NOTES ON BRITISH SPECIES OF CORTICIUM.

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WITH PLATE 3.

Of Basidiomycetes, the *Thelephoreae* have perhaps received least attention among mycologists generally, the reason being probably the difficulty of finding satisfactory names for species. The old descriptions are usually quite inadequate, and little can be added to them from the examination of dried material preserved in herbaria. The examination of several species of *Corticium* and allied genera in the fresh state convinced the writer that in this condition many interesting microscopic characters may be observed, which are often entirely lost sight of in dried material.

In some of the more delicate hypochnoid species, such as *C. botryosum* Bres., the very thin-walled mature basidia collapse as soon as the spores are shed, or after being subjected to drought, and as a rule resist all efforts to revive them. This fact probably accounts for these species having been long overlooked, for they can only be recognised as basidiomycetes when fresh and vigorously growing. When dried they may easily be mistaken for the sterile mycelium of a "mould," especially those species, such as *C. botryosum*, in which clamp connections are not present.

Many species are well characterised by the structure of the basal tissue,—whether close or open, etc.—or by the presence of vesicles, or swollen hyphae having the appearance of laticiferous tissue. These structures collapse on drying, and in many cases the application of reagents to swell them out causes changes to take place in the contents, and sometimes even in the walls of the hyphae. Some of the more fleshy species may be revived simply by moisture, after being dried for some months, and can be examined as if fresh. (Buller* found that *C. laeve* recovered after being dried for twelve months.) In many of these, however, after desiccation for about eighteen months

* Researches on Fungi, p. 111.

or more, the application of swelling reagents will not at all or only slightly reproduce some of the finer structural details that characterise them when fresh,—though much depends on the condition of the specimen when gathered. Hence "type" specimens of these plants are often of little value except for spore comparisons—if it can be proved that the spores present belong to them,—which is by no means always the case.

Another difficulty lies in the variability of these Fungi. Details such as the nature of the margin, the thickness of the tissue, or the degree of compactness of the hymenium, appear to be merely a question of the age and vigour of the individual. In *C. laeve* the hymenium may sometimes become so irregular and warted as to resemble that of the genus *Radulum*. This species also, when growing on a vertical surface, often produces well-marked pilei like a *Stereum*.

The microscopic structure may also show variability. In some species the size of the spore is fairly uniform, but in others the spore measurements are very variable, and the shape of the spore appears to be a more constant and recognisable character. Many species of *Corticium* may produce sterile outgrowths of various kinds, and thus approach *Peniophora*. In fact the distinction between *Peniophora* and *Corticium* does not appear to be so sharp as was originally supposed, *C. sambuci*, for instance, often shows irregularly scattered trichome-like outgrowths of the hymenium, more or less encrusted with particles of calcium oxalate ("cystidioles"). *C. laeve* has occasionally smooth-walled, fusiform, projecting cells—approaching certain species of *Peniophora* Cke. with smooth-walled cystidia. *C. sanguineum* has sometimes scattered definite cystidia-like outgrowths, resembling in form those of typical species of *Peniophora*, though much more slender. This species has in fact been transferred to the genus *Peniophora* by Bresadola. Two other species which have recently been transferred to *Peniophora* are *C. lacunosum* B. & Br., which according to von Höhnel is identical with *P. byssoides* Karst., and *Hypochnus longisporus* Pat., a remarkable species which I have once found at Kew. These two species have abundant erect pointed outgrowths (septate in *C. lacunosum*), but these are more or less narrowly cylindrical and scarcely differentiated from the ordinary hyphae, while the general structure is that of a *Corticium*.

The definition of the genus *Peniophora* is at present somewhat vague. It is proposed to undertake a thorough revision of the British species of *Corticium* and *Peniophora*, from the examination of fresh material, and in the meantime it is thought that some notes on those species of *Corticium* which have been identified and studied up to the present may be of service. Advantage is taken of this opportunity to appeal for fresh

material of these two genera, and to those members of the British Mycological Society and of the Yorkshire Naturalists' Union who have already assisted me in this way, I wish to express my best thanks. My thanks are also due to the Abbé G. Bresadola, who has kindly confirmed my determinations of species described by him.

C. laeve Fr. Epicr. 560 (Pers. Disp. Meth. Fung. p. 31, 1797) = *C. evolvens* Fr. Epicr. p. 557. Pl. 3, figs. 23, 24.

A very variable species. Sometimes entirely adnate (= *C. laeve*), sometimes, when growing on a vertical surface, forming distinct reflexed, white, strigose pileoli (= *C. evolvens*). The hymenium when fresh is smooth and waxy, usually more or less undulate, but sometimes coarsely tuberculate, especially towards the centre, like a Radulum. Young specimens may be entirely cream-coloured, but in mature specimens the colour varies from pinkish-ochre or livid to brownish when old; when dry pale buff with a pinkish or lilac tinge (Klinks. and Val. Code de Coul. n. 103 C-D). The hymenium usually becomes much cracked in an areolate manner when dry. Young specimens are entirely adnate, with a white, silky, shortly radiating margin; in older specimens the white margin disappears, and the edge tends to become upturned, especially on drying. The best characteristic of the species is the shape of the spores, which are rather large, piriform or pip-shaped, usually slightly incurved at the base, 9-12 × 6-7·5μ, generally 11 × 6-7μ.

The plant here described is that generally accepted as *C. laeve* by mycologists. An examination of a type specimen from Fries of *C. evolvens* in the Kew Herbarium proves that the two species are identical.

C. sambuci Fr. Epicr. 565 (Pers. Disp. Meth. Fung. p. 31, 1797) = *Thelephora sera* Pers. Syn. p. 580, 1801. Pl. 3, figs. 1, 2.

This species is not confined to elder, but may grow on bark and wood of various kinds, and I have once seen it running over grass and soil with the habit of *Sebacina incrustans* Tul., having started probably from a half-buried stick. When fresh it is entirely pure snow-white or chalk-white, and only becomes slightly tinged cream on drying. It is inseparable and the margin indeterminate.

The tissue consists of rather loosely-interwoven hyphae, 3-4μ wide, sometimes with scattered minute crystals adhering to the outer walls; clamp connections present at the septa. Sterile outgrowths occur in the hymenium, which are narrowly fusoid, often expanded into a knob at the apex, and these too may be encrusted with tiny crystals. Spores broadly elliptical, appear-

ing almost subglobose under a low magnification, with a small lateral apiculus, 4-6 × 3-4·5μ, and usually containing a single oil-drop near the base.

The white species of *Corticium* present most difficulties in identification. *C. arachnoideum* forms a separable pellicle when well developed, and differs from *C. sambuci* in its more cylindrical spores, which however may vary considerably in size. The name "*C. calceum* Fr." should apparently be dropped, as it is not an entity. In the Kew Herbarium there are several specimens from Fries, some of which are *Peniophora*, and one an unrecognisable species of *Corticium*. According to Bresadola* the true *Thel. calcea* of Persoon is a *Sebacina* (=*S. calcea* (Pers.) Bres.). I have received this species once from Sussex. I have not yet seen anything I could refer to *C. lacteum*. There occur in Britain a number of other white or pale-coloured species which apparently have been hitherto overlooked: one or two of these are evidently quite common. Some of these have been identified with species recently described by Continental mycologists, and are here given as the first British records.

C. trigonospermum Bres. (in Ann. Myc. 1905, p. 163). Pl. 3, figs. 3, 4, 5.

Thin, irregularly effused, chalk-white or becoming slightly tinged with cream, margin quite indeterminate. Hymenium with a slightly granular or mealy appearance under the lens. The structure is loose and hypochnoid, the basal hyphae 2·5-3μ wide, with clamp connections at the septa, sometimes slightly encrusted with minute crystals. Basidia 5μ wide, 20-25μ long, with 2-4 straight sterigmata, 2-3·5μ long. Spores in face view with 3 rounded arms, indented between them, 5μ diameter; in profile more or less elliptical, flattened on the inner side and swollen towards the base on the outer side.

On pine bark, Forres, foray, Sept., 1912.

Distinguished from all other species by the shape of the spores. Von Höhnel† and Brinkman‡ have stated that it is a young form, or a variety, of a species of *Tomentella* (with warted spores). In the specimen I received the spores were remarkably uniform in size, and to all appearances quite mature, and there was no trace of any other form of spore. Bresadola (in litt.) states that "*Tomentella trigonosperma*, von Höhnel" is a distinct species.

* Fung. Trid., p. 64.

† Sitz-ber. d. k. Akad. d. Wissenschaft, Wien., Math. nat. Kl. Bd. cxvii., 1908, p. 1090.

‡Bot. Zeit, 1909, Abt. ii., p. 259.

C. confine Bourd. & Galz. (in Bull. Soc. Myc. Fr. 1911, p. 260-261). Pl. 3, figs. 12, 13, 14.

Effused, thin, at first snow-white and arachnoid, hymenium eventually becoming deep cream-coloured or ochraceous, but the margin always pure white and byssoid in good specimens. Hymenium not continuous, but consisting of minute irregular areas, to the naked eye somewhat resembling a *Grandinia;* the granules waxy when fresh and closely packed, but when dry shrinking away from one another and revealing the thin white fibrillose subiculum. Structure loose and hypochnoid. Basal hyphae 2-4μ, with clamp connections, and often inflated at the septa. Basidia 3-5μ wide, with 2-4 straight or slightly curved sterigmata, 2-4μ long. Spores subglobose, pointed at the base, usually containing one oil-drop, 3-4 × 2-3μ.

On rotten wood, bark, etc., of various trees, mycelium often forming fine branching cord-like strands beneath the bark. It appears to be very common, but has probably been confused with young stages of *Hydnum farinaceum*, which it superficially resembles. It differs, however, in the persistently smooth spores.

Kew (abundant); Mulgrave Woods, near Whitby; Clyne Woods, near Swansea.

First recorded in the " Naturalist," Jan., 1913.

The above description applies to vigorous well-developed specimens. In poorly developed forms the tufts of basidia may be so minute as to resemble a mould; and in young stages the hymenium is sometimes developed on fine anastomosing threads, such as occur in *Phlebia vaga* Fr.

C. botryosum Bres. (in Ann. Myc. I., p. 99, 1903). Pl. 3, figs. 15, 16, 17.

Forming a delicate, pulverulent layer, resembling a mould in general appearance, whitish at first, then greyish or glaucous, with a tinge of yellow here and there when old, separable as a thin film. Margin quite indeterminate. Basal hyphae slightly yellowish, broad, 9-10μ wide, branched at right angles, frequently septate, and with no clamp connections. Basidia scarcely distinct from the hyphae, 20-25 × 9-10μ, with 2-6 stout, slightly curved sterigmata, 3-4μ long. Spores of a peculiar shape, in face view elliptical or almond-shaped, in profile flattened on the inner side and swollen on the outer side (navicular), 8-10 × 4-5μ (most 9 × 5μ).

On very soft rotten wood; apparently not uncommon. Epping Forest; Kew.

C. subcoronatum v. Höhn. and Litsch. (in Sitzber. d. k. Ak. d. Wissensch. Wien., Math-nat. Kl. CXVI., Abt. 1, 1907, p. 822).

Resembles *C. botryosum* in habit, and occurs much more commonly in similar situations. It differs in having well-developed clamp-connections at every septum, and in the usually narrower spores, but possibly is only a form of that species.

C. albo-stramineum comb. nov. *Hypochnus albo-stramineus* Bres. (in Ann. Myc. I., 1903, p. 110). Pl. 3, figs. 9, 10, 11.

Effused, rather thick, separable, at first whitish, then deep cream, or pale straw-colour. Hymenium rather loose and pulverulent under the lens, the margin thin and indeterminate, not cracking when dry.

The structure is rather loose. The basal tissue consists of interwoven hyphae, 5-6μ wide, branched and much septate, with clamp-connections at practically every septum. From the basal hyphae arise scattered erect, cylindrical, elongated, cystidia-like bodies (45-120 × 6-9μ), with thin walls and rather deeply staining contents, which traverse the hymenium and sometimes project slightly above it. Nothing is known as to the nature and functions of these bodies. They have been called "gloeocystidia" by Continental mycologists, and a new genus *Gloeocystidium* established to include those species of *Corticium* which show them. The author, however, prefers for the present to keep them in *Corticium*.

The basidia are 8-9μ wide above, tapering below, and rather variable in length, according to the thickness of the tissue. Spores broadly elliptical, or subglobose, rather thick-walled, with granular contents, 7-9 × 6-8μ. The spore-walls have been described as finely warted, and usually appear so in fresh specimens; but on the application of swelling reagents, or in dried spores which have lost their contents, the uneven outline disappears, so that it is probably due only to the granular nature of the cell-contents.

On bark, fallen twigs, etc. Not uncommon.

Corticium lactescens Berk. (Outl. p. 274). Pl. 3, figs. 6, 7, 8.

When fresh and in good condition this is a beautiful plant, with a pure white narrowly radiating margin, and a thick, soft, waxy hymenium, whitish to clear flesh colour, or pale brown-pink. I have not gathered it myself, and in the specimens which have reached me I have not been able to detect any flow of milk when broken,—possibly this character is evanescent. The smell resembling that of *Lactarius quietus* mentioned by Berkeley is quite distinct in good specimens. In section the tissue

contains numerous closely-crowded, laticiferous hyphae, with highly refractive contents. These arise from the base and run parallel right to the surface, sometimes projecting slightly above the hymenium and giving it a pruinose appearance under a lens. When broken under a cover-glass the contents of these hyphae come out as a cloudy fluid.

The spores are broadly elliptical with rather blunt ends, with a lateral apiculus, 6-9 × 4-6μ (most 7·5 × 5μ), and have dense granular contents.

On drying, the colour becomes dull pale brownish, and the hymenium shrinks and becomes cracked with short cracks in all directions, showing the thick white fibrillose tissue in the interstices.

C. polygonium Fr. Epicr. 564 (Pers. Disp. Meth. Fung., p. 30, 1797.) Pl. 3, figs. 21, 22.

Begins as small erumpent cushions, from which the hymenium spreads centrifugally over the bark. In section this species also shows a system of laticiferous or storage (?) hyphae, consisting of rather coarse hyphae with densely-staining contents, which run up from the base and end beneath the hymenium in large pear-shaped or subglobose vesicular swellings, and are especially abundant in the central tubercle. The spores are cylindrical, slightly curved, with a lateral apiculus, 10-13 × 3-4μ.

C. sanguineum Fr. (Epicr. p. 561). Pl. 3, figs. 18, 19, 20.

The hymenium when in good condition is creamy-white, or with a faint tinge of pink. Hyphae 3-4μ; spores elliptical, with a slightly curved apiculus, 5-6 × 2-3μ. Cystidia pointed, slender, thin-walled, slightly encrusted, easily broken off and overlooked, 40-60 × 5-6μ (at the widest part).

C. caeruleum (Schrad.) Fr. (Epicr. p. 562). Pl. 3, fig. 26.

Spores hyaline, ovate-elliptical, 7-9 × 4-6μ, rather variable in size. I have once found a second blue species, to which however I have as yet been unable to give a name. It is paler than *C. caeruleum*, and has the structure of a *Hypochnus*, and differs especially in having irregularly shaped bluish spores.

C. comedens Fr. (Epicr. p. 565). Pl. 3, fig. 25.

Is sometimes confused in the field with *Radulum laetum* Fr., which is frequent on hornbeam, and develops beneath the bark exactly like *C. comedens*. The latter is however known by its large sausage-shaped spores, usually 20-22 × 6-7μ. *R. laetum* is probably only a form of *Peniophora incarnata*.

Explanation of Plate 3.

All figures are × 800.

Figs. 1 & 2. *C. sambuci;* 1, section of hymenium; 2, spores.

„ 3-5. *C. trigonospermum;* 3, basidia; 4, spores; 5, basal hyphae.

„ 6-8. *C. lactescens;* 6, basidium; 7, " gloeocystidium "; 8, spores.

„ 9-11. *C. albo-stramineum;* 9, " gloeocystidium "; 10, basidia, young and mature; 11, spores.

„ 12-14. *C. confine;* 12, basidia; 13, spores; 14, basal hyphae with characteristic swellings.

„ 15-17. *C. botryosum;* 15, basidia, young and mature; 16, spores; 17, basal hyphae, showing branching at right angles.

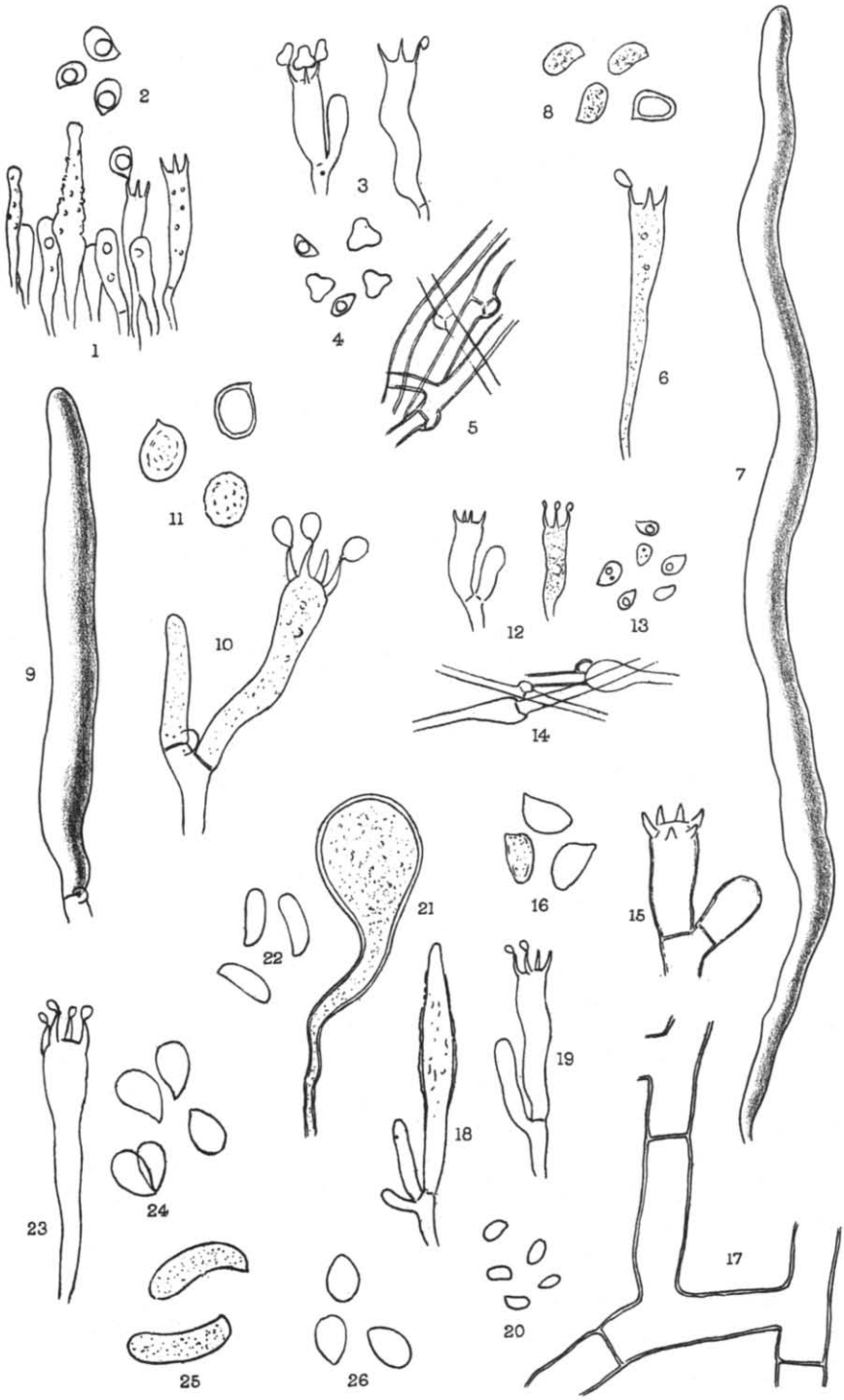
„ 18-20. *C. sanguineum;* 18, cystidium; 19, basidium; 20, spores.

„ 21-22. *C. polygonium;* 21, " gloeocystidium " with characteristic swollen head; 22, spores.

„ 23-24. *C. laeve;* 23, basidium; 24, spores.

„ 25. *C. comedens;* spores.

„ 26. *C. caeruleum;* spores.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