, *dry*, clay-coloured, then ferruginous, edge serrated, white. *Pers. Ic. et Descr.*, t. 5, f. 3-4; *B. & Br. Ann. N. Hist.*, No. 1869.

In fir woods. Coed Coch, 1880.

Agaricus (Naucoria) hamadryas, *Fr. Hym. Eur.*, p. 254.

Pileus rather fleshy, convex, then expanded, gibbous, even, ferruginous-bay, when old and dry of a fleshy red; stem hollow, equal, smooth, pallid; gills attenuated, adnexed, almost free, ferruginous. *B. & Br. Ann. Nat. Hist.*, No. 1870.

In woods. Brandon (C. B. P.).

Pileus 1½-2in. broad; stem 2-3in. long, 3 lin. thick, fragile.

Agaricus (Naucoria) abstrusus, *Fr. Hym. Eur.*, p. 257.

Pileus rather fleshy, convex, obtuse, even, smooth, viscid, ferruginous clay colour; stem fistulose, rigid, smooth, ferruginous; gills adnate, crowded, plane, watery ferruginous. *B. & Br. Ann. Nat. Hist.*, No. 1871.

On sawdust. Coed Coch, 1880.

Pileus 1½in. broad.

Agaricus (Naucoria) tenax, *Fr. Hym. Eur.*, p. 261.

Pileus rather fleshy, campanulate, then expanded, smooth, slightly viscid, hygrophanous; stem stuffed, then hollow, equal, yellow, becoming tawny, striate with adpressed fibrils, becoming smooth, veil fugacious; gills adnate, rather distant, edge entire, whitish. *B. & Br. Ann. Nat. Hist.*, No. 1872.

On grassy walk. Coed Coch, 1879.

Pileus usually cinnamon colour.

Agaricus (Naucoria) rubricatus, *B. & Br.*

Cæspitose, white, then reddish tinted; pileus small, at length becoming plane; stem slender. *Ann. Nat. Hist.*, No. 1873.

On decayed twigs. Hereford, 1878 (Miss Ruth Berkeley).

Having made a drawing of this species at the time it was found I am able to add somewhat to the above description. It was growing on a bramble twig. The largest specimen was scarce half an inch high, and the diameter of the pileus about a quarter of an inch; the stem hollow, sprinkled with delicate mealy granules at the base, and about half-way up; gills adnexed behind and narrowed in front, whitish, then flesh-coloured, becoming brownish. —M. C. C.

Agaricus (Psalliota) comptulus, *Fr. Hym. Eur.*, p. 231.

Pileus rather fleshy, convex, then plane, obtuse, smooth or with an adpressed silkiness; stem hollow, somewhat attenuated, ring medial, fugacious, white, then yellowish; gills free, crowded, broadest in front, flesh-coloured, then roseate. *B. & Br. Ann. Nat. Hist.*, No. 1874.

In grassy places. Coed Coch, 1880.

Stem 2in. long, 2-3 lin. thick.

Agaricus (Stropharia) inunctus, *Fr. Hym. Eur.* p. 284; "*Grevillea*," Vol. i, p. 183.

"A pale form occurred at Sibbertoft, which we should have been inclined to refer rather to *Ag. albocyaneus*; but the cuticle peeled off with the greatest ease, and after a heavy rain it dripped with gelatinous matter. It resembles greatly Fries's figure of *A. torpens*, var." *B. & Br. Ann. Nat. Hist.*, No. 1875.

Agaricus (Hypholoma) appendiculatus, *Bull.* var. **lanatus.**

"A curious form occurred in a hollow apple tree at Sibbertoft, densely woolly when young, traces of the woolly coat remaining at the apex of the pileus when fully expanded." *B. & Br. Ann. Nat. Hist.*, No. 1876.

Coprinus narcoticus, *Batsch.*, fig. 77.

Fœtid. Pileus very thin, clavate, then expanded, woolly, with white recurved floccose scales, at length naked and striate, hyaline; stem fragile, woolly, white, becoming smooth; gills free, approximate, white, then blackish. *Fr. Hym. Eur.*, p. 329. *B. & Br. Ann. Nat. Hist.*, No. 1877.

On dung. Shrewsbury (W. Phillips).

"Smell highly disagreeable."

Cortinarius (Myxacium) salor, *Fr. Hym. Eur.*, p. 357.

Pileus conico-campanulate, viscid, then expanded; disc compact, gibbous; margin thin, fibrillose, violet; stem solid, bulbous, conically attenuated, smooth, with the glutinous blue veil adhering at the apex; gills adnate, rather distant, quite entire, grey, then clay-coloured, with a violet edge. *B. & Br. Ann. Nat. Hist.*, No. 1878.

On the ground. Coed Coch.

"In considerable abundance, but rather decayed. The base of the stem was strangely swollen, showing the original universal veil half way up the swelling, which ends abruptly. The head still covered with the bluish slime."—*B. & Br.*

Cortinarius (Myxacium) illibatus, *Fr. Hym. Eur.*, p. 358.

Pileus fleshy, thin, campanulate, then convex, pelliculose; stem hollow, soft, thin, white, smooth, viscid; gills adnate decurrent, arcuate, crowded, flesh-coloured, then clay-coloured cinnamon. *B. & Br. Ann. Nat. Hist.*, No. 1879.

In pine woods. Coed Coch.

Stem 3 in. long, 2 lin. thick. Pileus 1-2 in. broad, yellowish, with the disc darker.

Cortinarius (Telamonia) impennis, *Fr. Hym. Eur.*, p. 376.

Pileus fleshy, convex, obtuse, rigid, becoming smooth, somewhat testaceous, or brick red, discoloured; stem solid, short, slightly bulbous, pallid, with the apex and rings or bands of violet, veil white; gills adnate then emarginate, distant, thick, violet, soon purplish, at length watery cinnamon.—*B. & Br. Ann. Nat. Hist.*, No. 1880.

In pine woods.

Stem 2 in. long, $\frac{1}{2}$ in. thick.

Cortinarius (Telamonia) flabellus, *Fr. Hym. Eur.*, p. 384.

Pileus rather membranaceous, conical then expanded, obtusely umbonate, olive brown becoming pale (tan-coloured), fibrillose; stem stuffed then hollow, flexuous, floccosely squamose, pallid; squamules and ring white; gills adnate, connected by veins,

linear, rather crowded, olive then ferruginous. *B. & Br. Ann. Nat. Hist.*, No. 1881.

In moist places. Coed Coch, 1880.

Odour strong.

Cortinarius (Telamonia) paleaceus, *Fr. Hym. Eur.*, p. 386.

Pileus rather membranaceous, conical then expanded, umbonate, squamules silky white then becoming tawny; stem fistulose, flexuous, ringed with white scales, which also become tawny; gills adnate, truly crowded, whitish, at length cinnamon. *B. & Br. Ann. Nat. Hist.*, No. 178; *Grevillea t.* 113, *f.* 5, *t.* 114, *f.* 4.

On the ground. Near Hereford (Dr. Bull). Coed Coch.

"Apparently a very variable species."

Cortinarius (Hydrocybe) jubarinus, *Fr. Hym. Eur.*, p. 393.

Pileus rather fleshy, campanulate, then expanded, smooth, shining tawny cinnamon; stem stuffed, then hollow, firm, striate with fibrils, becoming tawny, fugacious, veil white; gills adnate, rather distant, tawny cinnamon. *Bull. t.* 431, *fig.* 1; *B. & Br. Ann. Nat. Hist.*, No. 1883.

In pine woods. Coed Coch. Abundant early in 1879.

Cortinarius (Hydrocybe) fasciatus, *Fr. Hym. Eur.*, p. 399.

Pileus membranaceous, conical, then expanded, smooth, tawny, umbo rather fleshy, acute, becoming blackish; stem almost hollow, splitting in fibrils, rather undulated, smooth, pallid then tawny; gills adnate, thin, rather distant, cinnamon. *B. & Br. Ann. Nat. Hist.*, No. 1884.

In pine woods. Coed Coch.

Stem 2-3 in. long, 1 lin. thick. Pileus ½ inch broad, rarely more.

Hygrophorus sciophanus, *Fr. Hym. Eur.*, p. 417.

Pileus somewhat brick-red, convex, then depressed, obtuse, slightly viscid, opaque, margin striate; stem hollow, equal, rather flexuous, even; gills decurrent, distant, connected by veins. *Fl. Dan. t.* 1845, *f.* 2; *B. & Br. Ann. Nat. Hist.*, No. 1885.

In mossy places. Coed Coch.

Hygrophorus subradiatus, *Schum. Fr. Hym. Eur.*, p. 416.

Pileus rather membranaceous, radiately striate, disc rather fleshy, somewhat umbonate, tawny; stem fistulose, equal, smooth, pallid, white at the base; gills adnate, with a long decurrent tooth, ventricose, thin, distant, white. *B. & Br. Ann. Nat. Hist.*, No. 1886.

On heathy ground. Shrewsbury (W. Phillips).

Lactarius flexuosus, *Fr. Hym. Eur.* p. 427.

Pileus compact, convex, then fractured and repand, dry, smooth, at length cracking into scales, opaque, lurid, becoming pale; stem solid, stout, unequal; gills thick, distant, yellowish; milk acrid, white. *Harzer i.* 43.

In woods. Haywood Forest, Woolhope Foray, 1881.

Lactarius intermedius, *Krombh. t.* 58, *fig.* 11-13.

Pileus fleshy, broad, infundibuliform, viscid, smooth, ochraceous yellow, margin involute, tomentose, then smooth; gills broad, lurid, whitish, somewhat decurrent, affixed, entire; stem short, thick, solid, or sometimes hollow, yellowish, covered with spot-like depressions; milk white then yellowish, rather acrid. *B. & Br. Ann. Nat. Hist.*, No. 1887.

In woods. Dereham (Rev. J. M. du Port).

Referred by Fries to *Lactarius cilicioides.*

Russula (Furcatæ) drimeia, *Cooke.*

Acrid, peppery. Pileus compact, firm, convex, then depressed, scarcely viscid when moist, opaque when dry, bright purple; margin sub-incurved, even; stem solid, firm, cylindrical, equal, tinged with purple; gills adnexed, scarcely crowded, narrow and furcate at the base, at first pale sulphur-yellow, then deeper yellow, never white; spores pale ochre.

On the ground, amongst larch. Black Park, Sept., 1881.

Pileus 2-4 inches broad. Stem 2-3 inches long, $\frac{1}{2}$-$\frac{3}{4}$ inch thick. So intensely peppery that after tasting a small fragment, the tongue tingled for more than half an hour. Gathered in company with H. T. Wharton, Esq. The colour and habit similar to *R. Queletii*, but distinguished by the yellow gills, ochraceous spores, and intensely peppery taste.

Russula (Rigidæ) cutefracta, *Cooke.*

Mild. Pileus fleshy, firm, dry, opaque, variable in colour, green, purple, dull red, &c., convex, then a little depressed in the centre, cuticle cracking from the margin inwards into minute firmly adnate areolæ, otherwise even; flesh beneath the cuticle tinged with purple; stem firm, solid, nearly equal, or a little attenuated above, smooth, slightly tinged with purple; gills somewhat crowded, narrowed behind, furcate, adnexed, or nearly free, white.

On the ground in woods. Epping, Kew Gardens, Dinedor, and other places around Hereford.

Pileus 3-4 inches or more. Stem 3 inches long, often 1 inch thick. Allied to *R. virescens*, which it resembles in the cracking of the cuticle, but differs in the purple tint beneath, even in green specimens, and in the tinted stem, as well as in the colour of the pileus, which is of a darker and different shade of green, and sometimes of a deep bluish-purple, as well as of a madder-red.

Figures of these two species will ultimately be published in the "Illustrations."

Marasmius urens, *Fr.*

"A curious form with the pileus becoming very dark when fully grown, and exceedingly acrid, occurred in a hothouse at Coed Coch in profusion for many weeks in September and October, with the white form of *Ag. cepæstipes*, and *A. meleagris*."—*B. & Br. Ann. Nat. Hist.*, No. 1889.

Polyporus (Resupinati) umbrinus, *Fr. Hym. Eur.*, p. 571.

Resupinate, determinate, undulating, tuberculose, reddish umber; margin smooth, paler; pores minute, rather rounded, unequal, of the same colour. *Rostk. t.* 27, *fig.* 6; *B. & Br. Ann. Nat. Hist.*, No. 1890.

On trunks. Knowle Park.

Polyporus (Resupinati) reticulatus, *Fr. Hym. Eur.*, p. 580.

Orbicular, thin, falling away, white; margin floccose with radiating fibres; pores distant, cup-shaped. *B. & Br. Ann. Nat. Hist.*, No. 1891.

On putrid wood. Hereford, 1878.

Dædalea aurea, *Fr. Hym. Eur.*, p. 587.

Golden yellow. Pileus between corky and coriaceous, gibbous, velvety, somewhat zoned, of one colour; hymenium at first poriform then labyrinthiform, yellow. *Batt. t.* 35, *fig.* F; *B. & Br. Ann. Nat. Hist.*, No. 1896.

On prostrate trunk. Near Hereford (M. C. C.).

"Imbricated, the veins for the most part straight and radiating."—*B. & Br.*

Hydnum rufescens, *Fr. Hym. Eur.*, p. 601.

Pileus thin, nearly regular, pubescent; stem almost equal; spines regular, of the same colour. *B. & Br. Ann. Hat. Hist.*, No. 1892.*

On the ground. Dolgelly (Miss Ruth Berkeley).

"Differing from *H. repandum* in having the pileus distinctly tomentose, in this case studded with little warts."—*B. & Br.*

Hydnum acre, *Quelet Bull. Soc. Bot. Fr.* xxiv., *t.* 6, *f.* 1.

Stem short, grey, bistre at the base; pileus fleshy, compact, turbinate, flattened, tomentose; pale bistre, browner in the centre; flesh greyish or bistre, fragile and bitter; spines grey-bistre with the extremities whitened; spores (·006 mm.) very spinulose. *B. & Br. Ann. Nat. Hist.*, No. 1893.

In fir woods. Forres (Rev. J. Keith).

Cyphella Bloxami, *B. & Phil.*

White, floccose, membranaceous. Disc yellowish, crenately lobed; flocci smooth, sporophores turbinate. Spores (·0003-·0004 in.), ·0076-·01 mm. *B. & Br. Ann. Nat. Hist.*, No. 1894.

On *Ulex*. Twycross (Rev. A. Bloxam).

Clavaria canaliculata, *Fr. Hym. Eur.*, p. 678.

Solitary, fistulose, rather tough, quite smooth, not rooting, white, at length compressed, channelled, or splitting longitudinally. *Quelet*, t. 21, fig. 1; *Bull.*, t. 496, fig. L. M. *B. & Br. Ann. Nat. Hist.*, No. 1895.

On grassy ground. Coed Coch.

About 3 inches long.

Myxosporium dracænicola, *B. & Br.*

Orange. Spores ovate. *B. & Br. Ann. Nat. Hist.*, No. 1896.

On leaves of *Dracæna*.

Spores (·00835 in.), ·0085 mm. long, and (·0002 in.) ·005 mm. wide.

"On the same leaves, scattered in the form of minute black specks, was a *Diplodia*, with oblong uniseptate spores, slightly constricted in the middle, colourless, and probably immature (·0006-·0007 inch), ·015-·017 mm. long. These are doubtless states of more perfect fungi, but are mentioned here because they are connected with a disease which seems fatal to *Dracænæ*." *B. & Br.*

Glæosporium Lindemuthianum, *Sacc. in Fungi Italici*, fig. 1032, *Michelia*, i. 129.

Spots subrotund, brownish, at first girt with a rufous line. Sori dirty white in the middle of the spots, inflated, then erumpent. Sporophores fasciculate, cylindrical. Conidia apical, oblong, straight or curved, rounded at the ends, ·016-·019 × ·0045-·0055 mm. *M. J. B. in Gard. Chron.*, Sept. 17, 1881. *Septoria Leguminum*, Desm. Exs.

On leaves, stems, and pods of dwarf French beans.

Glæosporium cytisi, *B. & Br.*

Spots white, one time or other circled with red. Perithecia minute; spores minute, elliptic. *B. & Br. Ann. Nat. Hist.*, No. 1897.

On *Cytisus laburnum*. Glamis (J. S.).

Protomyces melanodes, *B. & Br. Gard. Chron.* Sept. 1879, p. 403.

External cells filled with a violet mass which becomes blackish. Spores elliptical, hyaline (·0006 in.) ·015 mm. long. *B. & Br. Ann. Nat. Hist.*, No. 1898.

On leaves and inflorescence of *Phlox*.

Cryptosporium turgidum, *B. & Br.*

Perithecia globose, rather prominent, obtuse; spores curved, obtuse at each end, faintly triseptate. *B. & Br. Ann. Nat. Hist.*, No. 1899.

On ash. Twycross (Rev. A. Bloxam).

Spores ·0008 inch-·02 mm. long.

Sporonema phacidioides, *Desm.*

Scattered, numerous, minute, rounded, flattened, dark brown, splitting in 4-5 unequal obtuse teeth. Disc nearly plane, cinnamon. Spores ovate-oblong, binucleate, ·005 mm. long. *Desm. Ann. des Sci. Nat.*, 1847, viii., 182; *B. & Br. Ann. Nat. Hist.* No. 1900.

On leaves of *Medicago maculata*. Wimbledon.

Leptothyrium asterinum, *B. & Br.*

Spot-like, incrassated, with a red margin; spores oblong, curved, binucleate (·001-·0015 in.), ·025-·038 mm. *B. & Br. Ann. Nat. Hist.*, No. 1901, t. 3, fig. 1.

On *Aster tripolium*. Fleetwood (Rev. A. Bloxam).

Septoria violæ, *Rabh. in Klot. Herb.*, No. 1457.

Perithecia small, innate, prominent, numerous, scattered, brown, seated on pale orbicular spots limited by a brown line. Spores

linear, very delicate, straight or flexuous. *West, in Kickx. Fl. Fland.*, i., 434. *Michelia* i., p. 183. *B. & Br. Ann. Nat. Hist.*, No. 1902.

On leaves of *Viola canina.*

Gymnosporium lateritium, *B. & Br.*

Effused, brick red, spores obovate, shortly pedicellate. *B. & Br. Ann. Nat. Hist.*, No. 1903.

On Wych elm. St. Catherine (C. E. B.).

"Looks like a stratum of finely-powdered brickdust. Spores (·0003 in.), ·007 mm. long." *B. & Br.*

Selenosporium tuberculariodes. *Corda Icon.* i. fig. 3.

Erumpent, purple, minute; stroma fleshy, ochraceous. Spores large, fusiform, curved, very acute at each end, six septate, hyaline, colourless. *B. & Br. Ann. Nat. Hist.*, No. 1904.

On raspberry. Orton wood (Rev. A. Bloxam).

Hardly different from *Fusarium.* The genus might with advantage be suppressed.

Uredo plantaginis, *B. & Br.*

Spots pallid, pustules minute, soon ruptured at the apex, spores elliptic, yellow. *B. & Br. Ann. Nat. Hist.*, No. 1905.

On *Plantago.* Woodnewton.

On *Plantago lanceolata.* Dolgelly (Ralfs).

Isaria floccosa, *Fr. Sys. Myc.*, iii., p. 274.

Cæspitose, subulate, simple, white, everywhere tomentose. *B. & Br. Ann. Nat. Hist.*, No. 1906.

On a caterpillar. Milton, Norths.

Fusarium equiseti, *Desm. Exs., No.* 1846

Erumpent, minute, convex, rounded or oblong, girt by the epidermis, rufous, gelatinous when moist. Spores elongated, curved, hyaline. *B. & Br. Ann. Nat. Hist.*, No. 1907, t. iii., fig. 2. *Hymenula equiseti*, Lib. Ex., No. 236.

On *Equisetum.* Oswestry.

Spores at first (·0002 in.), ·005 mm., at length (·0015 in.), ·038 mm. long.

Fusarium salicinum, *Corda Icon.* iii., fig. 87.

Spots growing pale, stroma subcortical, effused, contorted; hymenium orange, basidia filiform. Spores long, rod-shaped, lunulate. *B. & Br. Ann. Nat. Hist.*, No. 1908.

On willow. Twycross (Rev. A. Bloxam).

Monotospora elliptica, *B. & Br.*

Punctiform. Spores elliptical, binucleate, sometimes uniseptate. *B. & Br. Ann. Nat. Hist.*, No. 1909, t. 3, f. 5.

On herbaceous stems.

Helminthosporium molle, *B. & C. Amer. Fungi.*

Soft. Flocci fasciculate, flexuous, obtuse, simple. Spores oblong or oblong-elliptic, obtuse at both ends, triseptate. *B. & Br. Ann. Nat. Hist.*, No. 1910.

On *Ilex.* Powerscourt.

Chalara longipes, *Strauss.*

Tufts effused, inconspicuous; mycelium branched, sometimes anastomosing, septate; flocci simple, septate, brown, pellucid; apex catenate, simple, dichotomous, white, rigid, very easily breaking up into cylindrical joints or spores. *Cylindrospora longipes*, Preuss. *Sturm*, Heft. 30, Tab. 35. *B. & Br. Ann. Nat. Hist.*, No. 1911.

On old walnuts. Dr. Buchanan White.

Aspergillus griseus, *Link. Spec.* I. *p.* 69.

Woolly, grey; capitulum small; spores minute, globose, of the same colour as the threads. *B. & Br. Ann. Nat. Hist.*, No. 1912.

On various decaying substances.

Penicillium saponis, *B. & Br.*

Black; chaplets of spores rising from 2 or 3 cells; spores globose. *B. & Br. Ann. Nat. Hist.*, No. 1913, t. 3, f. 3.

On soap. Rev. J. Hort.

Penicillium abnorme, *B. & Br.*

White, flocci thin, terminating in top-shaped bodies, on which are seated the chaplets of spores; spores very minute. *B. & Br. Ann. Nat. Hist.*, No. 1914, t. 3, fig. 4.

On leaves of *Trientalis*.

Zygodesmus terrestris, *B. & Br.*

Tawny; spores subelliptic or lemon-shaped, at first even, at length rough. *B. & Br. Ann. Nat. Hist.*, No. 1915.

On bare chalk. Crundall, Kent.

"Forming a thin brown stratum."

Peronospora dipsaci, *Tul. Comptes Rendus*, 1854.

Conidiophorous stems slender, 6-7 times dichotomously branched; primary branches flexuous, ultimate branches straight, acute, rigid, squarrose and spreading, conidia elliptic, obtuse, with a dirty violaceous membrane. *De Bary, Peronospora*, p. 118, No. 20. *B. & Br. Ann. Nat. Hist.*, No. 1916.

On *Dipsacus sylvestris*.

Ramularia veronicæ, *B. & Br.*

Wholly white; flocci short; spores oblong, narrow, slightly attenuated downwards. *B. & Br. Ann. Nat. Hist.*, No. 1917, t. 3, f. 7.

On *Veronica agrestis*. Sibbertoft.

Coccotrichum brevius, *B. & Br.*

Clusters subglobose, rufous; flocci sparingly branched, articulate, the articulations short; spores elliptical, granulated. *B. & Br. Ann. Nat. Hist.*, No. 1918, t. 3, f. 8.

On bark. Leigh Wood (C. E. B.).

"Of a rich brown colour. When placed in water it tinges it with the same colour. When young the tufts are distinct; they afterwards become confluent. When dry they assume a buff or ferruginous tint." *B. & Br.*

OVULARIA, *Sacc.*

Flocci nearly simple, erect, bearing about the apices globose or ovoid conidia. *Saccardo in Michelia* II, p. 17.

Analogous to *Ramularia*.

Ovularia elliptica, *Berk.*

Flocci abbreviated, here and there nodulose, articulate, rising from a creeping mycelium ; spores large, elliptical, smooth. *Gard. Chron.*, Sept. 10, 1881, with fig.

On various species of lilies in cultivation.

Polyactis capitata, *B. & Br.*

Wholly white, flocci rising from swollen articulations at the base, trifid or bifid. Spores obovate (·001 in.) ·025 mm. long. *B. & Br. Ann. Nat. Hist.*, No. 1919.

On *Cheiranthus*. Sibbertoft.

Stachylidium trabeum, *B. & Br.*

Pallid; flocci sparingly branched, with the apices 3-4 fid.; spores globose. *B. & Br. Ann. Nat. Hist.*, No. 1920, t. 3, f. 6.

On an old beam. King's Cliffe.

Helvella Klotschiana, *Corda. Sturm Flora*, III, t. 57.

Pileus bilobate, deflexed, membranaceous, even, opaque, brown, margin repand, even beneath and yellowish ; stem thin, cylindrical, yellow ; asci cylindrical ; sporidia elliptic, uninucleate; ·012-·014 × ·006 mm. ; paraphyses clavate above, brown. *Cooke Mycographia*, fig. 168. *B. & Br. Ann. Nat. Hist.*, No. 1921.

In fernery. Coed Coch.

Verpa speciosa, *Vitt. Mang., p.* 120, *t.* 15, *fig.* 6.

Pileus conico-campanulate, rather obtuse, plicate, costate above, alveolate, brown, even below and floccose; stem large, whitish, floccose, internally stuffed with cottony fibres. *B. & Br. Ann. Nat. Hist.*, No. 1922.

On the ground. Coed Coch.

" Agreeing in size and colour with Vittadini's figure, but the sporidia are not oblong, so that there is some doubt as to the species." *B. & Br.*

We saw these specimens, and feel very doubtful whether they are anything more than a variety of *V. digitaliformis*, in company with which they were found.—M. C. C.

Dermatea cinnamomea, *DC.*

Solitary or in groups, cinnamon coloured, rather fleshy, sessile, smooth, a little pulverulent beneath, flat or slightly undulated and sinuated at the margin, sometimes irregular. *B. & Br. Ann. Nat. Hist.*, No. 1923. *Peziza cinnamomea*, DC. Fl. Fr., Vol. v., p. 23.

On maple.

Cenangium rubi, *Daby. Bot. Gall.* II, 736.

Innate erumpent, cups somewhat horny, even, flattened, black, at length the disc open and pallid. *B. & Br. Ann. Nat. Hist.*, No. 1924.

On twigs of *Rubus*. Glamis.

Eurotium lateritium, *Link. Spec.* I, *p.* 84.

Peridia membranaceous, immersed in a dense interwoven woolly orange tomentum ; asci octosporous ; sporidia globose, hyaline. *Mont. Ann. Des. Sci. Nat.*, 1849, xi, 54. *B. & Br. Ann. Nat. Hist.*, No. 1925.

Dolgelly. Ralfs.

Sphæria (Psilosphæria) Stevensoni, *B. & Br.*

Black, fragile, scattered, subglobose, smooth; sporidia oblong, 2-3 septate (·0002 m.), ·005 mm. long. *B. & Br. Ann. Nat. Hist.*, No. 1926. *Stevenson, Myc. Scot. Add.*, No. 2222.

On dead wood. Glamis (Rev. J. Stevenson).

FUNGI MACOWANIANI.

By the Rev. C. Kalchbrenner.

(*Continued from Vol. IX., p.* 137.)

Ag. (Lepiota) Montagnei, *K.* Conf. Ann. d. sc. Nat. vii., 1847, No. 1 (sine nomine).

Cel. Montagne in Enum. Fungorum Africæ merid. a M. Drege quondam lectorum, l.c. mentionem facit de *Lepiota, Ag. clypeolario, Ag. excoriato*, et *Ag. mastophoro*, Berk., affini, sed ad nullum horum referenda. Idem prorsus de nostra specie valet.

Pileus ovato-expansus, papillatus, parce rufo-squamulosus, albus; stipes pro-ratione curtus et tenuis, sursum attenuatus, basi bulbosus; lamellæ liberæ, albæ, annulus integer, mobilis.

Somerset East, No. 1430.

Pil. 1-3 poll. latus., stipes $1\frac{1}{2}$-2 poll. longus, $1\frac{1}{2}$-3 lin. crassus. Papilla in vortice pilei rufo-fusca.

Ag. (Collybia) radicatus, *Fr.* var. **brachypus.**

Pileo gibboso, brunneo; stipite striato, haud gracili, basi dilatato et in radicem brevem acuminato. Terrestris.

Somerset East, No. 1424.

Inter *Ag. radicatum* et *Ag. butyraceum*, ambigis.

Ag. (Mycena) rhodiophyllus, *K.*

E Basipedibus, pileus membranaceus, convexo campanulatus, subpapillatus, brunneus; stipes filiformis, glaber, pallidior, basi mycelio-floccoso, radiante cinctus; lamellæ attingentes, lineares, confertæ, brevioribus mixtæ, roseæ.

P. Natal, No. 338.

Pil. 2 lin. latus, stipes $1\frac{1}{2}$-2 poll. longus.

Ab affinibus pileo bicolore et lamellis crebris, confertis valde diversus.

Ag. (Mycena) argutus, *K.*

E minimis; pileolo acute conico, striatulo, cum stipite concolore (albido) filiformi, basi institio, pruinoso. Lamellæ flaventes.

P. Natal, No. 340.

Pileus 1 lin. altus latusque; stipes vix dimidium pollicem longus.

Ob minutiem fungi et oculos debiles insertionem lamellarum observare non possum; nec certe distinguere, an Mycena sit vel veso. Bolbitii sp. pygmæa, C. K.

Ag. (Crepidotus) scalaris, *Fr.* var. **lobulatus,** *K.*
A specie typica, modo pileolis lobato-incisis differt.
P. Natal, No. 342.

Coprinus digitalis, *Fr.*
P. Natal, No. 384.

Boletus flavidus, *Fr. Syst. p.* 387.
P. Natal (Wood), No. 329.

Pol. (Mesopus) arcularius, *Fr. Ep.* 420.
(*a*) Forma legitima; pileo margine strigoso.
Port Natal, Inanda (Wood), No. 181.
(*b*) Pileo fusco-atro, margine denudato.
In mont. Boschberg (MacOw.), No. 1032.
(*c*) Pileo læte rufo-fulvo, squamulis fuscis eleganter variegato. Var. valde egregia.
Grahams Town, leg. Trollip.

Pol. (Mesopus) Cladonia, *Berkl. cent. I.* **P. bulbipes,** *Fr. Symb. p.* 72.
E stirpe *Pol. perrennis.* Pileo coriaceo, tennui, pro ratione parva, sublaterali, profunde umbilicato, ad marginem obsolete zonato, ferrugineo; stipite inaquali, sursum attenuato, 3 centm. longo, 3-4 mm. crasso, sæpe ramo sterili aucto, ferrugineo, primum subtiliter velutino, dein glabrato. Pori minuti conferti, subrotundii integri cinnamomei.
Ob stipitem sæpe ramosum speciei huic nomen. *P. cladonia.* convenientissimum.
P. Natal, leg. (J. W. Wood, No. 160).

Polyporus (Mesopus) umbraculum, *Fr. Ep. I., p.* 435.
Insignis, amplus, spithamam fere latus; stipite splendide laccato, pollicem crasso 3-4 pollices longo. Substantia ferruginea, intus eximie zonata.
Ad radices, sub arboribus variis montis Boschberg (MacOwan, No. 1079).

Polyporus (Pleuropus) elegans, *Fr. Ep.* 440.

Polyporus (Pleurotus) Baurii, *Kalch.*
Pileus carnoso-coriaceus, horizontalis, tenuis at rigidus, reniformis, vage rugulosus, e pubescenti glabratus, alutaceus, margine loborum imbricatorum serie auctus. Pori minuti, rotundi, obtusi, concolores, perbreves, substantia pallida.
Afr. Austral. ad Bazuja Caffrariæ leg. Rev. Baur, No. 698.
E prolificantibus. Pileus 3-5 unc. longus latusque, 2-3″ crassus; stipes brevis, scutato-adnatus, digiti minoris crassitie.
Denominatus in honorem R. Baur, Missionarii Herrnhutensis, naturæ scrutatori solentissimo, qui vero nunc, ob bellum Caffrorum, stationem suam desercre debuis.

Polyporus (Pleuropus) vibecinus, *Fr.* (Fung. Natal, No. 10).
P. Nat. leg. Wood, No. 121, 123, 212.
Var. *antilopum,* K.
Pileo vix virgato, margine exciso-lobato, lobis passim dichotomis; poris nudicoribus, reticulatis.
P. Natal. (l. Wood, No. 99).

Polyporus (Pleuropus) sanguineus, *Fr. Epicr..p.* 444.
Sub-variis formis, (*a*) lateraliter stipitatus vel umbonato-adnatus, et (*b*) sessilis = P. regius Miguel Fung. exot., p. 4.
Ad Somerset East l. M.Owan, No. 1008. Ad Bazuja Caffrariæ l. Rev. Baur, No. 685.
Notæ a forma pororum et crassitie pilei desumtæ, nullatenus sunt constantes.

Polyporus (Pleuropus) elongatus, *Berkl.* Lond. Journ., Fr. Symb., p. 78.
Somerset East l. MacOwan. Specimina juvenilia.

Pol. (Trametes) scalaris, *Fr.* Natal. p. 12.
Effuso-reflexus, scolari imbricatus, pileo angusto, in æquali, subscruposa, azono, sordide ferrugineo, margine acuto, contextu fibroso-radiante concolori, poris subrotundis, obtusis, medius intus canescentibus (Fr. l.c., 11).
Bazuja, No. 694.

Pol. (Anodermeus) gilvus, *Schw. Fr. Ep.* I., 455; II., *p.* 548.
P. Natal (Wood), No. 203).

Pol. (Anodermei) Natalensis, *Fr.* Natal., p. 13.
Pil. suberosa lignoso, applanato, azono, impolito, alutaceo albo, cuticula membranacea adnata, margine obtuso, inflexo, poris minutis, subrotundis integerrimis, ligneo-pallidis. Fr. l.c. Context. albus.
P. Natal ad Inanda leg. I. M., No. 217.
In trunco Eucalypti.

Polyporus (Anodermeus lentus), MacOwani. *Kalchbr.*
Pilei tenuis, submembranacei, effuso-reflexi, imbricato-concrescentes, pubescentes, albi; pori minimi, curti, rotundi integri, fusco- vel nigrocanti-purpurei, ore albo-irrorati.
Somerset East, Boschberg (MacOw.), No. 1085.
Pileoli 2 cent. et ultra longi lati que, vix 1 mm. crassi; margine sterili, acuto; spurie concentrice zonato. A. Pol. nigro-purpureo Schwein., qui durus,—tenuitate, a Pol. dichroo Fr., colore pororum differt.

Polyporus (Anodermei) nidulans, *Fr. Ep.* 455.
C. B. sp. Somers. E. Boschberg (MacOw.)

Polyporus (Placodermei) Australis, *Fr.*
Colon. Capensis. Queenstown, leg. Rev. Baur, No. 881.

Polyporus (Placodermei) igniarius, *L. Fr. Ep.* 466.
Somerset East l. MacOw.

Polyporus (Placodermei ?) focalis, *Kalch.*
Hujus fungi segmentum modo lamellare adest quod, obiter inspectum, e P. fomentario sumtum videtur; sed pileus crusta laccata, castanea est obductus, fomentum vero ferrugineum, *sericeo-nitens* et tactu molligimum, ut velutinum diceres. Proh dolor fragmentum hocce de forma pilei parum prodit. Ulteriori attentioni comendatur ?
Afr. Australis prope Murraysburg leg. Tyson com. MacOwan.

Pol. (Placodermei) isidioides, *Berkl.* Hook. Journ. II., 415, 1845. 62. Fr. Fung. Natal, p. 10. Montg. Ann. d. sc. Nat. vii., 1847 (Fung. Dregeani, No. 10.)

Pileo suberoso-lignoso, duro, dimidiato-sessili vel postice effuso, gilvo-ferrugineo, tuberculis crebris exasperato, et uno alteroque sulco notato, poris minimis, confertis, punctiformibus, cinnamomeis. Contextus fulvo-ferrugineus.

Somerset East (MacOwan, No. 1063, 1079, 1270), ad Bazuja Caffrariæ (Rev. Baur, No. 687).

Diagnoses auctorum l.c. haud parum differunt. Fries fungo suo, pileum crassum, durum, margine obtusum tribuit, Montagne; pileum fragilem, margine acutum, Berkeleyus pileum margine velutinum, postice setosum. In nostris speciminibus omnibus, pileus durus est, tuberculis elongatis, stipatis "isidioideis" asperrimus, ceterum forma maxime varius. Etiam effuso reflexus occurrit, margine vix prominulo (=Pol. stenoloma, Kalchbr. olim). Sed setas aut pubem velutinam non observavimus.

Polyporus (Placodermei, Lignosus) nubilus, *Fr. Ep.* 471. var. **albolimbatus.**

Pileus glaber nigrescens margine limbo lato, albo, per sulcum a disco discreto, cinctus.

Ad Bazuja Caffrariæ (Rev. Baur).

Pol. inconstans, *Kalch.*

E Stuposis, prolificantibus, carne colorata. Pileo tenui, lateraliter umbonato sessili, conchato, semiorbiculari vel elongato, basi cuneato-flabellari, margine plano, acuto, plus vel minus lobato, tenuiter crustato, zonato, rufo-fuscescente. Contextu ferrugineo. Poris minutis subrotundis, integris, cinnamomeis.

Duplex forma. (*a*) Pileo subsessili, unicolore, subnitente conchato, vix lobato, zonis crebris exarato. (*b*) Pileo tenuiori elongato, basi cuneato et substipitate, flabelliformi, eximie lobato, ad marginem modo parcius zonato, ceterum verrucoso, glabro, colore peculiari, illo argillæ adustæ simili, lateritio-fuscescente et passim testaceo.

In truncis velustis mont. Boschberg (l. MacOw., No. 1080), ad Bazuja, Caffrariæ (Rev. Baur, No. 688 et 690).

Pileus 3-10 cent. longus, 2-4 mm. crassus, in margine acuto fere papyraceus.

Polyporus (Inodermei) biformis, *Fr. Ep. p.* 475.

In cortice arborum, ad Bazuja Caffrariæ (leg. Rev. Baur), (M. Owan).

Forma resupinata, pileolis parum evolutis, porisque obliquis.

Polyporus (Inodermei) glirinus, *Kalch.* Syn. *P. murinus*, K. in Grevill. iv., 1872.

Afr., Austral (leg. M.Owan).

Nomen. "P. murinus" jum a cel. Leveillé consumtum.

Polyporus (Inodermei) hirsutus, *L.*

Afr., Austr., ad Bazuja Caffrariæ (leg. Rev. Baur, No. 691), ad Somerset East. C. B. sp. (l. MacOwan, No. 1093).

Polyporus (Inodermei) vellereus, *Berkl.* Hook. Lond. Journ. p. 454.
P. Natal, Inanda (J. M. Wood, No. 164), (M.Ow.).

Polyporus (Inodermei) versicolor, *Fr.*
Afr., Austr., ad Somerset East (MacOwan, No. 1061.) Ad Bazuja Caffrariæ (l. Rev. Baur), No. 686.

Polyporus (Inodermei) velutinus, *Fr.*
Afr., Austr., ad Som. E. (leg. MacOwan).

Polyporus (Resup.) subliberatus, *B. et Br.* Cuban Fung. No. 291.
C. B. Sp. ad Somerset East (leg. M. Owan).

Polyporus (Resup.) aneirinus, *Tournef.*
Afr., Austral., Natal (leg. Wood, No. 159).

Polyporus (Resupin.) vinctus, *Berk.* Engl. Flora, v.
Afr. Australis, ad Somerset East (l. MacOw., No. 1185).

Polyporus (Resupin.) epilinteus, *Berk. et Br.* Fung. of Ceylon No. 509.
C. B. Sp. In ramis emortuis ad mont. Boschberg (l. MacOwan, No. 1073.

Polyporus (Resupin.) callosus, *Fr.*
Afr. Austr., ad Somerset East, in mont. Boschberg (leg. MacOwan). Ad Bazuja Caffrariæ (leg. Rev. Baur, No. 702).

Polyporus (Resupin.) molluscus, *Fr.*
C. B. Sp., ad Somerset East (l. MacOwan).

Polyporus (Resupin.) sanguinolentus, *Fr.*
Afr., Austr., P. Natal (l. Wood, No. 156).

Polyporus (Resupin.) corticola, *Fr.*
Port Natal (leg. Wood, No. 188, 153.

Polyporus (Resupin.) vulgaris, *Fr. Syst.* 381.
In cortice ramosum truncorumve montis Boschberg (leg. Mac Ow., No. 1069).

Trametes ambigua, *Berkl. Decad. N.* 83. Fr. Symb. p. 96.
C. B. Sp., ad Somerset East (l. MacOwan, No. 1065, 1066).

Trametes torrida, *Fr. El. p.* 103.
C. B. Sp., Somerset East (mis. M.Ow., No. 1425).
Specimina male evoluta!

Trametes moesta, *Kalchbr.*
Pileus suberoso coriaceus, triqueter, velutino-tomentosus, azonus-fuligineo-fuscus, substantia crassa mollis, umbrina ; pori ampli, rotundi vel subangulati, concolores, intus passim glaucescentes.
C. B. Sp. Murraytown (leg. Tyson) (com. M.Ow.).
Pileus basi decurrens, dissepimenta pororum crassa.

Trametes lactea, *Fr. Symb.* p. 96.
Pileo suberoso, pulvinato, duro, lævi, azono e floccoso-glabrato, lacteo, contextu niveo, subzonato; poris rotundis, æqualibus, obtusis, albis (Fr. l.c.).
Somerset East, No. 1066. P. Natal, sine No.

Trametes sepium, *Berkl.*
C. B. Sp., Somerset East (leg. MacOwan).

Daedalea Dregeana, *Montg.* (*?*) Ann. de Scienc. Nat. vii. 1847.
C. B. Sp., Somerset East (l. MacOwan).

Hexagona polygramma, *Montg.* Fr. Ep. p. 497.
P. Natal (leg. Wood, No. 158, 169, 201).
Eadem plane forma, quam Fries (Fung. Natal, p. 17), sub H. tenui Fr. habet, de qua tamen (Symb. Myc., p. 102), notat, candem, monente Berkeleyo, strictius ad H. polygramam referendam esse.

Merulius serpens, *Fr. Ep.* I. 502, II. 593.
Somerset East, sine 160.

Merulius Corium, *Fr. Ep.* I. 500, II. 591.
Somerset East, sine No.

Hydnum ambiguum, *B. et Br.* Fung. of Ceylon, p. 60.
Late effusum, ochroleucum, margine albo, pulverulento, aculeis minutis, dense approximatis, rimose congestis, tomentosis (Berk. l. c.).
Bazuja Caffrariæ (leg. Rev. Baur).

Hydnum mucidum, *Fr. Ep.* I., 518 ; II., 616.
Somerset East (Boschb., 1874, No. 1067).

Hydnum pudorinum, *Fr. Ep.* I., 514 ; II., 612.
Bazuja, n. 699.

Irpex tabacinus, *B. et C.* Fr. Symb. p. 106.
Spadiceus, pileo coriaceo, tenui, effuso, leviter reflexo ; superne scruposo tomentoso ; dentibus, compressis, obtusis, irregulariter seriatis.
P. Natal, Iuanda, in cortice *Acaciæ Lophanthæ*, L. (leg. Wood, No. 216).
Pulchra species. Vidimus specimina e Canada Natalensibus, omnino conformia.

Irpex grossus, *Kalch.*
Pileo suberoso-coriaceo, effuso reflexo, subazono, adpresse villoso, albido ; dentibus e scamno poroso emergentibus, ad marginem transversim positis, seriatim confluentibus, truncatis, incisis,—mediis inordinatis, dentatis, ligneo-fuscescentibus. Substantia ligneo-patens.
Somerset East, Boschberg (leg. M. Owan, No. 1092).
Placas orbiculares sistit, 2-3 cent. latas, supra margine angusto limitatas. *Ir. paleaceo*, Fr., proximus, sed habitu peculiari, rudi distinctus.

Irpex deformis, *Fr.*
In ramis semimortuis, in silv. Mont. Boschberg (leg. M. Owan, 1874, No. 1077).

Irpex flavus *(Jung.—non Klotsch), Fr. Symb.*, p. 85 (Sub. *Polyporo*).
P. Natal, Inanda (leg. Wood, No. 202).
Forma membranacea, tota effusa, crustaceo-adnata, poris dentium amplis, superficialibus, sinuosis.

Radulum orbiculare, *Fr. Ep.* I., 524 ; II., 623.
Somerset East, sine No.

LOPHARIA, *K. et M. Ow.*

Hymenium cartilagineo-membranaceum glabrum, contiguum, in rugas interruptas, cristato-incisas elevatum.

Phlebiæ maxime affine; sed in hac rugæ acie integerrima gaudent.

Lopharia lirellosa, *K. et M. Ow.*

Effusa, plana, pallide rufescenti carnea, subpruinosa, ambitu determinato, villoso-ciliatulo, albidiore; plicis interruptis, varie curvatis, subramosis, cristato-incisis.

Somerset East (l. MacOwan).

Ligno arcte adnata, placas oblongas formans. Plicæ ad formam lirellarum Graphidis eûrvatæ.

Cladoderris infundibuliformis, *Klotsch.* Fr. Fung. Natal, p. 21.
P. Natal (l. Wood, No. 94).

Cladoderris Thwaitesii, *B. et Br.* Fung. of Ceylon, No. 571.
Port Natal (l. Wood, No. 239).

Thelephora biennis, *Fr. Ep.* I., p. 540; II., p. 636.
Somerset East, No. 1244.

Thelephora punicea, *Alb. et Schw.* (Sterilis). Fr. Ep. 541.
Port Natal (l. Wood, No. 190).

Stereum elegans, *Meyer. Fr. Ep.* 545.
Somerset East (l. MacOw., No. 1232).

Stereum luteo-badium, *Fr. Ep.* 547.
Port Natal (l. Wood, No. 163).

Stereum versicolor, *Swartz. Fr. Ep.* 547.
In truncis vetustis mont. Boschberg pr Somerset East (leg. M. Ow., No. 1084, 1163, 1276).

Stereum bicolor, *Pers. Fr. Ep.* 550.
Somerset East (l. M. Ow., No. 1244).

Stereum tabacinum, *Fr. Ep.* 550. var. **Australis**, *Montg.*
Hymenochæte tabacina, Lev.
Somerset East (l M. Ow.).
Zonis creberrimis, senio nigricantibus ornatum.

Stereum amœnum, *K. et M. Ow.*

Pileo coriaceo-membranaceo, conchato umbonato-sessili vel postice effuso, strigoso-hirsuto, albido, demum fulvescente, zonis crebris exarato. Hymenio laevi, glabro, lilaceo vel alutaceo. Substantia alba.

In truncis vetustis mont. Boschberg (leg. M. Ow., No. 1086, 1084). Ad Bazuja Caffrariæ (l. Rev. Baur, No. 684, 695). Specimina alba.

A proximo *St. hirsuto* (Fr.), differt substantia tenuiore, pileis ad 2-4 pollices ampliatis, crebrius zonatis, et hymenio plerumque amoene lilaceo.

Stereum albo-badium, *Fr. Ep.* 551.
C. B. Spec, in mont. Boschberg.

Stereum notatum, *B. et Br.* Fung. of Ceylon, No. 597.
Som. E., No. 1091 ; Bazuja m., 693 ; P. Natal, No. 109.
Hymenium pallidum, peltatum, subumbonatum, et plerumque hic umbo jugis quibusdam elevatis, concentricis cingitur.

Corticium nudum, *Fr. Ep.* 564.
P. Natal, No. 161.

Corticium calceum, *F. Ep.* 563.
Som. E. Boschberg (leg M. Ow., No. 1074 et 1206).

Corticium cœruleum *Fr. Ep.* 562.
Som. E. (leg. MacOwan, No. 1125).

Corticium cinereum, *Fr. Ep.* 563.
Peniophora cinerea Cooke in "Grevillea."
Port Natal, No. 208.

A Curious Trade in Fungus.—The "Colonies and India" says :—"Among the various articles of trade exported from New Zealand perhaps the most curious is a species of fungus which grows on decaying trees in all parts of the North Island, but most plentifully in the provincial district of Taranaki. In shape this fungus resembles the human ear, and it is of a brown colour and semi-transparent when fresh. It was not deemed of sufficient importance to be included in the list of colonial exports until 1872, when 58 tons, the value of which was £1,927, were shipped; in 1877, 220 tons, valued at £11,318, were exported ; and last year the value of the export was £6,227. China is the destination of this product. It is much prized there as an article of food, forming the chief ingredient of the favourite soup of that country on account of its gelatinous properties and its peculiar flavour. Whether the immigrant Chinese, who were more numerous in New Zealand five years ago than they are now, discovered the virtues of this fungoid growth, or whether the Maoris, with their naturally keen wit, hit upon the idea that the substance would just suit the peculiar tastes of the Chinese, does not appear. The Europeans in the colony, however, have never acquired a taste for it. To prepare this fungus for export, nothing more is required than to pick it from the trunks of the trees and dry it in the air or under sheds. When dry it is packed in bags and shipped to China by way of Sydney or San Francisco. *Very few white men, except those of idle, dissipated habits, collect fungus.* The children of the small bush farmers, however, often keep themselves in pocket-money by gathering it and selling it to the dealers. The task of collecting it is one, too, which just suits the Maori disposition. When the natives are in want of funds for tobacco, or desire to raise the wherewithal to provide the large feasts which it is their delight to give periodically, they send out parties to the bush who bring in fungus in large quantities for sale."—[N.B.—The fungus here spoken of is *Hirneola polytricha.* —Ed.]

AUSTRALIAN FUNGI.

By M. C. Cooke.

(*Continued from Vol.* ix., *p.* 149.)

Gen. 2. Coprinus, *Fries.*

Copr. stercorarius, *Fr. Hym. Eur.*, 331.
Victoria, N.S. Wales, Queensland, Tasmania.

Copr. ephemerus, *Fr. Hym. Eur.*, 331.
Queensland.

Copr. plicatilis, *Fr. Hym. Eur.*, 331.
N.S. Wales.

Copr. murinus, *Kalhc, in Grev.*, viii., *t.* 142 *f.* 10.
N.S. Wales.

Copr. tomentosus, *Fr. Hym. Eur.*, 325.
Queensland.

Gen. 3. Bolbitius, *Fries.*

Bolb. fragilis, *Fr. Hym. Eur.*, 334.
W. Australia.

Bolb. titubans, *Fr. Hym. Eur.*, 334.
Victoria.

Gen. 4. Cortinarius, *Fries.*

Cort. (Myxacium) erythræus, *Berk. Hook. Journ.*, 1845, *p.* 48.
W. Australia.

Cort. (Myxacium) Archeri, *Berk. Fl. Tasm.*, *t.* 181, *f.* 7.
Tasmania.

Gen. 5. Paxillus, *Fries.*

Pax. eucalyptorum, *Berk. Hook. Journ.*, 1845, 49.
W. Australia.

Pax. Muelleri, *Berk. Linn. Journ.*, xiii., 159.
Victoria, N.S. Wales.

Pax. crassus, *Fr. Hym. Eur.*, 404.
Queensland.

Gen. 6. Hygrophorus, *Fries.*

Hygr. flammans, *Berk. Linn. Journ.*, xiii., 160.
Victoria.

Hygr. ceraceus, *Fr. Hym. Eur.*, 417.
Victoria.

Hygr. miniatus, *Fr. Hym. Eur.*, 418.
Queensland.

Hygr. nigricans, *Berk. Linn. Journ.*, xiii., 160.
Australia.

Hygr. scarlatinus, *Kalch. in Grevillea*, VIII., *t.* 143, *fig*, 11.
Queensland.

Hygr. porphyrius, *B. & Br. (M.S.S.)*.
Queensland.

Gen. 7. LACTARIUS, *Pers.*

Lact. subtomentosus, *B. & Rav., Ann. Nat. Hist., Oct.*, 1869.
Victoria.

Lact. stenophyllus, *Berk. Fl. Tasm.* II., 248, *t.* 181, *f.* 8.
Tasmania.

Gen. 8. RUSSULA, *Fries.*

Russ. sanguinea, *Fr. Hym. Eur.*, 442.
Burnett's River.

Russ. rubra, *Fr. Hym. Eur.*, 444.
Victoria, N.S. Wales, Queensland.

Russ. emetica, *Fr. Hym. Eur.*, 448.
Tasmania, Victoria, N.S. Wales.

Russ. Clusii, *Fr. Hym. Eur.*, 449.
Daylesford.

Russ. fragilis, *Fr. Hym. Eur.*, 450.
S. Australia, Queensland.

Gen. 9. CANTHARELLUS, *Adans.*

Canth. cibarius, *Fr. Hym. Eur.*, 455.
N. S. Wales.

Canth. aurantiacus, *Fr. Hym. Eur.*, 455.
Queensland.

Canth. concinnus, *Berk. Linn. Journ.*, XVI., 38.
N. S. Wales.

Canth. viscosus, *Berk. Hook. Journ.*, 1845, 49.
W. Australia.

Canth. strigipes, *Berk. Fl. Tasm.*, 11, 245.
Tasmania.

Canth. pusio, *Berk. Hook, Journ.*, VIII., 134.
Tasmania.

Gen. 10. MARASMIUS, *Fries.*

Mar. rotula, *Fr. Hym. Eur.*, 477.
Queensland.

Mar. confertus, *B. & Br., Ceylon Fungi, No.* 352.
N. S. Wales, Queensland.

Mar. rhyticeps, *Kalch. in Grevillea*, IV., 71, *t.* 143, *f.* 14.
Queensland.

Mar. rufopallidus, *Kalch, in Grev.*, IV., 71, *t.* 143, *f.* 15.
Queensland.

Mar. calobates, *Kalch, in Grev.*, IV., 71, *t.* 143, *f.* 16.
Queensland.

Mar. primulinus, *Berk. Linn. Journ.*, XVI., 38.
N. S. Wales.

Mar. opacus, *B. & Curt., Hook. Journ.*, 1849, 99.
N.S. Wales.

Mar. hæmatocephalus, *Mont. Syll.*, 109.
Victoria.

Mar. ferrugineus, *Berk. Hook. Journ.*, 1843, 630.
Victoria.

Mar. aciculœformis, *B. & Curt. Linn. Journ.*, X.
Queensland.

Mar. minutissimus, *Muell. & Kalch, Grev.*, XIII., *t.* 143, *f.* 12.
N. S. Wales.

Mar. pilopus, *Kalch, in Grev.*, VIII., *t.*143, *f.* 13.
N. S. Wales.

Mar. equicrinis, *Muell, in Grev.*, VIII., *Linn. Journ.*, XVIII., 383.
N. S. Wales.

Mar. hepaticus, *Berk. Hook. Journ.*, V., *p.* 1.
Tasmania.

Mar. affixus. *Berk. Hook. Journ.*, VII., 573.
Tasmania.

Mar. subsupinus, *Berk. Fl. Tasm.*, II., 249.
Tasmania.

Mar. eucalypti, *Berk. Fl. Tasm.*, II., 249.
Tasmania.

Mar. meloniformis, *Berk. Fl. Tasm.*, II., 249.
Tasmania.

Mar. Muelleri, *Berk. Linn. Journ.*, XVIII., 383.
Herbert's Creek.

Mar. emergens, *Berk. in herb.*
On wood. Allied to *Marasmius spaniophyllus*, B.
Tasmania.

Mar. lignyodes, *Berk. Linn. Journ.*, XVIII., 384.
Australia.

Mar. exocarpi, *Berk. Linn. Journ.*, XVIII., 384.
Queensland.

Gen. 11. LENTINUS, *Fries.*

Lent. cochleatus, *Fr. Hym. Eur.*, 484.
W. Australia.

Lent. pergamenus, *Fr. Sym. Myc.*, 37.
Queensland.

Lent. fulvus, *Berk. Ann. Nat. Hist.*, X., 369.
Victoria, N. S. Wales, Queensland.

Lent. fasciatus, *Berk. Hook. Journ.*, 1840, 146.
W. Australia, Tasmania, N. S. Wales, Queensland.

Lent. dealbatus, *Fr. Pl. Preiss.*, II., 153.
W. Australia.

Lent. cyathus, *B. & Br. Linn. Trans.*, 1879, 400.
Queensland.

Lent. Lecomtei, *Fr. Epic.*, I., 388.
N. S. Wales, Queensland.

Lent. subdulcis, *Berk. Hook. Journ.*, 1851, 46,
Queensland.

Lent. subnudus, *Berk. Hook. Journ.*, 1847, 492.
S. Australia.

Lent. exilis, *Klotsch. Fr. Sym. Lent.*, 10.
S. Australia, Queensland.

Lent. vulpinus, *Fr. Hym. Eur.*, 486.
N. S. Wales, Queensland.

Lent. Dunalii, *Fr. Hym. Eur.*, 481.
Queensland.

Lent. fusco-purpureus, *Kalch., Grev.*, VIII., *t.* 143, *f.* 17.
N. S. Wales.

Lent. læviceps, *Kalch. in Grev.*, VIII., *t.* 144, *f.* 19.
Australia.

Lent. hyracinus, *Kalch. Grev.*, VIII., *t.* 143, *f.* 18.
Richmond River.

Lent. hepatotrichus, *Berk. Fl. Tasm.*, *t.* 181, *f.* 9.
Tasmania.

Lent. pulvinulus, *Berk. Fl. Tasm.*, *t.* 181, *f.* 10.
Tasmania.

Lent. holopogonius, *Berk. in Herb.*
Queensland.

Lent. lateritius, *Berk. Linn. Journ.*, XVIII., 384.
Australia.

Lent. Guilfoylei, *Berk. Linn. Journ.*, XVIII., 384
Australia.

Gen. 12. Panus, *Fries.*

Panus cinnabarinus, *Fr. Pl. Preiss.*, *p.* 133.
W. Australia.

Panus coriaceus, *Berk. Linn. Journ.*, XIII., 160.
Victoria.

Panus incaudescens, *B. & Br.* (*M.S.S.*).
Queensland.

Panus saccharinus, *Berk. Fl. Tasm.*, II., 250.
Tasmania.

Panus viscidulus, *B. & Br. (M.S.S.).*
N. S. Wales, Queensland.

Panus rivulosus, *Berk. Linn. Journ.*, XVIII., 384.
Australia.

Panus torulosus, *Fr. Hym. Eur.*, 489.
Moreton Bay.

Panus arenicola, *Berk. Linn. Journ.*, XVIII., 384.
Australia.

Gen. 13. XEROTUS, *Fries*.

Xer. Archeri, *Berk. Fl. Tasm.*, II., 250, *t.* 182, *f.* 1.
Tasmania, Victoria.

Xer. Rawakensis, *Fr. Epic.*, I., 401.
Queensland.

Xer. papuasius, *Kalch. in Grev.*, VIII., *t.* 144, *f.* 20.
N. S. Wales.

Xer. proximus, *B. & Br.* (*M.S.S.*).
Queensland.

Xer. papyraceus, *Berk. Fl. Tasm.*, *t.* 182, *f.* 2.
Tasmania.

Xer. fulvus, *B. & Br.* (*M.S.S.*).
Queensland.

Gen. 14. SCHIZOPHYLLUM, *Fries*.

Schiz. commune, *Fr. Hym. Eur.*, 492.
W. Australia, S. Australia, Victoria, Tasmania, N. S. Wales, Queensland.

Schiz. multifidum, *Fr. in herb. Berk.*
Chatham Islands, Moreton Bay.

Gen. 15. LENZITES, *Fries*.

Lenz. Beckleri, *Berk. Linn. Journ.*, XIII., 161.
N. S. Wales, Queensland.

Lenz. Berkeleyi, *Lev. Ann. Sci. Nat.*, 1846, 122.
Queensland.

Lenz. deplanata, *Fr. Epic.*, I., 404.
Queensland.

Lenz. faventinus, *Cald. Erb. Critt. Ital.*, *No.* 89.
Queensland.

Lenz. striata, *Fr. Epic.*, I., 406.
Queensland.

Lenz. abietina, *Fr. Hym. Eur.*, 495.
S. Australia.

Lenz. betulina, *Fr. Hym. Eur.*, 493.
Queensland.

Lenz. Palisoti, *Fr. Epic.*, I., 404.
N. S. Wales, Queensland.

Lenz. torrida, *Kalch. Grev.*, VIII., *t.* 144, *f.* 21.
Richmond River.

Lenz. Guilfoylei, *Berk. in herb. Berk.*
Pileo dimidiato (3 in.), conchiformi, subglabro, punctato-tuberculato, postice fumoso, antice pallido; margine acuto. Lamellis sublatis, repetite furcatis pallidis, acie tenui.
Tweed River.

NEW AND RARE BRITISH FUNGI.

By W. Phillips, F.L.S., and Charles B. Plowright.

With Plate 158.

(Continued from Vol. viii., *p.* 109*).*

* **Agaricus (Tricholoma) tumidus,** *Pers.* var. **Keithii,** *Ph. & Pl.*
This differs from the type in its cinereo-rufescent pileus, less turgid, dirty-white stem, which has brownish innate fibres, and in being tinged with red, especially near the base. In some of these characters it agrees with *A. sudus*, Fr., from which it differs in its undulating pileus, distant gills, and often rooting stem. The whole plant is fragile, the gills have a cineretious tinge, usually at length becoming rufescent. It frequently has a powerful odour of new meal, and is intermediate between *A. sudus* and *A. tumidus*, but is nearer the latter.

In pine woods. Forres, N.B. Rev. J. Keith. Oct.

* **Agaricus (Tricholoma) panæolus,** *Fr.*
Amongst short grass. Massingham, Norfolk. Sept., 1881. Studley Royal, Ripon. Oct., 1881.

175. **Agaricus (Clitocybe) tumulosus,** *Kalchbr. Fung. Hung., p.* 13, *t.* 5.
(*Vide* description—New British Fungi, p. 42).
On charcoal beds in woods. Shropshire and Herefordshire. Autumn.

176. **Agaricus (Clitocybe) incilis,** *Fr. Hymen. Eurp., p.* 94.
Pileus fleshy, plane, umbilicate, smooth, opaque; margin silky, inflexed, crenate; stem hollow, short, somewhat silky, attenuated downwards, becoming compressed; gills adnate-decurrent, rather distant, reticulated with veins, pallid whitish.
Kings Lynn. Nov.
Stem dilutely brick-red. Odour farinaceous.

* **Agaricus (Collybia) semitalis,** *Fr.*
Castle Rising. Nov., 1881. By the road side.

* **Agaricus (Collybia) rancidus,** *Fr.*
This species occurred in several localities round Hereford. Oct., 1881.

177. **Agaricus (Mycena) discopus,** *Lév.*
Very delicate, white, pileus conical, obtuse, and like the stem, very thin, covered with whitish meal; gills adnate, few, widely distant, plicate.
Léveill. Ann. Sc. Nat., 1841, p. 239, t. 14, f. 4. *A. subtilissimus*, Fries. Hymen., p. 151; Oudem. Bat., p. 24.
On a stick under a hedge bank. Castle Rising. Sept., 1881.

* **Agaricus (Omphalia) leucophyllus,** *Fr.*
Castle Rising. Sept., 1881. Amongst moss in a fir wood.

178. **Agaricus (Entoloma) Persooniana,** *Ph. & Pl.*=**Ag. Sericeus,** *Persoon Icon. et Descrip., p.* 17, *t.* 6, *f.* 2.
(*Vide* description—New British Fungi, p. 42).

On the earth. Mattishall. The Rev. J. M. DuPort.

The bulb in our plant is much more decided than in Persoon's figure, having a distinctly abrupt margin, and the pileus is not so fleshy. The large angular spores are as wide as the basidia, and the hymenium abounds with large cystidia. Spores, including the angles, ·015 mm.

179. **Agaricus (Hebeloma) glutinosus,** *Lindgr.*

Pileus fleshy, convex, becoming plane, obtuse, viscous with a tenacious gluten, with scattered white superficial squamules, yellowish-white, disc-like; stem stuffed, nearly bulbous, with whitish squamules, farinose at the apex, having a bark; gills adnexed with a sinus, crowded, yellowish, becoming cinnamon clay-colour.

Lindgr. Bot. Not., 1845, p. 199; Fries. Monogr. I., p. 324; Hymeno. Europ., p. 238; Icones, t. 112, f. 1.

On dead leaves (beech). Hereford, 1875, and Sept., 1881.

180. **Agaricus (Naucoria) anguineus,** *Fr.*

Pileus slightly fleshy, campanulate, then convex, gibbous, smooth, yellowish tan-coloured, with a silky zone around the margin; stem rather hollow, brown, and thickly covered with white fibrillæ; gills nearly free, crowded, linear, pale-yellow, then ferruginous.

Fries. Epicrisis, p. 193; Hymen., p. 255; Icon., t. 122, f. 1.

In a flower-pot. West Lynn. Nov. 11, 1880.

Stem 2-3 inches long by 2-3 lines thick; pileus 2 inches broad. (Fries.)

189. **Agaricus (Galera) pygmæo-affinis,** *Fr.*

Pileus submembranaceous, campanulate then expanded, dry, without striæ, slightly corrugated, honey-yellow; stem fistulose, equal, straight, white; gills nearly free, thin, crowded, clay-coloured then ferruginous ochre.

Fries. Monograph I., p. 389; Hymen., p. 269; Icones, t. 128, f. 1.

In a cucumber house. West Lynn. Nov. 1880.

Stem 2-3 inches long, apex pruinose, gill very narrow. (Fries.)

190. **Agaricus (Psathyrella) crenatus,** *Lasch.*

Pileus membranaceous, hemispherical, sulcate, atomate, hygrophanous, *margin crenate*, stem slightly curved, fragile, glabrous, white, striate above, primrose; gills adnate, subventricose, yellowish-brown, then black.

Lasch., No. 465; Fries. Hymen., p. 315.

In a cucumber house. West Lynn. 6 Nov., 1880.

Stem 3 cm. long, 1 to 1-5 mm. thick; slightly thicker above and below; gills broad, adnate, edge whitish. Pileus 1 to 1-25 cm. across, whitish, with a rufous tinge, atomate, margin crenate.

191. **Lactarius flexuosus**, *Fr.*

(*Vide* description—New British Fungi, p. 42).

This species was found by Mr. Bucknall and others in Haywood Forest, Oct., 1881. The *Agaricus flexuosus*, Pers., figured by Hussey, t. 59, is a different species, viz., *L. zonarius*, Fr.

* **Russula consobrina**, *Fr.*, var. **Sororia**, *Larb.*

North Wootton. Aug., 1881. This is probably a common species in fir woods.

* **Sparassis crispa**, *Fr.*

This fine fungus occurred in Costessy Park, Norwich, 18 Oct., 1881.

* **Geaster coliformis**, *Pers.*

Hillington, Norfolk, Sept., 1880 and 1881.

192. **Ustilago Rudolphi**, *Tul.*

Produced in the ovaries. Spores simple, globoso-angular or rather ovate, umber, about ·06 mm. in diameter.

Sorosporium saponariæ, Rud, in Linn., 1829, p. 116; Fckl. Symb. Myc., p. 40.

In the ovaries of *Dianthus deltoides* in a garden in Norwich. T. Southwell, 1881.

The plant was originally brought from the Engidine, and was apparently healthy, but during the last two years the fungus has quite destroyed its fructification.

193. **Peziza (Humaria) Roumegueri**, *Karst. Grevillea, v.* VII., *p.* 65, var. **carnosissima**, *Phillips, El. Brit. No.* 158.

On decayed vegetation. Glamis. Scotland. Rev. J. Stevenson.

The sporidia are somewhat smaller than in the type, ·016-·018 × ·005 mm.

194. **Peziza (Humaria) misturæ**, *Phillips ; Bucknall's Fungi, Bristol Dist., pt.* III., *No.* 611.

Crowded or scattered, sessile, concave when dry, applanate when moist, submarginate, chestnut-brown, glabrous ; asci cylindraceo-clavate ; sporidia 8, subglobose, smooth, with one large nucleus ; ·014-·016 × ·011-·012 mm.; paraphyses from one to six times branched, summits proliferously pyriform, or moniliform, or only slightly enlarged.

On a mixture of lime and cow dung, spread on the trunks of apple trees.

The cups are ½ to 3 mm. across ; the paraphyses are remarkable for their proliferous growth. The cells of the exterior of the cup are small, oblong rather than globose.

195. **Peziza (Dasy. Sess.) barbata**, *Kunz.*, **B. pellita**, *Pers. Myco. Europ.*, I., *p.* 264; *C. Bucknall, Fungi of Bristol District, pt.* III., *p.* 8.

Cups subglobose, densely tomentose ; sporidia narrowly fusiform, ends acute, ·012-·018 ·0025 mm., with 3 to 4 nuclei ; hairs septate, pointed at the summits, where a heap of transparent granules collect, as is not uncommon with some of the closely allied species.

On beech mast. Bristol. Mr. C. Bucknall.

Persoon's plant occurred on *Lonicera caprifolium*, but no difference can be detected between Mr. Bucknall's plant on beech mast and that on *Lonicera*.

196. **Peziza (Dasy. Sess.) araneo-cincta**, *Phillips ; Bucknall, Fungi Bristol District, pt.* III., *p.* 8 ; *Phil. El. Brit., No.* 169.

Minute, scattered, sessile, concave, thin, pale yellow, margin fringed with long, slender, flexuous, pointed, white hairs; asci broadly clavate ; sporidia 8, biseriate, narrowly fusiform, acutely pointed, ·01-·013 × ·001-·0015 mm.

On decayed birch leaves. Clifton, Bristol. Mr. C. Bucknall.

Cups 2-3 mm. across. The hairs are devoid of septa, and so delicate that they are diffluent in water, with only slight pressure.

197. **Peziza (Dasy. Sess.) spirotricha**, *Oud. Archives Nederlandensis, vo.* VIII.; *Phil. El. Brit., No.* 168.

This was described under the name of *P. asterostoma*, Phillips, in Grev., v. vii., p. 140, which name must be withdrawn, Professor A. C. Oudeman, of Amsterdam, having described it in Archives Neederlandensis, v. viii. ; *vide* Hedwigia, 1874, p. 87.

198. **Peziza (Dasy. Stip.?) solfatera**, *C. & E. ; Grevillea, v.* VII. *p.* 7. *Bucknall, Fung. Brist. Dist., pt.* III., *No.* 618.

This pretty, but minute species, was detected on pine leaves near Bristol; though occasionally sessile, it is usually provided with a minute stem.

199. **Peziza (Hymenos) electrina**, *Ph. & Pl. ; Grevillea, v.* VIII., *p.* 155 ; *Phillips, El. Brit., No.* 187.

Gregarious, minute, subgelatinous, glabrous, amber-coloured, disc concave, marginate; stem short, firm ; asci narrowly clavate, pointed at the summit ; sporidia 8, biseriate, cylindraceo-fusiform, ·005 × ·001 mm.

On decaying leaves of *Pinus sylvestris*, Forres, N.B., associated with *Dacrymyces succineus*, Fr., of which it is the more perfect condition.

200. **Peziza (Mollisia) luteo-rubella**, *Nyl. Pezizæ Fenniæ, p.* 55 ; *Phillips, El. Brit., No.* 185.

Minute, scattered, disciform, glabrous, somewhat tremelloid, yellowish-red or yellowish-brown ; asci cylindraceo-clavate ; sporidia fusiform, ·007-·01 × ·001-·0015 mm. Apices of paraphyses somewhat subglobose.

On dead willow bark. Shrewsbury.

Very near *P. leucostigma*.

201. **Peziza (Mollisia) inflatula**, *(Karst.), Bucknall, Fung. Bristol Dist., pt.* III., *p.* 8.

Cups gregarious, nearly flat, thin, hyaline-whitish, when dry globular, contracted into angles, dirty-yellowish, or nearly brick-red; asci cylindraceo-clavate; spores 8, filiform, ·004-·007 × ·005 mm.

Bristol. Mr. C. Bucknall, 1879.

This is very near *P. epipora*, Nyl.

202. **Helotium menthæ** *Phil. Elv. Brit., No.* 188.

Scattered, stipitate, at first convex, then applanate, disk egg-yellow, margin paler; the under side of cups and slender stem white; asci cylindraceo-clavate, often pointed at the summit; sporidia broadly fusiform, acute at one extremity, sometimes at both, often curved, two to four nuclei, or spuriously uniseptate, ·014-·02 × ·003-·005; paraphyses filiform.

On dead stems of *Mentha*. Shrewsbury.

203. **Helotium sulphuratum** *(Flo. Dan.,* **Pez. sulphurata,** *t.* 1915, *f.* 2), *Phillips, El. Brit., No.* 189.

Scattered, turbinate, or with a stout stem, often seated on a white floccose tapesium, disc depressed or concave, egg-yellow, externally white; asci cylindraceo-clavate, obtuse at the summit; sporidia 8, biseriate, fusiform, acute at the ends, curved, two to four nuclei; paraphyses filiform often branched from near the base

On decaying pine leaves. Cawdor Castle, Scotland. Sept.

204. **Ascobolus (Saccobolus) neglectus**, *Boud.*

Very minute, at first globose, then flattened, glabrous, whitish or cinereous, sometimes tinged with purple, paler at the base; disc fulvus, appearing black by reason of the exserted asci; paraphyses simple or branched, scarcely thickened at the apex, hyaline, septate; asci minute, broad, narrowed at the base, hyaline; sporidia oblongo--subacuminate, varying from roseate to greyish-violet, ·015-·019 × ·006-·008 mm.

King's Lynn. April, 1876. On rabbit dung, Leigh Wood, Bristol. Mr. C. Bucknall, June, 1881.

205. **Ascobolus (Thecotheus) Pelletieri,** *Cronan.*

Scattered or crowded, conical at first, then cylindrical, at length applanate; greyish or greyish-lilac; externally clothed with an excessively subtile white pruina; paraphyses slender, longer than the asci, septate, hyaline, divided at the base; asci elongated, large, broad, with a subumbonate operculum; sporidia 32, hyaline, large, elliptical-subucuminate, ·027 × ·014 mm.

Grown under glass, Bristol. Mr. C. Bucknall. On horse dung, Scarborough. Mr. Massee.

206. **Patellaria connivens,** *Fr. Systema, v.* II., *p.* 151, *Karsten, Myco. Fen., p.* 234; *Phillips, El. Brit., No.* 190.

Gregarious, minute, sessile, disc depressed, black or rufescent, margin thin, when dry compressed and deformed; asci broadly-clavate; sporidia 8, oblongo-fusiform, six to eight nuclei; paraphyses filiform, very slender, branched from near the base, abundant.

On decorticated wood. Shrewsbury.

207. **Patellaria Hyperici,** *Phillips, El. Brit., No.* 191.

Gregarious, very minute, innato-sessile, applanate, immarginate, glabrous, blackish-brown; asci broadly clavate; sporidia biseriate, oblongo-fusiform, triseptate, ·017-·02 × ·005-·008 mm., paraphyses filiform.

On dead stems of *Hypericum*. Shrewsbury.

The sporidia of this species germinate freely within the ascus, their threads projecting through the walls of the ascus.

This is near *Lecanidion herbarum*, Sacc.

208. **Hypocrea lactea,** *Fr.*

Fleshy, effused, naked, white; perithecia rather large, globose; ostiola punctiform; asci cylindrical, ·05-·06 mm. long by ·003-·004 mm. wide; sporidia 16, hyaline, subequal, globose, ·003 mm.

Fries. Sum. Veg. Scand., p. 383; Syst. Mycol. II., p. 337; Fckl. Mycol. Europ., p. 185: Sacc. Mich. I., p. 302.

On the hymenium of *Polyporus medulla-panis*. Castle Rising. 16 Sept., 1881.

209. **Hypomyces candicans,** *Plow. Monograph British Hypomyces. Grevillea, ined.*

On some *Myxogaster*. Leziate, King's Lynn. Aug., 1880. Bathford Downs, Oct., 1880.

210. **Hypomyces aureo-nitens,** *Tul. Sel. Carp. Fung.* III., *p.* 64. *Plow. Mono. Brit. Hypomyces Grev., ined.*

On *Stereum hirsutum*. Pwllycrochon Wood, North Wales. 10 Oct., 1880.

211. **Nectria Lamyi** (*Desm.*), *De Not.*

Perithecia cæspitose, dark cinnabar red, rugose; ostiola minute, depressed; asci oblong, substipitate, octosporous, ·074 × ·014 mm.; sporidia oblong lanceolate, but obtuse at both ends, obscurely uniseptate, hyaline, ·02 × ·008 mm.

De Not. Sfereacei Ital. I., No. 9; *Sphæria Lamyi*, Desmaz., Ann. de Sci. Nat., 1836, II., p. 246; *Sphæria Berberidis*, Fries. Sys. Myc. II., p. 415, in part; *Nectria Lamyi*, Fckl. Mycol. Europ., p. 178.

Flitcham Abbey, King's Lynn, July, 1881. On dead branches of *Berberis vulgaris*.

212. **Nectria erubescens,** *Desmaz.*

Perithecia scattered or subgregarious, superficial, with a white radiating villous base, minute, globose, soft, smooth, brick-red, then reddish-brown, collapsing; ostiola papilliform; asci clavate, ·05 mm. long; sporidia oblong, subacute, slightly curved, triseptate, hyaline, ·017 mm. long by ·004 mm. wide.

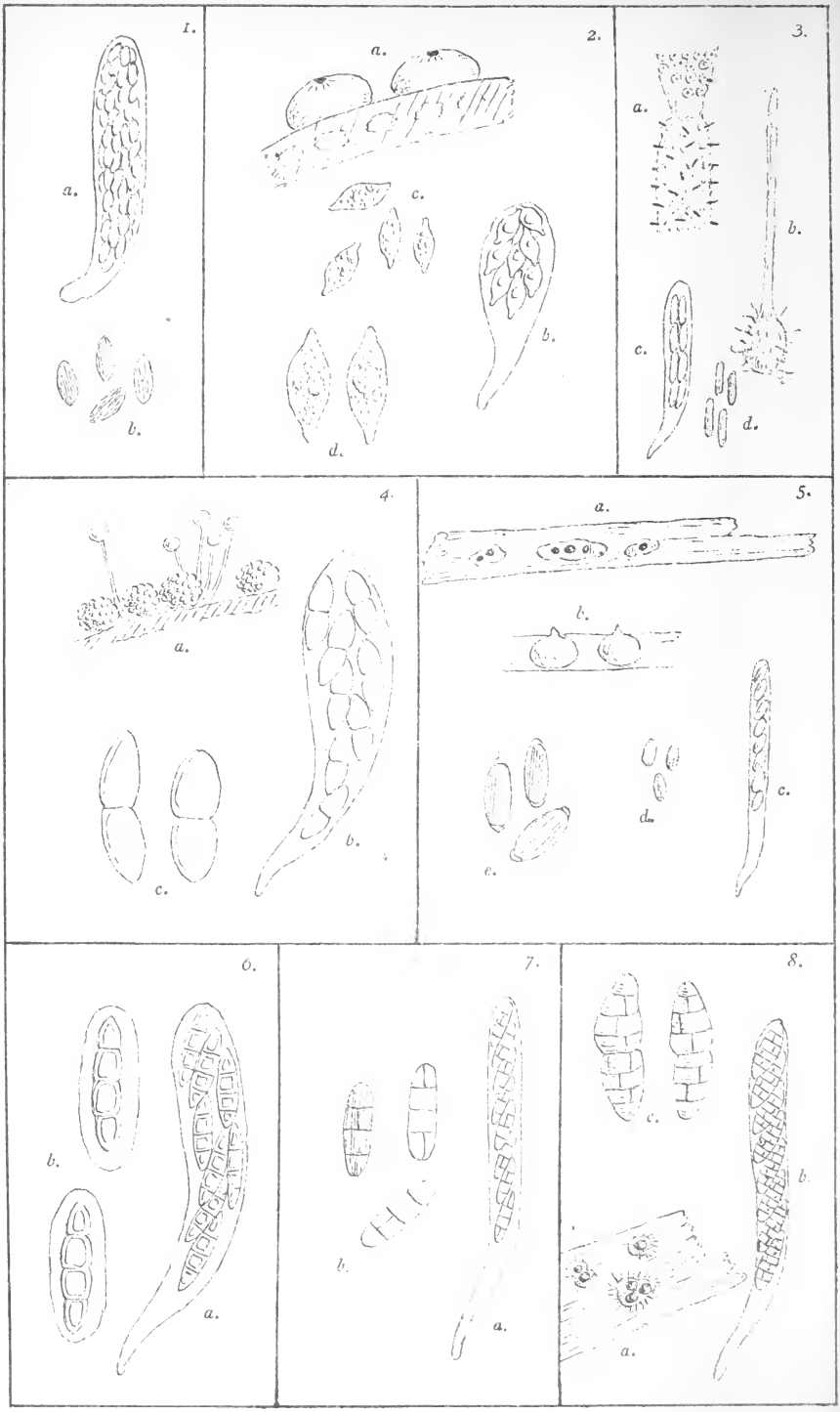
Desmaz. XIII., sub Sphæria; De Not. Sf. It., p. 72; Sacc. Michelia I., p. 309.

On dead holly leaves. Clifton Down. Oct., 1879 (C. Bucknall, Esq.).

In October, 1870, Mr. Bucknall found upon the under side of fallen holly leaves a *Nectria*, which answered to the above in all points save in having much smaller sporidia (·008-·01 × ·001-·002 mm.), which we were at first inclined to regard as a distinct species.

213. **Sphærostilbe aurantiaca,** *Tul.*

Conidia *Stilbum aurantiacum*, Bab., subfasciculate, orange; stem smooth, darker below, head subclavate; spores oblong,



C.B.P. ad nat. del.

New British Fungi.

obtuse, subtruncate. Bab. Abs. Linn. Trans., 1839; B. & Br. Ann. N. H., No. 223, t. 12, f. 14; Cooke, Hdbk., p. 553.

Ascophore. Perithecia gregarious, with the conidia, spherical dark red, rather large, rugulose; asci broadly clavate, ·13 × ·03 mm.; sporidia hyaline, uniseptate, ovate, oblong, slightly constricted, ·025-·03 × ·008-·01 mm. Tulasne Sel. Carp. Fung. III., p. 99, t. 14, f. 1-13; Sacc. Mich. I., p. 298.

On a dead elm tree. Brandon. Oct. 14, 1881.

Plate 158, fig. 4, (*a*) conidia and ascophore enlarged, (*b*) ascus, (*c*) sporidia.

214. **Melanospora parasitica,** *Tulasne.*

Perithecium spherical, attenuated upwards into a very long flexuous neck, which is five or six times the length of the perithecium, brown, clothed with white floccose mycelium; asci very delicate, about ·02 to ·03 mm. long by ·005 to ·008 mm. wide; sporidia pale brown, almost hyaline, cylindrical, obtuse at either end, ·01 mm. long by ·002 mm. wide.

Upon an immature specimen of *Torrubia militaris,* which was passing from the Isaria stage before it had acquired the red fleshy character of the perfect *Torrubia.* Tulasne figures this plant upon a beetle (*Melolontha vulgaris*), which is obviously attacked by *Isaria farinosa.*

Tulasne Sel. Carp. Fung. III., t. III., f. 11-14.

North Wootton. Sept., 1880.

Plate 158, fig. 3, portion of *Torrubia militaris* with the *Melanospora,* enlarged, (*b*) perithecium, (*c*) ascus, (*d*) sporidia.

215. **Melanospora episphæria,** *Ph. & Pl.*

Perithecia hyaline, globose, superficial, neck none, at first almost colourless, then blackish from the dark sporidia, ·35 mm. across; asci very delicate, soon absorbed, pyriform, ·07 mm. long, ·04 mm, wide at the upper part; sporidia lemon-shaped, at first hyaline and filled with granules then almost black and reticulated, ·03 mm. long by ·01 to ·012 mm. wide.

The reticulated sporidia are very remarkable. On *Hypomyces terrestris.* King's Lynn. Oct., 1880. This species also appeared on a specimen of the *Hypomyces,* which M. Boudier sent from Montmorency in November, 1880.

Plate 158, fig. 2 (*a*) two perithecia upon the stroma of *Hypomyces terrestris,* enlarged, (*b*) ascus, (*c*) sporidia, (*d*) two sporidia, more highly magnified.

216. **Valsa (Authostoma) gastrinoides,** *Ph. & Pl.*

Disc concave, black, stroma blackish; perithecia 8-10, ambient, half buried in the wood; asci cylindrical, ·08 × ·008-·01 mm.; sporidia eight, obliquely uniseriate, dark brown, elliptical, nucleate at first, ·015 × ·005 mm.

On *Viburnum.* March, 1880. Bristol. Mr. Bucknall.

This species is a true *Valsa,* as we accept the genus. It

approaches very closely to Fuckel's *Quaternaria Nitschkii*, which Saccardo considers a corticolous state of *Melogramma gastrinum*.

217. **Valsa (Valsella) clypeata,** *Fckl.*

Conceptacles shield-like, oblong, 1·5 mm. long by 1 mm. wide, black, immersed in the substance of the bark, olivaceous within; disc rounded or oval, projecting through a fissure in the epidermis, whitish; perithecia 4-8, crowded, globose, minute black; ostiola punctiform, black; asci sessile, oblong, polyporous, ·052 × ·007; sporidia cylindrical, obtuse at both ends, slightly curved, simple, ·006-·007 mm. long by ·0015 mm. wide.

Fckl. Mycol. Europ., p. 203.

On dead bramble stems. Forres. Rev. James Keith. April, 1880.

218. **Cucurbitaria lauro-cerasi,** *Ph. & Pl.*

Perithecia erumpent, 1 to 4 in a group, globose, smooth, small; ostiola inconspicuous; asci cylindrical, ·12-·125 × ·02 mm.; sporidia uniseriate, dark brown, oblong, ovate, slightly constricted about the middle, muriform, ·02-·025 × ·012 mm.

On cherry laurel. Forres. Rev. J. Keith. May, 1880.

This species comes near Fuckel's *C. coryli* (Nach. I., p. 20), as far as the size of the sporidia, but differs in other characters. The sporidia have often seven primary transverse septa—four in upper half of the sporidia and three in the lower.

Plate 158, fig. 8, (*a*) the plant, enlarged, (*b*) ascus, (*c*) sporidia.

219. **Massaria tiliæ,** *Ph. & Pl.*

Perithecia subcuticular, globose, then depressed, black; ostiola minute, just piercing the epidermis; asci subcylindrical; sporidia eight, hyaline involved in gelatine, triseptate, constricted at the septa, quadrinucleate, ·04-·06 mm. long by ·01 mm. wide.

On lime twigs. Forres. Rev. J. Keith. May, 1880.

This species comes very near *Massaria eburnoides*, Sacc., but the sporidia are twice the size of Saccardo's plant.

Plate 158, fig. 6, (*a*) ascus, (*b*) sporidia.

220. **Sordaria pleiospora,** *Winter.*

Perithecia scattered, semi-immersed, globose; neck conical; apex curved, thick, obtuse, attenuated almost to the length of the perithecia, brownish-black, covered by short thick black hairs, about ·38-·42 mm. in diameter; asci large, elongate, ventricose, 16-64 sporous, ·36 mm. × ·08-·12 mm.; paraphyses tubular branched, shorter than the asci; sporidia ovate, opaque, black-brown, truncate at both ends, and appendiculate, terminal appendage, hyaline, curved as long as the sporidium, inferior appendage, straight, twice or thrice the length of the sporidium; sporidia without the appendage, ·024-·033 × ·016-·019 mm.

Winter, Deutsch. Sord., p. 29, t.x., f. 17, a.k; Winter, Hedwigia, 1871, p. 161; Fckl. Mycol. Europ. App. II., p. 44; *Sordaria Langei*, Fckl. in litt.

On rabbit's dung. Bristol. Feb., 1881. Mr. C. Bucknall.

221. **Sordaria polyspora,** *Ph. & Pl.*

Perithecia semi-immersed, scattered, globose, bristled with a few black hairs upon the upper part; ostiola elongate; asci cylindrical, polysporous (128?), ·06 × ·01 mm.; sporidia elliptical, black, simple, ·005-008 × ·004-·005 mm.

Upon rabbit's dung. Leigh Down, Bristol. 6 March, 1881. Mr. C. Bucknall.

This well marked species is distinguished by the small size of its sporidia and other characters.

Plate 158, fig. 1, (*a*) ascus, (*b*) sporidia.

222. **Sphæria (Teichospora) deflectens,** *Karst.*

Perithecia scattered or gregarious, at length nearly superficial, spherical, at length often more or less collapsing; ostiola inconspicuous, smooth, shining black; asci cylindrical, ·06-·08; sporidia 6 or 8, obliquely uniseriate, oblong, thicker in front, 1-3 septate often with one or more longitudinal septa, slightly constricted at the septa or not, brown, ·012-·06 mm. × ·008-·005 mm.

Karsten. Mycol. Fenn. II., p. 69.

On rotten beech wood. Stapleton Park. Dec., 1878. Mr. Bucknall.

Plate 158, fig. 7, (*a*) ascus, (*b*) sporidia.

223. **Sphæria (Melanomma) fuscidulum,** *Sacc.*

Perithecia scattered or gregarious, free or semi-immersed, black, smooth, spherical or subdepressed, ·25 mm. across; ostiola cylindraceo-conical as long as the perithecia; asci clavate, ·055 × ·007-·008 mm., attenuated below, octosporous; sporidia biseriate, ·012-·014 × ·0035-·004 mm., straight or curved, at first sub-hyaline, 4 nucleate then 3 septate, slightly constricted at the septa, brown.

Saccardo, Michelia I., p. 450; Fung. Ital., p. 294; Fungi Venet ser. III., p. 5.

On holly. Coed Coch. Oct., 1880 (W.P). On elder. King's Lynn, Nov., 1880.

224. **Sphæria ammophila,** *Ph. & Pl.*

Perithecia immersed, large, two or three in a group beneath the circumscribed blackened epidermis; ostiola minute, punctate; asci cylindrical, ·08 mm. long by ·008-·01 mm. wide; sporidia eight, oval, black-brown, uniseriate, with a slight hyaline appendage at either end, ·008-·01 mm. long by ·005-·006 mm. wide.

Plate 158, fig. 5, (*a*) the plant enlarged, (*b*) perithecia, (*c*) ascus, (*d*) sporidia, (*e*) three sporidia more highly magnified, showing the hyaline appendage.

On *Ammophila arundinacea.* Holm-next-the-Sea, Norfolk. 15 August, 1880.

225. **Sphæria fluviatilis,** *Ph. & Pl.*

Perithecia minute, immersed, globose; ostiola papillate; asci clavato-cylindrical, ·06-·07 × ·01-·015 mm.; sporidia biseriate, triseptate, fusiform, curved, pale greenish-brown, ·02-·022 × ·005 mm.

On *Lemania fluviatilis.* Longmynd. May, 1880 (W.P.).

226. **Sphærella uliginosa,** *Ph. & Pl.*

Perithecia punctiform, seated upon bleached spots on the living leaves; asci clavato-cylindrical, ·06 × ·02 mm.; sporidia brown, triseptate, lanceolate, acute, slightly curved, having one joint often slightly swollen, ·03-·035 × ·01-·012 mm.

On living leaves of *Stellaria uliginosa.* Forres, 1881. Rev. J. Keith.

SYMBOLÆ LICHENO-MYCOLOGICÆ.

By Dr. Minks.*

Dr. Minks, the author of this work, has set forth his views on the morphology and physiology of lichens in the "Flora" for 1878 and in his book "Das Microgonidium," to which the attention of the readers of "Grevillea" has already been called.† It is to be regretted that no sufficiently competent Lichenologist possessing a knowledge of the German language has come forward to place Dr. Minks's views before an English speaking public in more detail and completeness than has hitherto been done, for it is only fair to him that views so subversive of the hitherto received notions should be brought fully before the critical attention of the English student, that they may stand or fall by their own merits.

Dr. Minks himself affirms that without the aid of his figures much that he has written will be difficult to understand. This much, however, is clear, that he finds minute bodies in the tissues of lichens, which he calls "microgonidia," to which he assigns high physiological value, that they exist throughout the vegetative and reproductive parts, being present in the hyphæ, the gonidia, the cortical layer, the various component parts of the apothecia—the paraphyses, the asci, and the sporidia. "Each tissue contains in its cells at least one microgonidium;" that owing to their number and arrangement in the cells, it is that the cells may be either green or colourless, which depends simply on optical conditions. These microgonidia can be seen by the aid of Hatnack's No. VIII. microscope, with 2, 3, and 4 eyepieces, and No. IX. immersion object-glass. In the work, the title of which is given above, he discards the hitherto accepted criterion between lichens and fungi, namely, the absence or presence of gonidia in their substance, and substitutes the presence or absence of these microgonidia, which he considers a much more valuable test. Dr. Nylander asserts that the bodies Dr. Minks has under view are nothing more than the "molecular granulations" long since known to the students of Vegetable Anatomy, and have no special relation to gonidia or their origin. In this opinion the Rev. M. J. Cromby fully concurs. If this be the case, the criterion advocated

* "Symbolæ Licheno-Mycologicæ." Beiträga zur Kenntniss der Grenzen Zwischen Flechten und Pitzen, von Dr. Arthur Minks. Erster Theil. Kassel, 1881.

† "Grevillea," Vol. xii., p. 89, 118 and 143; also Vol. ix., p. 34 and p. 48.

by Dr. Minks will prove a most fallacious one, and will only tend to render the line of demarkation between these two closely allied classes still more uncertain and perplexing than it hitherto has been. Gonidia are sufficiently conspicuous objects to catch the eye of the least experienced observer and form a comparatively easy criterion by which to detect a lichen from a fungus; but microgonidia, which do not always indicate their presence by their green colour, must be a very uncertain guide to the student in determining the true alliance of the plant he is examining. In this book 170 species are enumerated and briefly described, some few of which are already recognised by authors as lichens, but the large majority of which have hitherto been accepted as *Discomycetes*, the whole of which he transfers to lichens. It is quite impossible to follow the author, in this necessarily brief notice, into the investigation of individual species and the ground on which he would remove the whole into the Class Lichens, but it is difficult to avoid the expression of some surprise to find such species as *Peziza flammea*, A. & S., *P. corticalis*, Pers., *P. calycina*, Schum., *P. tricolor*, Sow., forced into so unnatural an alliance.

The commonest of these well-known species, *P. calycina*, Schum., is said by our author to have in its paraphyses the small microgonidia which are easily recognised and also counted; it will be in the power, therefore, of any one to satisfy himself as to what bodies are meant by him which are henceforth to constitute the line of demarcation. The greater proportion of the examples he has selected from the *Discomycetes* are, it is confessed, such as have always held a more or less doubtful position when tested by the old criterion, and here no great violence is done to our notions of classification, but it is altogether otherwise with such species as those mentioned above. The genera from which his 170 examples are drawn are the following:—*Ascobolus*, *Aulographum*, *Blitridium*, *Cenangium*, *Cryptomyces*, *Dermatea*, *Discella*, *Ditiola*, *Dothiora*, *Durella*, *Eusteyia*, *Excipula*, *Heteropatella*, *Heterosphæria*, *Hymnobolus*, *Hysterium*, *Labrella*, *Lachnella*, *Lecanidion*, *Lecidea*, *Nœtrocymbe*, *Nodularia*, *Odontotrema*, *Patellaria*, *Pezicula*, *Peziza*, *Peltidium*, *Phacidium*, *Podophacidium*, *Pragmophora*, *Pyrenostegia*, *Retinocyclus*, *Sphæria*, *Triblidium*, *Tympanis*, *Trochila*.—W. P.

LECTURES ON THE VEGETABLE KINGDOM.

We have received a volume with this title, by Dr. Wm. Woolls, and published in Sydney, but the only cryptogams which receive notice are the "Ferns," and these, in common with Phanerogams, are outside the sphere of our activities. It is a popular volume, dealing chiefly with the aspects of the Vegetable World in Australia, and doubtless will be of considerable interest to the colonist. Popular botanical works, written by those who are practically acquainted with the subject, are not so common but that we may afford a half-dozen lines to welcome them whenever they appear.

FUNGUS FORAYS.

Scottish Cryptogamic Society.—The annual excursions this year were fixed for the 30th August, in the Island of Mull; perhaps this is the reason why we have not heard of any extraordinary results having been achieved.

Yorkshire Naturalists' Union.—The first cryptogamic meeting of this society was held at Leeds on September 30th and October 1st, under "two most favourable conditions of fine weather and an abundance of fungi." We are assured by some who migrated southwards at the close of the meetings, that there was a third condition, "an abundance of good cheer," from which those who indulged scarce recovered for a week. The details of this meeting will be found in the "Gardener's Chronicle" for October 8th. So numerous are "Forays" becoming, and so popular, that full reports are more than we can undertake. The exhibition of Fungi after the excursions was exceptionally good as a first exhibition, and created quite a sensation. Very interesting species were found, but neither here nor elsewhere have unusual forms, either new or rare, been abundant. The most noteworthy species were, according to the report, *Agaricus panæolus*, Fr., *Agaricus Bucknalli*, B. & Br., *Agaricus pisciodorus*, Fr., *Agaricus dryinus*, Fr., *Agaricus seminudus*, Fr., and several *Hygrophori*. It would appear that the organization of the meetings was irreproachable, which is more than can be said for "first meetings" in general, and Fungus forays in particular.

Epping Club Fungus Foray was appointed for Saturday, October 1st, and was equal to the former in attendance, and as good as any in results. An account appeared in the "Gardener's Chronicle" for October 8th from the vigorous pen of Mr. Worthington Smith. The show was this year made the most of, for the specimens were spread over tables in a room adjoining that in which the meeting was held. For this and other reasons, the place selected this year was preferable to that of last year. The greatest "take" of the day was Mr. W. Smith's "gigantc Sparassis," four feet in diameter, notwithstanding that we arie assured that a specimen equal in size was discovered by a friend of ours last year. This excursion into excellent hunting grounds each year is a treat which mycologists residing in and around London should never miss.

Woolhope Club Fungus Foray.—This year the meetings commenced on Monday, October 3rd, and continued until Friday, October 7th. A full account appeared in the "Gardener's Chronicle" for October 22nd, which we cannot reprint for lack of available space. Any new species will be found in the list of "New British Fungi." Of these the most notable are *Agaricus* (*Clitocybe*) *catinus*, Fr., *Agaricus* (*Clitocybe*) *tumulosus*, Kalch., and

Lactarius flexuosus, Fr., the latter really a most distinct and splendid species. The weather was all that could possibly be desired, but fungi were by no means abundant. Several interesting and valuable papers were read; one by C. B. Plowright, on "Diseases of the Tomato," being published in "Gardener's Chronicle," November 12, 1881, and another by the same gentleman appears in the current number of "Grevillea."

Birmingham Natural History Society.—The first Fungus Foray of this society took place on Saturday, October 8th, in Sutton Park; but as it did not commence until the afternoon, and extended over only two or three hours, it cannot be expected that much was done. There was an extraordinary dearth of fungi, and nothing new was discovered, although *Agaricus heteroclitus*, Fr., and *Agaricus echinatus*, Roth., deserve to rank amongst rare species. There was a good attendance, and it is to be hoped that if the experiment should be repeated next year, a better account will be presented. The climatic conditions of early October were not favourable to the development of Fungi.

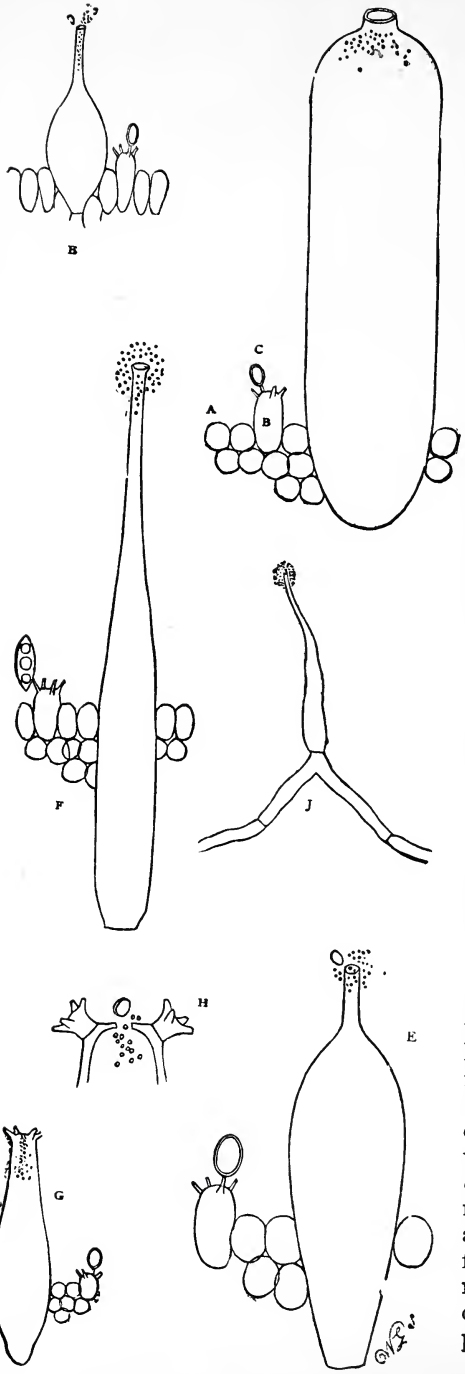
CYSTIDIA IN THE MUSHROOM TRIBE.

By W. G. Smith, F.L.S.

The receipt of the magnificent specimens of *Agaricus bombycinus* from your correspondent the Rev. J. M. Du Port, has again directed my attention to the subject of cystidia in Agarics. Knowing by experience how fine the cystidia are in some near allies of *A. bombycinus*, the first thing I did on receipt of the specimens was to look for the cystidia. For several hours of the night my efforts to find any were unavailing; at last I saw one, soon afterwards two others (in the hymenium), at length two more; they all agreed exactly in their great size (longer than any here illustrated), in their spindle-shape, and in being without spicules at the summit. The cystidia must be extremely rare in *A. bombycinus*, and this fact will give some one a good opportunity for saying he cannot see them, or for some rash person to deny their existence altogether.

I will briefly state what is meant by cystidia in the Mushroom tribe, and my impression that they represent the male element of these plants.

As a good example, I will take *Coprinus atramentarius;* this is an extremely common deliquescent Agaric, very frequently about rotten palings and wooden borders of gardens. Under the cap one can, of course, see innumerable black gills, each gill about as thick as tissue-paper. If the edge of one of these gills, or a section through any part of the gill surface, is examined with a microscope, three sorts of cells, in addition to the spores, will be seen. First, the simple cells of the plant, as at A, fig. 71; next, cells of



a somewhat larger size, called basidia, B; these carry the spores, as at C. The basidia always carry four spores, on the minute spikes here shown, but one spore only is shown in position for convenience; and lastly, other bodies of an immensely larger size occur, as at D—these latter comparatively gigantic flasks are extremely abundant; in some species of Coprinus they are so large that they can be seen without a lens, and they are so heavy that they drop out of the fungus in large numbers and rest on the ground with the fallen spores. At first these bodies are filled with fluid, but as the fungus becomes ripe the fluid becomes differentiated and takes a fine granular form; at this period the cystidium opens at the top, either by an orifice or sometimes by a little operculum or trap-door, which flies off, and the minute mobile granules pour out. Cystidia are distinctly hyaline and glutinous bodies, the spores always stick to them. Now in such deliquescent fungi as Coprinus the cells of the plant speedily perish, with the exception of the basidia, with the spores *and the cystidia*; the cystidia remain uninjured as long as the spores, and this fact alone suggests to my mind that they should be considered of equal importance with the spores.

At E is seen the cystidium of *Agaricus cucumis;* at F, the cystidium of *Gomphidias viscidus;* at G, *Agaricus umbrosus;* at H, *Agaricus radicatus*, with the little operculum or lid, at H, flying off. The figures are enlarged to an uniform scale, namely 400 diameters; and in each figure the simple cells of the plant and the basidia, with the spores, are also illustrated. It will be seen how important these bodies are as regards size and persistence.

Many botanists have noticed cystidia; but in my opinion cystidia have at present by no means received the attention that is their due. I could fill several pages of the "Gardener's Chronicle" with illustrations of their diverse forms, but in no instance have I ever seen a cystidium smaller than the ordinary cells of the fungus; they are usually larger, sometimes hundreds of times larger, always more hyaline.

Professor de Seynes expresses an opinion that cystidia are hypertrophied basidia—that is, basidia (or spore bearers) blown out in size; and Dr. Cooke seems to think this view is supported by some cystidia, being furnished with spicules at the top, G, as if they were intended to bear spores. If these views are admitted we have organs that are hypertrophied and atrophied at the same time, a by no means impossible state of things. It is the case of a mountain bringing forth a mouse. The cell is blown out so as to give enormous expectations, and when quite mature it puts out four little effete horns, but never produces spores.

That the cystidium and basidium are modifications of each other I am quite prepared to admit; and as for the four spicules in Pluteus, if botanists will only look at *A. petasatus* they will see cystidia with eight or even twelve spicules in three rows. Are these then to be considered attempts to produce eight or twelve spores instead of the normal four? Sometimes the spicules are proliferous, and each spicule will produce four others of a minor order, as at G (*A. umbrosus*, enlarged 1280 diam.). Is this for sixteen spores?

In conclusion, I will advert to the way in which the cystidia in *Gomphidius* are borne. In many instances (if not in all) they arise from two conjoined cells, as at J (enlarged 160 diameters). I have not seen basidia so arise, and it looks superficially like what is termed conjugation. It is a very curious thing that Dr. Cooke, in figuring *Peniophora sparsa* ("Grevillea," p. 125, fig. 16), shows two metuloids (like small cones) with a forked base; this is remarkable, and to my mind it indicates that the metuloids of *Peniophora* may sometimes arise from two cells, instead of a single one.—*From the Gardener's Chronicle, Sept.* 17, 1881, *p.* 369.

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Grevillea,

A QUARTERLY RECORD OF CRYPTOGAMIC BOTANY AND ITS LITERATURE.

GREVILLEA ATLAS.*

The coloured plates of Hymenomycetes which have from time to time appeared in "Grevillea" require in a few instances some observations, and these may best be furnished by giving a catalogue of the figures in the order of publication, with such notes as may be necessary. Now that the publication of "Illustrations" of British species is fairly on the way, it is scarcely probable that any occasion will arise for the publication of any further figures of the British *Agaricini* in the pages of "Grevillea." In the following series no exotic species are included except when they occur on the same plates as those which are found in this country. Of course, it must be expected that all the figures are not equally characteristic of the species they represent, but the individuals themselves vary, and figures of variations are always useful. It has been our endeavour to correct any manifest errors which may have occurred.

Pl. 76, fig. 1. *Cantharellus Houghtoni*, Phil. From drawing by W. Phillips, F.L.S.

" " 2. *Lactarius pubescens*, Fr. From drawing by W. Phillips, F.L.S.

Pl. 77, fig. 1. *Agaricus* (*Armillaria*) *bulbiger*, A. & S. From drawing by W. Phillips, F.L.S.

" " 2. *Agaricus* (*Nolanea*) *rufo-carneus*, Berk. From drawing by W. Phillips, F.L.S.

" " 3. *Agaricus* (*Clitopilus*) *cretatus*, B. & Br. From drawing by W. Phillips, F.L.S.

" " 4. *Agaricus* (*Tubaria*) *autochthonus*, B. & Br. From drawing by the Editor.

Pl. 78, fig. 1. *Hygrophorus Houghtoni*, B. & Br. From drawing by W. Phillips, F.L.S. It seems impossible to separate this from *Hygrophorus laetus*, Fr., of which it seems to be only a condition, scarcely even a variety.

* A few extra copies of all the plates enumerated, with a reprint of this list, may be had on application to the Editor or Publishers at ten shillings each.

Pl. 78, fig. 2. *Agaricus* (*Psathyra*) *bifrons*, B. & Br. From drawing by W. Phillips, F.L.S. This is very different from the figure of the same species given by Fries, and also from an original drawing from the Rev. M. J. Berkeley communicated for the "Illustrations," in which it will be figured.

Pl. 79. *Cortinarius* (*Inoloma*) *bolaris*, Fr. From drawing by Dr. Bull.

Pl. 82, fig. 1. *Agaricus* (*Pholiota*) *Cookei*, Fr. From drawing by the Editor, copy of which was sent to Fries with the original specimens.

„ „ 2. *Hygrophorus olivaceo-albus*, Fr. So named on the authority of W. G. Smith; but it does not appear to be the true species.

„ „ 3. *Agaricus* (*Collybia*) *cirrhatus*, Schum. From drawing by Dr. Bull.

Pl. 83. *Cortinarius* (*Phlegmacium*) *sebaceus*, Fr. From drawing by Dr. Bull, reduced. The pileus is darker than Fries' figures in the Icones, and it cannot be regarded as a characteristic illustration of the species.

Pl. 84, fig. 1. *Cortinarius* (*Hydrocybe*) *acutus*, Fr. From drawing by Dr. Bull. This is evidently *Cortinarius paleaceus*, Fr.

„ „ 2. Called *Cortinarius acutus*, Fr. Drawn by Dr. Bull from specimens collected by J. Renny; but it is clearly *not* that species, and scarcely a Cortinarius at all, or if so, a bizarre form of *Cortinarius fasciatus*.

„ „ 3. *Cortinarius* (*Telamonia*) *gentilis*, Fr. From drawing by Dr. Bull.

Pl. 85, fig. 1. *Cortinarius* (*Dermocybe*) *ochroleucus*, Fr. From drawing by Dr. Bull. The tint is scarcely satisfactory; it should have been a pale ochre.

„ „ 2. *Cortinarius* (*Hydrocybe*) *dilutus*, Fr. Variety. From drawing by Dr. Bull. This is certainly not the typical form.

„ „ 3. *Agaricus* (*Pholiota*) *togularis*, Fr. From drawing by the Editor.

Pl. 90. *Agaricus* (*Flammula*) *alnicola*, Fr. From drawing by Dr. Bull. It illustrates one of the forms of the species, longer and darker in the stem than usual.

Pl. 91, fig. 1. *Russula lutea*, Fr. From drawing by W. Phillips, F.L.S. Colour hardly bright enough.

„ „ 2. *Agaricus* (*Flammula*) *sapineus*, Fr. From drawing by Dr. Bull.

Pl. 92. *Cortinarius* (*Phlegmacium*) *saginus*, Fr. Reduced one-third, from drawing by Dr. Bull. It was from a copy of this drawing sent to the venerable Fries that he determined the species. Hence, although its accuracy has been called in question, such is its history.

Pl. 93. *Agaricus* (*Pluteus*) *leoninus*, Fr. Variety. From drawing by Dr. Bull. Although very characteristic of this splendid variety, it is not the typical form usually met with.

Pl. 102, fig. 1. *Cortinarius* (*Phlegmacium*) *claricolor*, Fr. This, and the succeeding figures, to Plate 116, are from drawings by Dr. Quelet. Stem of this species more robust than as figured by Fries.

„ „ 2. *Cortinarius* (*Phlegmacium*) *cyanopus*, Fr. Not so characteristic as Sowerby's figure.

Pl. 103, fig. 1. *Cortinarius* (*Phlegmacium*) *largus*, Fr.

„ „ 2. *Cortinarius* (*Phlegmacium*) *variicolor*, Fr. By no means a characteristic figure.

Pl. 104, fig. 1. *Cortinarium* (*Phlegmacium*) *Riederi*, Fr. A very small specimen.

„ „ 2. *Cortinarius* (*Phlegmacium*) *percomis*, Fr. The true species, but a very small, unexpanded specimen.

„ „ 3. *Cortinarius* (*Phlegmacium*) *anfractus*, Fr. Hardly the species of Fries, which is a very large and fine representative of this genus—once seen, never to be forgotten. We have a beautiful drawing of it by Mons. Boudier, determined by the Rev. M. J. Berkeley.

„ „ 4. *Cortinarius* (*Phlegmacium*) *multiformis*, Fr. Very like, but very small.

„ „ 5. *Cortinarius* (*Phlegmacium*) *glaucopus*, Fr. Not a characteristic figure, though doubtless the true species.

Pl. 105, fig. 1. *Cortinarius* (*Phlegmacium*) *callochrous*, Fr. Colours too bright.

„ „ 2. *Cortinarius* (*Phlegmacium*) *purpurascens*, Fr.

„ „ 3. *Cortinarius* (*Phlegmacium*) *cœrulescens*, Fr. Rather more slender habit than usual.

„ „ 4. *Cortinarius* (*Phlegmacium*) *dibaphus*, Fr. Very different in tone from Worthington Smith's figure of this species in "Mycological Illustrations," which latter is too highly coloured.

Pl. 106, fig. 1. *Cortinarius* (*Phlegmacium*) *orichalceus*, Fr.

„ „ 2. *Cortinarius* (*Phlegmacium*) *prasinus*, Fr.

Pl. 107, fig. 1. *Cortinarius* (*Phlegmacium*) *turbinatus*, Fr. Much too small, and rather too yellow.

„ „ 2. *Cortinarius* (*Phlegmacium*) *scaurus*, Fr. Not like Fries' figure. It is at least doubtful.

Pl. 107, fig. 3. *Cortinarius* (*Phlegmacium*) *crystallinus*, Fr. Young specimens.

„ „ 4. *Cortinarius* (*Phlegmacium*) *decoloratus*, Fr. Usually twice as large or more.

Pl. 108, fig. 1. *Cortinarius* (*Myxacium*) *salor*, Fr. A small specimen.

„ „ 2. *Cortinarius* (*Myxacium*) *delibutus*, Fr.

„ „ 3. *Cortinarius* (*Myxacium*) *vibratilis*, Fr.

„ „ 4. *Cortinarius* (*Myxacium*) *mucifluus*, Fr. Dripping with slime, which cannot well be shown in the figures.

Pl. 109, fig. 1. *Cortinarius* (*Inoloma*) *turgidus*, Fr. Strong-scented, robust, often deformed.

„ „ 2. *Cortinarius* (*Inoloma*) *tophaceus*, Fr. Not so rufescent as the figures given by Fries.

Pl. 110, fig. 1. *Cortinarius* (*Dermocybe*) *caninus*, Fr. Not a characteristic figure, and small.

„ „ 2. *Cortinarius* (*Dermocybe*) *myrtillinus*, Fr. Habit too slender for the typical form.

„ „ 3. *Cortinarius* (*Dermocybe*) *miltinus*, Fr.

„ „ 4. *Cortinarius* (*Dermocybe*) *cinnabarinus*, Fr. Pileus should be more of a bright orange-vermilion.

Pl. 110, fig. 5. *Cortinarius* (*Dermocybe*) *sanguineus*, Fr.

Pl. 111, fig. 1. *Cortinarius* (*Dermocybe*) *anthracinus*, Fr.

„ „ 2. *Cortinarius* (*Dermocybe*) *cinnamomeus*, Fr. Variety *semisanguineus*, Fr.

„ „ 3. *Cortinarius* (*Dermocybe*) *croceoconus*, Fr. Commonly larger, with a stronger tint of saffron-yellow.

„ „ 4. *Cortinarius* (*Dermocybe*) *orellanus*, Fr. Spoilt in the colouring, which is too dark and heavy.

„ „ 5. *Cortinarius* (*Dermocybe*) *cotoneus*, Fr. Only a young specimen.

„ „ 6. *Cortinarius* (*Dermocybe*) *raphanoides*, Fr.

„ „ 7. *Cortinarius* (*Telamonia*) *bivelus*, Fr. Very like the figure by Krombholz, not so much like those in Fries' Icones.

„ „ 8. *Cortinarius* (*Telamonia*) *urbicus*, Fr.

Pl. 112, fig. 1. *Cortinarius* (*Telamonia*) *plumiger*, Fr.

„ „ 2. *Cortinarius* (*Telamonia*) *scutulatus*, Fr. Generally tone of colour rather more livid.

„ „ 3. *Cortinarius* (*Telamonia*) *evernius*, Fr.

„ „ 4. *Cortinarius* (*Telamonia*) *limonius*, Fr. The figures by Fries and also by Holmskiold are the colour of *Agaricus aureus* or *Agaricus spectabilis*.

„ „ 5. *Cortinarius* (*Hydrocybe*) *acutus*, Fr. This is the true species, and *not* those figured on plate 84.

Pl. 113, fig. 1. *Cortinarius* (*Telamonia*) *hinnuleus*, Fr. Very small undeveloped specimens.
„ „ 2. *Cortinarius* (*Telemonia*) *brunneus*, Fr.
„ „ 3. *Cortinarius* (*Telamonia*) *flexipes*, Fr.
„ „ 4. *Cortinarius* (*Telamonia*) *rigidus*, Fr.
„ „ 5. *Cortinarius* (*Telamonia*) *paleaceus*, Fr. See also plate 114, fig. 4.
„ „ 6. *Cortinarius* (*Hydrocybe*) *subferrugineus*, Fr. A large and rather coarse species.
„ „ 7. *Cortinarius* (*Hydrocybe*) *ianthipes*, Fr. No figure can do justice to this delicate little gem.
Pl. 114, fig. 1. *Cortinarius* (*Hydrocybe*) *isabellinus*, Fr.
„ „ 2. *Cortinarius* (*Hydrocybe*) *germanus*, Fr.
„ „ 3. *Cortinarius* (*Hydrocybe*) *decipiens*, Fr. A very common species in English woods.
„ „ 4. *Cortinarius* (*Telamonia*) *paleaceus*, Fr.
„ „ 5. *Cortinarius* (*Hydrocybe*) *fasciatus*, Fr.
„ „ 6. *Cortinarius* (*Hydrocybe*) *milvinus*, Fr.
Pl. 115, fig. 1. *Cortinarius* (*Hydrocybe*) *duracinus*, Fr.
„ „ 2. *Cortinarius* (*Hydrocybe*) *erythrinus*, Fr.
„ „ 3. *Cortinarius* (*Hydrocybe*) *castaneus*, Fr.
„ „ 4. *Cortinarius* (*Dermocybe*) *sanguineus*, Fr. Not sufficiently red.
Pl. 116, fig. 1. *Cortinarius* (*Phlegmacium*) *latus*, Fr.
„ „ 2. *Cortinarius* (*Hydrocybe*) *fulvescens*, Fr.
„ „ 3. *Cortinarius* (*Inoloma*) *traganus*, Fr.
Pl. 117, fig. 1. *Cortinarius* (*Inoloma*) *pholideus*, Fr. From drawing by W. Phillips.
„ „ 2. *Cortinarius* (*Telamonia*) *torvus*, Fr. From drawing by Dr. Bull. Though small, this certainly corresponds with the figures in Fries' Icones.
Pl. 121, fig. 1. *Hygrophorus Wynniæ*, B. & Br. Drawn from original specimens by the Editor.
„ „ 2. *Hygrophorus fœtens*, Phil. From sketches by W. Phillips.
„ „ 3. *Agaricus* (*Eccilia*) *atropunctus*, Fr. From drawing by the Editor.
„ „ 4. *Agaricus* (*Crepidotas*) *Phillipsii*, B. & Br. From drawing by W. Phillips.
Pl. 122, fig. 1. *Peniophora Ayresii*, Berk. This and the following plates to plate 125, inclusive, from drawings by the Editor. The majority are exotic.
„ „ 2. *Peniophora disciforme* (Fr.).
„ „ 3. *Peniophora aschista* (B. & Br.).
„ „ 4. *Peniophora Berkeleyi*, Cooke.
Pl. 123, fig. 5. *Peniophora lilacina* (B. & Br.).
„ „ 6. *Peniophora tephra* (B. & C.).
„ „ 7. *Peniophora limitata* (Fr.).
„ „ 8. *Peniophora cinerea* (Fr.).

See "Grevillea," Vol. VIII., p. 20.

Pl. 124, fig. 9. *Peniophora papyrina* (Mont.).
„ „ 10. *Peniophora Habgallæ* (B. & Br.).
„ „ 11. *Peniophora carnea*, B. & Cke.
„ „ 12. *Peniophora Ravenelii*, Cke.
Pl. 125 „ 13. *Peniophora quercina* (Fr.).
„ „ 14. *Peniophora flavido-alba*, Cke.
„ „ 15. *Peniophora velutina* (Fr.).
„ „ 16. *Peniophora sparsa* (B. & Br.).

See "Grevillea," Vol. VIII., p. 20.

Pl. 126, fig. 1. *Agaricus* (*Stropharia*) *Percevalii*, B. & Br. From drawing by the Editor. The scales on the stem too decided.
„ „ 2. *Hygrophorus hypothejus*, Fr. From drawing by Dr. Bull.

Pl. 127, fig. 1. *Cortinarius* (*Inoloma*) *crocolitus*, Q. From drawing by Dr. Quelet, as well as the remaining figures in this and the succeeding plates.
„ „ 2. *Cortinarius* (*Hydrocybe*) *imbutus*, Fr.
„ „ 3. *Cortinarius* (*Dermocybe*) *decumbens*, Fr. Small specimens.

Pl. 128, fig. 1. *Cortinarius* (*Telamonia*) *impennis*, Fr. Fries figures this six inches high and three or four inches in diameter of the pileus.
„ „ 2. *Cortinarius* (*Telamonia*) *arenarius*, Q. No other figure of this species extant.
„ „ 3. *Cortinarius* (*Hydrocybe*) *Cookei*, Q. This is the only figure of this pretty little species not yet decidedly found in Britain. The single specimen found at Coed Coch and at first referred to it being subsequently held doubtful.
„ „ 4. *Cortinarius* (*Hydrocybe*) *scandens*, Fr.
„ „ 5. *Cortinarius* (*Telamonia*) *flabellus*, Fr.
„ „ 6. *Cortinarius* (*Telamonia*) *fallax*, Q. The only figure published of this species.
„ „ 7. *Cortinarius* (*Hydrocybe*) *saturninus*, Fr.

Pl. 129, fig. 1. *Cortinarius* (*Hydrocybe*) *obtusus*, Fr., var. *gracilis*. From drawing by Dr. Quelet.
„ „ 2. *Hygrophorus cossus*, Fr. From drawing by Dr. Bull.

Several of the species of *Cortinarius* included in this list have not as yet been determined as British.

THE ORGANIZATION OF CŒNOGONIUM AND THE THEORY OF LICHENS.

By M. le Dr. J. Muller, Professor in the University of Geneva.*

(*Translated by* W. Phillips, F.L.S.)

The genus *Cœnogonium*, established in the Class *Lichenes* in 1820, by Ehrenberg, comprises at the present time about twenty species which grow in the warm regions of the two hemispheres. Their fruit, or apothecia, and their spores, approach those of the section *Biatorina* of the genus *Patellaria*, while their thallus, or vegetative part, has a totally different structure, which approaches the genus *Graphis*.

If of this thallus we examine the constituent elements—which are filiform, slightly branched, more or less parallel with each other, very loosely united in a felted mass, and which, according to the species, may take the form of a little bed, or of a flattened cushion, or may develop horizontally in the form of a fan, about 2 to 8 c.m. in diameter—we are struck with the great resemblance these filamentous elements present to the filaments of *Conferva*. Some of the large tubes (filaments), about 5-30μ ($\mu = \frac{1}{1000}$ mm.), according to the species, contain a single series of green cells, filled with chlorophyll, which touch end to end, and which are ordinarily several times longer than broad. But there the details cease if we study them with an ordinary microscope, and it is thus far that Ehrenberg defined the analysis of his new genus.

By a superior analytical method, and by the aid of superior objectives, Dr. Karsten and Professor Schwendener recognised in 1862 that around some large confervoid filaments there exist other filaments much more slender, having a diameter of about 1-2μ, which appear to be hyaline, and which creep in some measure on the surface of the large green filaments. There is but one single series around the green filaments, and yet this series is interrupted, the slender filaments not touching laterally in a regular manner; but they often show some anastomosing and there occasionally form, at least in places, a rather close net-work. Hence we had two constituent elements in the thallus of *Cœnogonium* as in other Lichens, that of the large green cells still enclosed in their mother cells, corresponding to the gonidia, and those of the slender hyaline filaments corresponding to the hyphal filaments. But a genitic correlation between the two had not yet been observed in 1866 (de Bary, "Morphol. et Physiol. der Pilze und Flechten," p. 270).

It is clear, then, that according to the celebrated theory of Professor Schwendener, announced in 1867, the large green filaments will represent the nourishing Alga, and the slender hyphal filaments will be the parasitic Fungus, the two forming together the thallus

* Communicated to the Physical and Natural History Society of Geneva Sept. 1st, 1881.

of a plant which should no longer, because of this union, take its legitimate place amongst the series of classes of vegetation.

By the side of this normal structure there are occasionally found imperfect individuals, amongst which the slender enveloping filaments are wanting, as in *C. confervoides*, Nyl., and others. In this case the plants are necessarily sterile, without apothecia, for these are formed, according to the researches of Professor Schwendener ("Flor. Ratisb.," 1862, tab. 1), exclusively by the concourse of the hyphal filaments. This difference, meanwhile, is not everywhere absolute, for the new *Cœnogonium pannosum* (which I have just published in the "Flora de Ratisb." of this year, Lichenol. Beitr., No. 309), sent from Brazil by M. Puiggari, presents the two conditions at the same time. Certain filaments show only the large green tube—the gonidia; and others from the same bed (gazon), covered with apothecia, are surrounded with a small number of slender hyphal filaments.

But this last-named kind are precisely the filaments which have shown me, when I have analysed the species mentioned for its specific character, a remarkably demonstrative case, which forms the object of this note, and which confirms the beautiful general results recently published in the splendid work of Dr. Minks.

This filament, in a great part of its length, measures 8μ in diameter, and is composed only of a large green tube. It was conformed to the large green tube of other filaments of the same bed, of which the greater number were loosely covered by, or encased with, a small number of the slender hyphal filaments. It contained then the cylindrical green gonidia, which simulated some articulations of conferva, and was the alga of the theory. But at a certain point this large gonidia-bearing tube suddenly narrowed, under the form of a cone a little longer than broad, and afterwards continued under the form of a very slender capillary tube, only 2μ in size, without there being any discontinuation of the cavity between the large tube and the very slender portion. The whole was formed of one single cell, at first large, afterwards very narrow, being comparatively hyaline, and moreover perfectly conformable to the slender hyphal tubes of the theoretic fungus, which covered the large green tubes, or theoretic alga, in other filaments of the same species. Besides, the narrow part, examined by the aid of some powerful immersion objectives, and the light condenser of Professor Abbé, showed clearly the microgonidia, the gonidia in their preliminary state, under their form, size, and normal arrangements, and in this respect there was a conformity between the narrow part and the hyphal enveloping tubes of the encased filaments.

It follows that one and the same cell—in the one case enlarged and bearing gonidia—should have been the theoretic alga, while in the other case, it remaining narrow and containing the microgonidia, it should have been the theoretic fungus, thus proving in the most absolute manner the falsity of the theory that one and the same cell may at the same time pertain to two classes of vegetation. There is neither Fungus nor Alga;

the whole is Lichen nothing but Lichen ; and the two kinds of tubes, so different at first view, are but different states of the evolution of one single and individual organ. The very slender hyphal tubes are the first part containing the microgonidia. This first part may remain always in this state, or it may also enlarge and lengthen, while the microgonidia, originating by free formation, may pass into the stage of gonidia, and then the narrow hyphal tubes will become large gonidia-bearing tubes.

Mimicry in Fungi.—Since my paper upon this subject, which appeared in September number of *Grevillea*, my friends have kindly brought other facts under my notice. Mr. W. R. Gerard was good enough to send me the Bulletin of the Torrey Botanical Club, for March, 1880, in which there is a note by him upon the "Correlation between the odour of the Phalloids and their relative frequency," in which he points out the avidity with which flies devour the fœtid hymenia of these fungi, in the following words :—"In fact, so similar to decaying animal organisms is it (*i.e.*, the odour), that even flies are deceived thereby ; and before the ill-scented mass has had time to creep away, it will have been greedily devoured by numbers of these insects. As flies have 'no local habitation,' they give the minute ingested spores a wide dissemination by means of their ejections. It is a well-observed fact that the very common species of 'stink horns' (*Phallus impudicus*, *indusiatus*, etc.) are found in the greatest abundance around human habitations, where they occur under porches, in the door yard, and in the garden, and often in such numbers and so frequently as to occasion serious inconvenience. This tendency to become domesticated, is thus correlated with their fœtid odour, and the presence of those constant companions of man—the flies. More rarely these malodorous plants are found in woods in the vicinity of villages and cities. In such localities, where flies are less abundant, the same office is often performed for them by other insects—especially by beetles. The only fresh specimen of a *Phallus* that I ever met with in the woods was being visited by several individuals of a common species of carrion beetle—*Silpha Noveboracensis*." The writer then proceeds to point out that the much greater frequency of *Phallus impudicus* as compared with *Cynophallus caninus*, is probably due to the fact that the former is powerfully fœtid, whilst the latter is nearly inodourous. That *Phallus impudicus* occurs so frequently near human habitations in the United States is peculiar, as it certainly does not do so with us in Britain. Respecting the odour of *Pilacre petersii*, my friend Mr. Worthington G. Smith has called my attention to the fact that it is identical with that of liquorice (*Glycyrrhiza glabra*). During the meeting of the Woolhope Club, last October, Mr. H. T. Wharton drew attention to the smell of *Lactarius camphoratus*, which, when dry, exactly resembles that of fenugreek (*Trigonella fœnum-grecum*).

King's Lynn, 7th Nov., 1881. Charles B. Plowright.

CRYPTOGAMIC KNOWLEDGE IN 1620.

Very few remarks are necessary to introduce the following extracts from Lord Chancellor Bacon's "Sylva Sylvarum, or Natural History," a work which he evidently thought of great value, for he decided on publishing it, notwithstanding that, owing to its want of system, it would reflect but little honour on him, for the benefit it would be to the community. We farther learn that he considered that in his Natural History, he described the world "as God made it, and not as men have made it, for that it hath nothing of imagination."

Readers of "Grevillea" will not require explanations of Bacon's descriptions of Fungi, &c.; nor need it be pointed out that he does not recognise the difference between the Mosses and the Lichens. Whether the perfumers use any lichen from the apple tree for purposes of their art I do not know; but, if so, it is not to my knowledge mentioned in any of our English manuals.

Scattered throughout the book are various Cryptogamic notes; one on a lumminous tree trunk is especially interesting, but is too long for insertion. The following, however, which is the strictly Cryptogamic portion of the work, gives a vivid idea of the knowledge of that branch of botany when Bacon retired to Gorhambury to write those works which have placed him amongst the foremost philosophers of any age.

Experiments in consort touching the rudiments of plants, and of the excrescences of plants, or super-plants.

The Scripture saith, that Solomon wrote a Natural History, *from the cedar of Libanus, to the moss growing upon the wall:* for so the best translations have it. And it is true that moss is but the rudiment of a plant; and, as it were, the mold of earth or bark.

Experiment 537.—Moss groweth chiefly upon ridges of houses tiled or thatched and upon the crests of walls: and that moss is of a lightsome and pleasant green. The growing upon slopes is caused, for that moss, as on the one side it cometh of moisture and water, so on the other side the water must but slide and not stand or pool. And the growing upon tiles or walls etc. is caused, for that those dried earths, having not moisture sufficient to put forth a plant, do practice germination by putting forth moss; though when by age or otherwise, they grow to relent and resolve, they sometimes put forth plants, as wall-flowers. And almost all moss hath here and there little stalks besides the low thrum.

538.—Moss groweth upon alleys, especially such as lie cold and upon the north; as in divers terrases: and again, if they be much troden; or if they were at the first graveled; for whereso-ever plants are kept down the earth putteth forth moss.

539.—Old ground that hath been long unbroken up, gathereth

moss: and therefore husbandmen use to cure their pasture grounds when they grow to moss, by tilling them for a year or two: which also dependeth upon the same cause; for that the more sparing and starving juice of the earth, insufficient for plants, doth breed moss.

540.—Old trees are more mossy far than young; for that the sap is not so frank as to rise all to the boughs, but tireth by the way, and putteth out moss.

541.—Fountains have moss growing upon the ground about them;

Muscosi fontes;

The cause is, for that the fountains drain the water from the ground adjacent, and leave but sufficient moisture to breed moss: and besides the coldness of the water conduceth to the same.

542.—The moss of trees is a kind of hair; for it is the juice of the tree that is excerned and doth not assimilate. And upon great trees the moss gathereth a figure like a leaf.

543.—The moister sort of trees yield little moss; as we see in asps, poplars, willows, beeches etc. which is partly caused for the reason that hath been given, of the frank putting up of the sap into the boughs; and partly for that the barks of those trees are more close and smooth, than those of oaks and ashes; whereby the moss can hardlier issue out.

544.—In clay-grounds all fruit trees grow full of moss, both upon body and boughs; which is caused partly by the coldness of the ground, whereby the plants nourish less; and partly by the toughness of the earth, whereby the sap is shut in, and can not get up to spread so frankly as it should do.

545.—We have said heretofore, that if trees be hide-bound they wax less fruitful and gather moss; and that they are holpen by hacking &c. And therefore by the reason of contraries, if trees be bound in with cords, or some outward bands, they will put forth more moss: which I think happeneth to trees that stand bleak, and upon the cold winds. It should also be tried whether, if you cover a tree somewhat thick upon the top after his polling, it will not gather more moss. I think also the watering of trees with cold fountain water will make them grow full of moss.

546.—There is a moss the perfumers have which cometh out of apple trees, that hath an excellent scent. *Query*, particularly for the manner of the growth, and the nature of it. And for this experiment's sake, being a thing of price, I have set down the last experiments how to multiply and call on mosses—

Next unto moss, I will speak of mushrooms; which are likewise an imperfect plant.

The mushrooms have two strange properties; the one that they yield so delicious a meat; the other, that they come up so hastily, as in a night; and yet they are unsown. And therefore such as are upstarts in state, they call in reproach mushrooms. It must

needs be therefore, that they be made of much moisture; and that moisture, fat, gross and yet somewhat concocted. And, indeed, we find that mushrooms cause the accident which we call *incubus*, or the mare in the stomach. And therefore the surfeit of them may suffocate and empoison. And this sheweth that they are windy; and that that windiness is gross and swelling, not sharp or griping. And upon the same reason mushrooms are a venereous meat.

547.—It is reported that the bark of white or red poplar, which are of the moistest of trees, cut small, and cast into furrows well dunged, will cause the ground to put forth mushrooms at all seasons of the year fit to be eaten. Some add to the mixture leaven of bread dissolved in water.

548.—It is reported, that if a hilly field where the stubble is standing, be set on fire in a showery season, it will put forth great store of mushrooms.

549.—It is reported that hartshorn, shaven or in small pieces, mixed with dung and watered, putteth up mushrooms. And we know hartshorn is of a fat and clammy substance: and it may be ox-horn would do the like.

550.—It hath been reported though it be scarce credible, that ivy hath grown out of a stag's horn; which they suppose did rather come from a confrication of the horn upon the ivy than from the horn itself. There is not known any substance but earth, and the procedures of earth, as tile, stone, *etc.* that yieldeth any moss or herby substance. There may be trial made of some seeds, as that of fennel-seed, mustard-seed, and rape-seed, put into some little holes made in the horns of stags or oxen, to see if they will grow.

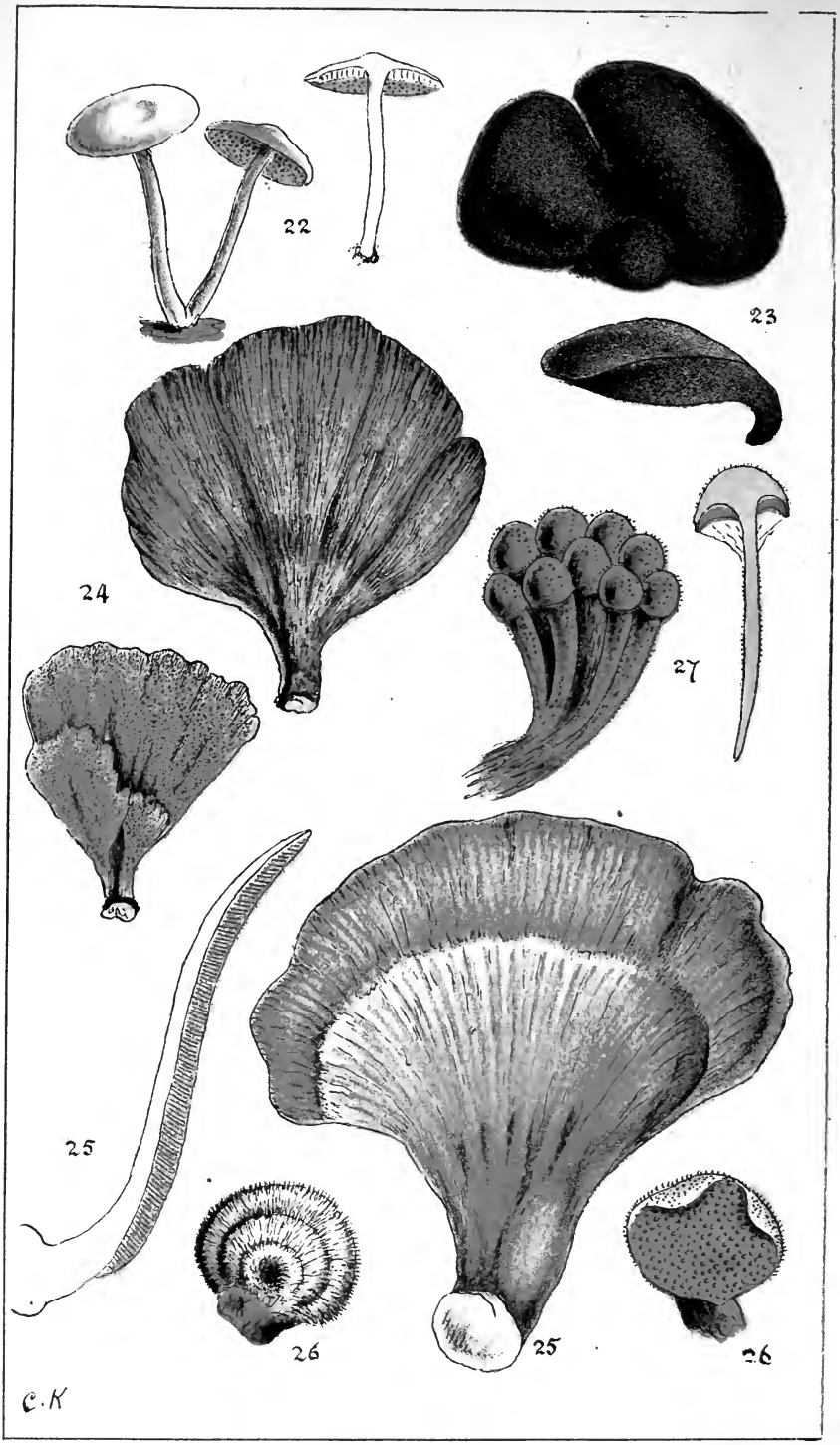
551.—There is also another imperfect plant, that in shew is like a great mushroom: and it is sometimes as broad as one's hat; which they call a toad's stool: but it is not esculent; and it groweth, commonly, by a dead stub of a tree, and likewise about the roots of rotten trees: and therefore seemeth to take his juice from wood putrified. Which sheweth, by the way, that wood putrified yieldeth a frank moisture.

552.—There is a cake that groweth upon the side of a dead tree, that hath gotten no name, but it is large and of a chestnut colour, and hard and pithy; whereby it should seem, that even dead trees forget not there putting forth; no more than the carcases of men's bodies, that put forth hair and nails for a time.

553.—There is a cod, or bag, that groweth commonly in the fields; that at the first is hard like a tennis ball, and white; and after groweth of a mushroom colour, and full of light dust upon the breaking; and is thought to be dangerous for the eyes if the powder gets into them; and to be good for kibes.* Belike it hath a corrosive and fretting nature.

554.—There is a herb called Jews-ear that groweth upon the

* Ulcerated chilblains.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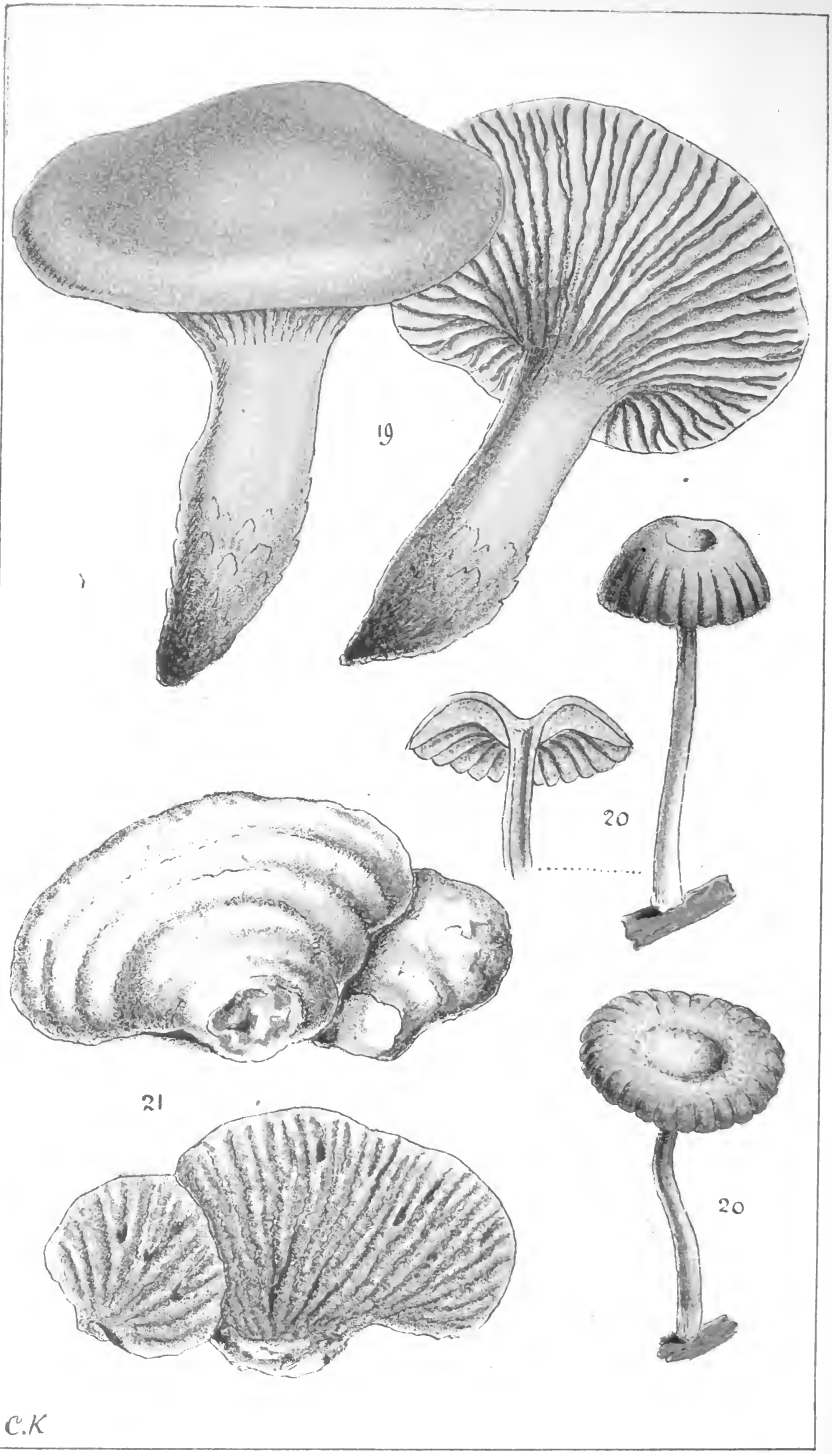

AUSTRALIAN FUNGI.

roots and lower parts of the bodies of trees; especially of elders, and sometimes ashes. It hath a strange property; for in warm water it swelleth, and openeth extremely. It is not green but of a dusky brown colour. And it is used for squinancies and inflamations in the throat; thereby it seemeth to have a mollifying and lenifying virtue.

555.—There is a kind of spungy excrescence which groweth chiefly upon the roots of the laser-tree; and sometimes upon cedar, and other trees. It is very white, and light, and friable; which we call agaric. It is famous in physic for the purging of tough phlegm. And it is also an excellent opener for the liver; but offensive to the stomach: and in taste it is at first sweet, and after bitter.

R. B. C.

AUSTRALIAN FUNGI.

By M. C. Cooke.

(Continued from p. 64.)

Ord. II. Polyporei, *Fr.*

Gen. 1. Boletus, *Dill.*

Bol. pachypus, *Fr. Hym. Eur., p.* 506; *Sverig. Svamp. t.* 68.
Queensland.

Bol. marginatus, *Drum. Berk. Hook. Journ.,* 1845.
W. Australia.

Bol. infractus, *Fr. Pl. Preiss, p.* 134.
W. Australia.

Bol. subtomentosus, *Fr. Hym. Eur., p.* 503; *Schœff. Icon. t.* 12.
N. S. Wales.

Bol. cæsarius, *Fr. Pl. Preiss, p.* 134.
W. Australia.

Bol. subsimilis, *Preiss. Fr. Pl. Preiss, p.* 134.
W. Australia.

Bol. ananœceps, *Berk. Linn. Journ.* XIII., 161.
Victoria, Queensland.

Bol. arenarius, *Fr. Pl. Preiss, p.* 134.
W. Australia.

Bol. napipes, *Muell. Linn. Journ.* XIII., 161.
Victoria.

Bol. alliciens, *Berk. Hook. Journ.,* 1845, 50.
W. Australia.

Bol. fructicicola, *Berk. Hook. Journ.* VI., 574.
Tasmania.

Bol. megalosporus, *Berk. Fl. Tasm.* II., 251, *t.* 182, *f.* 3.
Tasmania.

Bol. Thozetii, *Berk. Linn. Journ.* XVIII., 384.
Queensland.

Gen. 2. STROBILOMYCES, *Berk.*

Strob. nigricans, *Berk. Hook. Journ.*, 1852, *p.* 139.
Queensland.

Gen. 3. POLYPORUS, *Mich.*

Sect. A. MESOPUS, *Fr.*

Pol. myelodes, *Kalch. in Grev.* IV., 74.
Queensland.

Pol. brumalis, *Fr. Hym. Eur.*, 526.
Queensland.

Pol. arcularius, *Fr. Hym. Eur.*, 526.
Queensland, N. S. Wales.

Pol. tricholoma, *Mont. Syll.*, 153.
Queensland.

Pol. perennis, *Fr. Hym. Eur.*, 531.
Queensland.

Pol. oblectans, *Berk. Hook. Journ.*, 1845, 51.
Tasmania, Victoria, Queensland, W. Australia, S. W. Australia.

Pol. Armitii, *Muell. & Kalch., Grevillea t.* 145, *f.* 22.
Lentus, pileo tenui, umbonato, coriaceo-membranaceo, lævi, glabro, albo, ½ unc. lato; stipite brevi, unciam longo, lineam crasso, incurvo fibrilloso, concolori; poris regularibus, decurrentibus, obtusis, minutis, albis.
Austral. Nord Queensland ad Dunrobin leg. Armit.
Pol. leptocephalo, Fr., affinis, sed totus albus et pileus—plus minus—umbonatus.

Pol. luteo-nitidus, *Berk. Hook. Journ.*, 1856, 175.
Queensland.

Pol. cladonia, *Berk. Hook. Journ.*, 1845, 51.
W. Australia.

Pol. bulbipes, *Fr. Plant. Preiss*, 135.
W. Australia.

Pol. xanthopus, *Fr. Epic.* I, 437.
Victoria, N. S. Wales, Queensland.

Pol. collybioides, *Kalchbr.*
Totus fusco rufescens. Pileus carnosulus, convexus 3-6 lin. latus, lævis, glaber; stipes subcartilagineus, tenuis 1-2 poll. altus; pori alveolares, gyroso-angulati, profundi, flaccidi, siccitate collabentes. Sporæ creberrimæ, ovatæ et irregulares, hyalinæ.
Richmond River (Muell.).
Est quasi *Collybia porosa*, et vix verus *Polyporus*.

Pol. quadrans, *B. & Br. Linn. Trans.*, 1879, 400.
Queensland.

Pol. dictyopus, *Rostk in Sturm. Fl. t.* 33 (*? Boletus*).
Queensland.

Pol. rudis, *Berk. Fl. Tasm. t.* 182, *f.* 4.
Tasmania.

Pol. perdurans, *Kalch. Grev.* IX., *p.* 1.
Tasmania.

Pol. nigripes, *Fr. Epicr. p.* 435.
Richmond River.

Pol. rufescens, *Fries Hym. Eur.*, 529.
S. W. Australia, Queensland.

Sect. B. Pleuropus, *Fr.*

Pol. melanopus, *Fr. Hym. Eur.*, 534.
Victoria, Queensland.

Pol. picipes, *Fries Hym. Eur.*, 534.
Queensland.

Pol. superpositus, *Berk. Linn. Journ.* XIII., 161.
N. S. Wales.

Pol. varius, *Fr. Hym. Eur.*, 535.
W. Australia.

Pol. multilobus, *Kalchbr.*
Pileus coriaceus, tenuis et rigidus, subreniformis, in stipitem lateralem brevissimum angustatus, vage rugulosus, e pubescenti glabratus, albo-alutaceus, margine lobatus, lobis rotundis, azonis, in fungo adultiore imbricatis. Pori minuti, rotundi, obtusi, perbreves, cum substantia albi.
Richmond River (Mueller).
E. Prolificantibus. Pileus 3-5 unc. longus latusve, 2-3 lin. crassus.

Pol. stereinus, *B. & C. Linn. Journ.* X., 308. *Cuban Fungi, No.* 212.
Richmond River, Upper Daintree River.
Two species, quite distinct from each other, are confounded under this name.

Pol. cognatus, *Kalch.* ? = **P. stereinus**, *Berk. & Curt.*
N. S. Wales, Queensland.

Pol. rhipidium, *Berk. Hook. Journ.*, 1847, 319.
Victoria, N. S. Wales, Queensland.

Pol. lucidus, *Fr. Hym. Eur.*, 537.
Tasmania, Queensland.

Pol. gibbosus, *Nees. Fr. Epicr.*, 443.
Queensland.

Pol. sanguineus, *Meyer Fr. Epic.* I., 444.
W. Australia, S. Australia, Victoria, Tasmania, N. S. Wales, Queensland, Lord Howe's Island.

Pol. platotis, *B. & Br. Linn. Trans.*, 1879, 401.
Queensland.

Pol. dilatatus, *Berk. Hook. Journ.* 1847, 499.
N. S. Wales, Queensland.

Pol. rugosus, *Nees Acta Nat. Cur.* XIII.
N. S. Wales.

Pol. fusco-lineatus, *B. & Br. Linn. Trans.*, 1879.
Queensland.

Pol. peroxydatus, *Berk. Linn. Journ.* XVI., 39.
N. S. Wales.

Pol. flabelliformis, *Klotsch. Linnea*, VIII., 483.
N. S. Wales, Queensland.

Pol. glabratus, *Kalch. in Hedwigia* XV., *p.* 114.
Victoria.

Pol. luteus, *Nees Acta Nat. Cur.* XIII.
N. S. Wales, Queensland.

Pol. affinis, *Nees. Fr. Epic.* I., 445.
N. S. Wales, Queensland.

Pol. Hodgkinsoniæ, *Kalch. Grevillea t.* 145, *f.* 24.
E Petaloideis, pileo tenui, membranaceo-coriaceo, rigido, planoconvexo, spathulato, striis elevatis radiantibus dense lineato, primum subsericeo demum verucelloso, margine acuto, subtus sterili sublobato, albido; stipite curto, cylindrico, basi disciformi, linea recta in pileum transiente. Pori minuti, brevissimi, angulati, demumve dentato-laceri, ex albo flaventes.
N. S. Wales, Richmond River leg. Maria Hodgkinson.
A simili *P. elongato* B. pileo teneriore, eximie lineato differt.

Pol. elegans, *Fries Hym. Eur.*, 535.
Tasmania.

Pol. elegans var. **nummularius**, *Fr. Epic.*, 440.
Richmond River.

Pol. intonsus, *Berk. Fl. Tasm.* II., 254.
Tasmania.

Pol. grammocephalus, *Berk. Hook. Journ.*, 1842, 148.
Queensland.

Pol. Emerici, *Berk. in Herb.*
Albidus. Pileo spathulato, vel reniformi, lævi, fibrillis adnatis obscurioribus radiato-virgato. Stipite abbreviato. Poris angularibus, mediis; dissepimentis tenuibus, mox diffractis.
Queensland.
Allied to *Polyporus grammocephalus*, B.

Pol. ornithorhynchi, *Kalch. Grevillea t.* 145, *f.* 23.
Pilei subcæspitosi, tenues, coriacei, obovato-cuneati, azoni, villoso tomentosuli, rubiginoso-umbrini, in stipitem concolorem, brevem vel subnullum attenuati; pori decurrentes, breves, rotundi, umbrini. Substantia cinnamomea.
Richmond River leg. Mar. Hodgkinson.
Pileus unciam circiter latus, cuticula tegitur glabra, nigricante, cui stratum tenue tomenti umbrini superpositum est. E grege quidem *Pol. prolificantis*, sed ceteris hujus gregis ob pileum azonum et erugem diffinis.

Pol. Muelleri, *Kalch. Grevillea t.* 145, *f.* 25.
E serie P. petaloidis, totus albus, pileo-carnoso-coriaceo, tenui, rigido, flabellari-expanso, postice depresso, glabro, azono, dense radiatim lineato, basi coarctato; stipite peltam hemisphæricam referente, glabro; poris mediocribus, brevibus, angulatis, inæqualibus, ore subintegris.
N. S. Wales.
Pileus 2-3 poll. longus latusve, siccitate alutaceus.

Sect. C. Merisma, *Fr.*

Pol. frondosus, *Fr. Hym. Eur.*, 538.
Tasmania.

Pol. sulphureus, *Fr. Hym. Eur.*, 542.
Tasmania, Australia.

Pol. radiato-rugosus, *Berk. Ann. Nat. Hist.* III., 323.
Tasmania.

Pol. scabriusculus, *Berk. Linn. Journ.* XVIII., 385.
Australia.

Sect. D. Anodermei, *Fr.*

Pol. citreus, *Berk. Linn. Journ.* XIII., 162.
Australia.

Pol. fruticum, *Berk. & Curt. Linn. Journ.* X., 310.
Queensland.

Pol. gilvus, *Schwz. Fr. Hym. Eur.*, 548.
W. Australia.

Pol. adustus, *Fr. Hym. Eur.*, 549.
Queensland.

Pol. chioneus, *Fr. Hym. Eur.*, 546.
N. S. Wales.

Pol. Beckleri, *Berk. Linn. Journ.*, XIII., 162.
N. S. Wales.

Pol. demissus, *Berk. Hook. Journ.*, 1845, 52.
W. Australia.

Pol. corrivalis, *Berk. Linn. Journ.* XIII., 162.
S. Australia.

Pol. fœdatus, *Berk. Linn. Journ.* XVI., 41.
Queensland.

Pol. citro-aurantius, *B. & Br. MSS.*
Queensland.

Pol. tephronotus, *Berk. Fl. Tasm.* II., 252.
Tasmania, N. S. Wales.

Pol. ochroleucus, *Berk. Hook. Journ.* 1845, 53.
W. Australia, N. S. Wales, Tasmania, Queensland.

Pol. semi-digitaliformis, *Berk. Linn. Journ.*, XVI., 29.
N. S. Wales.

Pol. Palliseri, *Berk. in. Herb. Berk.*
Pileo e carnoso-lento coriaceo, conchiformi, lævi vel papillato; leniter sericeo, postice albo; antice cinereo-fusco; margine subacuto, sæpe albido, obscure zonato. Carne albo. Poris albis, æqualibus, rotundatis, mediis, dissepimentis incrassatis.
Victoria, Queensland.
Two to three inches across to $\frac{1}{2}$ inch thick.

Pol. ascoboloides, *Berk. Linn. Journ.* XIII., 162.
Australia.

Pol. eucalyptorum, *Fr. Pl. Preiss*, 135.
W. Australia.

Pol. pisiformis, *Kalch.*
Totus albus, globosus, adnato-sessilis, pisi magnitudine et minor; pori minuti, punctiformes, integri, in parte fungi terram spectante, imarginata, et parum modo deplanata siti.
Melbourne (Mueller).
Singularis omnino species! Suspicari quidem licet, eam statum valde juvenilem fungi cujusdam incogniti sistere; sed pori bene evoluti contrarium indicare videntur.

Pol. rubidus, *Berk. Hook. Journ.*, 1847, 500.
Queensland, N. S. Wales.

Pol. cinnabarinus, *Fr. Hym. Eur.*, 503.
S. Australia, Victoria, Tasmania, Queensland.

Pol. leonotis, *Kalch. Grevillea* IV., 73. (= **Trametes leonotis.**)
Australia.

Pol. funalis, *Fr. Epic.*, 459. (= **Trametes funalis.**)
Queensland.

Pol. campylus, *Berk. Fl. Tasm* II., 252.
Tasmania.

Pol. angustus, *Berk. Fl. Tasm.* II., 253.
Tasmania.

Pol. rhinocephalus, *Berk. Fl. Tasm.* II., 253, *t.* 182, *fig.* 8.
Tasmania.

Pol. Gunnii, *Berk. Fl. Tasm.* II., 253.
Tasmania.

Pol. pelliculosus, *Berk. Hook. Journ.* VI., 575.
Tasmania.

Sect. E. Placodermei, *Fr.*

Pol. chilensis, *Fr. Sym. Myc.*, 47.
Queensland.

Pol. australis, *Fr. Hym. Eur.*, 536, (not **P. tornatus**, *Pers.*)
Tasmania, Victoria, N. S. Wales.

Pol. incrassatus, *Berk. Linn. Journ.* XVI., 41.
Queensland.

Pol. applanatus, *Fr. Hym. Eur.*, 537.
Victoria.

Pol. igniarius, *Fr. Hym. Eur.*, 559.
W. Australia, S. Australia, Victoria, Tasmania, N. S. Wales, Queensland.

Pol. fomentarius, *Fr. Hym. Eur.*, 588.
Clarence River, Twofold Bay.

Pol. rimosus, *Berk. Hook. Journ.*, 1845, 54.
W. Australia, Tasmania, N. S. Wales.

Pol. fulvus, *Scop. Fr. Hym. Eur.*, 559.
W. Australia, N. S. Wales, Queensland.

Pol. isidioides, *Berk. Hook. Journ.* II., 415.
W. Australia.

Pol. lignosus, *Klotsch. Fr. Epic.* I., 471.
Victoria.

Pol. ponderosus, *Kalchbr.*
Pilei lignosi, durissimi, dimidiato sessiles, scalari-imbricati, conchati, indurato-incrustati, scabriusculi, luride grisei ad basim fuligineo-fuscescentes, margine tenui quidem sed obtusiusculo, vel tumente, subdeflexo; pori minimi, rotundi, umbrino-nigricantes.
Rockhampton (Muell.).
Fungus duritie et pondere insignis. Pileoli 1-2 poll. lati, cumorphi, 2-3 lin. crassi, margine deflexo, eleganter limbati. Colore pororum et forma ad *Dichroos* accedis; sed ceteræ notæ hunc fungum ad "Impolitos," trahunt.

Pol. hypopolius, *Kalchbr.*
E Lignescentibus, contextu albo. Pileus coriaceo-lignosus, durus, effuso-reflexus, subconchatus, vel prorsus resupinatus; crusta rigida castanea obductus, tuberculis creberrimis exasperatus, ad marginem acutum zonatus; pori mediocres, breves (1 lin.), subangulati et, e situ elongati, lacerique, ex albo ligneoque canescentes.
Rockhampton (Mueller).
Pileus passim ex pluribus confluens, 1-2 unc. longus 4-5 unc. latus, marginem versus valde attenuatus. Sitaneus sericellus, concentrice lamellato-plicatus, sordide cinereus. Hornotinus, supra inspectus. *Pol. annosum* valde tuberculosum in memoriam revocat.

Pol. gryphœformis, *Berk. Hook. Journ.*, 1845, 54.
W. Australia.

Pol. eucalypti, *Kalch. Grevillea.*, IV., 73.
Queensland.

Pol. conchatus, *Fr. Hym. Eur.*, 560.
Victoria.

Pol. placodes, *Kalch. Grevillea*, IV., 73.
Queensland.

Pol. salicinus, *Fr. Hym. Eur.*, 560.
Queensland.

Pol. carneus, *Nees. Acta. Nat. Cur.*, XIII., *t.* 3.
S. Australia, Victoria.

Pol. senex, *Nees. Mont. Syll.*, 160.
Victoria, N. S. Wales, Queensland.

Pol. portentosus, *Berk. Hook. Journ.*, 1485.
W. Australia, S. Australia, Tasmania, Victoria, N. S. Wales.

Pol. compressus, *Berk. Hook. Journ.*, 1845, 53.
W. Australia, Queensland.

Pol. cinereo-fuscus, *Curr. Linn. Trans.*, XIX., 124.
Queensland.

Pol. orbiformis, *Fr. Epic.*, I., 463.
Victoria.

Pol. ferreus, *Berk. Hook. Journ.*, 1847, *p.* 502.
Queensland.

Pol. endopalus, *Berk. Linn. Journ.*, XIII., 163.
N. S. Wales, Queensland.

Pol. Gourliæi, *Berk. Fl. Tasm.*, II., 253.
Tasmania.

Pol. Laurencii, *Berkeley, Fl. Tasm.*, II., 254.
Tasmania.

Pol. zonalis, *Berk. Ann. Nat. Hist.*, X., 375.
Queensland.

Pol. Tasmanicus, *Berk. Fl. Tasm.*, II., *p.* 254.
Tasmania.

Pol. strumosus, *Fr. Epic.*, I., 462.
Victoria.

Sect. F. Inodermei, *Fr.*

Pol. scruposus, *Fries Epic.*, I., 473.
Tasmania, Victoria, N. S. Wales, Queensland, S. W. Australia.

Pol. Feei, *Fr. Epic.*, I., 476.
W. Australia, Tasmania, Victoria, N. S. Wales.

Pol. lilacino.gilvus, *Berk.* (not of Persoon).
S. W. Australia, Queensland.

Pol. libum, *Berk. Linn. Journ.* XIII., 163.
N. S. Wales, Queensland.

Pol. limbatus, *Fr. Epic.*, I., 479.
Victoria.

Pol. aratus, *Berk. Linn. Journ*, XVI., *p.* 53.
Queensland, Lord Howe's Island.
Hardly distinct from *Trametes acupunctatus. B.*

Pol. luteo-olivaceus, *B. & Br. Linn. Trans.*, 1879.
Queensland.

Pol. hypothejus, *Kalch. Grevillea, t.* 145, *fig.* 26.
Australia (locality uncertain).

Pol. radiatus, *Fr. Hym. Eur.*, 565.
Victoria, Queensland.

Pol. xerampelinus, *Kalch. Grevillea,* IV., 72.
Queensland.

Pol. cichoraceus, *Berk. Hook. Journ.*, 1862.
Victoria, Queensland.

Pol. chrysoleucus, *Kalch. Grevillea*, IV., 72.
Queensland.

Pol. hirsutus, *Fr. Hym. Eur.*, 567.
Victoria, N. S. Wales, Queensland.

Pol. murinus, *Kalch. Grevillea*, IV., 72.
Queensland.

Pol. versicolor, *Fr. Hym. Eur.*, 568.
Tasmania, N. S. Wales, Queensland.

Pol. pinsitus, *Fr. Epicr.*, 479.
Queensland.

Pol. gallo-pavonis, *Berk. & Br.*
Pileo coriaceo, tenui, rigido, applanato, conchiformi, lævigato, leniter pubescenti, cervino, lineato-zonato; margine fusco, acuto; poris minimis, angulatis, ochraceis.
Queensland.

Pol. hololeucus, *Kalch. in Hedwigia*, XV., 114.
Victoria.

Pol. Floridanus, *Berk. Ann. Nat. Hist.*, X., 376.
Queensland.

Pol. Peradeniæ, *B. & Br. Linn. Journ.*, XIV., 51.
Queensland.

Pol. dispar, *Kalch.*
Victoria.

Pol. venustus, *Berk. Hook. Journ.*, 1845.
W. Australia, Queensland.

Pol. brunneoleucus (brunneo-albus, *Muell.*), *Berk. Hook. Journ.*, 1856, *p.* 176.
Tasmania.

Pol. vernicifluus, *Berk. Fl. Tasm.*, II., 254.
Tasmania.

Pol. Friesii, *Klotsch. Linnea.*, vol. VIII., *p.* 487, pl. XI.
Tasmania.

Pol. cupreo-roseus, *Berk. Hook. Journ.*, 1856, 233.
Australia.

Pol. bireflexus, *B. & Br. (MSS).*
Pileo effuso, adnato, margine reflexo, incurvo, pallido, obsolete lineari-zonato, e pubescente glabro, poris regularibus, subrotundatis, albidis, tubulis elongatis. Carne tenui.
Queensland.

Pol. Hasskarlii, *Lev. Ann. Sci. Nat.*, 1844, 190.
Australia, Queensland.

Pol. elongatus, *Berk. Hook. Journ.*, 1842, 140.
Queensland.

Pol. laceratus, *Berk. Ann. Nat. Hist.*, 1839, 392.
Illawarra.

Polyporus gausapatus, *Kalch.*

Substantia alba. Pileus carnoso-coriaceus, rigidus, dimidiato sessilis, conchatus, zonatus, tactu asperrimus strigosus, cervino-fuscescens; pori mediocres, rotundi, obtusi, ex albo grisei vel rufescentes.

Richmond River (Mueller).

Pileus 3-5 unc. latus, basi $\frac{3}{4}$ unc. crassus. Superficies, per se alba, valde rudis, dentato lacera, in zonis elevatis indumentum fuscum gerens, panno rudi simile.

Polyporus illotus, *Kalchbr.*

E vicinia *P. versicoloris*, *P. detonsi*, *P. pinsiti*, etc., sed cum nullo horum apte conjungendus. Pileus coriaceo-membranaceus, flaccidus, molliter velutino-tomentosus, concentrice sulcatus, sordide griseo-fuscescens; pori minuti, angulati, dissepimentis tenuibus, passim dentato-laceri, sordide albi.

Melbourne (Muell.).

Polyporus hypothejus, *Kalchbr.*

Pileus vix pollicaris, tenuis, coriaceus, conchatus, basi angustata adnatus, sericeo villosus, albus, zonatus, zonis concoloribus; pori majusculi, curti, fere foveolares, angulati, acuti, amœne lutescentes.

Richmond River (Mueller).

A simili *P. decipiente* Schw. poris majoribus, a *P. barbatulo*, Fr., villo pilei longo, subsericeo, albo, differt.

Polyporus seriatus, *Kalchbr.*

Stuposus, contextu pallide ligneo. Pilei semi-orbiculares, rigidi, utrinque plani, plerumque serialiter connati, concentrice sulcati radiatim rugulosi et passim nodulosi pulveraceo-velutini, testacei, vel gilvo-fuscescentes; pori minuti rotundi, isabellini, in carneum vibrantes.

Victoria (Muell.).

Pilei 1-1$\frac{1}{2}$ unc. longi latique, 1-2 lin. crassi margine subobtuso.

Polyporus proteus, *Kalchb.*

E. Stuposo-coriaceis, contextu albo. Pilei effuso-reflexi imbricato concrescentes, vel vero integri, orbiculares, medio dorso adnati, ceterum liberi, demum in stratum planum, resupinato-effusum confluentes; leviter concentrice sulcati, margine acuti, adpresse puberuli, albi, senio glabrescentes, et postice gilvescentes; pori minuti, rotundi, obtusi, ligneo-fuscescentes aut gilvescentes.

Melbourne (Muell.).

Pilei primum orbiculares, 1-2 poll. lati, demum in stratum, 4-5 unc. longum confluent. Hymenium saepe uno alterove sulco *circulari* notatum est. In diverso evolutionis stadio vix idem fungus videtur.

Polyporus caperatus, *Berk. Ann. Nat. Hist.*, 1839, 391.

Richmond River.

Sect. G. Resupinati, *Fr.*

Pol. Broomei, *Rabh. Fungi Eur. Ex.*, *No.* 2004.

Queensland.

Pol. obliquus, *Fr. Hym. Eur.*, 570.
N. S. Wales.

Pol. ferruginosus *Fr. Hym. Eur.*, 571.
W. Australia, Queensland.

Pol. corium. *Kunze*, (probably only a variety of *P. ferruginosus, Fr.*).
Clarence River.

Pol. tardus, *Berk. Hook. Journ.*, 1845.
W. Australia.

Pol. corticola, *Fr. Hym. Eur.*, 580.
S. Australia, Queensland.

Pol. parilis, *Fr. Pl. Preiss., p.* 136.
W. Australia.

Pol. vulgaris, *Fr. Hym. Eur.*, 578.
Victoria, Queensland.

Pol. vaporarius, *Fr. Hym. Eur.*, 579.
W. Australia, Victoria, Queensland, Tasmania.

Pol. calceus. *B. & Br. Linn. Journ.*, XIV., 58.
Queensland.

Pol. apricus, *Berk Fl. Tasm.*. II., 254.
Tasmania.

Pol. merulinus, *Berk. Fl. Tasm.*, II., 254.
Tasmania.

Pol. Archeri, *Berk. Fl. Tasm.*, II., 255.
Tasmania.

Pol. orbicularis, *Berk. Ann. Nat. Hist.*, III., 324.
Tasmania.

Pol. latus, *Berk. Ann. Nat. Hist.*, III., 325
Tasmania.

Pol. hyalinus, *Berk. Fl. Tasm.*, II., 255.
Tasmania.

Pol. scorteus. *Fr. Nova. Symb., p.* 73.
N. S. Wales.

Pol. Victoriæ, *Berk. in Herb. Berk.*
Fumosus, effusus, tenuis. Poris obliquis, elongati-rotundatis, minutis; dissepimentis tenuissimis.
Victoria.

Pol. hyposclerus, *Berk. in Herb.*
Effusus, crassiusculis margine, tenuis, subliberatus, supra pallide ochraceus vel carneo-tinctus. Poris minimis, elongatis, pallidis, regularibus. Dissepimentis tenuibus. *Pol. vinctus affinis.*

Poly. sinuosus, *Fr. Epic.*, 487.
Clarence River.

Poly. niphodes, *Berk. & Br. Ceylon Fungi, No.* 507.
Richmond River.

Polyporus lividus, *Kalchbr.*
Totus effusus, ligno arcte adhærens, margine determinato, firmus, pori minuti, rotundi, obtusi, ex albo-lividi vel luridi, substantia umbrina.
Richmond River (Mueller).

Tubuli, in fungo vetustiore sibi stratose superpositi, ore albidi, in strato interiori colorem mutant et umbrini fiunt.

Polyporus rufo-lateritius, *Kalchb.*

Longe lateque effusus, ligno arcte adhærens; pori minimi, stipatissimi, rotundi, obtusi, sublateritii, strato xylostromateo pallido impositi.

Richmond River.

FUNGI MACOWANIANI.

By the Rev. C. Kalchbrenner.

(*Continued from p.* 59.)

Cyphella farinacea, *K. et Cooke.* Grevillea, ix., p. 18.

In ligno fabrefacto vinearum pr Somerset E. l. M. Ow. et Tuck., No. 1221.

In bene evolutis cupulæ intus cinereo-olivascentes.

Cyphella punctiformis, *Fr.* var. **strigosa**, Syn. **Peziza punctiformis**, *Fr. pr. p.* (Grevillea, ix., p. 18).

In foliis deciduis.

Cyphella Curreyi, *B. et Br.* Cooke Hdbk. i., p. 328.

Somerset East, l. MacOwan.

Cyyhella pelargonii, *Kalch.* In Flora, 1875, p. 378.

Cæspitulosa, membranaceo-papyracea, obconica, vertice attenuato affixa, pendula, margine truncato, lævis, candida, vix 1 mm. longa; hymenium læve, ochraceum. Sporæ minutæ, globosæ, nucleolatæ.

In caulibus *Pelargonii zonalis* ad mont. Boschberg, l. MacOw., No. 1035.

Cyphella Friesii, *Quelet.* Champ. iii., p. 15.

Claviformis, breviter flipitata, membranacea, tubulosa, tenuis, floccosa, flavo-fuscescens. Orificium hians, subciliatum (Quel. l.c.).

Somerset East, (l. M. Ow.).

Cyphella variolosa, *Kalch.*

Minima, punctiformis, dense gregaria, albo pulverulenta.

Somerset East, in ligno humi jacente, ad ped. mont. Boschberg, No. 1047, et 1381.

Cupulæ subglobosæ, seminum Papaveris magnitudine, demum rufidulæ.

STIGMATOLEMMA, *Kalch.*

Effusum, fibroso-coriaceum, in superficie granulosum; granulis poro pertusis, intus hymeniiferis. Sporæ acrogenæ.

Est quasi *Corticium* superficie in *Cyphellas* minutissimas effiguratum.

Stigmatolemma incanum, *Kalch.*

Incrustans, tenue, ligno arcte adhærens, margine nudo, plano, incanum; tuberculis graniformibus minimis, densissime stipatis, poris mox in foveolas dilatatis, intus cinereis. Sporæ ovatæ-globosæ, inæquales, 0·0015 mm. longæ hyalinæ.

Somerset E. leg. M. Owan.

Guepinia petaloides, *Kalch.*

Simplex aut subcæspitosa, stipitibus ochraceo-tomentosis, sursum dilatatis in pileum compressum, spathulatum, aut obcordatum, glabrum, lætissime aurantiaco-miniatum.

Somerset East, No. 1206.

Vix ultra centimetr. alta. In optime evolutis pileoli petalum profunde emarginatum pulchre referunt.

Guepinia sparassoides, *Kalch.*

Densissime cæspitosa, pollicaris, *carnea*, stipitibus confluentibus, stipatissimis, fulvis, pileis foliaceo crispatis complicatisque.

Ad Bazuja Caffrariæ, in truncis leg. Rev. Baur, No. 698.

G. cochleatæ, B. et Br., proxima; sed Hymenium non est rugose-costatum, et cæspites ita complicati sunt ut Sparassim simulent, nec forma singuli pileoli discerni possit.

Clavaria ligula, *Fr. Ep.* 573.

In solo, e foliis deciduis formato, m. Boschberg, l. M. Ow., No. 1194.

Clavaria semivestita, *B. et B.* Fung. of Ceylon, No. 677.

In acervis Formicarum. Som. E., No. 1097.

Tomentum stipitem vestiens, candidum. Sporæ albæ, 0·0045 mm.

Clavaria furcellata, *Fr. Eu.* 576.

In ligno putrido mutis. Boschberg, leg. Tuck., No. 1097 (*b*).

Clavaria byssiseda, *Pers.* Obs. I., 32.

Som. E., No. 1097.

Clavaria dichotoma, *Kalchb.*

Ramosa, pallida, rufescens, ramis strictis, repetito didrotomis; ultimis longe furcatis, aut subfasciculatis, acutis.

Mons. Boschberg, inter folia putrida, No. 1219.

Robustior, rigidior quam proximi, *Cl. gracilis* et *Cl. stricta*, P.

Clavaria cristata, *Holmsk., Fr. Ep.*, 572.

Somerset East.

Clavaria cladoniæ, *Kalchbr.*

Terrigena, simplex, ochraceo-ferruginea clavulis vix pollicem altis, sursum dilatatis et in ramulos breves, compressos, subfoliaceos divisis.

Somerset East, l. McOw., No. 1431.

Basi mycelio radiculoso albo, supra folia serpente aucta. Clavulæ nonnunquam scyphum Cladoniæ pyxidatæ referunt. Quam, Clavaria pyxidata, Pers. multo tenerior!

Clavaria læticolor, *B. et C.* Cuban Fung. m. 463.

Ad radicofruticum et in graminosis pr. Somerset E., l. MacOw., No. 1099 et 1123.

Differt, clavulis roseo-carneis potius quam aurantiacis.

Clavaria setaceæ, *Kalch.*

Delicatula, cæspitosa e basi filiformi ramosa, ramis setaceis, strictis, ultimis capillaribus acutissimis, ex albido-rufescentibus.

Somerset East.

Cæspes densus, dimidium pollicem vel parum ultra altus, basim versus albo pruinatus, sursum nudus, rufulus. *A. Clav. delicata* et

Cl. epichnoa, Fr., jam colore differt et ramis subangulo acuto egre dientibus, haud divaricatis. *Polysiphoniam* in memoriam revocat!

Clavaria filaris, *Kalch.*

E basi simplici, filiformi vage ramosa, alba, pruinosa, ramis gracilibus, elongatis, filo tenuioribus, acutis.

Somerset East, No. 1097, b. In ligno putrido. Pollicem et ulta, *Clav. delicatæ*, Fr., proxima. Basi flavescens.

Calocera cornea, *Fr. Ep.* 581.

Somerset East.

Hirneola nigra, *Sw.* Fr. Fung. Natal, p. 27.

P. Natal, leg. Wood, No. 108.

Hirneola fusco-succinea, *Montg.* Fr. Natal, p. 27.

Boschberg, leg. M.Ow., No. 1031.

Major quam prior, minusque in dorso villosa.

Hirneola vitellina, *(Lév.) Fries.* Fung. Natal, p. 27.

Cupula sessili, excavata, obtuse marginata, extus nuda, venosa, hymenio ruguloso, vitellino.

P. Natal, leg. Wood, No. 398.

Tremella alba, *Kalch.*

Gelatinoso-cartilaginea, foliacea, cæspitosa, lobato-incisa, alba; lobis antice dilatatis, crenatis, crispatis.

P. Natal, leg. Wood, No. 218.

Pollicem alta, siccitate albo-lutescens, lobis intricatis. Sparassim simulans; vel folia Endiviæ referens, humectata parum intumescit. *Tremellæ fusiformi*, B. affinis.

Tremella lutescens, *Fr. Ep.* 588.

Somerset East.

Tremella micropera, *K. et C.* Grevillea IX., p. 18.

Cape of Good Hope.

Exidia glandulosa, *Fr. Ep.* 591.

In ramulis putr., Boschberg.

Exidia purpureo-cinerea, *MacOwan.*

Primo patellaris centro affixa, dein effusa, plana, dense papillosa, purpureo, vel cœruleo-cinerea.

Somerset East, in mte. Boschberg, l. MacOwan.

A proxima *E. glandulosa*, Fr., differt colore et papillis multo minoribus, et confertioribus.

Ord. GASTEROMYCETES, *Fr.*

Phallus campanulatus, *Berkl.*

Somerset East, Boschberg, leg., Tuck et M. Owan, No. 1225 et 1286.

A *Phallo impudico*, in Africa haud observato, differt ovo globoso (nec ovali) et pileo late campanulato, pallido, rugoso polius quam scrobiculato.

Kalchbrennera Tuckii, *Berkl.*, in Gard. Chron.

B. Sp. In monte Boschberg, leg. MacOwan.

Anthurus Woodii, *M.Ow.* Kalchbr. Phalloidei novi., pr. 6.

Port Natal, Inanda, leg. T. M. Wood, No. 149.

MACOWANITES, *Kalch. n. gen.* In Garden. Chron., 1876, p. 785.

Peridium epigæum, stipitatum, carnosum, in centro solidum sed circumcirca cavernosum; cavernulis hymenio vestitis, subtus apertis, elongatis, in stipitem decurrentibus. Sporophora bispora; sporæ globosæ, hyalinæ, tuberculatæ.

Genus hocce cum Gautiera arcte cognatum.

Nomen "Macowania l. c. adhibitum," mutandum erat, cumjam pro genere phanerogamo consumtum sit.

MacOwanites agaricinus, *Kalch.*

Peridium hemisphæricum, supra læve, impolitum, sordide brunneum, deorsum in processum stipitiformem, glabrum, album productum; carne ad peridii verticem usque solida, pallida in ambitu fovens cellulas hymenii copiosas, subtus in longitudinem protractas, apertas, aëri pervias, albas. Odor gravis, alliaceus. Sporæ amplæ, globosæ, episporio crasso, tuberculoso.

In campis prope Somerset East, inter gramina ad pedem Acaciarum l. M.Ow., No. 1211.

Magnitudine Solani tuberosi minoris. Procul dubio edulis.

Hydnangium nigricans, *Kalch.*

Globosum, nucum Inglandis magnitudine, extus glabrum, nigricans, intus e pallido-ferrugineum. Sporæ 0·015 mm.

Sub *Acaciis*, in campis graminosis ad pedem mtis Boschberg pr. Somers. East leg. M.Ow., No. 1211.

Cyathus vernicosus, *DC. Fl. Fr.* II., 270. var. **extus floccosus.**

Ad ramenta ligni.

Sub *Cyathus olla*, P., No. 1042. Macowan.

Cyathus pallidus, *Berkl.*

Somerset East, M.Owan.

Cyathus sulcatus, *Kalch.*

Peridiis obconicis, tomentoso, strigosis, cervinis, extus, ad orificium profunde sulcatis. Peridiolis nitentibus, nigricantibus.

Natal l. Wood, No. 334.

Sphærobolus stellatus, *Tode. Fr. Myc. Eur.* II., 309.

In stercore bovino vetusto, prope Somerset East.

C. B. sp. tempore pluvioso leg. Guil. Tuck., No. 1190. Wood in Nat., 167.

Podaxon pistillare, *Fr. Myc. Eur.* III., 63.

Sporæ globosæ, ferrugineæ, dein vinosæ; flocci ferruginei, curvati, flexites, collabentes; stipes striatus, non semper tortus.

Afr., Austr., e republica Transgaripina (Orange Free States) misit Medicus. Fl. Exton. Formicarum acervos diligit, No. 1040.

Podaxon carcinomalis, *Fr. Myc. Eur.* III., 62. C. MacOwan, No. 1362.

Specimina missa nondum sunt matura, de sporarumque et floccorum indole nil produnt. Hinc de specie, dubitare licet. Differunt vero a P. pistillari-statura majore, fere pedali; stipite fere pollicem crasso; et peridio laciniis membranaceis passim appendiculato.

Tulostoma squamosum, *Prs. Syn.*, 179.

In solo humido sub arbustis demissioribus pone Mtm. Boschberg.

C. B. sp., Januar., 1876, leg W. Tuck, No. 1205 (Mac.Ow. s. num.).

Spores and flocci accord with specimens of *T squamosum* in Herb., Paris, but not in habit with either *T. exasperatum*, Mont., or *T. Meyenianum*, B.

Broomeia congregata, *Berkl.* Hook. Journ., 1844, p. 193.
Sub *Acacia horrida* in carroideis pr. flumen Ktyn Visch Rivier, haud procul a monte Boschberg pr. Somerset East. alt. 2500′ leg. M.Owan. Port Natal, Iuanda, leg. Wood.
" Non oculis, sed *Naso* detexi," monet, M.Ow.

Geaster granulosus, *Fuckel.* In Enum. Fung. Nassoo., Ser. I.
Peridio exteriori simplici, coriaceo, multifido, fornicato, laciniis acuminalis, triangularibusve, rimosis, sordide pallidis; peridio interiori pedicellato, subrotundo, ore lato-conico, striato, umbrino, cum pulvere granuloso candido tecto (Fuck. l.c.).
In solo vegetabili inter arbusta ad pedem mtis Boschberg pone Somerset East.
C. B. sp. leg MacOwan, No. 1174.
Laciniæ 8, sporæ 0·0003.

Geaster MacOwani, *Kalch.*
Habitu. G. fornicati, Fr., sed triplo major. Peridium exterius, quadrifidum, laciniis ovato-lanceolatis, peridium interius, breviter stipitalum, glabriusculum; sporæ *fusco-purpureæ*.
C. B. sp. leg. M.Owan.
Orificium—proh dolor—totum destructum sed numerus loborum et color sporarum characteres bonos præbet.

Geaster coliformis, *Pers. Syn.*, 131.
Somerset East, leg. M.Ow., No. 1234.

Geaster fimbriatus, *Fr. Myc. Eur.* III., 16.
In solo, e foliis mortuis silvarum, ad latus mtis Boschberg, leg. M.Ow., No. 1124.

Geaster limbatus, *Fr. Myc. Eur.* III., 14.
Ad Somerset East, leg. MacOwan, No. 1236.

Geaster hygrometricus, *Pers. Syn.* 135.
In solo hortensi, rejectamentis mixto.
Ad Som. E. legg. M.Owan et Tuck, No. 1060.

Bovista lilacina, *Mont. et Berkl.* In Hook. Lond. Journ., 1845, p. 64.
In depressis humidis, graminosis ad pedem mont. Boschberg, leg. M.Ow., No. 1009.

Lycoperdon cyathiforme, *Bosc.* In Berl. Mag. v., 87.
Somerset East, McOwan, 1004.

Lycoperdon radicatum, *Welw. et Curr.* In Transact. of Linn. Soc., Vol. XXVI., part 1, p. 289.
Sphæroideum, pomiforme, 2-3 poll. altum latumque, sub lente tenuissime tomentellum, pallide fuscum, corium recens æmulans, demum glabrescens, rimulosum, nigricans, basi in stipitem obconicum plicosum abiens. Massa sporalis brunneo-violacer. (M. Ow.)
In-graminosis ad mont. Boschberg, ubi-armenta ruminantia decumbere solent, leg. M. Ow., No. 1004.

Lycoperdon saccatum, *Fr.* Syst. Myc. III., 35.
Somers. E., M. Ow.

Lycoperdon Caffrorum, *K. et C.*

Peridium e turbinato-globosum (2-3 poll. diam.), basi attenuata radicans, primo glabellum, dein cute in squamulas minutissimas faticente, densissime punctulatum leniterque asperulum, ferrugineo-fuscescens. Sporæ echinulatæ, cum capillitio argillaceo fuscæ.

M. Ow., 1003, 1424.

Statura minor, Peridium saturatius coloratum, et sporæ minus glabræ quam in simili L. Gardneri B.

Lycoperdon Curtisii, *Berkl.* North Amer. Fung., No. 333, in Grevillea, 1873.

Port Natal, leg. Wood, No. 185, arcte affine !

Lycoperdon glabellum, *Peck* (?)

Somerset East, No. 1337. Ad Bazuja, Caffrariæ, leg. Rev. Baur.

Lycoperdon cæspitosum, *Well & Curr.* In Transact. of Linn. Soc., Vol. xxvi., part 1, p. 289.

Somerset East, l. M. Ow , No. 1005.

Lycoperdon gemmatum, *Fr.* Syst. Myc. iii., 36.

M. Ow., No. 1005.

Lycoperdon pusillum, *Batsch.* Cont. ii., 123.

Somerset East, l. Tuck, No. 115 *b*.

Scleroderma pyramidatum, *Kalch.*

Globosum (2 poll. et ultra diam) brevissime stipitatum, areo latum, areolis elevatis, pyramidulas truncatas formantibus. Sporæ (?)

Natal, Wood, No. a 375. Sterile, sed arc olis pyramidatis insigne.

Scleroderma verrucosum, *Pers. Syn.* 154.

Somerset East, MacOwan, 1424.

Phellorina squamosa, *K. et M. Ow.*

Capitulum stipiti contiguum, globosum vel globoso depressum, suberoso-coriaceum et fere membranaceum, demum fragile vertice læve, vel squamis quibusdam angulatis auctum, glabrum, stipes corticatus, subæqualis vel basi bulbosus, squamis firmis vestitus. Capillitium subnullum; sporæ globosæ, minutæ, 0·006 mm., in massam pulveraceum lateritii coloris conglobatæ.

P. Natal. l. Wood. Ujtenhage, l. MacOw., 1095.

THE PRESERVATION OF FUNGI.

We are glad to announce that Mr. J. L. English, of Epping, has printed his "Manual," explaining the method which he has adopted so successfully for the preservation of the larger Fungi. This little "Manual" explains clearly the stages of experiment through which Mr. English passed in search of the method which ultimately developed under his hands such satisfactory results. It is no part of our business to inform our readers how this was accomplished, for the author is clearly entitled to reap all the advantage which can accrue (and we fear it will be but small) from divulging his method, which was only successful because of his continued perseverance. He certainly deserves the encouragement of mycologists, even if they do not desire to become apprentices to his business.

NEW BRITISH MARINE ALGÆ.

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

During the last three or four years I have, in conjunction with a few other algologists, attempted to extend the limits of the British Flora with respect to marine algæ. The occurrence of Norwegian or Swedish species on the north-eastern coast of Great Britain seemed to me to be highly probable, inasmuch as the Foraminifera of these coasts belong to similar species. It also appeared likely from the fact of northern species, *e.g.*, *Odonthalia dentata*, occurring on the Yorkshire Coast, that a cold current of sea-water from the north might convey Norwegian or Baltic species to the east coast of Britain, at all events as far as the projecting county of Norfolk. On the other hand, a number of marine algæ which occur on the coast of France should, in like manner, be found on the southern shores of Britain, and possibly as far north as Cumberland or wherever the warmth of the Gulf Stream is felt. Many southern species of Lichens, &c., are met with on the Welsh Coast and on the coast of Cumberland, and even further north, which must have been brought thither by this influence. With a view of stimulating further research in Britain for the species found on the Norwegian and French Coasts, the following list, which is the result of desultory observations during not more than four years, is now published :—

Cryptophyceæ.

* **Codiolum gregarium,** *A. Braun. Alg. Unicell.*, *p.* 20, *t.* 1.
Teignmouth, Rev. R. Cresswell, 1879.

Dermocarpa Leibliniæ, *Bornet, Notes Algologiques* II., *pp.* 75 *and* 76, *t.* 26, *figs.* 3-5.
On *Calothrix crastacea*. Teignmouth, 1880, Rev. R. Cresswell. Detected also by the same observer on a specimen of *Lyngbya majuscula*, in Miss Gifford's Herbarium, collected in Jersey in Oct., 1874.

* **Dermocarpa prasina,** *Bornet, Notes Algologiques* II., *p.* 76, *t.* 26, *figs.* 6-9.
On *Catenella opuntia*. Sidmouth, E. M. Holmes. Teignmouth, Rev. R. Cresswell. Firth of Forth, G. W. Traill. Cornwall, R. V. Tellam.

This plant appears to have been mistaken by Turner for the fructification of *Catenella*. Hist. Fucorum II., p. 96, t. 107, figs. *c.* and *d.*

Lyngbya luteo-fusca, *J. Ag. Alg. Medit.*, *p.* 11.
Elie, Fifeshire, G. W. Traill, 1880.

Microcoleus lyngbyaceus, *Thur., Bornet, Notes Algol.* I., *pl.* 2, *p.* 5.
Sidmouth, Rev. R. Cresswell, 1846. (Recently identified by Dr. Bornet, to whom the specimen was submitted.)

Calothrix crustacea, *Thur., Bornet, Notes Algologiques* I., *pl.* 4, *p.* 13.
Salcombe, near Teignmouth, Rev. R. Cresswell, 1880.

Calothrix æruginea, *Thur. Bornet, Notes Algolog.* II., *pl.* 37, *pp.* 157, 158.
On *Ceramium rubrum*. Trevone Bay, near Padstow, R. V. Tellam, 1880. On *Cladophora*, Tor Abbey rocks, Rev. R. Cresswell, 1881.

Isactis plana *Thur., Bornet, Notes Algologiques*, II., *p.* 163, *pl.* 40.
On *Punctaria latifolia*.
Ventnor, E. M. Holmes, 1880. Probably the plant described by Harvey, in his Manual of British Algæ, 1st ed., p. 152.

CHLOROSPOREÆ.

* **Prasiola marina,** *Crouan, Florule du Finisterre, p.* 130.
Dunoon, near Glasgow, E. M. Holmes, 1880. Joppa and Caroline Park rocks, near Edinburgh, G. W. Traill, 1881. Teignmouth, Rev. R. Cresswell, 1881.

* **Monostroma laceratum,** *Thur., Syn. Ulv. p.* 32. *Wittrock, Monogr. Monostroma, p.* 30, *t.* 1, *fig.* 2.
Near Wadebridge, R. V. Tellam, 1881.

M. latissimum, *Kutz. Rhyc. Gen., p.* 296. *Wittrock, Monog. Monostroma, p.* 33. *t.* 1, *fig.* 4.
Gathered by F. Hindom, in the brackish ditches at the mouth of the River Otter, 1850, but it remained unidentified in Herb. Cresswell until 1880.

M. quaternarium, *Kutz., Tab. Phyc.* v., *tab.* 13, *fig.* 2 (*sub. Ulva*). *Wittrock, Monog. Monostroma, p.* 37, *t.* 1, *fig.* 5.
Shoreham, Sussex. E. M. Holmes, 1881.

* **M. Wittrockii,** *Bornet. Notes Algologiques* II., p. 176, *pl.* 45.
Within reach of the tide, on timber, River Tamar, opposite Saltash (Devonshire side), and in the estuary of the Plym near Marsh Mills and Turnchapel, Plymouth.

Ulva marginata, *Le Jolis, Liste des Algues Marines de Cherbourg, p.* 53.
On a muddy bank near Lydden Spout, Dover. E. M. Holmes, 1881.

Rhizoclonium Kochianum, *Kutz. sp. Ag., p.* 387,
Floating in rock pools under the Hoe, Plymouth. E. M. Holmes, 1880.

Cladophora hirta, *Kutz. Phy. Germ., p.* 208.
On *Cladophora rupestris.* Falmouth, F. W. Smith, 1880.

(To be continued.)

BREAKING OF THE MERES.

A short notice under this heading occurrs in "Grevillea," Vol. IX., p. 5, to which the following notes are supplementary. The misapprehension under which the author laboured that the *Echinella articulata* of the English Botany had not been figured since, may, I think, be rectified by a reference to "Kutzing's Tabulæ Phycologiæ," where a figure of the same plant, undoubtedly, will be found under the name of *Chætophora punctiformis*, and singularly enough the specimens from which the drawings were made came from Ellesmere, the same locality as that in which they were found by Mr. Phillips. Reference to Rabenhorst's "Algæ," III., 386, will show that its existence was not ignored by this author, although both omit reference of any kind to either the name or the figure in English Botany.

The principal motive of this communication is to furnish two or three extracts bearing upon this subject. The first of these is

* I intend issuing a series of fasciculi of the New British species as soon as practicable; 25 species for £1 1s. Those marked with an asterisk will appear in the 1st fasciculus. Only 25 sets will be prepared.

from Dickie's "Botanist's Guide," under *Trichormus flos-aquæ*, Lyngb. (p. 310):—"For some years excursions were made with the students of my botanical class to a loch on the estate of Parkhill, about four miles north-west from Aberdeen. The sheet of water in question is about a quarter of a mile in its greatest length; on almost all sides it is surrounded by extensive deposits of peat, with the soluble matter of which a great proportion of the water passing into the loch is impregnated. The locality was generally visited in the beginning of July; nothing particular had ever been observed till the summer of 1846, when my attention was arrested by a peculiar appearance of the water, especially near the edge, but extending also some distance into the loch. Numerous minute bodies, with a spherical outline, and varying in size from 1-24th to 1-12th of an inch in diameter, were seen floating at different depths, and giving the water a peculiar appearance. In some places they were very densely congregated, especially in small creeks at the edge of the loch. A quantity was collected by filtration through a piece of cloth, and, on examination by the microscope, there could be no doubt that the production was of a vegetable nature, and a species of *Rivularia;* one, however, unknown to me, and not agreeing with the description of any species described in works to which I had access. Specimens were sent to the Rev. M. J. Berkeley; he informed me that the plant belonged to the genus mentioned, and stated it to be *Rivularia echinulata*, Eng. Bot. Along with it, but in very small quantity, I also found another plant, *Trichormus flos-aquæ*, Bory.

"In the first week of July, 1847, the same species were observed similarly associated, but the *Trichormus* was now more plentiful, without, however, any apparent corresponding diminution in the quantity of the *Rivularia*.

"In July, 1848, it was observed that the *Rivularia* was as rare as the *Trichormus* had been in 1846; to the latter consequently the water of the loch now owed its colour, which was a very dull green; the colour, however, becomes brighter when the plant is dried. In neither of the seasons mentioned was it in my power to make any observations on the colour of the loch earlier or later than the date above mentioned, consequently nothing can be added respecting the comparative development of the two plants at other periods of the season. Other two lochs in the vicinity did not contain the plants alluded to."

To this it may be added that specimens formerly belonging to Sir William Hooker, together with drawing, in the Kew Herbarium, are also labelled, *Rivularia articulata*. Unless greatly deceived by appearances, the two gatherings of this historic Alga, which we have seen in a living condition, were of a beautiful chlorophyllous green, and gave no indication of an approach to the *Phycochromaceæ*. In extenuation of the name *Rivularia*, it may be added that at the period when *Chætophora endiviæfolia* and *Chætophora elegans* were respectively termed *Rivularia*, the two divisions of *Chlorophyllaceæ* and *Phycochromaceæ* had not come to be recognized, so that in associating the English Botany plant

with these two species of *Chætophora* in *Rivularia*, is evidence of its relationship having been appreciated.

Another quotation which we purpose adding is from "The Annals of Natural History" (April, 1840), by W. Thompson, on "An Alga which Colours Ballydrain Lake." He says, "On visiting the lake (July 15) to-day I found that the whole body of water was tinged with a dull faintly glaucous hue. On going out in a boat to ascertain the cause of this appearance, I saw that the water was everywhere filled with extremely minute particles, which might be compared to the motes in a sunbeam. To the unassisted eye they seemed as delicate as the finest human hair, and of a spiral form. On enquiry I learned that the appearance had been observed only for the last four or five years, and for about three months in each year. One of my friends had looked upon its approach with dread, as it interfered so much with his angling, that during the period of its continuance this sport had to be abandoned." Subsequently the plant was observed as late as the 27th September, but on October 7th all had disappeared. In the following year the Alga was seen first on the 3rd of July, and last on the 23rd of September.

"The specimens obtained were invariably of similar breadth, and rarely presented more than four spiral turns, and when of this size were 1-50th of an inch in length. The species at first, when mingling with the water, is of a dark green colour, when in calm weather it ascends to the surface in separate particles it appears pale green; when it does so *en masse* (the earliest symptom of decay) it is of a pale blue, and in the last stage of decomposition ferruginous. When two of the spiral portions come in contact they have an elastic power, by which they can, though slowly, disentangle themselves, and separate from each other." The alga, of which the above is only an abridged account, was called *Anabæna spiralis* by Mr. Thompson, but has been transferred by Rabenhorst to *Spirulina*, to which genus it undoubtedly belongs, as *Spirulina Thompsoni*."

In the same communication is a brief account of the occurrence of *Anabaena flos-aquæ*, Bory, tinging in a similar manner "with its delicate green hue the margin of the smallest of the lochs Maben, in Dumfriesshire, on the 15th of August, 1838."

Also of *Aphanizomenon recurvum*, Morren (now referred to *Sphærozyga flos-aquæ*), found floating on the surface of sheltered creeks in Ballydrain Lake, having the appearance of powdered verdigris. Mr. Thomson says of it:—"In Ballydrain Lake I have, both in 1838 and 1839, remarked its presence in very calm days, for it is only at such times visible, during the months of July, August, and September, and then it appears in the most sheltered creeks only, floating in patches of various dimensions."

The last of the series of quotations will be from the first number of the "Annals of Natural History" (vol. i., p. 1):—"On a New *Oscillatoria*, the Colouring Substance of Glaslough Lake, Ireland," by Dr. Drummond. He commences by stating that "Glas-lough" signifies "green lake," an appellation given to it from time im-

memorial on account of the hue of its waters, which exhibit a green tinge, equal to, or exceeding in intensity, that of the sea, though it is not at all times equally striking. "From the accounts I received, the green colour is evident in the lough throughout the year, and if I may judge from my own observations, every drop of it is impregnated with the oscillatory filaments." "When a little of the water is lifted in the hand it seems perfectly transparent, and it appears equally clear at the edges of the lake, but at a depth of two feet the bottom is indistinguishable, and the water presents a sort of feculent opacity, accompanied by a dull, dirty, greenish hue. On lifting some of this in a glass it seems at first sight quite transparent, but on holding it up to the light innumerable minute flocculi are seen floating through every part of it, and producing a mottled cloudiness throughout the whole." At first I could only find the plant diffused through the water, but at length I discovered a wet ditch extending from the lake into an adjoining field, and there it appeared swimming on the surface in large masses several inches in thickness and above a foot and a half in length. These seemed evidently to be produced by an agglomeration of the filaments floated in from the lake, matted together at the surface, and increased in growth. The surface of these masses, where dried by the contact of the air, was of a bright bluish verdigris hue, while the parts immersed in the water were of a dull opaque green."

"On examining specimens in the microscope I sometimes observed their motions to be very vivid, and in other instances little or no motion could be perceived. They are extremely minute, their transverse striæ very numerous, and at distances of about half a diameter from each other. The filaments in the conglomerated masses appeared to me to be many inches long, and running parallel together; the broken fragments dispersed through the lake cross each other in all directions."

For this species the name of *Oscillatoria ærugescens* was proposed, and under this it is recorded in Harvey's "Manual" (p. 163).

In the same memoir as the above a summary is given of the facts narrated by Decandolle of the occurrence of *Oscillatoria rubescens* in Lake Morat, in Switzerland, which is related to the present subject. It is stated that Lake Morat during every spring presents the appearance of a reddish scum on the surface, which the fishermen express by saying that the "lake is in flower." In the spring of 1825 this phenomenon was so remarkable as to strike with astonishment the inhabitants of its banks. In this year the red appearance continued from the month of November till May, and its unusual exuberance was supposed to originate from the great mildness of the winter, and the consequent smaller elevation of the water of the lake being favourable to the development of the matter, which was evidently organic, and caused the redness.

During the early hours of the day the lake presented nothing remarkable, but soon after there appeared long, red, very regular and parallel lines along its borders and at some distance from the shore. The breezes urged this matter into the little creeks, and

heaped it up around the reeds. There it covered the surface of the lake like a fine reddish scum, forming patches of colours varying from greenish black to a beautiful red. It was also seen of a yellow, a red, and grey of every shade; some of them were marbled, and others presented figures much resembling those produced by positive electricity on the electrophorus. During the day this mass exhaled an infectious odour, but during the night all disappeared, to be renewed on the following day. When the lake was agitated by strong winds the phenomenon disappeared, but again presented itself on the re-establishment of a calm.

M. C. Cooke.

NEW BRITISH FUNGI.

By M. C. Cooke.

(*Continued from p.* 52.)

We gladly acknowledge the assistance of Professor Bayley Balfour, which has enabled us to record six additions to the Myxomycetes of Great Britain, three of which are new, and have been discovered by Professor Balfour during a critical examination of the specimens contained in the Herbarium of the late F. Currey, F.R.S.

Agaricus (Entoloma) Persoonianus, *Du Port.*

This species has again been found by the Rev. M. J. Berkeley.

We find on reference that there already is a species of *Agaricus* named *A. Persoonii*, and therefore the name of *Persoonianus* as given by Phillips and Plowright to this species will stand (see *Grevillea*, p. 66) as now corrected.

Ovularia syringæ, *Berk.*

Flocci for the most part decumbent, acrospores at first subglobose, with a terminal papilla, then elliptic, at length ovate, very large. *Gard. Chron.*, Nov. 19, 1881, with fig. 135.

On lilac leaves. Aberdeenshire.

The length of the threads is ·012 in., that of the acrospores ·002-·003 in.

Æcidium barbareæ, *DC. Fl. Fr.*, II., 241.

On both sides. Spots rufescent. Peridia aggregated in large irregular clusters, large, cup-shaped, margin whitish, crenulate; spores orange. *Duby. Bot. Gall.*, ii., 905.

On leaves of *Barbarea præcox*. Near Plymouth (E. G. Varenne).

Sometimes the peridia occupy the whole surface of the leaf, which is distorted and curved inwards.

Physarum granulatum, *Balf. fil.*

Sporangium stipitate $\frac{1}{24}$ in. high, rising from a brownish-black hypothallus; stipe dilated at base, tawny or darker brown, or dirty grey, striate, about equalling the capsule; capsule globose slate-grey, dotted with large white granules, brittle, wall single, dirty white when separated, impregnated with small rounded granules of lime

in irregularly shaped patches, and coated with remote easily-detached white clusters of lime crystals; coumella absent; capillitium uncoloured, forming a small meshed net, few angles swollen into small rounded knots, enclosing a few small rounded lime granules, intervening threads undulate and delicate; spores violet with thick smooth membrane, ·0093-·0109 diam.

In Herb. Currey. No locality. On bark.

Very distinct, with its scattered cluster of crystals on the surface of the capsule wall. In the paucity and smallness of the swollen knots of the capillitium it approaches *Tilmadoche*, but differs in its irregular and intricate branching.

Physarum Phillipsi, *Balf. fil.*

Sporangium subsessile, or shortly stipitate, about $\frac{1}{18}$ in. high; stipe black, stout, much shorter than capsule; capsule subreniform or subpyriform, sometimes by coalescence plasmodiocarpoid or deformed, laterally compressed, umbilicate, ash-grey and commonly rugose, fragile, wall single, uncoloured when separate, densely impregnated with small rounded granules of lime in rounded patches; coumella absent; capillitium uncoloured, threads delicate at attachment to wall, internally forming a compact net, all angles swollen into rounded knots filled with minute rounded lime granules, intervening threads very short, undulate, and very delicate; spores violet warted with thick membrane 0117 mm. diam.

On manured ground in an orchard house. Shrewsbury. Phillips. In Herb. Currey.

A very marked species, possibly having its nearest ally in *Physarum nephroideum*, Rtfki., which is not however a British species.

Trichia lateritia, *Lév.*

Sporangia pyriform, stipitate, together with the stem brown-black, opaque. Mass of spores and elaters brick red. Elaters fusiform, the ends terminating in a sharp, almost smooth spine. Spirals four to the right, rather prominent. Spores with a thick membrane, smooth. 01-012 mm. diam. *Rostafinski Monog.*, p. 250. *Cooke, Myxomycetes*, figs. 223, 224.

On dead wood. Orton Wood (Rev. A. Bloxam).

Trichia affinis, *De Bary.*

Sporangia, in the typical form, collected in clusters, sessile on a common strongly developed hypothallus. Elaters cylindrical (004-005 mm.), smooth, straight or slightly bent, spirals combined in a reticulate manner. Spores (from ·01 to ·012 mm. or even ·014 mm.) epispore with hexagonal thickenings in a reticulate manner. *Rostafinski Monog.*, p. 257. *Cooke, Myxomycetes*, fig. 241.

On dead wood. Cotteral Wood, Cheshire, 1828. (Wilson). Epping Forest (M. C. C.), Hampstead (Cke. Fung. Gt. Brit., No. 614), Brandon (C. B. P., in Cke. Fung. Gt. Brit., ed. sec.. No. 527), Raehills, near Moffat and Queen's Cottage, Kew (Bayley Balfour), and in Herb. Currey.

Trichia Jackii, *Rtfki.*

Sporangia, in the typical form, collected in clusters, sessile on a common strongly developed hypothallus. Elaters cylindrical (004 mm. diam.) with smooth ends, straight or slightly bent. Spirals

three to four, rarely spinulose, with distinct broad interspaces. Spores globose with a thickened border, which is broad and perforated, branched so as to form an irregular network (·01-·012 or 012-014 mm. diam.). *Rostafinski Monog.*, p. 258. *Cooke, Myxomycetes*, fig. 242.

On rotten wood. Hassock's Gate, Oct., 1854 (Herb. F. Currey).

Trichia heterotricha, *Balf. fil.*

Sporangia sessile in clusters, dark yellow, wall thick, tough and leathery, inner layer areolate; elaters few, cylindrical ·0071 mm. diam. (thickenings excluded) with walls of medium thickness, irregularly and variously thickened either with spines often twice diameter of elater, or with short prickles or warts, or with complete or half-rings, or sometimes with interrupted and irregular spirals leaving large intervening unthickened portions, swollen towards the extremities, and ending in a tapered rarely smooth arcuate or twisted point, in length twice the diameter of elater, tube ·0035 mm. diam. terminating in the swelling of elater, or sometimes continued to the apex; spores globose ·0160-·0178 mm. diam. with a very thick smooth membrane.

In Herb. Currey. No locality. On bark.

A species resembling most nearly forms of *Tr. varia*, Pers., but the few elaters with the very varying sculpturing and the larger smooth spores sufficiently separate them.

Professor Bayley Balfour has also furnished the following notes on British Myxomycetes:—

Trichia affinis, de Bary, was first published as a MS. name without description, by Fuckel ("Symb. Myc.," 336). Austria is given as its locality, and *T. chrysosperma*, DC. ("Fl. Franc.," II., 250 pr. p.) is quoted as a synonym, and No. 1432 Fl. Rh., is mentioned as identical. Rostafinski, in his Classical "Monograph" (255), describes the species, giving as additional habitats Maryampol, Salem, Constance and Freiburg. He points out that the difference between this and the nearly allied form he describes as *T. chrysosperma*, a species which he attributes to Bulliard, and records as common in Europe, and occurring in Carolina and Chili. So far as general habit goes, there is but little character distinguishing these species. Both have aggregated sporangia, sessile, and of a coloration varying in like direction in each. In some typically grown specimens of *Tr. chrysosperma*, the sporangia are pyriform with narrow base. I have never seen this in *Tr. affinis*, the sporangia of which are usually quite sessile on a broad rest. Practically it is not possible to diagnose the species by external characters, and the differences between them lie mainly in the sculpturing and size of the elaters and spores. In *Tr. chrysosperma* the elaters are wider than in *Tr. affinis*, and have a series of thickened veins on the wall running parallel with the apex of the elater, and connecting the coils of the spirals. These are wanting

in *Tr. affinis*. The spores in *Tr. chrysosperma* have the projecting polygonally reticulate thickening of the exospore deep, narrow, and nonpunctulate, whilst in *Tr. affinis* these are broader, shallower, and conspicuously punctulate.

Under *Tr. chrysosperma*, Rostafinski quotes a very extensive synonomy. I have devoted some time to the study of the synonyms quoted, but I am not satisfied from the descriptions and figures by the several authors that the identification in all cases is correct. Indeed, I do not see how, by such descriptions and figures as are given, one can determine which of the sessile aggregated species—*Tr. chrysosperma*, *Tr. scabra*, Rtfki., *Tr. Jackii*, Rtfki., and *Tr. affinis* De Bary, all having a general likeness in habit—is referred to by the older authors. A correct estimate would only be possible after examination of the type specimens. How many of these Rostafinski was enabled to study I do not know. As I have not yet had the opportunity of seeing a sufficient number of these, I shall not at present criticise in detail the synonomy, but that great confusion has occurred in the identification of the several species of sessile, aggregate Trichias, an examination of the specimens in the Kew Herbarium has convinced me. I have not yet had a chance of critically studying the Myxomycetes of Berkley's Herbarium, but I have carefully gone over the other collections, and I may here give some of the results.

But first let me say a word as to the name *Trichia chrysosperma*, as adopted by Rostafinski. As I have stated he ascribes it to Bulliard ("Hist. des Champign.," T. (1791) 131, t. 417, f. 4), who describes a form, *Sphærocarpus chrysospermus*, presenting three varieties, the first of which is taken by Rostafinski as the type of the species *Trichia chrysosperma*, Bull. Now in Bulliard's description and figures there is nothing regarding the elaters and spores to show that his species really conforms with the definition of the species given by Rostafinski, and is not such another form as *Tr. affinis*, De By. Indeed, as I have mentioned already, Fuckel quotes the species as being in part De Bary's *Tr. affinis*, though I do not know the ground for his identification. But supposing Rostafinski's identification be correct, there is no warranty for affixing Bulliard's name to the species, as he describes it under another genus. The real authors of the name it would appear are Lamarck and De Candolle, who ("Synops. Plant.," No. 673, and again, "Flor. Franc.," II., 250) describe under this name what they take as identical with Bulliard's *Sphærocarpus chrysospermus*, which they quote as a synonym. Bulliard has no claim to the name. Rostafinski having adopted the name for the form he so carefully describes there need be now no longer any difficulty or confusion in the determination of the species as it is preserved in herbaria or gathered at the present day whatever decision be come to as regards synonyms.

Trichia affinis, De Bary, has been looked upon hitherto as a rare species, and there is no published record of its occurrence in Britain. But I find that it is really common, much more so than the other sessile aggregated forms. In Kew Herbarium is a specimen with

the label in W. Wilson's writing, "Tr. affinis, Cotterel Wood, Cheshire, 1828, W. W." This is the true species named *Tr. affinis*, by De Bary, and it is the first record of the species in Britain. It is a rather curious coincidence that Wilson should have given the same name to the plant as De Bary. In Currey's Herbarium are two specimens without locality of the species, but under the name *T. chrysosperma*. Under the same name are specimens from "Epping Forest (M. C. C.)" "Hampstead (Cke. Fung. Exs. Brit., No. 614)," "Brandon (C. B. P., in Cke. Fung. Exs. Brit., ed. sec., No. 527)." I have it from Raehills, near Moffat, and Queen's Cottage, Kew. These are all the localities in this country (I need not here refer to foreign habitats, which are numerous) from which I have seen specimens as yet. It is evidently widely-spread, and I doubt not is in many collections under a wrong name.

Trichia chrysosperma, Lam. and De C., is apparently a rarer species, though mentioned by Rostafinski as occurring all over Europe, and by Cooke ("Myxom.," 64), as at that time the only British species of the sessile aggregate ones. Though I have collected for a number of years now, and in many localities, I have never been fortunate in finding it; and the only authentic British locality I know as yet is Highgate ("Cke. Fung. Exs. Brit. ed. sec.," No. 524). There is in Kew Herbarium a specimen from "Dawson-Turner's Herb.," under the name "Tr. ovata, Pers., No. 71." No locality is given. This is *Trichia chrysosperma*, Lam. and D. C.

Trichia scabra, Rtfki., has been more seldom confounded with *Tr. chrysosperma*, Lam. and D. C., but occasionally the mistake is made. This species I found, I believe, for the first time in Britain, in the Royal Botanic Garden, Edinburgh, in October, 1878. Since then I have found it at Moffat and at Queen's Cottage, Kew. From this last locality are specimens in Kew Herbarium gathered by Dr. Cooke.

Trichia bavarica, "Thum., Myc. Univers.," No. 1497, is no Trichia. It is an Oligonema. Typical *Oligonema nitens* has few elaters without any pattern on the walls. In the De Theumen's specimens I find that the walls have a tendency to become spirally thickened, and the elaters sometimes are slightly pointed, and it therefore shows an approach to Trichia. But still the elaters are very few, and the whole plant is essentially an Oligonema, but I am not convinced as to its being *Olig. nitens*. De Thumen has sent out the same plant as *Trichia chrysosperma*, D. C., under No. 399 Mycoth. Univ.

BAYLEY BALFOUR.

EXOTIC FUNGI.

The Rev. J. E. Vize has just issued a small fasciculus of forty specimens of Micro-fungi from the Tropics. Several of these are now distributed for the first time. Particulars furnished by the preparer, Forden Vicarage, Welshpool.

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Johnson, Rev. W. Introduction to the Study of Lichens, in "Amer. Monthly Micro. Journ.," Nov., 1881.

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Hazslinszky, F. Rendhagyo Koggombak.

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Vize, J. E. Micro-Fungi Exotici, fasciculus of 40 specimens.

Roumeguere, C. Fungi Gallici Exsic. Cent. 19, 20.

Cooke, M. C. Illustrations of British Fungi. Parts 6, 7.

Cooke, M. C. British Fresh-water Algæ. Part 1, with eleven coloured plates.

Petit, P. Spirogyra des Environs de Paris.

Roumeguere, C. Revue Mycologique.

Stevenson, J. Additions to Mycologia Scotica, in "Scottish Naturalist," Jan., 1882.

No. 56.] [June, 1882.

Grevillea,

A QUARTERLY RECORD OF CRYPTOGAMIC BOTANY AND ITS LITERATURE.

EXOTIC FUNGI.

By M. C. Cooke.

In the enumeration which follows, only the new and undescribed species are inserted, notwithstanding that our knowledge of the Fungi of some of the countries is exceedingly limited. It would have been of manifest advantage to have furnished a catalogue of species for such places as Japan, Madagascar, Burma, &c., had the demands on our space permitted it. In the majority of instances the specimens described are in the Herbarium of the Royal Gardens at Kew.

JAPAN.

Lenzites alutacea, *Cke.*

Pileo suberoso-coriaceo, firmo, obsolete zonato, nitido, læte alutaceo, glabrescente ; margine subtomentoso ; lamellis rectis, crassiusculis, antice furcatis, subconcoloribus.

On trunks. Japan (Dickins).

Pileus 3-4 × 2½ inches, about ½ an inch thick behind.

Polyporus (Inodermei) cæsio-glaucus, *Cke.*

Pileo coriaceo, tenuissimo, effuso-reflexo, quandoque imbricato, tomentoso, zonato, cæsio-cinereo, zonis obscuriore ; poris rotundis, minimis, regularibus, curtis (·25 mm.), dissepimentis incrassatis, glaucescentibus.

On branches. Japan. (Dickins, 1449.)

Trametes purpurea, *Cke.*

Pileo suberoso-lignoso, convexo-plano, multizonato, glabro, atro-purpureo, zonis obscurioribus, intus ligneo-fusco ; poris subglobosis, oblongisve, inæqualibus (7 mm. lat.), alutaceis.

On trunks. Japan (Dickins).

Pileus 3-4 in. wide, 2½ in. long, nearly 1 in. thick behind ; tubes as much as ½ in. in length.

Hydnum aspratum, *Berk.*

Pileo carnoso, depresso, infundibuliformi, tessulato-squamoso, azono, umbrino ; stipite elongato, longitudinaliter sulcato, glabro ; aculeis decurrentibus, subcinereis.

On the ground. Japan (esculent).

Pileus 3-5 inches broad, stem 3 in. long, nearly an inch thick. The above diagnosis drawn up from dried specimens only. The entire fungus is suspended by the stem and dried for culinary purposes by the Japanese.

BURMA.

Marasmius Burmensis, *Cke.*

Albidus. Pileo membranaceo, plano, depressove, obtuso, exstrio, stipite farcto, brevi, tenui, albo, glabro; lamellis paucis, distantibus, adnatis, angustissimis, venosis, albis.

On twigs. Moulmein (Rev. C. Parish).

Exactly the size, habit, and appearance of *M. ramealis*, but the pileus is so thin that the lines of the narrow veinlike gills are visible through it. The gills are not half so numerous as in that species, and narrower. Stem very thin.

Marasmius Parishii, *Cke.*

Fulvus. Pileo convexo, sulcato, stipite rigido, erecto, nitido, nigrescente, supra attenuato. Lamellis paucis (6-8) angustis, distantibus, pallidis.

On grass, palm petioles, &c.

Stem 1-2 inches long, rather thick at the base, gradually attenuated upwards, chestnut colour, becoming blackish, rigid and erect. Pileus 2-4 lines broad, pale sienna brown, very thin and remotely sulcate, gills not more than 6 to 8, giving a crenulated appearance to the margin. Differing from *M. androsaceus* in the thicker rigid stem, thinner pileus, and small number of lamellæ.

MADAGASCAR.

Ten species, all of which were previously known.

SHIRI HIGHLANDS, ZAMBESIA.

Seven species, all previously known.

CHAMBA, N.W. INDIA.

Six species, all previously known.

RIO JANEIRO.

Several interesting species collected by M. Glaziou, of which the following are new :—

Dædalea microsticta, *Cke.*

Pileo suberoso, plano, papilloso, glabriusculo, ligneo-pallido, margine lineato-fusco, intus fuscescente; sinulis e poroso angustissime labyrinthiformibus, laceratisque, e pallido fuscescentibus.

On wood. Rio Janeiro. (No. 13381.)

Pileus 3-4 inches broad, 1 inch or more in thickness behind, acute at the margin. Pores at first, and at the edge, punctiform, then confluent and shortly labyrinthiform, very narrow, so as to be just visible to the naked eye. Hymenium two-thirds the thickness of the pileus.

Cladoderris fusca, *Cke.*

Conchiformis, imbricata, fusca (3-4 inches) adpresso-velutina; hymenio concolore, dendritico-rugoso, papillis minutis, obtusis, cristato.

On trunks. Rio Janeiro. (Glaziou, No. 13499.)

CARACAS.

Uredo oxalidearum, *Cke.*

Hypophylla. Soris minutis, numerosis, congestis, demum confluentibus. Sporis globosis, lævibus (·015 mm.) aurantio-flavis.

On leaves of *Oxalis corniculata.* Caracas (Dr. Ernst).

Quite distinct in its smooth orange spores from the *Uredo oxalidis*, Lev. Together with several imperfect fungi, such as *Phyllosticta*, the description of which would serve no useful purpose.

NATAL.

Collected by J. M. Wood, of Inanda, part of a collection of about 200 numbers.

Cyphella tabacina, *Cke. & Phil.*

Fusca, gregaria, in stromâ obscuriore, byssoideo nidulantia. Cupulis pyriformibus, breviter stipitatis, leniter tomentosis (1 mm. diam.), margine arcte connivente. Basidiis clavatis, sporis ovalibus fuscis (·006 × ·004 mm.).

On bark. Inanda, Natal. (Wood, 524.)

Solenia minima, *Cke. & Phil.*

Gregaria, minima, punctiformis, albido-pallida. Cupulis subcylindricis, abbreviatis.

On wood. Inanda, Natal. (Wood, 482.)

Femsjonia Natalensis, *Cke.*

Lutea, sessilis, cupulæformis, gregaria ($\frac{1}{2}$-1 mm. diam.) tremelloidea. Basidiis globosis, in gelatinâ immersis. Sporis imperfectis.

On decaying trunk. Inanda, Natal. (Wood, 476.)

In form, size, and general appearance closely simulating *Peziza* of the section *Mollisia.*

Chætomella artemisiæ, *Cke.*

Epiphylla. Peritheciis sparsis, subglobosis, atro-brunneis, pilis tenuis, fuscis, superne ornatis. Sporis ellipticis, hyalinis (·008-·01 × ·004 mm.).

On living leaves of *Artemisia afra.* Inanda, Natal. (Wood, 572.)

Sphæropsis Mappæ, *Cke.*

Hypophyllum, sparsum. Peritheciis brunneis, convexis, pertusis. Sporis ellipticis, hyalinis (012-·014 × ·005 mm.).

On leaves of *Mappa Capensis* Inanda, Natal. (Wood, 619.)

Æcidium Cussoniæ, *Kalchb.*

Amphigenis. Maculis suborbicularibus, bullatis, pallidis. Peridiis subcongestis, semi-immersis, margine albo-crenulatis. Sporis aurantiacis.

On leaves of *Cussonia spicata.* (88.)

Æcidium Crini, *Kalchb.*

Amphigenis. Maculis latis, pallidis. Peridiis dense circinnatim congestis, subimmersis, cupulatis; margine albo-crenulatis. Sporidiis aurantiacis.

On leaves of *Crinum* (Cooperi?).

In appearance scarcely differing from that of *Æcidium orchidearum.*

Æcidium acanthacearum, *Cke.*

Hypophyllis vel amphigenis. Acervulis laxis, suborbicularibus, in maculis decoloratis nidulantibus. Peridiis sparsis, centro subcongestis, subrigidis; margine pallidiore, serrulato. Sporis luteis.

On leaves of *Calophanes Burkei.* (645.)

On leaves of *Justicia.* (603.)

Æcidium plectroniæ, *Cke.*

Hypophyllis. Acervulis rotundatis, maculis orbicularibus decoloratis nidulantibus. Peridiis paucis, prominulis, margine subintegro, pallido. Sporis luteis (?)

On leaves of *Plectronia Gueinzii.* (577.)

Spermogonia on the upper surface of the same spots which bear the peridia.

Æcidium dissotidis, *Cke.*

I. Hypophyllis. Acervulis rotundatis, parvulis. Peridiis congestis, minimis, vix prominulis, margine albido. Sporis luteis.

On leaves of *Dissotis incana.* (223.)

On *Dissotis princeps.* (470.)

II. *Uredo dissotidis.* Maculis fuscis, hypophyllis, orbicularibus. Protosporis subglobosis, fuscis, asperulis (·02 mm.).

On leaves of *Dissotis incana.* (223.)

Æcidium vangueriæ, *Cke.*

Sparsum, vel irregulariter aggregatum, hypophyllum. Peridiis semi-immersis, pallidis, margine albo-lacerato. Sporis globosis, luteolis (·018 mm.) cellulis peridiorum elongato—hexagonis (·026 × ·018 mm.).

On leaves of *Vangueria infausta.* (527.)

and *V. latifolia.* (540.)

Often on the same plant, sometimes on the same leaves as *Hemileia Woodii,* K. & C.

Æcidium cardiospermi, *Cke.*

Hypophyllum. Peridiis minimis, in maculis brunneis orbicularibus congestis, margine subintegro, sporis luteolis.

On leaves of *Cardiospermum microcarpum.* (537.)

Æcidium flustra, *Berk.* in Hook. Journ.

On leaves of *Aster* (*Diplopappus*) *asper.* (No. 638.)

Fuccinia galopinæ, *Cke.*

I., II. (nondum vidi).

III. Hypophylla. Soris compactis, densis, purpureo-brunneis, convexis. Teleutosporis congestis, elongato-fusiformibus, lateraliter compressis, hyalinis, fusco-tinctis (·05 × ·009 mm.) membrano tenui, stipite brevi.

On leaves of *Galopina aspera.* Inanda, Natal. (Wood, 602.)

Puccinia tragiæ, *Cke.*

I. Epiphylla vel amphigena. Cæspitulis minimis. Peridiis (5-6) congestis, albis, elongatis, marginato-dentatis. Sporis globosis, aurantio-flavis.=*Æcidium tragiæ*, Cke. (Wood, 141)

II., III. Soris pulverulentis, purpureo fuscis. Teleutosporis ellipticis, medio-constrictis, castaneis (·05 × ·028 mm.). Stipite elongato, hyalino, infra attenuato (·07 mm. long).

On leaves of *Tragia*. Inanda, Natal. (Wood, 141, 628, 163.)

Puccinia tabernæmontanæ, *Cke.*

I. *Æcidium tabernæmontanæ*, Cke. Hypophylla, orbicularis ; peridiis circinatis, arcte apertis (vix maturis). (No. 469.)

II. Protosporis magnis, ellipticis, ovatisve, pallidis (·04-·042× ·03 mm.) Episporio asperato.

III. Soris pallidis. Teleutosporis ellipticis, ad medio valde constrictis, sub-lævibus (·045-·048 × ·03 mm.) breviter stipitatis.

On *Tabernæmontana ventricosa*. Inanda. (Wood, 612.)

Puccinia Thunbergiæ, *Cke.*

I. *Æcidium Thunbergiæ*, Cke. Hypophylla, in maculis orbicularibus congesta. Peridiis semi-immersis fimbriatis. (468.)

II. Protosporis subglobosis, fuscis (·018-·02 mm.), episporio sublævi.

III. Soris compactis, convexis, rugosis, purpureo-fuscis. Teleutosporis elongato-ellipticis (·042 × ·018 mm.) supra apiculatis, pallide-flavidis. Episporio lævi, tenui, ad apicem incrassato.

On *Thunbergia Natalensis*. Inanda. (Wood, 576.)

Puccinia phyllocladiæ, *Cke.*

I. & II. (nondum vidi).

III. Epiphylla et caulina. Soris suborbicularibus, demum confluentibus, pulverulentis, maculâ pallidâ gerentibus. Teleutosporis globosis, nec constrictis (·03 × ·028 mm.) castaneis, vix granulatis. Stipite elongato, hyalino (·06 mm.).

On stems and leaves of *Asparagus falcatus*. Inanda, Natal. (Wood, 630.)

Quite different from *Pucc. asparagi.*

Puccinia trochomeriæ, *Cke.*

I. (nondum vidi).

II. Protosporis ovalibus, brunneis (·022 × ·018 mm.), episporio granulato.

III. Hypophylla. Soris sparsis, mox fissuratis, denique epidermide cinctis, atro-fuscis. Teleutosporis ellipticis, medio constrictis, castaneis (·048 × ·03 mm.). Stipite elongato (·07 mm) incrassato, hyalino.

On leaves of *Trochomeria sagittata*. Inanda. (Wood, 594.)

Puccinia pentanisiæ, *Cke.*

I. (nondum vidi.)

II. Soris sparsis, pulverulentis, fuscis. Protosporis ovalibus, fuscis, leniter asperulis (·03 × ·025 mm.).

III. Hypophylla. Soris atris, mox confluentibus, pulverulentis.

Teleutosporis ellipticis, medio constrictis, castaneis, sublævibus (·035 × ·025 mm.), Stipite abbreviatis, lateraliter productis.

On leaves of *Pentanisia variabilis*. (Wood, (II.), 596 (III.), 567.)

Resembling *Puccinia lateripes*, B. & C., but quite distinct.

Puccinia holosericea, *Cke.*

I. & II. (Ignota).

III. Hypophylla. Soris (5-8) in maculâ pallidâ gerentibus, compactis. Teleutosporis sublanceolatis, pallidis, lateraliter compressis (·045 × ·015 mm.). Stipite abbreviato.

On leaves of *Ipomœa holosericea*. Inanda. (Wood, 560.)

Puccinia œdipus, *Cke.*

I. *Æcidium senecionis*, Desm., *forma capensis*.

II. Protosporis globosis (·038 mm. diam.), læte brunneis, spinulosis, in soris fuscis gerentibus.

III. Hypophylla. Soris sparsis, minimis, atris. Teleutosporis ellipticis, castaneo-brunneis, sublævibus, ad medio constrictis (·05× ·035 mm.). Stipite hyalino, subcrasso (·07 mm. long.)

On leaves of *Senecio panduræfolius*. Inanda. (Wood, 561.)

Puccinia Kraussiana, *Cke.*

I. (n. v.).

II. Protosporis ovatis, pallido-fuscis (·035-·04 × ·023-·025 mm.) leniter asperulis, immixtis.

III. Hypophylla ; soris sparsis, orbicularibus, convexis, compactis, purpureo-brunneis ; teleutosporis congestis, sublanceolatis, obtusis, mutuo pressione difformis, pallidis (·065-·07 × ·025 mm.). Stipite crassissimo infra attenuato ·09 mm. long. ·015-·018 mm. lat.

On leaves of *Smilax Kraussiana*. (Wood, 611.)

Puccinia popowiæ, *Cke.*

I. Peridiis in maculis orbicularibus aggregatis ; reliquis exoletis.

II. Protosporis subglobosis, fuscis, lævibus (·02 × ·018 mm.). cum seq ; immixtis.

III. Hypophylla. Soris minutissimis, mox confluentibus, purpureo-brunneis, pulverulentibus, in maculis orbicularibus congestis. Teleutosporis ellipticis, arcte constrictis, utrinque rotundatis, fuscis (·02-·028 × ·016-·018 mm.) episporio verruculoso.

On leaves of *Popowia caffra*. Inanda. (Wood, 614.)

Puccinia Vernoniæ, *Cke.*

I. (nondum vidi).

II. Hypophylla. Soris sparsis, fuscis, in tomento nidulantibus. Protosporis subglobosis, leniter granulatis, pallide-fuscis (·016-·02 mm.).

III. Teleutosporis cum protosporis immixtis, clavatis, nec perfecte evolutis.

On leaves of *Vernonia*, sp. (Wood, 546, 684, 622, 626.)

Puccinia plectranthi, (*Thum.*) *Cke.*

I. Hypophylla. Peridiis in maculis orbicularibus, decoloratis, congestis, semi-immersis, margine albo-fimbriatis. Sporis flavidis. (Wood, 50)

II. and III. Puccinia plectranthi, *Thum.*

On leaves of *Plectranthus*.

Uromyces mimusops, *Cke.*

I. & II. (nondum vidi).

III. Hypophylla. Maculis orbicularibus, brunneis; soris elongatis circumdatis, demum fissuratis. Teleutosporis clavatis (·08 × ·02 mm.) pallidis, granulosis, apice truncatis, ad basim hyalinis, breviter stipatis.

On leaves of *Mimusops*. Inanda, Natal. (Wood, 506.)

A singular species, with large clavate spores, truncate at the apex and hyaline at the base, reminding one of an elongated *Puccinia* without a septum. The sori are confined to the circumference of orbicular brown spots.

Uromyces dolichi, *C.*

I. Peridiis sparsis, semi-immersis, margine reflexo, albo. Sporis aurantiacis=*Æcidium dolichi*, Cke.

II. *Uredo dolichi*, B. & Br. Fungi of Ceylon, 829 ?

III. *Uromyces phaseolorum* forma in *Dolicho gibboso*, &c.

(I.) On leaves, petioles, and legumes of *Dolichos axillaris*. Inanda. (J. M. Wood, 640.)

Evidently distinct from *Æ. orobi*, D. C., and *Æ. leguminosatum*, Lk., in the orange spores.

Uromyces melantheræ, *Cke.*

I. (n. v.).

II. Soris fuscis, subpulverulentibus. Protosporis globosis, castaneo-fuscis, papillatis, episporio apice incrassato (·026 mm. diam.).

III. Soris pallidis, compactis, hemisphericis. Teleutosporis lanceolatis, pallidis, lævibus (·05 × ·02 mm.). Episporia supra incrassato.

On leaves of *Melanthera Brownii*. Inanda. (Wood, 627.)

Both forms occur on the same leaves at the same time.

Uromyces hypoxidis, *Cke.*

I. (n. v.).

II. Protosporis subglobosis, fuscis (·026 × ·02 mm.). Episporio granulato, immixtis.

III. Soris bullatis, in maculis nigricantibus, sparsis. Teleutosporis elliptico-pyriformibus, vel ellipticis, pallido-fuscis, glabris, intus granulosis (·03-·04 × ·02 mm.).

On leaves of *Hypoxis*. Inanda, Natal. (Wood, 586.)

Uromyces pseudarthriæ, *Cke.*

I. (n. v.).

II. Soris aggregatis, minimis, atro-fuscis. Protosporis subglobosis (·022-·025 × ·022 mm.), læte-fuscis, episporio asperato.

On leaves of *Pseudarthria robusta*. Inanda. (Wood, 599.)

Uromyces? rhynchosiæ, *Cke.*

I. Hypophylla. Peridiis sparsis, immersis, margine libero, albo, sporis luteis = *Æcidium rhynchosiæ*, Cke.

II. *Uredo* (*Trichobasis*) *rhynchosiæ*, Kalch.

III. (n. v.).

I. On leaves of *Rhynchosia*. (No. 557.)

II. On *Rhynchosia* (29). *Eriosema salignum* (528, 556) on *Flemingia* (553).

This is probably an *Uromyces*, but the teleutospores have not yet been seen.

Melampsora stratosa, *Cke.*

Hypophylla. Soris compactis, convexis, sparsis. Protosporis pyriformibus, infra truncatis, supra spinulosis, hyalinis (·035-·04 × ·025 mm.). Teleutosporis cuneatis, utrinque truncatis, univel bistratosis, lævibus, castaneo-fuscis (·045 × ·018-·02 mm.).

On leaves of *Croton sylvaticum*. Inanda. (Wood, 466.)

Ravenelia minima, *Cke.*

Protosporis ellipticis, aurantio-flavidis (·023 × ·015 mm) episporio asperato.

Teleutosporis fuscis ; capitulis convexis, infra applanatis (·05 mm. diam.), cellularum 6-8 (rarius 10) compositis ; episporio obtuse spinuloso.

On *Albizzia fastigiata*. Inanda. (Wood, 571.)

The smallest capitules of any known species. The protospores, undoubtedly of another species, occur on *Dalbergia* (Nos. 606-609), of which we have not yet seen the teleutospores.

Trichobasis hypöestis, *Cke.*

Epiphylla. Soris paucis, sparsis, fuscis, epidermide cinctis. Protosporis subglobosis, ovalibusve (·035-·04 × ·032 mm.), fuscis, episporio spinuloso.

On leaves of *Hypöestes aristata*. Inanda. (Wood, 589.)

Uredo ectadiopsidis, *Cke.*

Hypophylla. Soris in maculis suborbicularibus pulverulentis confluentibus. Protosporis globosis lævis, flavidis (·018-·02 mm. diam.).

On leaves of *Ectadiopsis oblongifolia*. Inanda. (Wood, 600.)

Micropeltis stigma, *Cke.*

Hypophylla, sparsa. Peritheciis minimis, atris, punctiformibus, convexo-applanatis. Ascis amplis, sporidiis immaturis.

On leaves of *Tabernæmontana ventricosa*. (Mixed with No. 612.)

Dothidea puncta, *Cke.*

Sparsa, atra, convexa, punctiformis. Ascis clavatis. Sporidiis ellipticis, utrinque leniter attenuatis, uniseptatis, fuscis (·02 × ·0075 mm.).

On leaves of *Dalbergia armata*. Inanda. (Wood, 605, 607.)

The small pseudoperithecia are scattered over the leaflets, very sparingly.

Dothidea lucens, *Cke.*

Maculis suborbicularibus, flavido-fuscis, pseudo-peritheciis punctiformibus, gregariis, convexis, nitidis. Ascis clavatis, sporidiis ellipticis, hyalinis (·018 × ·006 mm.) sæpe biguttulatis.

On leaves unknown. Inanda, Natal. (Wood, 581.)

With the habit of *Dothidea scabies*, but with smaller sporidia.

Dothidea Strelitziæ, *Cke.*

Maculæ orbiculares, fuscæ, sparsæ. Pseudo-perithecíis singulis, conico-convexis, atris, nitidis. Ascis sporidiisque imperfectis.

On leaves of *Strelitzia.* Inanda. (Wood, 580.)

The spots are about 1 mm. broad, in the centre of which is the black perithecium, showing a brown margin all round.

Dothidea crotonis, *Cke.*

Amphigena, atra, nitida. Pseudo-perithecíis cæspitosis, vel confluentibus ($\frac{1}{5}$ mm. diam.) convexis. Ascis clavatis. Sporidiis ovalibus hyalinis (·015 × ·01 mm.).

On leaves of *Croton sylvaticum.* Inanda. (Wood, 466.)

Rhytisma porrigo, *Cke.*

Epiphylla. Maculis orbicularibus, convexis, atris, opacis (2 mm. diam.) circinato-fissuratis. Ascis clavatis. Sporidiis ellipticis, arcte ad medio constrictis, fuscis, utrinque obtusis (·022-·025 × ·012 mm.), paraphysibus copiosis, superne fuscis.

On leaves. Inanda, Natal. (Wood, 660.)

Asterina (?) stylospora, *Cke.*

Gregaria, atra, Hypophylla, perithecíis hemisphericis, opacis, intra hyphis parcis nidulantibus, macrostylosporis ellipticis (026-·03 × ·01-012) supra rotundatis, infra in mucro hyalino, stiptiformi productis, plasmate fusco, medio fasciâ hyalino bipartito.

On *Sponia guineensis.* Inanda. (Wood, 564.)

There can be very little doubt of this being an *Asterina,* although only the macrostylospores have been seen. These are large, dark brown, elliptical, with a hyaline band across the centre, dividing the endochrome in two parts so as to have the appearance of being uniseptate. Similar, but smaller, macrostylospores have been met with in *Asterina reticulata.*

Asterina diplocarpa, *Cke.*

Epiphylla, effusa. Perithecíis applanato-convexis, orbicularibus (·13 mm. diam.) fuscis, sparsis vel segregatis. Ascis obovatis. Sporidiis fuscis uniseptatis, valde constrictis (·016 × ·008 mm.) utrinque cellulo globoso. Perithecíis aliis minoribus, subglobosis, macrostylosporis ovatis, fuscis, continuis (·018-·02 × ·01-012 mm.) continentibus.

On leaves of *Sida cordifolia.* Inanda, Natal. (Wood, 601.)

Asterina toruligena, *Cke.*

Atra, velutina, orbicularis. Perithecíis applanatis, subdiscoideis, convexis (·1 mm. diam.) opacis, rugulosis. Hyphis fuscis radiantibus, circumdatis, ascis clavatis, sporidiis arcte ellipticis, uniseptatis, fuscis, leniter constrictis (·012 × ·005 mm.). Stromate toruloideo ; hyphis erectis, simplicibus, subramosis, fuscis ; articulis ellipticis, (·008-·01 × ·004 mm.) dissilientibus.

On living leaves. Inanda, Natal. (Wood, 559, 635.)

A very characteristic species, in which the perithecia are seated amongst an undoubted black *Torula,* with narrowly elliptical joints, which appears to originate from the creeping brown mycelium of the perithecia.

Asterina myriadea, *Cke.*

Amphigena, sparsa. Peritheciis numerosissimis, fuscis, punctiformibus, subglobosis, ad basim applanatis, vel hemisphericis (·07-·1 mm.) sub lente olivaceis, membranaceis, aliis microstylosporis, ovalibus, hyalinis (·006 × ·003 mm.), aliis ascosporis gerentibus. Ascis arcte clavatis; sporidiis sublanceolatis, utrinque obtusis, uniseptatis (·01 × ·003 mm.) luteo-fuscis.

On living leaves. Inanda, Natal. (Wood, 641.)

Scattered over the leaves, with somewhat the appearance of an *Erysiphe*, without any visible stroma.

Asterina grewiæ, *Cke.*

Amphigena. Peritheciis hemisphæricis, atris, opacis, gregariis, punctiformibus (·12-·14 mm. diam.) ; mycelio fusco obsoleto. Ascis arcte clavatis. Sporidiis cylindraceis, uniseptatis, fuscis, utrinque rotundatis (·018 × ·005 mm.). Hinc illic conidiis lanceolatis, brunneis, triseptatis, stipitatis, cum peritheciis immixtis.

On leaves of *Grewia lasiocarpa.* Inanda. (Wood, 639.)

Perithecia scattered over the entire surface, or collected in patches, in minute black dots, without any appreciable mycelium, until examined under the microscope, when each perithecium is seen to be attached by short radiating brown threads.

Asterina phæostroma, *Cke.*

Atra, velutina, orbicularis, demum confluens, vel late effusa. Peritheciis hemisphericis (·06-·1 mm. diam.) brunneis, intra hyphis nidulantibus. Ascis amplis, subpyriformibus ; sporidiis ellipticis, arcte constrictis, utrinque obtusis, pallidis, uniseptatis (·022 × ·01 mm.) mycelio ramosissimo, læte fusco, aculeis rigidis erectis opacis (·1 mm. long) dense ornato.

On leaves of *Pavetta Natalensis.* Inanda. (Wood, 656.)

Similar in habit to *A. velutina* B. & C., but with different fruit. No. 652 on *Kraussia* appears to be the same species, but immature.

Asterina similis, *Cke.*

Epiphylla, atra, maculæformis. Peritheciis hemisphericis (·08-·12 mm.) stellato-fissuratis, hyphis ramosis, radiantibus circumdatis. Ascis clavatis. Sporidiis ellipticis, uniseptatis, fuscis, utrinque rotundatis (·015-·017 × ·006 mm.), microstylosporis minutis, ovatis, hyalinis.

On leaves of *Sida rhombifolia.* Inanda. (Wood, 544.)

Similar to *A. myriadea* in some respects, but with a definite brown mycelium and larger spores. Mixed with *Asterina diplocarpa* on the same leaves.

Braithwaite's Moss Flora.—We regret that the fifth part was published too late for notice in our last issue. Nevertheless we take this opportunity of reminding Bryologists that the work is in steady progress, and succeeding numbers are well in hand.

AUSTRALIAN FUNGI.

By M. C. Cooke.

(*Continued from p.* 104.)

Polyporus bistratosus, *B. & Cke., Linn. Journ.* xv., 384.
Bellenden Ker Range.

Polyporus lividus, *Cooke.*
Effusus, determinatus, crustaceus, livido-fuligineus, margine mox sublibero, Poris mediis, subrotundis, integris (·3 mm. diam.) dissepimentis rigidis.
On bark. Clarence River. (*Willcox.*)

Polyporus atrovinosus, *Cooke.*
Effusus, indeterminatus, atrovinosus, margine pulverulento-tomentoso; poris minutissimis, rotundis, longis, integris, æqualibus (·1 mm. diam.). Hymenio mox fissurato.
On trunks. Clarence River. (*Willcox.*)

Gen. 4. Trametes, *Fries.*

Tram. pini, *Fr. Hym. Eur.,* 582.
West Australia.

Tram. fibrosa, *Fr. Epic.,* 490.
South Australia.

Tram. pyrrhocreas, *B. Linn. Journ.* xiii., 164.
Queensland, Clarence River.

Tram. Muelleri, *B. Linn. Journ.* x., 320.
N. Australia.

Tram. acupunctata, *B. Linn. Journ.* xiii., 164.
Queensland. Apparently the same as *Polyporus aratus,* B. & Br.

Tram. phellina, *B. Linn. Journ.* viii., 164.
N. S. Wales.

Tram. devexa, *B. Linn. Journ.* xiii., 165.
N. S. Wales, Queensland.

Tram. ungulata, *B. Linn. Journ.* xiii., 165.
S. Australia.

Tram. epitephra, *B. Linn. Journ.* xiii., 165.
S. Australia.

Tram. lactinea, *B. Ann. Nat. Hist.* x., 371.
S. Australia, N. S. Wales, Endeavour River.

Tram. lævis, *B. Hook. Journ.,* 1847, 507.
Queensland, Port Denison, Richmond River.

Tram. colliculosa, *B. Hook. Journ.,* 1847, 506.
N. S. Wales, Port Denison.

Tram. occidentalis, *Fr. Epic.,* 491.
S. Australia, N. S. Wales, Queensland, Trinity Bay, Daintree River, Richmond River, Port Denison.

Tram. rigida, *B. & M. Ann. Sci. Nat.*, 1849.
N. S. Wales, Queensland, Clarence River.

Tram. scrobiculata, *B. Grevillea* VI., *p.* 70.
Victoria.

Tram. mollis, *Fr. Hym. Eur.*, 585.
N. S. Wales.

Tram. pictus, *Berk. in Herb.*
Queensland.

Tram. dædalioides, *B. Ann. Nat. Hist.* III., 325.
Tasmania.

Tram. Curreyi, *Cooke. Trans. Bot. Soc. Edin.* (*Tram. umbrina* Curr. nec *Trametes umbrina*, Fries).
Queensland, Clarence River, Port Denison.

Tram. Sprucei, *B. Hook. Journ.*, 1856, 336.
Clarence River, Rockhampton, Richmond River, Port Jackson, N. S. Wales.

Tram. versiformis, *B. Linn. Journ.* XIV., 56.
Rockhampton.

Tram. heteromalla, *Cke.*
Pileo suberoso, submolli, villoso, concentrice sulcato, albido-cinerascente, intus albo; poris rotundatis ($\frac{1}{3}$ mm.) albidis, dissepimentis crassis, obtusis.
On trunks. Mount Dromedary, N. S. W. (*Miss Bate.*)
Pileus 2-3 inches broad, $\frac{1}{2}$ inch thick.

Tram. versatilis, *B. Hook. Journ.*, 1842, 150.
Queensland, Clarence River.

Trametes cristata, *Cooke.*
Longissime effusa, marginibus late reflexis; pileo tenui, læte ochraceo, flexili, pilis subrectis fimbriatis cristato; margine acuto; poris mediis, angulatis, brevibus (·7 mm. diam.) dissepimentis plus minus dentatis, concoloribus.
On trunks. Port Denison. (*Shann*, 26.)
Allied to *T. versatilis*, but differing in many points, particularly in the branched hairs of the pileus.

Tram. acuta, *Cke.*
Effusum, margine late reflexo, pileo tenui, pallide ochraceo, flexili, contextu implexim strigoso, margine acutissimo, strigoso-sericeo, pallido; poris mediis, rotundatis, curtis, ($\frac{1}{3}$ mm. diam.), dissepimentis rigidis, subcrassis, integris, obscurioribus.
On branches. Richmond River (*Camara*), Port Denison (*Shann*).
It is doubtful whether *Polyporus Peradeniæ*, B. & Br., is not in reality a *Trametes* closely allied to these two last-named species.

Gen. 5. Dædalea, *Fr.*

Dæd. glabrescens, *B. Linn. Journ.* XVI., 39.
N. S. Wales.

Dæd. sanguinea, *Klot. Fr. Epicr.*, 493 (*Polyporus Persoonii, Fr.*).
N. S. Wales, Queensland.

Dæd. tenuis, *B. Hook. Journ.*, 1842, 151.
S. Australia, Queensland.

Dæd. Hobsoni, *B. Linn Journ.* XIII., 165.
S. Australia.

Dæd. aulacophyllus, *B. Linn. Journ.* XIII., 165.
S. Australia.

Dæd. Bowmanni, *B. Linn. Journ.* XIII., 165.
Queensland, Trinity Bay.

Dæd. Sprucei, *B. Hook. Journ.*, 1856, 236.
Queensland.

Dæd. unicolor, *Fr. Hym. Eur.*, 588.
Queensland.

Dæd. Schomburgkii, *Berk. in Herb.*
S. Australia.

Dæd. intermedia, *B. Linn. Journ.* XVIII., 385.

Dæd. subcongener, *Berk. in Herb.*
Queensland.

Dæd. aspera, *Klotsch. Linnæa* VIII., 480.
Queensland, Richmond River.

Dæd. sinulosa, *Klotsch. Linnæa* VIII., 482.
Port Denison.

Dæd. ambigua, *B. Hook. Journ.*, 1845, 305.
Clarence River.

Gen. 6. HEXAGONA, *Fries.*

Hex. polygramma, *Mont. Cuba t.* XIV., *f.* 3.
S. Australia, Queensland.

Hex. Gunnii, *B. Hook. Journ.*, IV. 57.
W. Australia, Tasmania, Victoria, Grampians.

Hex. decipiens, *B. Linn. Journ.* XIII., 166.
W. Australia, S. Australia, Victoria, Clarence River.

Hex. subtenuis, *Berk. in Herb.*
N. Australia, Queensland, S. Australia, Port Denison.
Separated from *H. tenuis* on account of the larger pores.

Hex. similis, *B. Hook. Journ.*, 1846, *p.* 4.
N. Australia, Illawarra, Port Denison, Richmond River.

Hex. Mulleri, *B. Linn. Journ.* XIII., 166.
N. S. Wales, Queensland, Illawarra.

Hex. umbrinella, *Fr. Fungi Natal*, 17.
Queensland.

Hex. rigida, *B. Linn. Journ.* XVI., 54.
N. S. Wales, Lord Howe's Island.

Hex. crinigera, *Fr. Epic.*, 496.
Queensland.

Hex. Wightii, *Klotsch. Fr. Nova Symb.*, 84.
Port Denison, Toorvoomba.

Gen. 7. Favolus, *Fries.*

Fav. squamiger, *B. Linn. Journ.* xiii., 166.
N. S. Wales.

Fav. cæspitosus, *B. Linn. Journ.* xiii., 166.
N. S. Wales.

Fav. hispidulus, *B. & C. Linn. Journ.* xiii., 166.
S. Australia.

Fav. pusillus, *Fr. Linnæa* v., 511, *t.* xi, *f.* 2.
Tasmania.

Fav. discolor, *Fr.* (?).
W. Australia. Species to me unknown.

Gen. 8. Laschia, *Fries.*

Laschia Thwaitesii, *B. & Br. Linn. Journ.* xiv., 58.
Queensland.

Laschia tremellosa, *Fr. Linnæa* v., 533.
Victoria, N. S. Wales, Queensland, Mount Dryander.

Laschia micropus, *B. Linn. Journ.* xiii., 170.
Victoria.

Laschia cinerascens, *Kalch.* (?)
Victoria.

Laschia pustulata, *B. & Br. Linn. Journ.* xiv., 58.
Queensland.

Gen. 9. Merulius, *Haller.*

Mer. corium, *Fr. Hym. Eur.*, 591.
W. Australia, Tasmania.

Mer. pallens, *Fr. Hym. Eur.*, 593.
Victoria, Tasmania.

Mer. lacrymans, *Sch. Fr. Hym. Eur.*, 594.
W. Australia.

Mer. aureus, *Fr. Hym. Eur.*, 592.
Rockhampton.

Gen. 10. Porothelium, *Fries.*

Por. subtile, *Fr. Hym. Eur.*, 595.
Tasmania.

Gen. 11. Fistulina, *Fries.*

Fist. hepatica, *Fr. Hym. Eur.*, 522.
S. W. Australia.

Ord. 3. Hydnei.

Gen. 1. Hydnum, *Fries.*

Hyd. repandum, *Fr. Hym. Eur.*, 601.
Tasmania.

Hyd. lævigatum, *Fr. Hym. Eur.*, 599.
Tasmania.

Hyd. nigrum, *Fr. Hym. Eur.*, 605.
N. S. Wales.

Hyd. Mulleri, *B. Linn. Journ.* XVI., 167.
N. S. Wales, Queensland.

Hyd. cervinum, *B. Fl. Tasm.* II., 256.
Tasmania.

Hyd. xanthum, *B. & Curt. Grev.* I., 98.
N. S. Wales.

Hyd. delicatulum, *Klotsch. Ann. N. Hist.* III., 395.
N. S. Wales.

Hyd. meruloides, *B. & Br. in Herb. Berk.*
Queensland.

Hyd. flavum, *Kl. Ann. N. Hist.* X., 380.
Queensland.

Hyd. ochraceum, *Pers. Fr. Hym. Eur.*, 612.
Queensland.

Hyd. gilvum, *B. Hook. Journ.*, 1851, 168.
Queensland.

Hyd. filicicola, *B. Fl. Tasm.* II., 256.
Tasmania.

Hyd. udum, *Fr. Hym. Eur.*, 615.
Tasmania, N. S. Wales, Queensland.

Hyd. investiens, *B. Hook. Journ.*, 1845, 57.
W. Australia.

Hyd. dispersum, *B. Hook. Journ.*, 1845, 58.
W. Australia.

Hyd. isidioides, *B. Hook. Journ.*, 1845, 58.
W. Australia.

Gen. 2. TREMELLODON, *Fr.*

Trem. gelatinosum, *Fr. Hym. Eur.*, 618.

Gen. 3. IRPEX, *Fries.*

Irpex flavus, *Klotsch. Linnæa* VIII., 488.
S. Australia, Queensland.

Irpex Archeri, *B. Fl. Tasm.* II., 257, *t.* 183, *f.* 1.
Tasmania.

Irpex zonatus, *B. Hook. Journ.*, 1854.
Queensland.

Irpex hexagonoides, *Kalch. Grevillea* IX., 1.
N. S. Wales.

Irpex maximus, *Mont. Ann. Sci. Nat.*, 1837.
Queensland, Clarence River.

Gen. 4. SISTOTREMA, *Pers.*

Sist. irpicinum, *B. & Br. in Herb. Berk.*
Queensland.

Gen. 5. Phlebia, *Fries.*

Phlebia reflexa, *B. Hook. Journ.*, 1845.
Victoria.

Phlebia hispidula, *B. Linn. Journ.* xvi., 167.
S. Australia.

Phlebia coriacea, *B. Linn. Journ.* xviii., 385.
Rockhampton.

Phlebia radiata, *Fr. Hym. Eur.*, 625.
Queensland.

Gen. 6. Kneiffia, *Fries.*

Kneiffia Mulleri, *B. Linn. Journ.* xvi., 167.
S. Australia.

Gen. 7. Grandinia, *Fries.*

Grand. granulosa, *Fr. Hym. Eur.*, 626.
Tasmania.

Grand. ocellata, *Fr. Hym. Eur.*, 626.
Chatham Island.

Grand. australis, *B. Fl. Tasm.* ii., 257.
Tasmania.

Gen. 8. Odontia, *Pers.*

Odontia secernibilis, *B. Fl. Tasm.* ii., 257.
Tasmania.

SOME OBSERVATIONS ON THE GERMINATION OF THE UREDINES.*

By Charles B. Plowright, M.R.C.S.

While conducting the experiments upon the heterœcism of *Puccinia graminis* and *Æcidium herberidis* detailed in a recent number of "Grevillea" my attention was drawn more or less directly to the various processes which take place during the development of these fungi. So interesting were these that I was induced to extend my observations to other allied species, and during the summer a continuous series of observations were carried on. As a matter of course, the ground has already been gone over by many other mycologists, and the classical memoirs of M. Tulasne, which are in themselves well-nigh exhausted, leave but little margin for startling discoveries of unexpected novelties; yet so important is the subject in an economic point of view, and so interesting are many of the phenomena which take place, that I venture to bring the subject forward again, and to narrate what I saw as well as to add some of the more important observations of the distinguished French mycologist, M. Tulasne.

* Read at the October meeting of the Woolhope Club, 1881.

In the "Handbook of British Fungi" the *Uredines* are distributed over three orders, viz., *Puccinei*, *Cœomacei*, and *Æcidiacei*. Excellent as this arrangement has proved itself to be to the present generation of British and American mycologists, it is quite probable that when the next edition of the "Handbook" comes to be prepared certain modifications will be made; some genera now disassociated will be united, or at any rate brought nearer together. Any such alterations, should they be made, will certainly not be brought about by the desire of the editor to pander to the strange vagaries now in vogue in certain quarters concerning mycological nomenclature, but will owe their existence to that progressive accumulation of knowledge, mainly the outcome of physiological research, which from time to time antiquates the best systems of classification in all departments of natural history. From no standpoint do we obtain so clear a view of the affinities of various forms of organic life as when we devote ourselves to the investigation of their development. Now, there exist two distinct modes in which the germination of *Uredines* takes place, which, for want of better names, may be called the *Puccinoid* and the *Uredinoid*, inasmuch as the former is proper to the *Pucciniæ*, while the latter is met with more constantly amongst the members of the so-called genus, *Uredo*. But it must not be supposed these two modes of germination are absolutely confined to the two forms of fungus-life just mentioned; on the contrary, as will be shown hereafter, the *Pucciniæ* may, and do sometimes, germinate after the manner of the *Uredines*, and *vice versâ*.

Puccinoid Germination.—As a general rule the *Puccinia* spore may be regarded as the resting spore of the *Uredo*, or at any rate, if not absolutely the resting spore, at least the spore which retains its germative energy the longest. Very many of the *Pucciniæ* will not germinate until the spring following the summer or autumn in which they were themselves produced; but this is not invariably the case. To take one instance only. *P. epilobii*, D.C., germinated freely with me in from 48 to 72 hours (plate 159, fig. 20).

Tulasne has shown that the germination of the *Puccinia* spore is brought about by the protrusion of the germ tube through an opening in the epispore (t. 159, f. 25). This tube is destined to produce secondary spores at its peripheral extremity, and is never of any great length. There is usually only one germ tube for each primary division of the spore. The figure quoted above is taken from Tulasne's Memoir, and shows the process as observed by him in *Puccinia graminis*. In other words, puccinoid germination implies the production of secondary spores, and is found in *Triphragmium*, *Phragmidium*, *Puccinia*, *Podisoma*, *Uromyces*, *Coleosporium*, and in the winter spores of *Melampsora*.*

The secondary spores are born upon the terminal extremities of short tapering branches given off by the primary germ tube after

* Probably also *Xenodochus*.

it has become septate, and are either spherical, oval, or subreniform. Plate 159, fig. 20, shows a recent spore, *Puccinia epilobii*, D.C., producing these secondary spores.*

Uredinoid Germination.—The *Uredo* spore is essentially ephemeral in its nature, and does not retain the power of germination for any great length of time. The germ tubes which are thrown out by *Uredo* spores are destined to penetrate the tissues of the living plant upon which the parasitic fungus grows, their main function being not the production of secondary spores, but the direct reproduction of the parasite. They invariably, I believe, germinate the same year they are produced. This mode of germination is met with in *Uredo*, *Trichobasis*, *Æcidium*, and *Peridermium*. In order to save repetition, however, the following is a detailed account of the process of germination observed in *Uredo linearis*, Pers., during the month of August, 1881, and is not based upon a single experiment, but is the outcome of a great many observations made at the time stated. When the spores of this fungus, which are more or less ovoid in form, are sown upon a drop of water on a glass slide, and placed under a bell glass, so arranged that the atmosphere within the bell glass is full of moisture, they very soon begin to germinate. As early as five hours and forty minutes they were found to have thrown out two germ tubes, one from each side of the long diameter of the spore, near its centre (plate 159, fig. 1). Sometimes only one tube was observed, but generally there were two. These tubes were hyaline, and filled with very pale yellow endochrome from the interior of the spore, and were of uniform diameter, as nearly as possible, throughout their entire length. As a rule, only one of these two twin tubes went on growing, *i.e.*, increasing in length. When the major tube attained a length equal to several times the diameter of the spore from which it sprang, it took a series of spiral turns from right to left, or *vice versâ*. At this stage the tube presented a uniform diameter from end to end, but very soon the basal portion of it became enlarged and empty, and soon afterwards, at a short distance from the spore, a septum appeared, which cut the empty base of the germ spore from the remainder. Before, however, this septum made its appearance, the abortive germ tube became quite empty, and the greater portion of the endochrome contained within the spore itself was transferred to the growing tube (plate 159, fig. 4). This transferrence of endochrome from the interior of the spore to the growing germ tube always took place. The yellow granules were plainly to be seen moving towards the distal extremity of the tube. Sometimes they were more diffused than at others, but the great bulk of endochrome was always to be observed nearest the distal extremity, not always, however, at the extreme end of the tube, but often a short distance from it (fig. 4). The

* The subject of puccinoid germination is fully treated of and well represented in "Fungi: their Nature, Influence, and Uses" (Cooke and Berkeley), p. 143-149.

active tube continued making spiral turns upon itself like a corkscrew. The actual number of turns varied, as did their direction, whether from right to left or left to right. Very often, too, the tube would turn two or three times in one direction, and then, reversing its movement, take a few turns in the opposite direction. The diameter of the helix, too, was subject to considerable variation. The sides of the tube were parallel to each other, and its diameter uniform. At the extreme end, which was blunt, there now appeared numerous irregularities, which were incipient branches (fig. 5). Not infrequently the end of the tube trifurcated in the manner of a trident (figs. 6 and 7). Usually one only of the main branches of the trident continued its growth, the others remaining rudimentary. From this point all semblance of regularity in the contour of the tube was lost, and it gave off lateral branches somewhat after the manner of a stag's horn. The extremity of the tube did not even now lose its tendency to convolute, although this movement is considerably diminished (fig. 8). The yellow endochrome had by this time all accumulated in the irregular branched part of the tube, for although the lower portion above the septum was obviously not empty, yet the only distinctly yellow colouration was to be seen in the distal branched portion.

It is obvious that the spiral movements above described are of great importance to the fungus, as by them the growing mycelial tube has the chance of its catching on any irregularity of the cuticle of the best plant greatly increased. This catching power is enhanced too by the trident-like terminal extremity with its irregular branched outline. It is possible that the non-development of some of the terminal branches is not a purely accidental circumstance, but a provision by which the mycelium may become fixed upon the leaf, while the favoured branch is penetrating it. The ultimate changes which were observed in the mycelial tube were simply that it appeared to become septate.

Similar results to the above were obtained from watching the germination of the *Uredo* of *Coleosporium tussilaginis*, Lev.; of *Phragmidium mucronatum*, Link.; of *Uromyces appendiculata*, Lev.; and of *Æcidium crassum*, Pers.

On the 12th and 13th August, 1881, some spores of *Uredo linearis* were observed to germinate in quite a different manner, for instead of producing the irregularly outlined branches (the stag's horn branches), the terminal extremity of the tube became expanded in a globular manner, into which all the yellow endochrome accumulated (plate 159, figs. 10-12). Often a secondary globular expansion took place at a lower part of the tube (figs. 11 and 12). Whether these bodies were really secondary spores, and, as such, fell away from the tube, or whether they were simply reservoirs into which the endochrome was accumulated previous to making a fresh departure in mycelial development, could not be clearly made out, but as they were not observed presenting any

tendency towards the isolation of their contents by a basal septum, nor were any of them subsequently to be seen floating about, as they must have done had they fallen off, the presumption is in favour of their being endochrome reservoirs. Be this as it may, this method of germination presents a very much closer analogy to the true puccinoid germination than was observed in any other *Uredine*, excepting in *Coleosporium*,* in which genus it seems to be the normal method.

The *Æcidia*, as far as I have observed them, germinate in the same manner as other *Uredines*, although Tulasne has described and figured one species *Æc. euphorbiæ sylvaticæ*, D.C., in which true puccinoid germination appears to have taken place.†

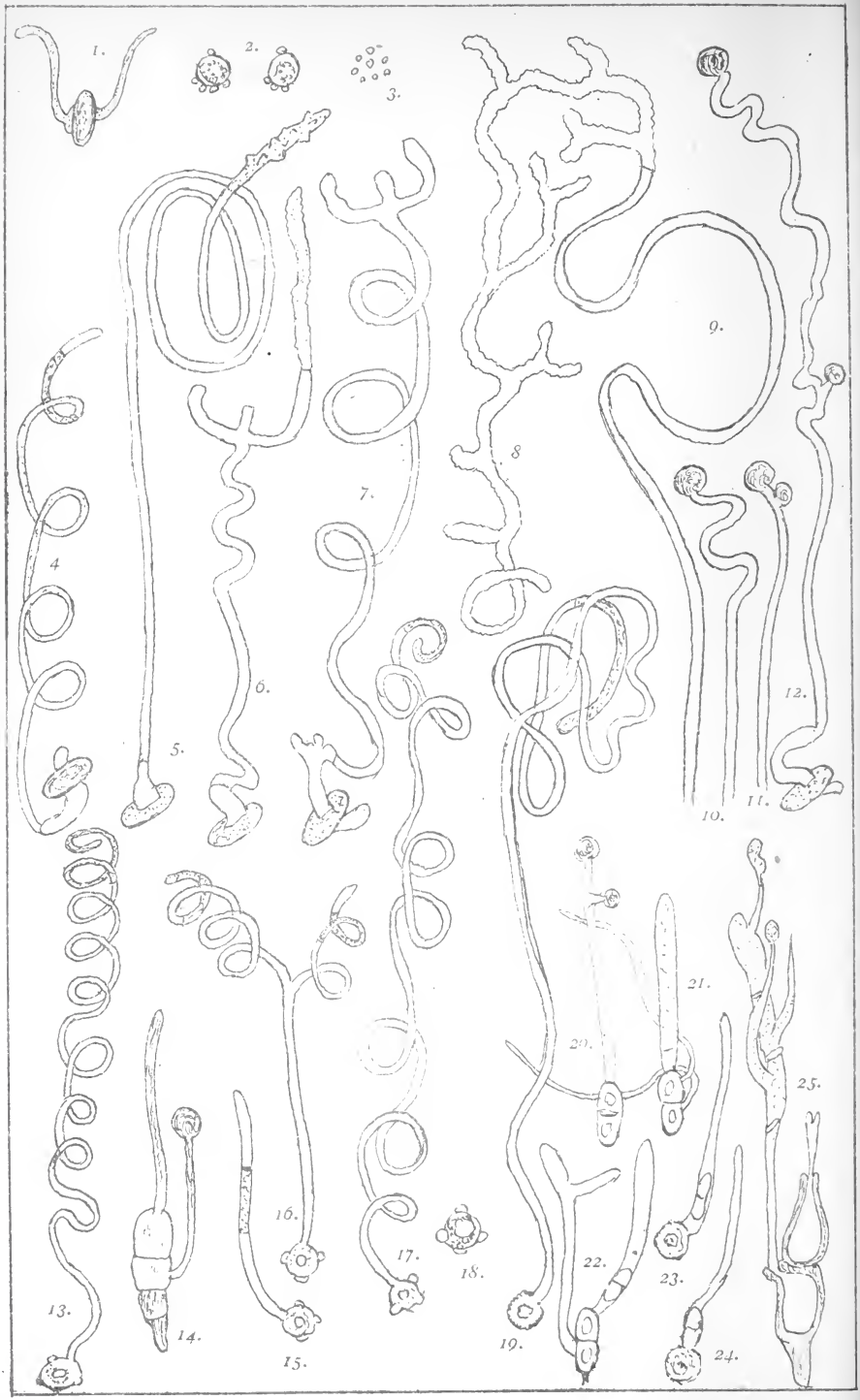
Plate 159, fig. 21, shows a spore of *Puccinia epilobii* in which both modes of germination have taken place, the two narrow tubes being the commencement of uredinoid mycelium, whilst the wider tube is the beginning of a puccinoid germination tube.

In observing the process of germination in various *Æcidia*, numerous minute spherical hyaline spores were encountered, that at first were supposed to be those of some stray mucedine. But that these bodies were connected in some way with the *Æcidium* seems distinctly shown from the fact that they were found in *Æc. herberidis*, *urticæ*, *tussilaginis* and *crassum*, immediately after the specimens had been gathered, and moreover in specimens that were collected of each of these species at various times, in habitats miles apart. There were furthermore not seen accompanying the spores of any other *Uredine*. These minute bodies were nearly globular or sometimes slightly ovate, measuring from two to three micromills across, and were often clustered around the *Æcidium* spores apparently adhering to them (plate 159, f. 2).

Another circumstance is worthy of record in connection with the germination of these fungi, viz., the occasional presence of an oval, cylindrical, uniseptate pale yellow spore, intercalated in the mycelial tube given off by certain species. This was observed in *Æcidium berberidis*, and *tussilaginis*. *Puccinia malvacearum*, and *Epilobii*, and in the *Uredo* of *Uromyces appendiculata* and of *Coleosporium tussilaginis*. These spores varied in size from 15 to 20 mk. in length to 5 to 10 mk. in width ; they were nearly hyaline, with a pale yellow tinge, uniseptate, with rounded ends, in fact very like miniature *Puccinia* spores. What their precise nature is it is not intended to affirm, but it would be interesting to hear if they have been encountered by other botanists who have studied the germination of the *Uredines*. The only suggestion which presents itself to my mind is that they may be abortive attempts at fructification on the part of a mycelium grown under abnormal conditions which attempts have assumed a form similar in contour with the most per-

* Tulasne, "Ann. des Sciénces Nat.," 4th Series, t. 8, f. 1, 8, 10, and 11.

† Tulasne loc. cit. plate 9, f. 24 to 33. Cooke and Berkeley. Fungi; their Nature and Uses, p. 142, f. 81.



C.B.P. ad nat. del.

Germination of Uredines.

manent spore as we commonly meet with it (plate 159. figs. 22, 23, and 24).

The following are the species of *Uredines* which were made the subject of study :—

Uredo of *Phragmidium mucronatum*, Link.
„ *Puccinia graminis*, Pers.
„ „ *Epilobii*, D.C.
„ „ *Arundinacea*, Hedw.
„ „ *striola*, Link.
„ *Uromyces appendiculata*, Lev.
„ *Coleosporium tussilaginis*, Lev.
„ „ *Sonchi*, Tul.
„ „ *Senecionis*, Schum.
Puccinia malvacearum, Corda.
„ *Epilobii*, D.C.
Coleosporium Sonchi, Tul.
„ *tussilaginis*, Lev.
„ *Senecionis*, Schum.
Æcidium berberidis, Pers.
„ *tussilaginis*, Pers.
„ *crassum*, Pers.
„ *urticæ*, D.C.
Peridermum pini, Chev.

Explanation of Plate 159.

Fig. 1.—A spore of *Uredo linearis* germinating. Two tubes have been thrown out, one from each side the spore near its centre. Each tube is filled with yellow endochrome from the interior of the spore (5 hours 4 min.).

Fig. 2.—Two spores of *Æcidium berberidis* with minute spherical secondary spores (?) adhering to them.

Fig. 3.—A group of these bodies, secondary spores (?).

Fig. 4.—A spore of *Uredo linearis* (20 hours) from which two tubes have in the first instance been thrown out ; one only has developed, and towards the end of this the yellow endochrome is being passed. The base of this tube is cut off by a septum, below which it is empty, as is the abortive tube.

Fig. 5.—Germinating spore of *Uredo linearis* (23 hours). The distal extremity of the tube contains all the endochrome. The walls of the tube here show signs of incipient branches. The tube has taken two spiral turns from left to right.

Fig. 6.—A spore of *Uredo linearis* (24 hours), showing the trifurcation which not uncommonly takes place ; one of these branches has gone on growing, but the walls of this portion of the tube are thinner and much more irregular in outline than the older portions. The endochrome has all accumulated in this part of the tube. 13th August, 1881.

Fig. 7.—A spore of *Uredo linearis* (20 hours) in this germinal tube has taken three perfect turns upon itself. The hollow basal portion shows indications of two additional, but abortive tubes. The endochrome should have been shown confined to the trident-like part of the tube. 22nd August, 1881.

Fig. 8.—Shows the further development of a germ tube; the extreme end only is shown. The tube here consists only of a very thin wall, in which, however, all the endochrome has accumulated. But it has thrown out numerous branches at right angles to the growing axis. The extreme end still retains its tendency to convolute. 22nd August.

Figs. 10, 11, and 12 show three examples of *Uredo linearis* in which, instead of producing the thin-walled, irregularly branched ("stag's horn") extremities, the endochrome has accumulated in globular expansions of the germ tube. In figs. 11 and 12 secondary globes are just beginning to be formed. The tubes are themselves quite empty, all the endochrome having accumulated in the globose expansions, which consequently have a distinct yellow colour. 13th August, 1881.

Fig. 13.—A spore of *Æcidium tussilaginis* which has germinated very actively in 10 hours. The germ tube has taken eight or nine spiral turns, at first from left to right, then reversing its movement, has turned from right to left. The endochrome has accumulated entirely at the extreme end.

Fig. 14.—Spore of *Coleosporium sonchi arvensis*, after 24 hours. The two upper segments of the spore are quite empty, all their contents having been removed to the germ tubes. The apical tube is given off from the end of the spore, the other laterally. The analogy between the germination of this spore and of those figured at 10, 11, and 12 is very striking.

Fig. 15.—Spore of *Æcidium tussilaginis* (16 hours), in which the endochrome is seen passing up the tube, but has not yet reached the extremity.

Fig. 16.—Spore of *Æcidium tussilaginis* in which the primary tube has divided into two equal branches, each of which has taken on independently spiral convolution (40 hours).

Fig. 17.—Spore of *Æcidium tussilaginis* which, in 40 hours, has thrown out a tube that has undergone very irregular spiral convolutions.

Fig. 18.—Spore of *Æcidium crassum* in which germination has just commenced. It is impossible to say which of the budding tubes will eventually develope, but one, or at most two, will do so.

Fig. 19.—Germinating spore of *Coleosporium tussilaginis* (*uredo*), 48 hours.

Fig. 20.—Germinating spore of *Puccinia epilobii* (72 hours) producing two secondary spores.

Fig. 21.—Spore of *Puccinia epilobii* which, in 48 hours, has thrown out one wide and two narrow tubes; the former will produce secondary spores (puccinoid germination).

Fig. 22.—A spore of *Puccinia epilobii*, in which both segments have thrown out tubes; in the upper tube a uniseptate intercalated spore is seen, 15 mk. long by 5 mk. wide.

Fig. 23.—Germinating spore of *Uredo fabæ*, with intercalated spore (15 × 8 mk.), 96 hours.

Fig. 24.—Germinating spore of *Æcidium berberidis* with intercalated spore (20 hours).

Fig. 25.—Germinating spore of *Puccinia graminis* taken from Tulasne. The tube from the upper segment is broken off, while that from the lower segment is seen at its upper part to be divided by three septa. From each division a pointed branch arises, which bears at its extremity an oval or subreniform secondary spore.

FUNGI MACOWANIANI.

By the Rev. C. Kalchbrenner.

(*Continued from p.* 109.)

MYXOGASTERES.

Physarum leucophæum, *Fr.* MacOw., 1051.

Physarum cinereum, *Fr.* MacOw.

Physarum Schumacheri, MacOwan (?)

Tilmadoche nutans, *(P.) Rostf.* MacOw., 1305.

Tilmadoche mutabilis, *Rostf.* MacOwan.

Trichamphora pezizoidea, *Rfni.* (*Jungh.*)
Som. E., No. 1159.

Didymium physarioides *(P.) Fr.*
Natal. Wood, 198.

Didymium leucopus, *Fr.* MacOwan.

Didymium microcarpon, *Fr.* MacOw.

Diachæa leucopoda, *Bull.*
Natal. Wood, 139.

Stemonitis fusca, *Roth.* M.Ow., 1173, Wood, 206.

Trichia scabra, *Rostf.* MacOw.

Hemiarcyria clavata *(P.) Rtfi.* MacOw., 1172, 1128.

Arcyria pomiformis, *Roth.* M.Owan.

Arcyria cinerea, *Fr.* MacOw., 1049.

Arcyria punicea, *P.* Natal. Wood, 183 ; MacOw., 1127.

Arcyria insignis, *K. et Cke.*
Parva, rosea, fasciculata. Peridiis ovatis. Sporis exoletis.
On rotten wood, No. 49.

Lycogala epidendron, *L.* M.Ow., 1191.

DISCOMYCETES.

Obs. Plurimæ species Discoideorum, Sphæriæorum, et Uredineorum a MacOwanio lectorum, jam in Grevillea ix., sub titulo. "Fungi Austro-Africani"; publicati sunt et hoc loco prætereuntur.

Leotia elegantula, *K.*
Subsolitaria, disco convexo, margine involuto, nitidulo, atro-brunneo, subpurpurascente, subtus rugoso, fere lamelloso, alutaceo-ochraceo; stipite cylindrico, æquali, basi dilatato, pulverulento, æque alutaceo-ochraceo. Sporæ breviter ovatæ ·009, × ·006 mm. diaphanæ, fuscidulæ.
Somerset East, l. MacOwan, No. 1310.
Pileus Pisi magnitudine ; stipes pollicaris 1½ lin. crassus.

Peziza (Scutellinia) lusatiæ, *Cke.* in Mycographia.
Auf feucht liegenden Holzsplittern, an Bachufern. Boschberg. MacOwan, No. 1130.

Von Pez. scutellata L. nur durch die etwas rauhen Sporidien unterschieden.

Peziza (Dasysc.) lachnoderma, *Berkl.* in Flor. Tasmanica.
An faulendem Holze. MacOw. und Tuck., No. 112*b*. P. Natal, Wood, No. 194 und 156.

Peziza (Sarcosc.) coccinea, *Jacq.* Fr. Syst. II., 79.
MacOwan, No. 1126*b*.

Peziza (Dasyscypha) columbina, *K. & C.*
Sessilis, pallide griseo-fusca. Cupulis hemisphæricis, pilis acutis, hyalinis, mollibus, dense obsitis; disco obscuriore ($\frac{1}{2}$ mm. diam.) margine incurvo. Ascis clavato-cylindricis, sporidiis lanceolatis, distincte uniseptatis, hyalinis (·014 × ·0035 mm.). Paraphysibus filiformibus.
On bark.

Peziza (Dasyscypha) calyculiformis, *Schum.* Flor. Dan., t. 2032.
Som. E., MacOwan, No. 1126*c*.

Peziza (Hymenoscyphe) aluticolor, *Berkl.* in Mycogr. 198.
In ligno putrido. Roschberg, MacOw., No. 1101.
Color puse aureo-ochraceus.

Peziza (Mollisia) subgilva, *K. & C.*
Gilva, ceraceo-mollis. Cupulis concavis, sessilibus ($\frac{3}{4}$-$1\frac{1}{2}$ mm. lat.) margine rotundato. Ascis cylindraceis. Sporidiis ellipticis, hyalinis (·008 × ·004 mm.). Paraphysibus linearibus.
On naked wood.

Peziza (Mollisia) rubella, *P.* Fr. Syst. II., 141.
Som. E., leg. MacOwan, No. 1414.

Peziza (Mollisia) cinerea, *Batsch.* Fr. Syst. II., 142.
Som. E., MacOwan.

Phillipsia kermesina, *K. et C.*
Coriaceo-ceracea, læte purpurea, primo substipitata, demum applanata, sessilis. Cupulis sparsis, vel 3-4 congestis (1-3 centm.) extus pallidis, subrugosis. Hymenio ab contextu separabili, siccitate rimoso. Ascis cylindricis. Sporidiis ellipticis, binucleatis (·019-·023 × ·011 mm.). Paraphysibus linearibus, nucleatis.
An Holzspäenen. Somerset East, MacOwan, No. 1102.

Genus "Phillipsia," species quaedam exoticus complectitur, firmioris quam Peziæ substantiæ; quorum Hymenium spontanee a strato inferiore secedit. Hinc siccando non corrugantur.

Helotium capense, *K. et C.*
Aureum. Cupulis applanatis, vel centro depressis, stipite subtusque pallidioribus, deorsum attenuatis, ad basim nigrescentibus. Ascis elongato-fusiformibus. Sporidiis arcte fusiformibus, quinqueseptatis, hyalinis.
Ad ramos. P. Natal, Wood, No. 180.
Cupulæ 3 mm. latæ, stipes $2\frac{1}{2}$ mm. longus. Species pulchella.

Helotium ferrugineum, *Fr.* Syst. II., 134.
Som. E., leg. MacOwan, No. 1126*b*.

Helotium claro-flavum, *Grev.* Fl. Edin., 424. Cooke Hdb., 713.
Boschberg, MacOwan, No. 1126*a*. P. Nat., No. 178.
Ad ramos deciduos.

Helotium epiphyllum, *P.* Fr. Syst. II., 137.
In fol. putrescentibus. Som. E., MacOwan.

Helotium conformatum, *Karst. H. Fenn.*
In fol. aridis. Somerset East, MacOwan, No. 1098.

Chlorosplenium æruginosum, *Tul.* Fr. Syst. II., 130 (Helotium).
Boschberg, MacOwan, No. 1016.

Ascobolus furfuraceus, *P.* Fr. Syst. II., 163.
In fimo. Som. E., MacOwan, No. 1267.

Ascobolus ciliatus, *Schum.*
Cape, in stercore vaccino, M.Ow., 1403.

Dermatea pelidna. *K. & C.*
Cæspitosa, subcoriacea. Cupulis (pressione mutua) irregularibus, læte badiis, furfuraceis (3 mm. diam.) disco atrobrunneo, vel fuligineo. Ascis minimis, cylindraceis (·03 mm. long). Sporidiis linearibus ·004 mm. long
On decorticated branches. Boschberg, MacOwan.
Allied to *Dermatea furfuracea*, Fr.

Triblidium rufulum, *Spr.*
On branches, leg. MacOwan, Nos. 1262, 1265, 1264, 1339.

Phacidium litigiosum, *Desm.* Syn. Pseudopeziza Ranunculi Fuckl.
In fol. vivis Ranunculi pinnati. Poiret.
Boschberg, MacOwan, No. 1281.

Stictis thelotremoidea, *Phillips* in litt.
Immersa, orbicularis ($\frac{1}{3}$-$\frac{1}{2}$ mm.) excavata; margine albido, vix prominulo (ut in "*Thelotrema*") subintegro. Ascis cylindraceis. Sporidiis filiformibus, hyalinis (·0·15 mm.).
On branches. Boschberg, M.Owan.
Might very easily be confounded with some species of *Thelotrema*.

Stictis bella, *K. & C.*
Immersa, orbicularis (1 mm.), limbo niveo lobato-lacerato, amplo; disco flavido vel aureo, ascis longissimis, cylindraceis. Sporidiis filiformibus (·3 mm.).
On branches (1288*a*.).
A very beautiful species, resembling miniature flowers of *Bellis perennis*. Cups narrowed at the base and much expanded above.

Stictis radiata, *P*
Somerset E., MacOwan, 1040, 1288, 1356.

PYRENOMYCETES.

Poronia œdipus, *Montg.*
C. B. Sp. Somers. E., l. MacOwan, No. 1300. In stercore vaccino.

Xylaria rhopaloides, *Montg.*
Port Natal, l. Wood, No. 346. Sterilis.

Xylaria polymorpha, *Fr.*
Cap. B. sp., leg. MacOwan, No. 1087. Steril.

Hypoxylon concentricum, *Bull.* sub = *Ustulina.*
Caffraria, l. Rev. Baur, No. 697. Boschberg, MacOwan, No. 1081.

Hypoxylon argillaceum, *Fr.*
Cap. Somers. E., leg. MacOwan.

Hypoxylon exutans, *Cooke.* North Amer. Fungi.
Ad Bazuja Caffrariæ, leg. Rev. Baur, No. 704.

Diatrype Duriæi, *Mont. Syll.*
On branches. MacOwan, No. 1344*b*.

Dothidea melianthi, *K. et C.* Syn. *Rhytisma Melianthi.* Thum.
In foliis Melianthi majoris, L. Grahams Town ad Mont Boschberg, l. M.Owan, 1266.

Dothidea graminis, *P.*
In Panico maximo, L. Somerset East, MacOwan, No. 1319. P. Natal, J. M. Wood, No. 221.

Dothidea perisporioides, *B. et C.* in Grevillea IV., 103; N. Amer. Fungi, No. 880.
P. Natal, J. M. Wood, No. 115.

Dothidea repens, *Corda.*
Port Natal, leg. J. M. Wood, 228.

Nectria, sp.
Cæspitosa, coccinea. Peritheciis globosis, pertusis, lævibus. Conidiis fusariæformibus, in stromate subgelatinoso enatis, fusiformibus, curvulis (·03 × ·004 mm.).
On bark. No. 157. Natal.
Uncertain, without fruit.

Sphærostilbe flammea, *Tul.* Forma Major. *Conidiifera.*
An MacOwan, No. 1059. On *Acacia horrida.*

Sphæria (Raphidospora) urticæ, *Rabenh.*
In caulibus Urticæ Mayeri Wedd., l. M.Owan, No. 1405.

Valsa salicina, *Fr.*
In salicibus minoribus. MacOwan, No. 1283.

Ceuthospora foliicola, *Libert.*
Somers. E., in fol. putridis, l. MacOwan.

Vermicularia dianthi, *Westdp.* Bull. Brüx., 1851.
An Blättern cultiverter Nelken, MacOwan, No. 1435.

Vermicularia dematium, *Fr.*
In fol. putrid. Caricis pendulæ, MacOwan, No. 1353.
In consortio Sphæriæ Cumanæ Sacc.

Septoria scabiosæcola, *Desm.*
Cap. B. sp., leg. MacOwan, in Scabiosa Columbaria.

Corynelia tripos, *Cke.* in Herb. Kew, et *Grevillea.*
Differt. *C. uberatâ*, pustulis linearibus, et sporidiis, 3 vel 4 lobatis, pulcherrimis.
On *Podocarpus Thunbergii*, 1253*b*.

Corynelia uberata, *Fr.*
Sporidiis globosis, brunneis.
On fruits of *Podocarpus*, &c.

Meliola amphitricha, *Fr.*

In fol. Justiciæ anagalloidis, Nees. Natal, Wood, Nos. 241, 22, 57. In Plectranthe ciliat. et Hypsobromo elato, ad Som. E et Grahamstown, leg. MacOwan, Nos. 1259, 1292, 1328.

Darluca filum, *Castg.*

In fol. Oxalidis purpuratæ, Jacq., Som. E., No. 1042.

NEW BRITISH FUNGI.

By M. C. Cooke.

(*Continued from p.* 52.)

The following includes descriptions of the new species enumerated by Messrs. Berkeley and Broome in the "Annals of Natural History" for March, 1882 :—

Agaricus (Tricholoma) Schumacheri, *Fr. Hym. Eur.*, 69.

Pileus spongy, compact, convex, then plane, obtuse, even, moist, margin exceedingly inflexed ; stem fleshy, solid, thick, fibrillose-striate; gills slightly emarginate (at length decurrent), plane, narrow, crowded, white. *Flor. Dan.*, *t.* 2267, *fig.* 1 ; *B. & Br. Ann. N. H.*, No. 1927.

In a hothouse. Apethorpe.

Agreeing very closely with the figure in Flora Danica, especially as regards the gills.

Agaricus (Tricholoma) porphyroleucus, *Fr. Hym. Eur.*, 75.

Firm, pileus fleshy, umbo darker and evanescent, stem solid, somewhat fibrillose, gills white. *Bull.*, t. 443 ; *B. & Br. Ann. N. H.*, No. 1928 ; *Illust.*, *t.* 119 B.

On the ground. Coed Coch.

Included by Fries under *Ag. melaleucus.*

Agaricus (Clitocybe) incilis, *Fr. Hym. Eur.*, 94.

Pileus fleshy, plane, umbilicate, even, opaque, margin rather silky, inflexed, crenate; stem hollow, short, silky, attenuated downwards, at length compressed, gills adnate-decurrent, rather distant, connected by veins, white, growing pallid. *B. & Br. Ann. N. H.*, No. 1929.

In woods. Shrewsbury (W. Phillips).

Pileus 2 in., stem $\frac{1}{2}$ in. and more, 2-3 lines thick.

Agaricus (Mycena) pseudopurus, *Cke.*

Pileus rather fleshy, campanulate, then convex, expanded, obtusely umbonate, smooth, growing pale, margin obscurely striate; stem rigid, straight, even, naked, at first rosy-white, becoming brown when dry ; gills adnate, whitish. Spores elliptical.

In woods. Coed Coch, 1870.

Pileus scarcely exceeding an inch, rosy, then pale; stem 2-3 inches long, slender, erect, hollow, turning dark brown in drying,

whilst *Ag. purus* does not change colour at all. Spores in *Ag. purus* shorter and ovoid, whilst in this species they are regularly elliptical. Allied to *Ag. zephirus*.

Agaricus (Mycena) excisus, *Lasch. Linn.*, VIII., 538.

Pileus campanulate convex, disc rather fleshy, somewhat umbonate, rugulose (bay or brownish); stem firm, tough, rooting, even, becoming brownish; gills ventricose, thick, distant, connected by veins, narrowed and cut out behind, nearly free. *B. & Br. Ann. N. H.*, No. 1930.

On trunks. Hothorpe, Norths.

"Magnificent specimens occurred Nov. 17, 1881, at the above locality. Pileus 3 in. across, stem 4 in. high, root 2 in. long. The specimens were either solitary or subcæspitose, gills purplish, strongly cut out behind. The fig. Bull. t. 518 I. is more characteristic of the specimens than that in Fries' Icones, taken from smaller and probably more superficial individuals."—*B. & Br.*

Figures of this form will be given, plate 148, of "Illustrations of British Fungi."

Agaricus (Omphalia) buccinalis, *Sow.*, *t.* 107.

This is certainly no form of *Ag. umbelliferus*, and it is too fleshy to be the same as *A. stellatus*. It is, as Sowerby says, not uncommon, and is in great perfection this Jan. 8, 1882. It has the habit of *A. ptychophyllus*, Cd., a species not noticed by Fries, but the gills are not plicate. *B. & Br. Ann. N. H.*, 1930.*

Agaricus (Omphalia) directus, *B. & Br.*

White, very slender, pileus nail-shaped, flat on the apex, stem ascending, clad with long hairs at the base, gills decurrent. *B. & Br. Ann. N. H.*, No. 1931.

On dead leaves. Chiselhurst.

Stem slightly rufous, thread-like, not an inch high.

Agaricus (Pleurotus) pantoleucus, *Fr. lc.*, *t.* 88, *f.* 2.

Wholly white; pileus excentric, fleshy, dimidiate, spathulate, even, smooth, rather depressed behind, margin entire, stem short, not rooting, solid, ascending, smooth; gills decurrent, crowded, simple, severed at the base. *B. & Br. Ann. N. H.*, No. 1932.

Blown out of a tree at Coed Coch during the gale of Oct 14, 1881. Exactly the plant of Fries, of which a drawing was originally sent from Sweden under the name of *A. spodoleucus*.

Agaricus (Pleurotus) revolutus, *Kickx*, *p.* 158.

Pileus convex-flattened, depressed in the centre, of large size, fleshy, firm, dry, elastic, margin regularly and broadly revolute, of a smoky colour with a yellowish tint, becoming grey or lead colour, darker in the centre; gills decurrent, not anastomosing, white, serrated. Stem obtuse, smooth, or slightly tomentose. *B. & Br. Ann. N. H.*, No. 1933.

On a poplar tree. Penzance.

A magnificent Agaric, clearly that of Kickx, but considered by Fries a form of *A. salignus*. It is clearly the same with *A. corticatus*, Saund. & Sm., t. 4, f. 2. The stem is short but distinct and swollen.—*B. & Br.*

Agaricus (Pleurotus) limpidus, *Fr. Ic., t.* 88, *f.* 3.

Pileus rather fleshy, obovate or kidney-shaped, even, smooth, white, hygrophanous, attenuated behind into a rudimentary stem; gills linear, crowded, decurrent at the base, white. *B. & Br. Ann. N. H.*, No. 1934.

On trunks. Penzance.

Hyaline-white when moist, whitish when dry, scarcely an inch broad.

Agaricus (Entoloma) lividus, *Fr. Hym. Eur., p.* 189.

Pileus fleshy, convex, then plane, dry, even, smooth, cuticle longitudinally fibrillose, livid clay colour, stem hollow, stout, smooth, pruinose at the apex, whitish; gills rounded, nearly free, broad, pallid, then flesh-colour. *B. & Br. Ann. N. H.*, No. 1935.

In woods. East Dereham (Rev. J. M. DuPort).

Pileus 4 in. and more; stem 3 in. long, 1 in. thick.

Agaricus (Entoloma) Batschianus, *Fr. Hym. Eur.*, 191.

Pileus slightly fleshy, umbonate, convex, then flattened and depressed, even, viscid, becoming blackish; stem fistulose, tough, striate with depressed fibrils, attenuated at the base, gills adnexed, attenuated behind, plane, cinereous. *B. & Br. Ann. N. Hist.*, No. 1936.

In moist woods. Coed Coch, Oct., 1881.

Pileus fuliginous or dark olive, $\frac{1}{2}$-$1\frac{1}{2}$ in., shining when dry, not hygrophanous. Spores rather irregular, ·0003 in. diam.

Agaricus (Entoloma) bulbigenus, *B. & Br. Ann. N. Hist., No.* 1937.

A. Persoonianus, *Phill. Gard. Chron.*, 1881, p. 874; A. sericeus, *Pers. Ic. & Desc., t.* 6, *f.* 2.

Spores ·0004 to ·0005 in. diam.

Another name for this poor unfortunate Agaric, although we fail to recognise the advantage of changing from *Ag. Persoonianus* because there is already an *Ag. Persoonii*.

Agaricus (Entoloma) speculum, *Fr. Hym. Eur.*, 197.

Shining white. Pileus between fleshy and membranaceous, convex, then expanded, rather depressed, quite smooth, hygrophanous, shining when dry; margin flexuous; stem fistulose, equal, very fragile, striate; gills emarginate, broad, ventricose, distinct, white, then flesh-coloured. *B. & Br. Ann. N. H.*, No. 1938.

Amongst grass and twigs. Coed Coch.

Subcæspitose, very fragile, inodorous. Spores irregular, ·0005 in. diam.

Agaricus (Pholiota) verruculosus, *Lasch. Fr. Hym. Eur.*, 221.

Pileus compact, obtuse, yellow, scales crowded and as, well as the papillæ, cinnamon; stem villoso-squamose. *B. & Br. Ann. N. H.*, No. 1939.

On trunks. King's Cliffe.

A subspecies, according to Fries, of *Ag. squarrosus*.

Agaricus (Pholiota) dissimulans, *B. & Br.*

Pileus at first lurid, then becoming pale, obtusely campanulate, scarcely viscid, hygrophanous, then expanded, with the margin in-

volute; stem thickened downwards, white, fistulose, cottony at the base; ring erect, often persistent; gills pallid clay-colour, sinuately adnate, at length decurrent. *B. & Br. Ann. N. H.*, No. 1940.

On sticks of hawthorn and sloe. Hothorpe.

Pileus 1 inch. "It ought perhaps to be recorded in the section *Tubaria*, which, however, is a purely artificial division, and the ring is against this. It must be placed at the head of the hygrophanous *Pholiotæ*, though it is not allied to the species in that division."—*B. & Br.*

Agaricus (Inocybe) Bongardi, *Fr. Myc. Eur.*, 229.

Spores bulging on one side, as in *Eunotia*, ·0005 in. long.—*B. & Br.*

Agaricus (Inocybe) flocculosus, *B. Eng. Fl., v.*, 97.

Spores irregular, ·0003 in. diam., sometimes slightly elongated.—*B. & Br.*

Agaricus (Inocybe) scabellus, *Fr.*

Spores granulated as in *A. fastigiatus*.—*B. & Br.*

Agaricus (Inocybe) cæsariatus, *Fr. Hym. Eur.*, 234.

Pileus fleshy, convex then plane, gibbous, tawny, clad with ochraceous fibrillose scales; stem solid, equal, fibrillose, ochraceous, growing pallid; gills somewhat adnate, quite entire, pallid ochraceous. *B. & Br. Ann. N. H.*, No. 1941. *Fr. Icon.*, 109, *f.* 3.

In beech woods. Coed Coch, Oct, 1881.

Spores even, ·0004 in. long.

Agaricus (Hebeloma) senescens, *Batsch., fig.* 197.

Pileus convex, then plane, slightly glutinous, ochraceous-tawny, extreme margin delicately white, tomentose; stem at first bulbous and brown below, then, except the white tomentose apex, squamulose, solid; gills crowded, at first pallid, adnexed, then cinnamon; flesh white. *B. & Br. Ann. N. H.*, No. 1941 bis.

Among fir trees. Gwrwch Castle.

Sometimes semiglobose; stem 5 inches high, always dark below; pileus 3 inches or more in diameter.

Agaricus (Hebeloma) subcollariatus, *B. & Br.*

Pileus convex, rather fleshy, pallid, centre brownish, slightly glutinous; veil floccose, evanescent; stem stuffed, at length delicately fistulose; base brown, pulverulent; gills ventricose, seceding, forming a short interrupted collar, clay colour, edge white. *B. & Br. Ann. N. H.*, No. 1492.

On naked soil. Sibbertoft.

"Pileus about an inch. Allied to *A. mesophæus*, of which we were at first inclined to consider it a variety. Spores elliptic, uninucleate, ·0005 in. long."—*B. & Br.*

Agaricus (Hebeloma) firmus, *Pers. Ic. & Des., t.* 5, *f.* 3, 4.

This appears to be a very variable species. The figure in the "Icones" does not accord in several respects with the characters in "Hym. Eur." The pileus is neither campanulate nor umbonate, but at length depressed. An Agaric certainly referable to this

species occurred at Hothorpe, Norths, Feb. 8, 1882, in which, though the essential characters are the same, the pileus is at first of a deep brown, but hygrophanous, changing to tan colour. The stem obviously though minutely scaly; the gills adnate with a minute decurrent tooth, at first pale, then argillaceous, their margin distinctly edged with snow-white particles. *B. & Br. Ann. N. Hist.*, No. 1942.*

Agaricus (Flammula) vinosus, *Bull., t.* 54.

Pileus fleshy, expanded, at length depressed, dry, ferruginous fawn colour; stem solid, firm, somewhat incrassated at the base, delicately flocculose; gills decurrent, crowded, simple, narrow, ferruginous. *Fr. Hym. Eur.*, 244. *B. & Br. Ann. N. H.*, No. 1943.

On the ground. Morfa, Conway.

"A very interesting species which has scarcely been gathered since the time of Bulliard. Spores pale umber, ·0002 inch long, shortly ovate."—*B. & Br.*

Agaricus (Flammula) astragalinus, *Fr. Hym. Eur.*, 248. *B. & Br. Ann. N. H., No.* 1944.

Glamis (Rev. J. Stevenson).

Entered before as British.

Agaricus (Flammula) apicreus, *Fr. Hym. Eur.*, 249.

Pileus fleshy, thin, nearly plane, even, smooth, moist; stem hollow, equal, not rooting, pallid, fibrillose and ferruginous at the base; gills adnate, crowded, thin, shining ferruginous. *B. & Br. Ann. N. H.*, No. 1945.

On trunks. Coed Coch, 1881.

Subcæspitose, similar to *A. alnicola.*

Agaricus (Naucoria) lugubris, *Fr. Hym. Eur.*, 253.

Pileus fleshy, campanulate, then expanded, undulate, gibbous, even, smooth, pallid, then ferruginous, opaque; stem stuffed, rigid, smooth, fusiform, rooting, pallid; gills free, perlate, crowded, pallid, then ferruginous. *B. & Br. Ann. N. Hist.*, No. 1945 bis.

On the ground amongst grass.

Stem 4 in. long, 4 lines thick. Pileus 3 in. broad.

Agaricus (Naucoria) melinoides, *Fr. Hym. Eur.* (not Bull., except t. 560, fig. 1 F, the other figures belonging to *A. hypnorum*).

On grassy ground. Kew (Dr. Cooke).

Spores elliptic, ·0006 in. long, with one or two nuclei. *B. & Br. Ann. N. H.*, No. 1946.

Agaricus (Naucoria) sideroides, *Bull. t.* 588. *B. & Br. Ann. N. H., No.* 1947.

Amongst moss. Sibbertoft, Nov., 1881.

Spores ·0004 to ·0005 in. long, half as much wide. Entered before as British.

Agaricus (Naucoria) cerodes, *Fr. Hym. Eur.*, 257.

Pileus rather fleshy, convex, then plane, obtuse, orbicular, even, smooth, hygrophanous; stem hollow, equal, naked, yellow, ferruginous at the base; gills plane, broad, ochraceous-cinnamon. *B. & Br. Ann. N. H.*, No. 1948.

Amongst moss. Sibbertoft, Sept., 1881.

Spores ·003 in. long.

Agaricus (Crepidotus) epigæus, *Pers. Syn., p.* 484. Ag. depluens, *Batsch., fig.* 122.

Pileus reniform, fragile, reddish grey; base villose, whitish; gills distinct, watery rufescent, divergent. *B. & Br. Ann. N. H.*, No. 1949.

On the clay of the marlstone. Hothorpe, Nov., 1881.

"Spores oblong, ·0004 in. long, not irregular, and more or less angular, as in the plant usually referred to, *A. depluens*, as figured by Hoffmann, so that its affinities seem rather to be with *Crepidotus* than *Claudopus*. The present is exactly the plant of Batsch, and we think it better to leave the name with what has formerly been considered his species, and retain that of Persoon. The gills of *A. epigæus* are no longer red when dry."—*B. & Br.*

AGARDH'S CLASSIFICATION OF ALGÆ.*

Although this work by the Emeritus Professor of Botany at Lund has a Swedish title and preface, it is written in Latin. Its purport will be best understood by the following translation of the short preface :—

"During the third part of a century which has elapsed since the publication of the first part of 'Species, Genera, et Ordines Algarum,' my Algological studies have been principally devoted to the Florideæ. It will be easily understood that during this long period many new species have been discovered among the groups which I three years ago associated under the name of Fucoideæ, and that there have been made many observations which render it necessary to modify some of the views which are therein expressed. I have, therefore, thought it expedient to return in the present work to some of the groups which seem most to need a critical revision."

The groups selected for this purpose are the Chordarieæ and Dictyoteæ. The former group now comprises the following genera, namely :—1, Elachistea (*sic*); 2, Myriocladia; 3, Corynophlæa; 4, Bactrophora; 5, Mesogloia; 6, Eudesme; 7, Castagnea; 8, Leathesia; 9, Cladosiphon; 10 (?) Petrospongium; 11, Polycerea; 12, Liebmannia; 13, Myrionema, Herponema; 14 (?) Ralfsia; 15, Cæpidium; 16 (?) Scytothamnus; 17, Chordaria. Of these five genera are new, namely, Bactrophora, the three

* "Till Algernes Systematik." Nya bidrag af. J. G. Agardh. Andra afdelningen. (Contributions to the Systematical Classification of Algæ.) "Lunds Univ. Årsskrift," Tom. xvii. The first part was published in the "Transactions of the University of Lund," Tom ix., in 1872. It contains essays on the genera Caulerpa and Zonaria, and on some tribes of the Australian species of Sargassum.

species of which are natives of Australia and Tasmania ; Eudesme, which includes *Mesogloia virescens* and other species ; Polycerea, containing one Tasmanian species only ; Herponema, perhaps only a sub-genus of Myrionema, one of the three species of which is *Elachista velutina* of the Phyc. Brit. Tab. XXVIII. ; and Cæpidium, of which only one species, *C. antarcticum*, is known. This very singular plant is dimorphous. It resembles, as Dr. Agardh informs us, in the lower and sterile parts a Riccia; while the upper and fertile parts are like an Anthoceros. The decumbent sterile frond spreads, like a Ralfsia over marine rocks ; but the flabellate lobes, instead of being of a scaly form, are almost cylindrical ; their ramification intermediate between dichotomous and pinnate. The thickened apices of the lobes are round and scutate, and on these are formed hollow discs like apothecia. From these discs the fertile parts arise. They consist of simple filaments about an inch long, as thick as a sparrow's quill ; the lower part is smooth, the upper covered with very minute warts. In the substance and blackish colour, as also in the structure of the fertile parts, the plant resembles the Chordarieæ, and Dr. Agardh considers that the genus is intermediate between Ralfsia and Chordaria, and that its place is amongst the most highly developed forms of the Chordarieæ.

As regards the classification of British Algæ, important changes besides those already mentioned, have been made in the present work; *Chordaria divaricata* and *Mesogloia Griffithsiana* are removed to Castagnea ; and *Dictyosiphon Hippuroides* is, by Dr. Agardh, considered as a form of *Chordaria flagelliformis*. The reasons for these changes in the classification, which are founded on the examination of the structure and fructification of the plants, are set forth at length by the author.

In the preliminary essays on the fructification of the Chordaricæ and Dicyoteæ, Dr. Agardh takes occasion to criticize some observations of M. Thuret, published in Le Jolis' "Algues Marines de Cherbourg," and in M. Bornet's "Etudes Phycologiques," relative to the fructification of the Dictyoteæ and of some of the Chordarieæ. These remarks by an Algologist so experienced as Dr. Agardh will undoubtedly have great weight with British students.

As now constituted, the genus Dictyota contains 26 species, several of those formerly included in it being referred in the present work to the new genera Dilophus and Glossophora. The other genera of which Dr. Agardh treats are Spatoglossum, Taonia, Padina, Zonaria, and Halyseris, of all of which the fructification has been made the subject of special study in these pages.

The work, which we heartily commend to the attention of Algologists, is illustrated with three plates, well executed in monochrome by Swedish artists.

M. P. M.

NOTE ON FUNGI EXSICCATI.

It is only during the past few years that the idle habit has come into vogue of publishing specimens in exsiccati, loosely enclosed in envelopes. We have heretofore protested against this innovation, and, with increased experience, we do so again, as a most vicious practice and one likely to produce very serious consequences, especially in public herbaria. In fact, we should strongly recommend the conservators of public herbaria *not* to purchase such exsiccati, or, if purchasing them, by no means to incorporate them, until every specimen is fixed. That this is not a mere prejudice on our part we think may be inferred from the following three reasons which should either of them be sufficient to condemn the present practice :—

I.—It is impossible to preserve specimens enclosed in envelopes from the insidious attacks of insects, which, if the specimens were fixed and exposed, would either not attack them at all, or if attacking, might be readily recognised and their ravages checked. This is not mere theory. It is the result of a long experience of large herbaria of fungi. Neither at the British Museum, nor at Kew, nor in the magnificent herbarium of the Rev M. J. Berkeley are the specimens loose in packets, but permanently affixed.

II.—Because specimens not affixed, but loosely enclosed in envelopes, are easily removed, exchanged, or mixed, so that in a short time they must cease to be absolutely authentic, and thus lose half their value. If securely attached, as in the case of the "Scleromyces" of Fries, the specimens of Kunze, mostly of Desmazieres, and other earlier exsiccati, the specimen is identified with the individual issuing it, and there is not the slightest doubt of its authenticity ; but now that specimens can be removed from five or six envelopes simultaneously for comparison, who can possibly guarantee that any one of them is returned again to its proper envelope? It is a most certain fact that in a herbarium specimens *must* eventually, by accident or otherwise, become so mixed, or *suspected* of being mixed, which is equally subversive of all confidence in their authenticity. We have in mind as we write certain specimens of *Stereum*, *Polyporus*, &c., fastened securely to paper, with the names written in characteristic caligraphy, by the late and illustrious Fries. After forty years these specimens are still as authentic as ever! Would they have been so had they been enclosed loosely in envelopes ? Can any comparison be instituted between the intrinsic value of specimens so securely authenticated and modern exsiccati, with the specimens loose or lost? Mycologists, careful of their reputation in the future, could scarce desire to maintain a system fraught with such grave danger,

III.—Because the specimens themselves, by facility of handling. and without protection such as is afforded by glueing firmly to paper, are soon injured, discoloured, broken, and ultimately

destroyed. The mere handling of the specimens in many instances is sufficient either to remove a slight pubescence, change the colour, alter the appearance, or in some one of many ways deteriorate the specimens.

For these reasons, which we hold to be weighty ones, against which nothing equivalent can be suggested in favour of the present system, we urge upon the *purchasers* of exsiccati to estimate the value of their purchases by these considerations, and to bear in mind that good authentic specimens, to which the labels are indissolubly attached, are worth, both now and for ever hereafter, fully fifty per cent. *more* than loose specimens in packets: This is an aspect of the question worthy of the consideration of those who prepare exsiccati as a commercial speculation.

M. C. COOKE.

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Note.—The plates of *Hypomyces*, part of which are included in this volume, will be continued, with descriptive letter press, in Vol. XI.