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Corrections

Page 97, in the title: change '*Cyhellaceae*' to '*Cyphellaceae*'.

Page 103, in the right column under '2nd fruitbody' lines 3, 4: delete "a few elliptical 9–9.75 × 4.2–5.75; ".

Page 125, Table III: delete the fifth collection mentioned.

Page 127, line 2: change '500' to '1000'.

Page 131, line 11 from bottom: change '*Cyphella rubi*' to '*Calyptella rubi*'.

Page 136, line 3: change 'Charles' to 'Univ. Charles'.

Page 136, line 5 from bottom: change '*Sromatocyphella*' to '*Stromatocyphella*'.

Page 140, line 23: change '*Calythella erucaeformis* Fr.' to '*Calathella erucaeformis* (Fr.) Reid'.

Page 215, line 9: change 'ballistospores' to 'secondary basidiospores'.

Page 281, line 28: change to '*Fomitopsis* P. Karst., *Daedalea* Pers. per Fr. (inclusive of *Phaeodaedalea* K. Fidalgo?), *Lenzites* Fr., *Gloeophyl-*'.

Page 315, line 14: change '*Palaeoephala*' to '*Palaeocephala*'.

Page 365, in the title, change '**1963**' into '**1964**'.

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THE GENUS THUEMENELLA WITH REMARKS ON HYPOCREACEAE AND NECTRIACEAE

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The Hague

(With five Text-figures)

The genus *Thuemenella* Penz. & Sacc. is revised. The new combinations *T. bicolor* (Ell. & Ev.) Boedijn, *T. cubispora* (Ell. & Holw.) Boedijn, *T. hirsuta* (Ell. & Ev.) Boedijn and the new species *T. hexaspora* Boedijn are proposed.

Descriptions are given of the families Hypocreaceae and Nectriaceae. The genera of the former family are briefly discussed.

During his visit to Java, Penzig made a large collection of fungi. Afterwards and in collaboration with Saccardo he published the new taxa in "Malpighia" between 1897 and 1902. Among the numerous Ascomycetes, a fungus with pale, fleshy stromata and one-celled, coloured spores was recognized to belong to a new genus, *Thuemenella*, described as *T. javanica* (16, 17), and assigned to the Hypocreaceae. Later the genus was placed in the synonymy of *Sarcoxylon* Cke by Clements & Shear (8), and the same was done by von Arx & Müller (2).

As part of the original collection of *Thuemenella javanica*, preserved in alcohol and numbered 3454, was left in the Herbarium at Bogor by Penzig, I had the opportunity to study this material. The diagnosis of Penzig & Saccardo proved correct, and the genus was rightly placed in the Hypocreaceae. *Thuemenella* has nothing in common with *Sarcoxylon* which is characterized by ellipsoid spores with a germslit and belongs to the Xylariaceae.

Seaver (18) in 1910 proposed the genus *Chromocreopsis* for hypocreaceous fungi with coloured, one-celled spores. In his description he mentioned that the spores were either simple or indistinctly septate. However, Müller & von Arx (13) found that the type was amerosporous, from which it becomes apparent that *Chromocreopsis* is identical with *Thuemenella*.

Thusfar *Thuemenella* has been known to have smooth spores only, so that the warted spores presently to be described in one of the species necessitate a slight emendation of the generic diagnosis.

THUEMENELLA Penz. & Sacc. emend.

Thuemenella Penz. & Sacc. *in* Malpighia **11**: 518. 1897. — Type species: *Thuemenella javanica* Penz. & Sacc.

Chromocreopsis Seaver *in* Mycologia **2**: 63. 1910. — Type species: *Hypocrea cubispora* Ell. & Holw.

Stromata superficial, hemispherical to subglobose, often irregularly lobed, smooth, fleshy, yellow or brown. Stromal tissue typically pseudoparenchymatous, hyaline to subhyaline, made up of angular, irregular, thin-walled cells. Cells of peripheral layer smaller, yellowish. Perithecia in a single layer, deeply immersed in the stroma; ostia hardly protruding; necks lined with periphyses; wall mostly distinct, yellow, consisting of a few layers of flattened cells. Asci originating from base of perithecium, typically elongated-cylindrical, narrow, thin-walled, with slightly thickened apical wall. Paraphyses thread-like, soon deliquescent. Spores uniseriate, 1-celled, subglobose to elongated or short-cylindrical, often subangular, smooth or finely warted, dark green changing to sepia in preserved specimens.

Special stress is laid on such characters as (i) the soft stroma which is made up of thin-walled cells, and (ii) the subglobose or somewhat elongated, subangular, and dark spores. The genus resembles *Creopus* Link, but has one-celled spores. *Sarawakus* Lloyd (3) has only superficial resemblance to *Thuemenella*, differing from the latter as follows. The stromata are more or less corky and originate in large numbers from an extensive subiculum. The stromal tissue consists of cells with thickened cell-walls. The cortical layer is distinct and is made up of very thick-walled cells of which the lumina are nearly obliterated. The dark spores are ellipsoid. *Sarawakus* is most probably related to Xylariaceae.

THUEMENELLA JAVANICA Penz. & Sacc.

Thuemenella javanica Penz. & Sacc. *in* Malpighia **11**: 519. 1897.

Stromata waxy-fleshy, subglobose, depressed, irregular in outline, 3–7 mm diameter, smooth, yellow. Stromal tissue pseudoparenchymatous, consisting of irregular, thin-walled cells. Perithecia numbering more than 100 in large stromata, in a single layer, deeply immersed, subglobose, 110–150 μ diameter; ostia hardly protruding; necks lined with periphyses, 40–50 × 15–22 μ. Perithecial wall 14–16 μ thick, consisting of a few layers of much flattened cells. Asci originating from base of perithecia, long-cylindrical, short-stalked, thin-walled, with slightly thickened apical wall, 8-spored, 53–78 × 7–9 μ. Paraphyses thread-like, soon deliquescent. Spores uniseriate, subglobose to short-cylindrical, subangular, smooth, dark green changing to brown in preserved specimens, 6–8 μ diameter or 7–10 × 6–7 μ.

Java, Tjibodas, on dead branches, *Penzig 832*.

Thuemenella cubispora (Ell. & Holw.) Boedijn, *nov. comb.*

Hypocrea cubispora Ell. & Holw. *in* J. Mycol. **1**: 4. 1885 (basionym). — *Chromocreopsis cubispora* (Ell. & Holw.) Seaver *in* Mycologia **2**: 63. 1910.

Stromata scattered, tubercular, with free margin, more or less contracted at base and often becoming substipitate, 0.5–1 cm across and high, at first very bright lemon-yellow and appearing pruinose, often discolouring in dried specimens; surface scarcely wrinkled when dried, punctate from the slightly protruding perithecial necks which are filled with dark spores. Asci cylindrical, 8-spored. Spores subellipsoid or cubical, smoky brown, with 1–2 oil drops, 5–7 × 4–5 μ (description after Seaver).

Iowa and Jamaica, on decaying wood and bark.

This certainly is a good member of the genus.

Thuemenella hirsuta (Ell. & Ev.) Boedijn, *nov. comb.*

Hypocrea hirsuta Ell. & Ev. *in* Bull. Labs nat. Hist. Univ. Iowa **2**: 397. 1893 (basionym). — *Chromocreopsis hirsuta* (Ell. & Ev.) Seaver *in* Mycologia **2**: 64. 1910.

Stromata gregarious or crowded, subhemispherical, coriaceous-carnose, 2–3 mm diameter, discoid, with obscure margin, brown, yellowish-white inside, contracted below, centrally attached, clothed in brown, bristle-like, septate hairs of 100–200 × 4 μ, convex or plane above, slightly roughened by the protruding perithecial necks. Perithecia buried in the stroma, ovoid, about 0.5 mm high. Asci clavate-cylindrical, swollen at the tip, 100 × 10 μ. Spores navicular-oblong or unequally ellipsoid, brown, 7–8 × 3–3.5 μ (description after Seaver).

Nicaragua, Central America, on bark.

This seems a doubtful representative of the genus, but until the type can be reexamined, the species is tentatively placed here.

Thuemenella bicolor (Ell. & Ev.) Boedijn, *nov. comb.*

Hypocrea bicolor Ell. & Ev. *in* J. Mycol. **4**: 58. 1888 (basionym). — *Chromocreopsis bicolor* (Ell. & Ev.) Seaver *in* Mycologia **2**: 64. 1910.

Stromata gregarious or densely crowded, subpatellate or irregular from mutual pressure, slightly convex, 1–3 mm diameter, cinereous, becoming dull brownish black, white inside; margin free; upper surface wrinkled when dry, punctate from the perithecial necks. Perithecia subglobose, about 0.5 mm diameter. Asci cylindrical, 70 × 5 μ, 8-spored. Spores uniseriate, ellipsoid, with 2 oil drops, smoky brown, 5 × 2–3 μ (description after Seaver).

Kansas and Missouri to Louisiana, Nicaragua, Central America, on decaying wood.

This species has also to be studied anew in order to assess its proper taxonomic position.

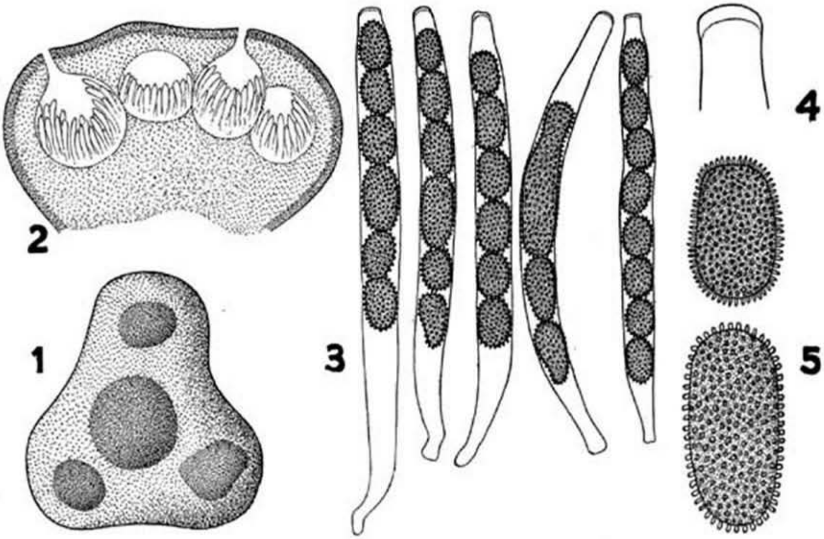
Thuemenella hexaspora Boedijn, *nov. spec.*—Figs. 1–5

Stroma subglobosum saepe irregulariter lobatum, glabrum, carnosum, luteum, parvum, 0.5—1 mm diam., 0.5 mm altus. Perithecia 2–12, omnino immersa, sphaerica, 216–288 μ diam. in collum breve 72–96 × 36–48 μ abrupte attenuata. Asci e basi perithecii oriundi, cylindracei, paraphysati, apice subtruncati, leniter incrassati, 3–8 plerumque 6 spori, 94–110 × 7–9.5 μ. Sporidiis breviter cylindraceis, verruculosis, atro-viridis, 12–26 × 7.5–12 μ.

Hab. in ramis corticatis emortuis. Typus: BO 11605.

Stromata soft fleshy, 0.5–1 mm diameter, up to 0.5 mm high, slightly irregularly lobed in outline, pale yellow (about Citron Yellow, Ridgway). Stromal tissue pseudoparenchymatous, consisting of hyaline to subhyaline, isodiametric to elongated, angular, thin-walled cells of variable size 5–26 μ long. Cells at the periphery smaller, very pale yellow. Perithecia 2–12, easily distinguishable under a handlens as grey-green spots, deeply immersed, in a single layer, globose, 216–288 μ diameter; necks 72–96 × 36–48 μ, lined with periphyses; ostia slightly protruding. Perithecial wall yellow, 12–14 μ thick, composed of a few layers of flattened cells 12–29 × 2–4.5 μ. Asci originating from base of perithecium, long-cylindrical, short-stalked, thin-walled, with slightly thickened cell-wall at attenuated apex, 3–8-spored, usually 6-spored, 94–110 × 7–9.5 μ. Spores uniseriate, irregular as to shape and size, mostly short-cylindrical with broadly rounded ends, but sometimes at one end attenuated, 12–26 × 9.5–12 μ, dark green, changing to sepia in preserved specimens, finely warted; contents homogeneous, usually with some indistinct oil drops. In 8-spored asci the spores are all nearly of the same size, but if there are fewer than 8, some spores are considerably larger, sometimes attaining a length of up to 50 μ. Larger spores often tend to have coarser warts. Paraphyses thread-like, soon deliquescent.

Java, Tjibodas, on dead branch, April 1930, *Boedijn 639* (BO 11605).



Figs. 1-5. *Thuemenella hexaspora* Boedijn — 1. Stroma seen from above. — 2. Section of stroma. — 3. Asci. — 4. Tip of ascus. — 5. Two spores, the larger one with slightly coarser warts.

In this remarkable species meiosis seems irregular and disturbed, which is apparent from the variable number and shape of the ascospores.

As already pointed out, Penzig & Saccardo placed *Thuemenella* in the Hypocreaceae, a family of Hypocreales. The Hypocreales, however, have been gradually abandoned by most authors, and the family transferred to the Sphaeriales, where the Hypocreaceae—a rather ill defined family—appeared not sharply delimited from the Nectriaceae. It is not surprising, therefore, that later authors tended to fuse both families. Munk (14) was the only author to keep the two apart, rightly so in my opinion. This also prevents the 'family' from becoming too unwieldy. Whereas I am in favour of distinguishing between Hypocreaceae and Nectriaceae, there now is a tendency with most authors also to accept a third family, the Hypomycetaceae, separated from the Nectriaceae. The two first-named families may be characterized as follows.

HYPOCREACEAE

Stromata superficial, subglobose, cushion-shaped, flattened or club-chaped, soft-fleshed but cottony in one genus, white, yellow, red, greenish or brown, composed of irregular, thin-walled cells. Perithecia 1-layered, deeply immersed, opening to the outside; necks more or less elongated, lined with periphyses; perithecial wall present although often inconspicuous. Asci originating from the bottom of the perithecia, long-cylindrical, narrow, thin-walled, with weakly developed apical plate. Spores uniseriate, subglobose, short-cylindrical, or ellipsoid, 1-celled or mostly 2-celled (the cells often already separating in the ascus), colourless or green when fresh, brown or sepia in preserved material, smooth, punctate, finely echinulate or warted. Paraphyses thread-like, mostly soon deliquescent.

Conidial states as far as known representing *Trichoderma* Pers. ex Fr., *Cephalosporium* Corda, and *Stromatocrea* W. B. Cooke.

On dead vegetable material and soil.

The family comprises the following genera.

Thuemenella Penz. & Sacc. — A genus of which at present five species are known.

Hypocrea (Fr.) Fr. — This is by far the largest genus of the family: more than one hundred species have been assigned to it. It is well characterized by its two-celled, hyaline, ovoid or short-cylindrical spores, each of which fall apart into 2 part-spores while still in the ascus.

Creopus Link. — This is a genus of about nine species. Most of its characters are the same as those of the previous genus, but the spores are dark green, changing to brown in preserved specimens. Some authors, Dingley (10) and Müller & von Arx (13) unite the genus with *Hypocrea*, but I am not prepared to follow them. Many ascomycetous genera are distinguished on spore colour only; in Agaricales and Deuteromycetes spore colour is even of paramount significance. Spore colour in general is a character of great value for classification and identification of fungi.

Podostroma Karst. — A genus comprising nine species, and neatly defined by its club-shaped, often large stromata.

Hypocreopsis Karst. — I can distinguish only two species in this genus, viz. *H. riccioidea* (Bolt. ex Fr.) Karst. and *H. rhododendri* Thaxter. Both are well characterized by their large, radially lobed stromata and their two-celled, colourless spores which do not fall apart.

Except for *Dozya* Karst., the synonyms listed by Müller & von Arx (13) should be disconnected from *Hypocreopsis*. *Myrmaeciella* Lindau and *Porphyrosoma* Pat. do not belong to either Hypocreaceae or Nectriaceae. *Stilbocrea* Pat. on the other hand is a good nectriaceous genus to be placed in the neighbourhood of *Sphaerostilbe* Tul.

Phaeocreopsis Sacc. & Syd. apud Lindau. — There are two species, *P. hypoxyloides* (Speg.) Sacc. & Syd. and *P. pezizaeformis* Boedijn. The genus is characterized by a cushion-shaped stroma which is sometimes concave above and has the perithecia in a single layer at the upper side. The two-celled spores are brown and do not fall apart like in *Hypocrea*.

Protocrea Petch. — The three species of this genus are characterized by a loose, cottony subiculum which surround the perithecia. This character may be difficult to observe in preserved material, but this is no reason to ignore the character and to sink the genus into the synonymy of *Hypocrea*.

NECTRIACEAE

Perithecia subglobose to pear-shaped, single, scattered, gregarious, or arising from a subiculum or a stroma, not completely sunken in the stroma, but superficial or immersed with the base; perithecial wall consisting of several layers of cells, on the outside sometimes provided with warts, hairs, or other appendages; colour predominantly red or orange, sometimes also yellow or blue; ostia apical, more or less distinctly papillate; the canal leading to the ostia lined with periphyses. Asci mostly arising from bottom and sides of the perithecium, cylindrical, thin-walled, with small apical plate, sometimes with short stalk. Spores 1–2-seriate, elliposid to more or less elongated, 1–2-celled, many-celled to muriform, colourless or almost so, smooth, punctate, striate, or warted. Paraphyses thread-like, finally mostly deliquescent.

Conidial states representing *Fusarium* Link ex Fr., *Cylindrocarpon* Wollenw., *Cylindrocladium* Morgan, *Stilbella* Lindau, *Tubercularia* Tode ex Fr., and *Volutella* Tode ex Fr.

Saprophytic on vegetable matter, parasitic on plants or on insects, especially scale-insects, or hyperparasitic on the mycelium of leaf-fungi, especially Asterinaceae and Meliolaceae.

I take the genera listed below to be good members of the family, but many others are in need of critical study before they can be satisfactorily placed. The genera here accepted are: *Pseudonectria* Seaver, *Nectriella* Nitschke, *Nectria* Fr., *Mycocitrus* Möller, *Sphaerostilbe* Tul., *Stilbocrea* Pat., *Nectriopsis* Maire, *Calonectria* De Not., *Gibberella* Sacc., *Actiniopsis* Starb., and *Thyronectria* Sacc.

I would like to thank Prof. Dr. H. C. D. de Wit, Wageningen, for his help in preparing the Latin diagnosis.

REFERENCES

1. AINSWORTH, G. C. (1961). Dictionary of the fungi. Fifth ed. Kew.
2. ARX, J. A. VON & E. MÜLLER (1954). Die Gattungen der amerosporen Pyrenomyceten. *In* Beitr. KryptFl. Schweiz **11** (1): 339.
3. BOEDIJN, K. B. (1934). The genus *Sarawakus* in the Netherlands Indies. *In* Bull. Jard. bot. Buitenz., Ser. 3, **13**: 263–265, 1 fig.
4. —— (1934). The genus *Podostroma* in the Netherlands Indies. *In* Bull. Jard. bot. Buitenz., Ser. 3, **13**: 269–275, 1 fig.
5. —— (1938). A new species of the genus *Podostroma* from Africa. *In* Ann. mycol., Berl. **36**: 314–317, 1 fig.
6. —— (1940). The Mycetozoa, Fungi and Lichenes of the Krakatau group. *In* Bull. Jard. bot. Buitenz., Ser. 3, **16**: 371–373, fig. 4.
7. —— & J. REITSMA (1950). Notes on the genus *Cylindrocladium*. *In* Reinwardtia **1**: 51–60, 3 fig.
8. CLEMENTS, F. E. & C. L. SHEAR (1931). The genera of fungi 281. New York.
9. DENNIS, R. W. G. (1960). British cup fungi and their allies 151–153, pl. 24 N, P; pl. 25 A–C. London.
10. DINGLEY, J. M. (1952). The Hypocreales of New Zealand III. The genus *Hypocrea*. *In* Trans. roy. Soc. New Zealand **79**: 323–337, 4 pls.
11. HEIM, R. (1953). Quelques Ascomycètes remarquables. I — Le genre *Hypocreopsis* en France. *In* Bull. Soc. mycol. France **68**: 359–366, 2 figs., 1 pl.

12. MOELLER, A. (1901). Phycomyceten und Ascomyceten. Untersuchungen aus Brasilien 73–133, 295–298, pls. 2, 3. Jena.
13. MÜLLER, E. & J. A. VON ARX (1962). Die Gattungen der didymosporen Pyrenomyceten. *In* Beitr. KryptFl. Schweiz. **11** (2): 640–655, 823, figs. 252–258.
14. MUNK, A. (1957). Danish Pyrenomycetes, a preliminary flora. *In* Dansk bot. Ark. **17** (1).
15. PATOUILLARD, N. (1928). Contribution à l'étude des champignons de Madagascar. *In* Mém. Acad. malgache fasc. **6**: 40–41, pl. 2.
16. PENZIG, O. & P. A. SACCARDO (1897). Diagnoses Fungorum novorum in Insula Java collectorum. *In* Malpighia **11**: 518–519.
17. —— & —— (1904). Icones Fungorum javanicorum 51, pl. 34 fig. 4.
18. SEAVER, F. J. (1910). The Hypocreales of North America III. *In* Mycologia **2**: 48—92, 2 pls.

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PHOMA HERBARUM WESTEND., THE TYPE-SPECIES OF THE FORM-GENUS PHOMA SACC.

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Plantenziektenkundige Dienst, Wageningen

(With two Plates)

The type of *Phoma herbarum* is selected and the characteristics of the species are redescribed from recently isolated material. Synonyms of this ubiquitous saprophytic fungus are *inter alia: Phoma urticae* S. Schulz. & Sacc., *Phoma oleracea* Sacc., *Phoma violacea* (Bertel) Eveleigh (described from paint), *Phoma hibernica* Grimes & al. (described from butter), and *Phoma lignicola* Rennerfelt (described from wood).

In the course of diagnostic mycological work with diseased or dead plant material we quite often isolated a typical *Phoma*. This fungus was characterized by its ability to develop a great number of thin-walled pycnidia on different kinds of substrata and by the production of only a small amount of aerial mycelium. Another peculiarity was that it maintained for a long time its ability to sporulate when cultivated *in vitro*. Only hyaline one-celled pycnidiospores were produced and no chlamydospores. The fungus appeared to belong to Group X of *Phoma* strains described by Dennis (1946) to which *Phoma urticae* S. Schulz & Sacc., *P. oleracea* Sacc., and *P. hibernica* Grimes & al. were assigned.

We informed Dr. R. W. G. Dennis that the fungus occurred on all kinds of plant material, whereafter he commented that it might be *Phoma herbarum* Westendorp (1852), a very common fungus on vegetable debris according to older literature. Dr. J. A. von Arx, Baarn, on examining the fungus on the seedcoat of *Brassica* spp. came to the same supposition. The suggestion made by these two mycologists was confirmed after consultation of the type material of *P. herbarum*, preserved in the Herbarium at Brussels.

Though in the course of time many mycologists determined fungi as *P. herbarum* (Saccardo, 1884; Allescher, 1901; Grove, 1935) the identity of this fungus remained doubtful. This is attributable to the fact that the identity of any species of *Phoma* is fully established only if the characters and variability of the fungus growing on an artificial substrate are known.

At the 8th International Botanical Congress at Paris (Lanjouw, 1956) it was laid down that *Phoma herbarum* Westend. be regarded as type-species of the form-genus *Phoma* Sacc. (nomen genericum conservandum). So a study of the characteristics of *P. herbarum* may lead to a better understanding and interpretation of the genus *Phoma*.

PHOMA HERBARUM Westend.

Phoma herbarum Westend. *in* Bull. Acad. Belg. **19** (3): 118.1852. — Lectotype: Herb. Crypt. belge, Fasc. 20 (1854) no. 965 on *Onobrychis viciifolia* Scop. ("Sainfoin") (BR). — Syntype: Herb. Crypt. belge, Fasc. 20 (1854) no. 965 on *Urtica dioica* L. ("Ortie") (BR).

Phoma urticae S. Schulz. & Sacc. *in* S. Schulz., Schwämme Pilze Ung. Slav. 700. 1869. — *Leptophoma urticae* (S. Schulz. & Sacc.) Höhn. *in* Hedwigia **59**: 262.1917 (misapplied).

Phoma oleracea Sacc. *in* Michelia **2**: 91–92. 1882.

Phoma oleracea var. *helianthi-tuberosi* Sacc., Syll. Fung. **3**: 135. 1884.

Phoma oleracea var. *scrophulariae* Sacc., Syll. Fung. **3**: 135. 1884.

Phoma oleracea var. *urticae* Sacc., Syll. Fung. **3**: 135. 1884.

Aposphaeria violacea Bertel *in* Öst. bot. Z. **54**: 205, 283, 288. 1904. — *Phoma violacea* (Bertel) Eveleigh *in* Trans. Brit. mycol. Soc. **44**: 577. 1961.

Phoma pigmentivora Massee *in* Kew Bull. **1911**: 325.

Phoma hibernica Grimes, O'Connor & Cummins *in* Trans. Brit. mycol. Soc. **17**: 99–101. 1932.

Phoma lignicola Rennerfelt *in* Svenska SkogsvFören. Tidskr. **35**: 60. 1937.

DESCRIPTIONS.—Dennis *in* Trans. Brit. mycol. Soc. **29**: 33–35. 1946 (*P. hibernica*, *P. oleracea*, *P. urticae*); Eveleigh *in* Trans. Brit. mycol. Soc. **44**: 578–582. 1961 (*P. violacea*); Grimes, O'Connor & Cummins *in* Trans. Brit. mycol. Soc. **17**: 100–101, 105–110. 1932 (*P. hibernica*).

DIAGNOSTIC CHARACTERS IN VIVO. — Pycnidia mostly superficially formed, simple or compound; wall of pseudoparenchymatic texture; simple pycnidia mostly globular, sometimes lenticular or flask-shaped, 80–260 µ diameter; compound pycnidia generally much larger. Ostioles somewhat protruding, oozing pinkish or yellow-white spore masses. Pycnidiospores 4.5–9.5 × 1.7–3.0 µ, commonly 5.0–5.5 × 2.0–2.5 µ.

DIAGNOSTIC CHARACTERS IN VITRO. — Aerial mycelium usually sparse. Pycnidia abundant, simple or compound; wall of pseudoparenchymatic texture; simple pycnidia mostly globular, sometimes lenticular or flask-shaped, 50–500 µ diameter; compound pycnidia sometimes even larger. Ostioles distinct, 1 in simple pycnidia, 2–3 or more in compound pycnidia. Spore mass abundant, completely covering the pycnidia at maturity, usually salmon pink, but sometimes yellow or white. Pycnidiospores 3.3–10.0 × 1.5–5.0 µ, commonly 4.5–5.0 × 2.0–2.5 µ (Pl. 2, fig. 6).

VARIABILITY IN VITRO. — The fungus grows well on various artificial media (compare Pl. 1, figs. 5, 6), but the rate of growth is influenced by the composition and acidity of the nutrient substrate (Eveleigh, 1961 A; as *P. violacea*). Optimal temperature 20–25° C. Growth both in darkness and daylight (Eveleigh, 1961 A; as *P. violacea*). Some strains of the fungus mainly develop small pycnidia and other strains mainly large ones. However, it often happens that sectors with small pycnidia occur alongside sectors with large pycnidia in the same culture. The quantity of aerial mycelium depends on the strains and the media. Often the fungus in culture shows sectors with a dense mycelial growth with only occasional pycnidia alternating with sectors with less copious aerial mycelium and abundant pycnidia ('dual phenomenon'—Hansen, 1938).

A characteristic of *Phoma herbarum* in culture is the typical pigment formation which also varies with the strains and the media. On cornmeal agar, oatmeal agar and potato-glucose agar the pigmentation is often well developed. The colour of the pigment is mostly pink, sometimes orange-red or red-violet. The pH influences the pigmentation, in an acid medium the colour darkens as the pH is raised. Some strains produce little pigment. In culture some sectors may also show striking differences in pigmentation. Strong pigmentation is often associated with abundant aerial mycelium Light is also known to stimulate the formation of pigment (Eveleigh, 1961 A, 1961 B; as *P. violacea*).

DEVELOPMENTAL CHARACTERISTICS OF THE PYCNIDIA. — The pycnidial primordium may develop by repeated divisions out of the pycnidiospores: conidiogenous origin. This may be observed by inoculating an agar plate with pycnidiospores suspended in sterile tap water. The spores inflate, bud out, and divide crosswise and diagonally until a rounded or irregular mass of cells is formed. Hyphal threads mostly branch from the mass. In a growing colony such a pycnidial primordium usually arises by the simple meristogenous method (Kempton, 1919). This is well seen by staining an agar culture with Cotton blue and examining it microscopically after washing and mounting. A few adjacent cells in a single hypha inflate, divide both crosswise and diagonally, inflate, and divide again. This rounded or elongated mass continues to enlarge, just as in the case of conidiogenous origin, also with hyphal branches budding from it (Pl. 2, figs. 1–3). In a few cases closely adjacent hyphae may take part in the formation, which then becomes compound meristogenous, but the typical method of development is the simple meristogenous one from a few cells of a single hypha. Occasionally, due to later anastomosis, the development of the primordium seems to be symphogenous (pseudo-symphogenous).

The cavity containing the spores apparently comes into being by a combined process of lysis (breaking up, disorganization) and celldivision (compare Dodge, 1923; lysigenetic origin). At first the central pseudoparenchymatic cells are gradually substituted by a meristematic tissue consisting of ellipsoid and ovoid small-celled elements. Thereafter this meristematic tissue is gradually reduced to a thin layer at the periphery of the cavity. In the meantime spore-formation takes place. The origin of the first spores is not clear. Possibly they are of endogenous origin (Pl. 2, fig. 4; compare Klebahn, 1933). Soon after the cavity is formed an ostiole is produced which is marked by dark hyphal cells. Structural provisions for the production of the ostiole are apparently already present in the primordium and hence the ostiole of the pycnidium of *Phoma herbarum* is a predetermined opening. The young pycnidial knot, which now has already all the essential characters of a pycnidium, becomes larger and larger until it attains the (variable) diameter of a mature pycnidium.

The peridium of such a mature pycnidium merely consists of a few cell-layers. The outer cells are relatively large and have a dark colour. The inner cells are mostly radially arranged and resemble a meristematic tissue. They are hyaline but their contents become strikingly stained in Cotton blue. The spores filling the whole cavity of the mature pycnidium project in rows from the hyaline cells lining the cavity. These cells are mostly somewhat cuspidate. The spores apparently originate by extrusion of parts of the plasm via a small pore in the point of those cells (Pl. 2, fig. 5), a process which Luttrell (1963) termed porogenous. It actually differs little from an endogenous spore-forming process, as was clearly explained by Goidanich & Ruggieri (1947). Since the spore-producing cells do not constitute a true hymenium, but are actually slightly differentiated pseudoparenchymatic peridial cells, the fructification of *Phoma herbarum* may be characterized as a histopycnidium (see Goidanich & Ruggieri, 1947).

HABITAT. — The fungus occurs on very diverse substrata, such as dead and dying herbaceous and woody plants, soil, water, milk, butter, paints, etc.

DISTRIBUTION. — World-wide.

SPECIMENS EXAMINED. —

Exsiccata: Lectotype on *Onobrychis viciifolia* Scop. and syntypes, Herb. crypt. belge, Fasc. 20 (1854) no. 965 (BR, PAD); *Phoma hibernica*, dried culture (1944) of type-isolate made by Prof. Grimes (K); *Phoma urticae*, Saccardo, Mycoth. ital. 1267 (PAD) and dried culture (1944) of isolate made by Dr. Dennis (K).

Cultures: *Phoma hibernica*, isolate from butter (1937), Vet. Landb. Maelkeri Lab. København (CBS); *Phoma lignicola*, culture of type (CBS); *Phoma pigmentivora* (*Aposphaeria violacea*), isolate used in U.S.A. for fungus resisting testing of white lead paint (1956) (ATCC–12569), isolate made by Cartwright (CBS), isolate from white lead paint, England (1952) (CMI–49.948), and isolate from bathroom paintwork, H. M. S. Vanguard (1950) (CMI–90.179).

The type exsiccatum of *Phoma herbarum* Westend. (Herb. crypt. belge, Fasc. 20 (1854) no. 965; BR) (syntype, sensu Troupin, 1949) contains fungal fructifications on a stem of nettle, *Urtica dioica* L. ("Ortie") and stem-pieces of sainfoin, *Onobrychis viciifolia* Scop. (Pl. 1, figs. 1,2). The descriptions follow.

The stem-pieces of sainfoin are closely covered with brownish black pycnidia. The latter are spherical, 70–170 μ diameter, or oval, 80–260 × 70–135 μ, with parenchymatic texture. Ostioles mostly 1, occasionally 2 or 3. Pycnidiospores more or less cylindrical, 4.5–9.5 × 1.7–3 μ, mean 5.5 × 2.2 μ. Microtome sections show these spores to develop from certain hyaline peridial cells which are mostly somewhat cuspidate.

The stem-piece of the nettle is for the greater part irregularly covered with pycnidia. These are subepidermal, erumpent, spherical or ellipsoid, 90–250 × 90–140 μ, with one distinct ostiole. A dark brown mycelium gives rise to macroscopically visible brown discolouration around the pycnidia. Pycnidiospores variable as to shape and size, generally cylindrical, 5–13.6 × 2–3.5 μ, mean 6.9 × 2.5 μ. Some pycnidia containing 2-celled spores 9.5–13.5 × 2.5–4 μ.

Occasional pycnidia on the nettle stem appear more superficially formed, agreeing wholly with those on sainfoin. These pycnidia lack the brown mycelium, while their pycnidiospores agree well with those of the fungus on sainfoin as to shape and size.

With regard to the nettle material, therefore, two clearly different fungi may be distinguished, the fungus commonly occurring on the sainfoin as well as in places on the nettle stem being considered to represent *Phoma herbarum* Westend. (lectotype: on sainfoin).

The pycnidial fungus isolated by us from various kinds of dead or dying plant material and other substrata, has the same characteristics as this type of *P. herbarum*. This was also verified by 'inoculation' of different strains of the isolated fungus on various dead sterilized herbaceous stems. This agreement, coupled with Westendorp's statement (1852) that *P. herbarum* occurs on dead stems of various herbaceous plants, leads to the conclusion that the *Phoma* described above is identical with *P. herbarum*.

The fact that the syntype material of *Phoma herbarum* contains two pycnidial fungi, explains why various taxonomic handbooks (e.g. Allescher, 1901; Grove, 1935) give the spore dimensions too large. In the original description of *P. herbarum*, Westendorp (1852) omitted spore dimensions. The first description to mention them was by Saccardo (Syll. Fung. **3**: 133. 1884 [1]). Apparently these spore dimensions were determined from a syntype of *P. herbarum* in the herbarium of Saccardo (Gola, 1930). This syntype, like the one at Brussels, contains, apart from *P. herbarum*, the second pycnidial fungus (on nettle, see above) with larger spores. Consequently, identifications based on Saccardo's spore measurements often refer to other fungi. Probably this holds especially for various alleged formae of *P. herbarum* which need further investigation.

The common *P. herbarum* has often been described under other names, as is evident from the synonyms listed. These are discussed below.

Saccordo already supposed (1884) that *Phoma urticae*, described from stems of *Urtica dioica* L., was a form of *P. herbarum*. The only exsiccatum of *P. urticae* in Saccardo's herbarium (see Gola, 1930) represents a *Phoma* which morphologically agrees completely with *P. herbarum*. As *P. herbarum* occurs widely on nettle stems (the syntype of *P. herbarum* is also on nettle stem, see above) *P. urticae* undoubtedly is a synonym of *P. herbarum*. It may be pointed out that Dennis (1946) gave the current name *P. urticae* to his strain 25 which turned out to be *P. herbarum*.

There are several indications which suggest that *Phoma oleracea*, described from stems of *Brassica oleracea* L., is a synonym of *P. herbarum*. Saccardo himself already stated that *P. oleracea*, of which type material is not known to be in existence, closely resembles *P. herbarum*. Slight differences in spore size were recorded but spore dimensions in *P. herbarum* are now known to vary a great deal.

The relation between *P. oleracea* and *P. lingam* (Tode ex Fr.) Desm. (basionym: *Sphaeria lingam* Tode), the well-known cause of dry rot and canker (black leg) of turnip and swede, has been much discussed (Henderson, 1918; Cunningham, 1927; Grove, 1935). It was generally believed that *P. oleracea* was probably identical with *P. lingam*. However, it was not realized that species of *Brassica* often harbour saprophytic *P. herbarum* in addition to pathogenic *P. lingam* (Pl. 1, figs. 3, 4), and that the first mentioned agrees well with Saccardo's description of *P. oleracea*. Saccardo was well acquainted with *P. lingam*, of which various exsiccata in his herbarium, some collected in Italy, bear witness (see Gola, 1930). Besides, he reported *P. lingam* from Italy (Saccardo, 1884). It must therefore be assumed that Saccardo considered *P. oleracea* different from *P. lingam*.

Both the "Centraalbureau voor Schimmelcultures" (CBS) and the "Phytopathologisch Laboratorium" (WCS) at Baarn used to record *P. lingam* and *P. oleracea* separately. The latter name was always applied to a fungus which has now proved

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[1] In his description of *P. herbarum* Saccardo referred to his previous publication (*in* Michelia **2**: 92. 1880), but this contained only the description of f. *humuli* and some other forms, not of *P. herbarum* proper. The same applies to an earlier publication (*in* Michelia **1**: 523. 1879), where f. *galiorum* was described (compare Saccardo, Syll. Fung. **3**: 133. 1884).

to be identical with *P. herbarum.* This explains further why Cunningham (1927), who studied the cultures of *P. lingam* and *P. oleracea* from the CBS, found that the latter was not parasitic to *Brassica* spp. Both his description and the photograph of his culture of *P. oleracea* are characteristic of *P. herbarum.* Cunningham concluded nevertheless that this *P. oleracea* was an aberrant strain of *P. lingam,* assuming it had lost its pathogenicity and acquired the capacity to produce many fruit-bodies, which does not seem probable.

Also, in a recent report of the WCS (Baarn) in which the influence of seed infection by *P. lingam* on the attack of *Brassica* spp. was discussed, Kok (1962) mentioned non-pathogenic *P. oleracea* separately from parasitic *P. lingam.* Subsequent examination proved the former species to be the fungus now known as *P. herbarum* (compare Pl. 1, fig. 3).

From all these facts it was concluded that what had been understood by *P. oleracea* was identical with *P. herbarum* and that this species was different from *P. lingam.*[2]

Several varieties of *P. oleracea* (Saccardo, 1884) said to differ from the typical variety only by their occurrence on other host plants must also be regarded as synonyms of *P. herbarum.* This applies in any case to *P. oleracea* var. *helianthi-tuberosi, P. oleracea* var. *scrophulariae* and *P. oleracea* var. *urticae.* Further investigation is required in order to assess the other varieties described with deviating spore dimensions (Saccardo, 1884) and the formae mentioned in Rabenhorst, Kryptogamenflora (Allescher, 1901).

Phoma violacea, also known as *Aposphaeria violacea* or *Phoma pigmentivora,* and known to be the cause of a disfiguration of painted surfaces, also proved identical with *P. herbarum.* This conclusion was based on the study of cultures of this fungus received from the ATCC at Washington, the CMI at Kew, and the CBS at Baarn, as well as on isolations from paint made by the author. Disfiguration of white lead paint and coloured oilpaints has often been found in this country. The red discolouration and the formation of pycnidia in concentric rings are a very striking feature.

Application of Eveleigh's laboratory tests (Eveleigh, 1961 A) revealed that strains of *P. herbarum* from plants cause symptoms on paint like those of the original paint strains. This is in accordance with Eveleigh's conclusion (Eveleigh, 1961 B) that *P. violacea* must be a saprophytic organism, occurring among other substrata on dead wood (see below: *P. lignicola*). Eveleigh's study of the characters of *P. violacea* (Eveleigh, 1961 C) viz. variability of growth *in vitro,* formation of sectors, presence of one or more nuclei, and the formation of pigment, can now be considered to hold also for *P. herbarum.* The observations concerning *P. herbarum* strains from herbaceous material wholly agree with Eveleigh's data on *P. violacea* from paint (Eveleigh, 1961 C).

Phoma hibernica, described from butter, is also a synonym of *P. herbarum.* Dennis

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[2] *P. lingam* is not a typical *Phoma.* We follow von Höhnel (1911) in placing the species in *Plenodomus* Preuss; its correct name is *Plenodomus lingam* (Tode ex Fr.) Höhn.

(1946) did not find significant differences between the original culture of *P. hibernica* and his *Phoma* strains 25 and 26, which can now be identified as *P. herbarum*. He only found that the mean spore dimensions of *P. hibernica* were somewhat larger and that this fungus showed some deviations on malt agar. These differences, however, are within the range of variation observed by the author to occur in several strains of *P. herbarum*. It also appeared that a dried culture of *P. hibernica* on malt agar obtained from the Herbarium at Kew was not different from certain Dutch strains of *P. herbarum* isolated from plants. It was finally ascertained that various Dutch strains of *P. herbarum* from plants grew well on butter. These cultures were not different from cultures on butter of a fungus determined by the CBS as *P. hibernica* apart from the fact that the latter did not sporulate. This culture, however, had been isolated from butter in Denmark as long ago as 1937 and its age may explain its sterility.

It seems therefore justified to conclude that *P. hibernica* is identical with *P. herbarum*. This fits the observations of Bisby, Timonin and James (1933) who isolated *P. hibernica* three or four times from soil at Manitoba, Canada. As *P. herbarum* occurs on all kinds of plant material it is of course widespread in soil. In this connection it is also worth mentioning that Borut & Johnson (1962) cultured *P. hibernica* many times from estuarine sediments in coastal North Carolina, U.S.A., while Bisby (1935) isolated *P. hibernica* from the air near the coast of Ireland.

The type culture of *Phoma lignicola* present at the CBS appeared not different from strains of *P. herbarum* producing a red-violet pigment. Rennerfelt isolated *P. lignicola* from woodpulp and described it as a new species, stating that comparison with the species mentioned by Grove (1935) and Allescher (1901) was not possible, as these were all connected with certain host plants. Although, indeed, *P. herbarum* is predominantly found on herbaceous plants, it is also frequently isolated from woody plants and wood.

There is no doubt that in the course of time further species will be reduced to the synonymy of *Phoma herbarum*.

The forementioned data should make it possible for mycologists to recognize in future whether isolated *Phoma*-like fungi are identical with the ubiquitous *Phoma herbarum*. The great variability shown by this fungus, however, will often make it desirable to compare cultures. For this purpose the "Plantenziektenkundige Dienst" at Wageningen preserves a great number of cultures of *P. herbarum*, both dried and living, which are sent on request.

REFERENCES

ALLESCHER, A. (1901). Fungi imperfecti: Hyalin-sporige Sphaerioideen. *In* Rabenh., KryptFl., 2 Aufl., **1** (6). Leipzig.

BISBY, G. R. (1935). Are living spores to be found over the ocean? *In* Mycologia **27**: 84–85.

BISBY, G. R., M. I. TIMONIN & N. JAMES (1933). Fungi isolated from soil profiles in Manitoba. *In* Can. J. Res. **13**: 51.

BORUT, S. Y. & T. W. JOHNSON (1962). Some biological observations on fungi in estuarine sediments. *In* Mycologia **54**: 181–193.

CUNNINGHAM, G. H. (1927). Dry-rot of swedes and turnips. *In* Bull. N.Z. Dep. Agric. **133**.

DENNIS, R. W. G. (1946). Notes on some British fungi ascribed to *Phoma* and related genera. *In* Trans. Brit. mycol. Soc. **29**: 11–42.

DODGE, B. O. (1923). Origin of the central and ostiolar cavities in pycnidia of certain fungous parasites of fruits. *In* J. agric. Res. **23**: 743–759.

EVELEIGH, D. E. (1961 A). The disfiguration of painted surfaces by fungi, with special reference to *Phoma violacea*. *In* Ann. appl. Biol. **49**: 403–411.

—— (1961 B). The growth requirements of *Phoma violacea*, with reference to its disfiguration of painted surfaces. *In* Ann. appl. Biol. **49**: 412–423.

—— (1961 C). *Phoma* spp. associated with painted surfaces. *In* Trans. Brit. mycol. Soc. **44**: 573–585.

GOIDANICH, G. & G. RUGGIERI (1947). Le Deuterophomaceae di Petri. *In* Ann. Sper. agr., Nuov. Ser. **1** (1): 431–448.

GOLA, G. (1930). L'erbario micologico di P. A. Saccardo. Catalogo Padova.

GROVE, W. B. (1935). British stem- and leaf-fungi (Coelomycetes) **1**. Sphaeropsidales. Cambridge.

HANSEN, H. N. (1938). The dual phenomenon in imperfect fungi. *In* Mycologia **30**: 442–455.

HENDERSON, M. P. (1918). The black-leg disease of cabbage caused by *Phoma lingam* (Tode) Desmaz. *In* Phytopathology **8**: 379–431.

HÖHNEL, F. VON (1911). Fragmente zur Mykologie 713. Über *Leptosphaeria maculans* (Desm.) und *Sphaeria Lingam* Tode. *In* S. B. Akad. Wiss. Wien (Math.-nat. Kl., Abt. I) **120**: 458–463.

KEMPTON, F. E. (1919). Origin and development of the pycnidium. *In* Bot. Gaz. **68**: 233–261.

KLEBAHN, H. (1933). Ueber Bau und Konidienbildung bei einigen stromatischen Sphaeropsideen. *In* Phytopath. Z. **6**: 229–304.

KOK, M. (1962). Aantasting van kool door *Phoma lingam*. *In* Tijdschr. PlZiekt. **68**: 149.

LANJOUW, J., et al. (1956). International code of botanical nomenclature 210. Utrecht.

LUTTRELL, E. S. (1963). Taxonomic criteria in *Helminthosporium*. *In* Mycologia **55**: 643–674.

SACCARDO, P. A. (1884). Sylloge Fungorum **3**. Patavii.

TROUPIN, G. (1949). La terminologie des types en botanique systématique. *In* Bull. Soc. Roy. Belgique **82**: 57–66.

WESTENDORP, G. D. (1852). Nouvelle notice sur quelques Cryptogames récemment découvertes en Belgique. *In* Bull. Acad. Belg. **19** (3): 118 (no. 51).

EXPLANATION OF PLATES 1, 2

PLATE 1

Figs. 1–3, 5, 6. *Phoma herbarum* Westend. — 1. Type material at Brussels, showing stems of nettle and sainfoin. — 2. Detail of stem of sainfoin covered with pycnidia (lectotype). — 3. Seed of *Brassica* sp. showing protruding pycnidia. — 5. Two strains on malt agar producing different sectors. — 6. Two strains on Ashby's medium.

Fig. 4. *Plenodomus lingam* (Tode ex Fr.) Höhn. — Seed of *Brassica* with protruding pycnidia.

PLATE 2

Figs. 1–6. *Phoma herbarum* Westend. — 1–3. Three stages of pycnidial primordium; simple meristogenous origin (free hand drawings). — 4. The first spores in the central cavity seem to be of endogenous origin. — 5. Porogenous spore production in mature pycnidium. — 6. Pycnidiospores showing their variability (camera lucida drawings).

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THE NOMENCLATURE OF TWO FUNGI PARASITIZING BRASSICA

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(With three Text-figures)

The nomenclature of the perfect and imperfect stages of *Mycosphaerella brassicicola* (Duby) Lind. and *Leptosphaeria maculans* (Desm.) Ces. & De Not. is discussed.

The imperfect stages of these two parasites of *Brassica* spp. are often confused. *Mycosphaerella brassicicola* has a spermagonial stage with the characters of the form-genus *Asteromella* Pass. & Thüm. In phytopathological literature it is incorrectly known as a *Phyllosticta* species: *P. brassicicola* McAlp. A new combination for this stage is proposed: *Asteromella brassicae* (Chev.) Boerema & van Kesteren.

The pycnidial stage of *L. maculans* is known in phytopathological literature as *Phoma lingam* (Tode ex Fr.) Desm. Its characters, however, are quite different from those of the type-species of the form-genus *Phoma* Sacc. As it agrees with the type-species of the form-genus *Plenodomus* Preuss, it is concluded that the correct name is *Plenodomus lingam* (Tode ex Fr.) Höhn.

In their diagnostic mycological work the present authors have been confronted with conflicting references to the nomenclature of the perfect and imperfect stages of two fungi parasitic on *Brassica* spp., viz. *Mycosphaerella brassicicola* (Duby) Lind. and *Leptosphaeria maculans* (Desm.) Ces. & De Not. The imperfect stage of the former in phytopathological literature is mostly given as *Phyllosticta brassicicola* McAlp., while the pycnidial stage of the latter is generally known as *Phoma lingam* (Tode ex Fr.) Desm.

By comparing original herbarium material of both these fungi and studying the literature the authors have tried to clear up the confusion.

MYCOSPHAERELLA BRASSICICOLA (Duby) Lind.

Sphaeria brassicicola Duby, Bot. Gall., Ed. 2, **2**: 712. 1830 ["*brassicaecola*" (Fries ined. . . .)]; not *Sphaeria brassicicola* Berk. & Br. *apud* Berk., Outl. Brit. Fungol. 401. 1860. — *Sphaerella brassicicola* (Duby) Ces. & De Not. *in* Comment. Soc. critt. ital. No. 4: 238. 1863 ("*brassicaecola*"). — *Mycosphaerella brassicicola* (Duby) Lind. *in* Nat. PflFam. **1** (1): 424. Febr. 1897. — *Mycosphaerella brassicicola* (Duby) Joh. *ex* Oudem., Rév. Champ. **2**: 210, 211. March 1897 ["*M. brassicaecola* (Duby) Johanson"].

Dothidea brassicae Desm. *in* Ann. Sci. nat. (Bot.), Ser. 2, **17**: 113. 1842.

Sphaeria brassicae Berk. & Br. *in* Ann. Mag. nat. Hist., Ser. 2, **9**: 384. 1852; not *Sphaeria brassicae* Dickson, Fasc. Pl. crypt. Brit. **1**: 23. 1785; not *Sphaeria brassicae* Bolton, Hist. Fung. Halifax **3**: 45. 1789 [= *Sclerotium semen* Tode ex Fr., the sclerotial stage of *Typhula betae* Rostrup = *Typhula brassicae* (Berg. ex Fr.) Vang]; not *Sphaeria brassicae* Schwein. *in* Trans. Amer. phil. Soc., N.S. **4**: 222. 1834 [= *Chaetomella brassicae* (Schwein.) Starb.]; not *Sphaeria brassicae* Klotzsch, Eng. Fl. **2**: 261. 1836 [= *Pleurosordaria olerum* (Fr.) Lunqvist in manuscr.]; not

Sphaeria brassicae Lasch, Exs. in Rab. Klotzsch. Herb. mycol. Ed. nov. 2, No. 550. 1885 [= *Pleospora herbarum* var. *brassicae* (Lasch) Sacc.]. — *Sphaeria brassicicola* Berk. & Br. *apud* Berk., Outl. Brit. Fungol. 401. 1860 ("*brassicaecola*"; name change); not *Sphaeria brassicicola* Duby, Bot. Gall., Ed. 2, **2**: 712. 1830. — *Stigmatea brassicae* (Berk. & Br.) Kickx, Fl. cryptog. Flandres **1**: 365. 1867 (incomplete reference to basionym).

Spermagonial stage: —

Asteromella brassicae (Chev.) Boerema & van Kesteren, *comb. nov.*

Asteroma brassicae Chev., Fl. Gén. Env. Par. **1**: 449. 1826.

Phoma siliquastrum Desm. *in* Ann. Sci. nat. (Bot.), Ser. 3, **11**: 280. 1849.

Sphaeria (*Depazea*) *brassicae* Curr. *in* Trans. Linn. Soc. Lond. (Bot.) **22**: 334. 1859 ("Pers. in litt.").

Phyllosticta napi Sacc. *in* Michelia **1**: 532. 1879.

Phyllosticta brassicicola McAlp. *in* Bull. Victoria agric. Dep. 27. 1901 ("*brassicaecola*").

Phyllosticta brassicicola Grove *in* J. R. hort. Soc. **40**: 76. 1914.

Phyllosticta brassicina Sacc. *in* Ann. mycol., Berl. **11**: 16. 1913. — *Asteromella brassicina* (Sacc.) Rupprecht *in* Sydowia **13**: 11. 1959.

Misapplications. — *Phoma siliquastrum* Desm. *sensu* Henderson *in* Phytopathology **8**: 389, 390. 1918; *sensu* Cunningham *in* Bull. New Zeal. Dep. Agric. **133**: 38. 1927; *sensu* Grove, Brit. Coelomycetes **1**: 70. 1935 (= *Plenodomus lingam*, see this paper under *Leptosphaeria maculans*).

Depazea brassicae Curr. *sensu* Sacc., Syll. Fung. **3**: 38, 39. 1884, pro syn. (= *Plenodomus lingam*, see this paper under *Leptosphaeria maculans*).

Descriptions & illustrations. — Dring *in* Trans. Brit. mycol. Soc. **44**: 253–264. 1961 (both stages).

Specimens examined. — Berkeley herb. (*Sphaeria brassicae*; K); Desmazières, Pl. crypt. N. France Ed. 1, 119 (*Phoma siliquastrum*; PC; type); Desmazières, Pl. crypt. France Ed. 2, 95 (*Dothidea brassicae*; FI); Greville herb. (*Phyllosticta brassicae* "Pers. in litt."; E); Hooker herb. [*Phyllosticta brassicae* "Pers. in litt."; K; type of *Sphaeria* (*Depazea*) *brassicae* Curr.]; Persoon herb. (*Phyllosticta brassicae* "Moug. in hb. Pers."; L 910. 261–906); Roumeguère, Fungi gall. exs. in herb. Roussel (*Asteroma brassicae*; PC); Saccardo, Mycoth. ital. 1269 (*Phyllosticta brassicina*; PAD; type); Saccardo, Mycoth. ital. 1326 (*Phyllosticta napi*; PAD; type).

This fungus is the cause of a typical leafspot, known as Ringspot, of *Brassica* spp., especially of varieties of *Brassica oleracea*. Apart from the leaves all other aerial parts of the plant may be infected. For description of the disease symptoms, see Weimer (1926).

At first there appear on the spots little pycnidia which are to be characterized as spermagonia (Snyder, 1946; Dring, 1961). Later on perithecia develop. As these two stages often occur together on the spots, the connection between them has long been known.

The nomenclature of the perfect stage has recently been worked out by Dring (1961). We agree with the synonymy given, but cannot follow him as far as the author citation of the species is concerned. Dring, being aware of the fact that Oudemans and Lindau had independently transferred the species in the same year to *Mycosphaerella*, thought "the actual priority would be difficult to establish, as 'Engler & Prantl' bears no date other than '1897'." However, Oudemans published the recombination (which he ascribed to Johanson and subsequently to Johanson &

Magnus; see Oudemans, 1921) in March 1897. It is remarkable that Dring overlooked the indication "Gedruckt im Februar 1897" in Lindau's publication.

Duby named the species *Sphaeria brassicaecola* Fr. ined., which is the cause that herbarium material is often cited as *Sphaeria brassicaecola* Fr. However, Fries never described this species.

The identity of *Sphaeria brassicae* Dickson and *Sphaeria brassicae* Bolton with the sclerotial stage of *Typhula brassicae* (*Sclerotium semen*) is based on data of Vang (1945) and Fries (Syst. mycol. **2**: 249. 1822).

The identity of *Sphaeria brassicae* Klotzsch (see also Dring, 1961) is based on notes by Cl. Moreau and Nils Lunqvist on the holotype of *Sphaeria olerum* Fr. in Herb. E. Fries at Uppsala.

In phytopathological literature the imperfect stage of the present fungus is mostly called *Phyllosticta brassicicola*. However, it represents not a conidial stage but a spermatial one which should be placed in the form-genus *Asteromella* Pass. & Thüm. (type-species: *Asteromella ovata* Thüm., see Batista, Peres & Maia, 1960).

In old herbarium material the imperfect stage is often indicated as *Depazea brassicaecola* Fr., a name not found in literature and apparently derived from Duby's name of the perfect stage, *Sphaeria brassicaecola* Fr. ined., discussed above.

The synonymy of the imperfect stage is mainly based on the investigation of original herbarium material as listed above. As we had no opportunity to examine original herbarium material of *Asteroma brassicae* (not known to be in existence), *Phyllosticta brassicicola* McAlp., and *Phyllosticta brassicicola* Grove, we had to rely on original descriptions. In our opinion these names may also refer to the spermagonial stage of *Mycosphaerella brassicicola* which is completely in accordance with the views of other authors.

On the type material of *Phyllosticta napi* no fructifications have been observed (see also Dring, 1961), but in view of the symptoms and the description of this fungus it can be said with certainty that this name refers to the spermagional stage of *Mycosphaerella brassicicola*.

There is much confusion about the fungus described by Currey as *Sphaeria* (*Depazea*) *brassicae* Pers. in litt. This name has to be attributed to Currey. Examination of an original exsiccatum in the Herbarium at Kew shows that this name is based on material collected by Mougeot with his indication "*Phyllosticta brassicae* Pers. in litt." In Persoon's herbarium at Leyden and in Greville's herbarium at Edinburgh paratype material also collected by Mougeot is present. However, Persoon never described this stage. *Sphaeria brassicae* Curr. is inexactly cited in several books as *Depazea brassicae* Curr., but Currey mentioned *Depazea* in parentheses as he considered it a subdivision of the genus *Sphaeria*. Saccardo (Syll. Fung. **3**) supposed that *Phyllosticta brassicae* as described by Westendorp (*in* Bull. Acad. Belg. Cl. Sci. **10**: 397. 1851) was a new combination of Currey's *Sphaeria* (*Depazea*) *brassicae* (1859). The dates of publication, however, clearly show this to be impossible. Westendorp's name is based on and a name change of *Depazea brassicaecola* Desm. = *Plenodomus lingam* (Tode ex Fr.) Höhn.

LEPTOSPHAERIA MACULANS (Desm.) Ces. & De Not.

Sphaeria maculans Desm. *in* Ann. Sci. nat. (Bot.), Ser. 3, **6**: 77. 1846; not *Sphaeria maculans* Sow. *ex* Berk. & Br. *in* Ann. Mag. nat. Hist., Ser. 2, **9**: 378. 1852 [= *Phaeosphaeria sowerbyi* (Fuck.) Holm]. — *Leptosphaeria maculans* (Desm.) Ces. & De Not. *in* Comment. Soc. critt. ital. No. 4: 235. 1863. — *Pleospora maculans* (Desm.) Tul., Sel. Fung. Carp. **2**: 274. 1863.

Sphaeria napi Fuck., Exs. Fungi rhen. No. 895. 1864 (nomen dubium). — *Leptosphaeria napi* (Fuck.) Sacc., Syll. Fung. **2**: 45. 1883.

Pleospora napi Fuck., Symb. mycol. 136. 1870 [nomen dubium, fide Holm *in* Symb. bot. Upsal. **14** (3): 36. 1957].

MISAPPLICATIONS. — See discussion.

PYCNIDIAL STAGE: —

PLENODOMUS LINGAM (Tode ex Fr.) Höhn.

Sphaeria lingam Tode, Fung. Mecklenb. Sel. **2**: 51. 1791 (devalidated name). — *Sphaeria lingam* Tode *ex* Fr., Syst. mycol. **2**: 507, 508. 1823. — *Phoma lingam* (Tode ex Fr.) Desm. *in* Ann. Sci. nat. (Bot.), Ser. 3, **11**: 281. 1849. — *Plenodomus lingam* (Tode ex Fr.) Höhn. *in* S. B. Akad. Wiss. Wien (Math.-nat. Kl., Abt. I) **120**: 463. 1911.

Depazea brassicaecola Desm., Exs. Pl. crypt. N. France, Ed. 1 (Fasc. 4), No. 185. 1826. — *Depazea vagans* var. ("y") *brassicae* Kickx, Fl. crypt. Env. Louv. 125. 1835 (name change). — *Septoria brassicae* Westend. & Wall., Exs. Herb. crypt. Belge (Fasc. 6), No. 294. 1847 (name change). — *Phyllosticta brassicae* Westend. *in* Bull. Acad. Belg. Cl. Sci. **10**: 397. 1851 (name change).

Sclerotium sphaeriaeforme Lib., Exs. Pl. crypt. Ard. (Fasc. 3), No. 237. 1834.

Plenodomus rabenhorstii Preuss *in* Linnaea **24**: 145. 1851.

Aposphaeria brassicae Thüm. *in* Hedwigia **12**: 189, 190. 1880. — *Phoma brassicae* (Thüm.) Sacc., Syll. Fung. **3**: 119. 1884.

Phoma napobrassicae Rostrup *in* Tidsskr. Landøkon. **11**: 330. 1892. — *Phoma lingam* var. *napobrassicae* (Rostrup) Grove, Brit. Coelomycetes **1**: 70. 1935.

MISAPPLICATIONS. — *Polydesmus exitiosus* Kühn *sensu* Fuck., Symb. mycol. 136. 1870 (= p.p. *Alternaria brassicae*, fide Neergaard, Danish *Alternaria* and *Stemphylium* 218. 1945).

Phoma oleracea Sacc. *sensu* Ritzema Bos *in* Tijdschr. PlZiekt. **10**: 61. 1904; **11**: 106. 1905 and Z. PflKrankh. **16**: 269. 1906; *sensu* Henderson *in* Phytopathology **8**: 392. 1918, pro syn.; *sensu* Cunningham *in* Bull. New Zeal. Dep. Agric. **133**: 38, 39. 1927, pro syn.; *sensu* Nielsen *in* Tidsskr. Planteavl. **38**: 147. 1932, pro syn.; *sensu* Grove, Brit. Coelomycetes **1**: 70. 1935, pro syn. (= *Phoma herbarum* Westend., fide Boerema, 1964).

Phoma incrustans Sacc. *sensu* Höhn. *in* S. B. Akad. Wiss. Wien (Math.-nat. Kl., Abt. I) **118**: 890. 1909, pro syn. [= *Phomopsis incrustans* (Sacc.) Died., the imperfect stage of *Diaporthe incrustans* Nits., fide Wehmeyer, Genus *Diaporthe* 1933].

Sphaeria olerum Mougeot *sensu* Höhn. *in* S. B. Akad. Wiss. Wien (Math.-nat. Kl., Abt. I) **120**: 463. 1911, pro syn. [= *Pleurosordaria olerum* (Fr.) Lunqvist in manuscr., fide Herb. E. Fries in Uppsala, *Sphaeria olerum* Fr.].

Phoma siliquastrum Desm. *sensu* Henderson *in* Phytopathology **8**: 389, 390. 1918, pro syn.; *sensu* Cunningham *in* Bull. New Zeal. Dep. Agric. **133**: 38, 39. 1927, pro syn.; *sensu* Grove, Brit. Coelomycetes **1**: 70. 1935, pro syn. (= *Asteromella brassicae*, see this paper under the spermagonial stage of *Mycosphaerella brassicicola*).

DESCRIPTIONS & ILLUSTRATIONS. —

Perfect stage: Müller *in* Sydowia **4**: 244. 1950; Holm *in* Symb. bot. upsal. **14**: 36, 37. 1957.

Imperfect stage: Tode, Fung. Mecklenb. Sel. **2**: 51, pl. 16 fig. 126. 1791

(*Sphaeria lingam*); Ritzema Bos *in* Tijdschr. PlZiekt. **10**: pl. 2, 3 figs. 3–7. 1904 (*Phoma oleracea*); Diedicke *in* Ann. mycol., Berl. **9**: 138, pl. 8 figs. 1, 2. 1911 (*Phoma lingam, Plenodomus rabenhorstii*); Cunningham *in* Bull. New Zeal. Dep. Agric. **133**: 41, 42, figs. 28, 29. 1927 (*Phoma lingam*).

SPECIMENS EXAMINED. — Desmazières, Pl. crypt. N. France Ed. 1, 185 (*Depazea brassicaecola*; FI, PC, L; type); 1784 (*Sphaeria maculans*; PC; type); 1877 (*Phoma lingam*; PC); Funck, Cryptog. Gew. 379 (*Sphaeria lingam*; L); Jaap, Fungi sel. Exs. 541 (*Plenodomus rabenhorstii*; L); Libert herb. (*Sclerotium sphaeriaeforme*; BR; type); Libert, Pl. crypt. Ard., 237 (*Sclerotium sphaeriaeforme*; BR); Persoon herb. (*Sphaeria lingam*; L 910.267–174, –175, –179); Rostrup herb. (*Phoma napobrassicae*; CP; type); Saccardo, Mycoth. ven. (*Leptosphaeria napi*; PAD); Sydow, Mycoth. germ. 1123 (*Plenodomus lingam*; PAD); Westendorp herb. (*Phyllosticta brassicae*; BR); Westendorp & Wallays, Herb. crypt. belge 294 (*Septoria brassicae*; BR).

This fungus causes leafspots, lesions and discolorations on the stems, siliquas and 'bulbs' of *Brassica* spp. The disease is known as Dryrot and Canker or Black leg and occurs especially on turnip, swede, broccoli and cabbage. For description of the disease symptoms see Henderson (1918), Cunningham (1927), and Buddin (1934).

The conspecificity of the perfect and imperfect stages has already been recorded as probable in much of the old systematic literature. In Switzerland, Müller and Tomaševič (1957) were able to prove this connection by single ascospore isolations. It had already been proved in 1956 by Smith in New Zealand who identified the perfect stage at first as *Leptosphaeria napi* (nomen dubium). Recently the connection between the perfect and imperfect stages has been established in England (written information of Dr. B. C. Sutton, IMI).

When one consults the systematic literature concerning the perfect stage (see among others Müller, 1950 and Holm, 1957), the general opinion appears to be that apart from *Brassica* spp. the fungus also inhabits other Cruciferae. The data, however, are often conflicting and doubtful, as is seen from the following account.

In the synonymy of *Leptosphaeria maculans* Müller (1950) cited also *Leptosphaeria cylindrospora* Auersw. & Niessl ex Sacc. on *Chamaerion angustifolium* and *Epilobium* species. According to Holm (1957), however, *L. cylindrospora*, differs clearly from *L. maculans* by the ascospores being 4-septate instead of 5-septate. *Leptosphaeria alliariae* (Auersw.) Rehm described from *Alliaria officinalis* is cited as a synonym of *L. maculans* both by Müller and Holm. The latter, however, mentions that the fungus occurring on *Alliaria* is of a distinct type with "des spores plus petites et un peu plus grossières," so *L. alliariae* seems to be a distinct species. Holm also mentions *Leptosphaeria virginica* (Cooke & Ellis) Sacc. as a synonym albeit with a question mark.

In view of the above contrarieties and uncertainties we have not reported these names and their basionyms in the synonymy. In our opinion we shall only be able to solve these questions after comparative infection trials and a comparative study of the imperfect stages. In connection with this it is worth noting that Müller and Tomaševič (1957) found pycnidia of the *Camarosporium*-type in addition to pycnidia of the *Plenodomus* (= *Leptophoma*)-type in a culture of a fungus, which they identified as *L. maculans* and isolated from *Artemisia campestris*. The former type, however, has never been observed in the life history of the fungus parasitizing *Brassica* spp. Indeed, Dr. E. Müller informed us that in his opinion it is just possible that only one specialized form of *L. maculans* parasitizes *Brassica* spp.

Leptosphaeria napi (Fuck.) Sacc. mentioned above in the synonymy of the perfect stage is to be characterized as a nomen dubium. Holm (l.c.) stated that the type material of this fungus is absolutely identical with *L. maculans*. However, in the description of *L. napi* 6–10–celled spores are mentioned whereas *L. maculans* always has 6–celled spores. See also Winter (1887). Neergaard (1945) mentions *Leptosphaeria exitiosa* Rostrup ["(Kühn) Rostrup"] as a synonym of *L. napi*. The description of *L. exitiosa* given by Rostrup (1902) makes it clear that this is incorrect.

The imperfect stage of *Leptosphaeria maculans* is mostly regarded as a member of the form-genus *Phoma* Sacc. and called *Phoma lingam*. With regard to the vague original description of that genus this looks correct. However, comparison with the type-species of the genus *Phoma* (*P. herbarum* Westend.; see Boerema, 1964) shows this to be a pycnidial stage with quite different characteristics. First a description of the imperfect stage of *L. maculans* is given.

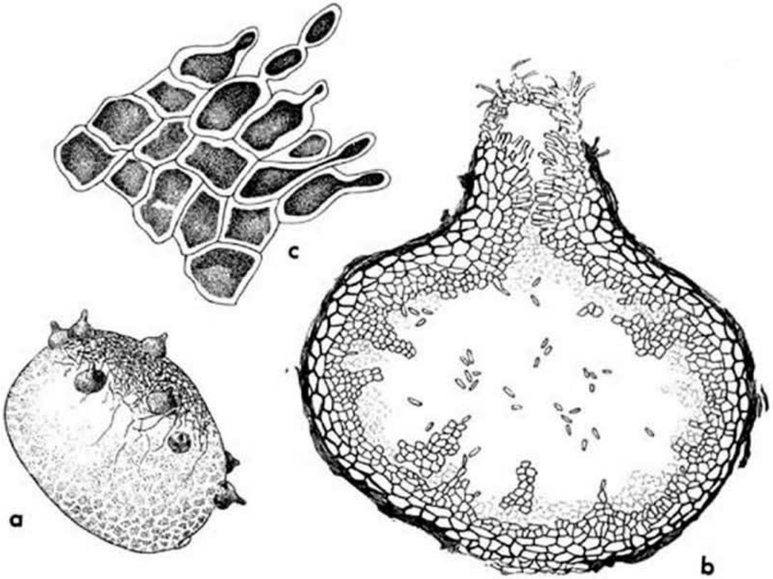

Fig. 1. *Leptosphaeria maculans* (Desm.) Ces. & De Not., stat. con. *Plenodomus lingam* (Tode ex Fr.) Höhn.: the 'normal' pycnidial phaenotype (type I). — a. Habitus on cabbage seed (× 16). — b. Vertical section (× 225, somewhat simplified). — c. Detail of wall structure and origin of the spores (× 2300).

In vivo the imperfect stage shows a variable habit apparently depending on the season (different phaenotypes). The pycnidia *in vitro* generally resemble those associated with spots on living leaves, siliquas, stems and 'bulbs' of *Brassica* spp. in summer (Fig. 1). The primordium of this type of pycnidium, which also occurs on the seeds (Fig. 1a), arises by the simple or compound meristogenous method (Kempton, 1919).[1]

In the gradually enlarging pseudoparenchymatic mass soon one or more cavities develop, filled with spores embedded in a gelatinous matrix. These cavities evidently originate by histolysis of the central cells (lysigenetic origin, cf. Dodge, 1923). The origin of the first spores is not clear. Probably they are of endogenous origin (Klebahn, 1933). The fruit-bodies remain long closed. The opening is formed toward the end of the growing process (Cunningham, 1927) and is preceded by rapid cell divisions at the top of the fruit-body. As a result a papilla develops which often grows out into a long cylindrical neck (Fig. 1a). Sometimes several papillae occur on one fruit-body. The central cells of the papillate beak gradually disintegrate, thus providing a narrow passage-way. In contrast with the predetermined opening or *ostiole* of the form-genus *Phoma* (Boerema, 1964), this opening may be called a *porus*. The cells lining the cavity in the papilla or neck mostly bud into short hyphae (Fig. 1b) which usually desintegrate, so that in a fully mature fruit-body little of them remains (cf. Dodge, 1923: 753). They are homologous with periphyses (Cunningham, 1927).

The peridium of a mature pycnidium consists of an outer and an inner wall and is made up of several cell layers. The outer wall shows three or four layers of relatively large, somewhat dark-walled cells which gradually pass into the smaller hyaline cells of the inner wall. These cells are somewhat radially arranged and their contents generally show a striking colour when stained with cotton blue. This layer varies considerably in thickness and sometimes series of cells stretch into the centre of the pycnidium (Fig. 1b), which makes the pycnidia sometimes seem divided into several loculi (Cunningham, 1927). The spores filling the whole cavity of the mature pycnidium arise directly from the meristematic hyaline cells (Fig. 1c). They are produced by budding, not only of the cells lining the cavity but also of more deeply situated cells. The latter form long narrow protuberances on which the spores are produced. This process of spore-forming may be referred to as *murogenous* (Luttrell, 1963) in contrast with the *porogenous* origin of the spores in the type species of the form-genus *Phoma* (Boerema, 1964).

The pycnidia described above are in phytopathological literature designated as type I (Henderson, 1918; Cunningham, 1927).

The imperfect stage of the fungus may occur in a different phase on dead over-wintered cabbage stems and mummified swede 'bulbs' and the like (Fig. 2). Generally this consists of relatively big pycnidia with a thick wall, indicated in phytopathological literature as type II (Henderson, 1918; Cunningham, 1927). This type originates from a pycnidium of type I (Cunningham, 1927), through the formation of a thick layer of typically sclerenchymatous cells between the large dark-coloured outer cells and the small hyaline meristematic cells. The shape of the thick-walled pycnidia is variable, sometimes turban-like (Fig. 2a). The elongated top with porus is not so striking as in the case of type I on account of the thick wall. At the base of the fruit-body the sclerenchymatous cells, arranged in the shape of a fan, clearly originate from the substrate (Fig. 2b).

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[1] It should be noted that Calvert & Pound (1949) by pairing two distinct types of the fungus obtained in the merger zone between the colonies a heavy line of "conjuncture" pycnidia which in their opinion were of symphogenous origin.

Sclerenchymatous cells sometimes also develop in immature pycnidia of type I which have not yet developed a porus. This results in a relatively big pycnidium, completely closed in the beginning, but rupturing irregularly without a definite porus (Fig. 3a).

Sclerenchymatous cells may also occur in pycnidial knots in which a distinct cavity is not yet present, giving rise to a sterile body, the *pycno-sclerotium* (Fig. 3a), the centre of which often shows a dish-shaped zone of small-celled tissue (Fig. 3b).

Incidentally, sclerotioid bodies with or without spore formation are also found to develop *in vitro* (Pound, 1947, isolate s39).

Finally it should be noted that in the development of the sclerenchymatous cells the pycnidia of type II resemble the perfect stage, which in fact has the same wall texture (Holm, 1957: 37).

The above description of the development of the imperfect stage of *Leptosphaeria maculans* clearly indicates that this state cannot belong to the form-genus *Phoma*

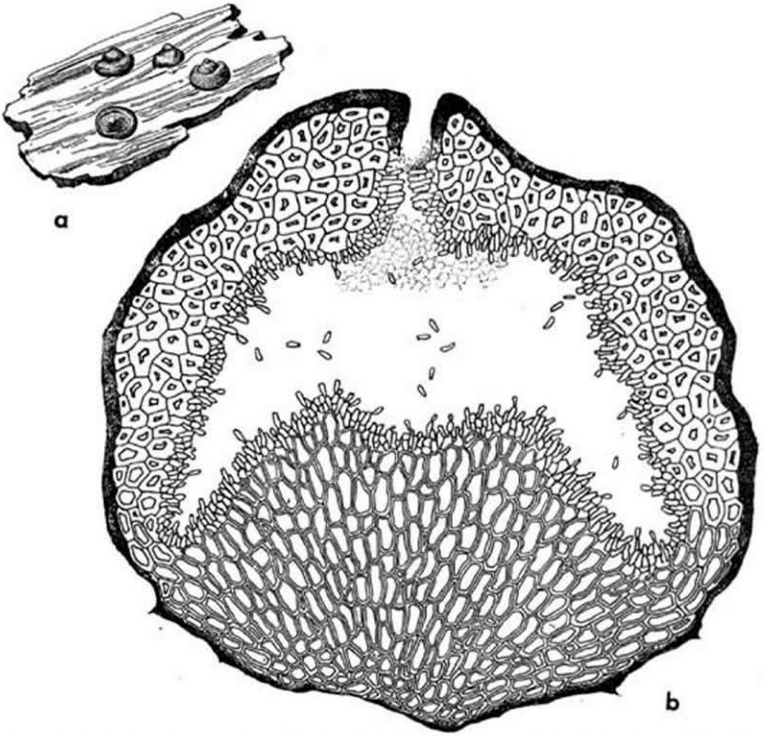

Fig. 2. *Leptosphaeria maculans* (Desm.) Ces. & De Not., stat. con. *Plenodomus lingam* (Tode ex Fr.) Höhn.: the 'sclerenchymatous' pycnidial phaenotype (type II). — a. Surface view on dead cabbage stem (× 11). — b. Vertical section (× 225, somewhat simplified).

Sacc. (cf. Boerema, 1964). However, it fits the form-genus *Plenodomus* Preuss and agrees with the type species, *P. rabenhorstii* Preuss. The original description of this species concerns the closed sclerotioid form where spores are liberated by rupture of the fruit-body. Later, Preuss (1862) included in the description the sclerotioid pycnidial form where the spores are set free through a porus. Of course, a name given to a certain phaenotype of a fungus imperfectus must also be applied to other phaenotypes of the same stage. Thus, the name *P. rabenhorstii* also fits the non-sclerotioid phaenotype of this stage.

The current name for this stage, *Phoma lingam*, was also first applied to the sclerotioid form (with and without a distinct porus) and not to the non-sclerotioid form. This follows from Tode's description and the figures of *Sphaeria lingam*.

That *Plenodomus rabenhorstii* and *Sphaeria lingam* were synonymous was proved independently by Diedicke (1911) and von Höhnel (1911). It was Diedicke who studied the original material of *Plenodomus rabenhorstii*. It is a pity that this type material (Botanisches Museum Berlin) was lost during the last war. The combination *Plenodomus lingam* published by von Höhnel is in our opinion the correct name for the imperfect stage of *Leptosphaeria maculans*.

The original description of the genus *Plenodomus* did not cover the whole range of phaenotypes of the type species. Also the additional descriptions by Diedicke (1911) and Bubák (1915: 29) did not complete the picture especially because these authors did not mention the non-sclerotioid form. However, for the time being we do not intend to improve this description. In our opinion it is necessary to have more information on related species of *Plenodomus* before a diagnosis can be made. It is also necessary to consider the generic characters and differences from related genera of the Sphaeropsidales.[2]

Original material of the synonyms of the imperfect stage was examined with the exception of *Aposphaeria brassicae* Thüm., of which no material was available. However, the description of *Aposphaeria brassicae*, as given by Saccardo (*Phoma brassicae*), clearly indicates that this refers to the imperfect stage of *Leptosphaeria maculans*. This is in accordance with the opinion of other authors (Henderson, 1918; Cunningham, 1927).

The synonym *Depazea brassicicola* ("*brassicaecola*") was described for the non-sclerotioid stage as it occurs on leaves of cabbage (type I). This explains why the author of this name, Desmazières, described the same fungus imperfectus a second time as *Phoma lingam* (sclerotioid, type II) 23 years later. We confirmed this by comparison of the type material of *Depazea brassicicola* and Desmazières' material of *Phoma lingam*. The synonym *Depazea brassicicola* was redescribed by Belgian authors successively as a variety of *Depazea vagans* (Kickx); a *Septoria* species (Westendorp &

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[2] Some later synonyms exist of the genus *Plenodomus* Preuss, e.g. *Leptophoma* Höhn. [*in* S.B. Akad. Wiss. Wien (Math.-nat. Kl., Ab. I) **124**: 73. 1915]. The type species of this genus, *Leptophoma acuta* (Fuck.) Höhn. [= *Phoma acuta* Fuck., the imperfect stage of *Leptosphaeria acuta* (Fuck.) Karst.], shows the same characters as *Plenodomus lingam*. In 1918 von Höhnel also came to this conclusion (see also Petrak, 1921: 192, and 1924: 101).

Wallays) and a *Phyllosticta* species (Westendorp). In the descriptions they changed the specific epithet "*brassicaecola*" to "*brassicae*". We also confirmed this by comparing their original material with that of Desmazières. However, it seems that the Belgian synonyms are often misused for the spermagonial stage of *Mycosphaerella brassicicola* as appears from exsiccata in various herbaria. The main reason of this error might be that Saccardo in his "Sylloge Fungorum" erroneously indicated *Phyllosticta brassicae* Westend. as a transfer of *Sphaeria brassicae* Curr. instead of *Depazea brassicicola* (*Sphaeria brassicae* Curr. is a synonym of the spermagonial stage of *Mycosphaerella brassicicola*, which see above).

It may be remarked that *Sclerotium sphaeriaeforme* is based on the pycnosclerotial phaenotype of the imperfect stage. This was already mentioned by Desmazières in his description of *Phoma lingam*.

The misapplication of the name *Phoma incrustans* as a synonym of *Plenodomus rabenhorstii* by von Höhnel (1909) was later on redressed by himself (von Höhnel, 1911; cf. Diedicke, 1911).

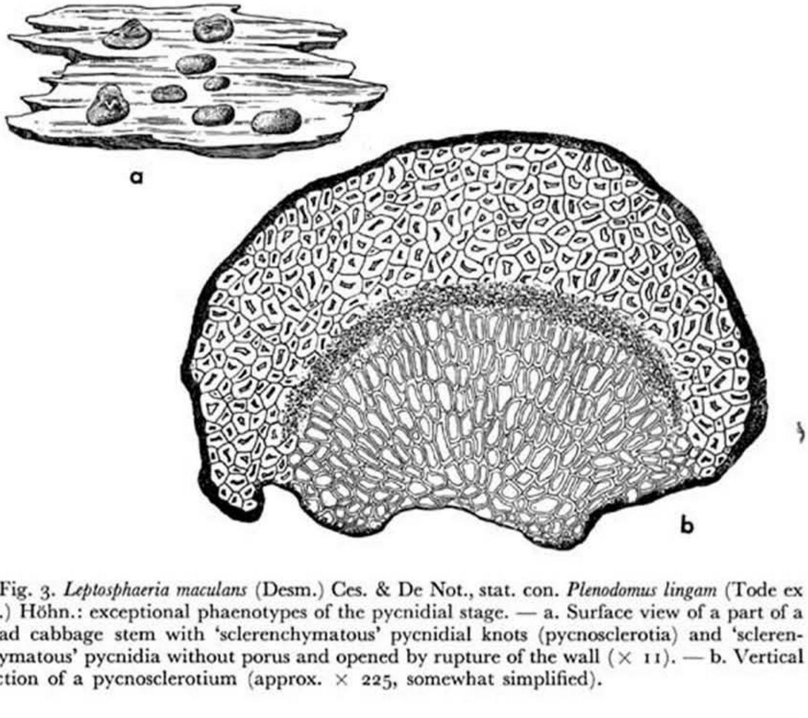

Fig. 3. *Leptosphaeria maculans* (Desm.) Ces. & De Not., stat. con. *Plenodomus lingam* (Tode ex Fr.) Höhn.: exceptional phaenotypes of the pycnidial stage. — a. Surface view of a part of a dead cabbage stem with 'sclerenchymatous' pycnidial knots (pycnosclerotia) and 'sclerenchymatous' pycnidia without porus and opened by rupture of the wall (× 11). — b. Vertical section of a pycnosclerotium (approx. × 225, somewhat simplified).

Finally it should be noted that *Phoma oleracea*, a synonym of *Phoma herbarum* (see also under misapplications) which is of general occurrence as a saprophyte on the seedcoats of *Brassica* spp., has often been mistaken for *Plenodomus* (*Phoma*) *lingam*.

This investigation was made possible thanks to the help of the directors of the herbaria at Brussels, Edinburgh, Firenze, Kew, Leyden, Padova, and Paris. Dr. R. W. G. Dennis, Kew, kindly corrected the English text. All figures were made by Mr. A. S. J. Noordijk, artist to the Netherlands Plant Protection Service.

References

Batista, A. Ch., Peres, G. E. P. & Maia, H. da Silva (1960). Revisão de alguns fungos do gênero *Asteromella*. *In* Saccardoa **1**: 17–24.

Boerema, G. H. (1964). *Phoma herbarum* Westend., the type-species of the form-genus *Phoma*. *In* Persoonia **3**:9-16.

Bubák, F. (1915). Neue Pilze aus Mähren. *In* Ann. mycol., Berl. **13**: 26–34.

Buddin, W. (1934). The canker and the dry rot diseases of swedes. *In* Bull. Minist. Agric., Lond. **74**.

Calvert, O. H. & Pound, G. S. (1949). Stimulated pycnidium production and symphogenous pycnidia in *Phoma lingam*. *In* Phytopathology **39**: 848–857.

Cunningham, G. H. (1927). Dry-rot of swedes and turnips: its cause and control. *In* Bull. New Zeal. Dep. Agric. **133**.

Diedicke, H. (1911). Die Gattung *Plenodomus* Preusz. *In* Ann. mycol., Berl. **9**: 137–141.

Dodge, B. O. (1923). Origin of the central and ostiolar cavities in pycnidia of certain fungous parasites of fruits. *In* J. agric. Res. **23**: 743–759.

Dring, D. M. (1961). Studies on *Mycosphaerella brassicicola* (Duby) Oudem. *In* Trans. Brit. mycol. Soc. **44**: 253–264.

Henderson, M. P. (1918). The black-leg disease of cabbage caused by *Phoma lingam* (Tode) Desmaz. *In* Phytopathology **8**: 379–431.

Höhnel, F. von (1909). Fragmente zur Mykologie VII (343): Über *Plenodomus Rabenhorstii* Preuss. *In* S. B. Akad. Wien (Math.–nat. Kl., Abt. I) **118**: 889–891.

—— (1911). Fragmente zur Mykologie XIII (713): Über *Leptosphaeria maculans* (Desm.) und *Sphaeria lingam* Tode. *In* S. B. Akad. Wiss. Wien (Math.–nat. Kl., Abt. I) **120**: 458–463.

—— (1918). Ueber die Gattung *Leptosphaeria* Ces. et de Not. *In* Ber. dtsch. bot. Ges. **36**: 135–140.

Holm, L. (1957). Etudes taxonomiques sur les Pléosporacées. *In* Symb. bot. Upsal. **14** (3).

Kempton, F. E. (1919). Origin and development of the pycnidium. *In* Bot. Gaz. **68**: 233–261.

Klebahn, H. (1933). Ueber Bau und Konidienbildung bei einigen stromatischen Sphaeropsideen. *In* Phytopath. Z. **6**: 229–304.

Luttrell, E. S. (1963). Taxonomic criteria in *Helminthosporium*. *In* Mycologia **55**: 643–674.

Müller, E. (1950). Die schweizerischen Arten der Gattung *Leptosphaeria* und ihrer Verwandten. *In* Sydowia **4**: 185–319.

—— & Tomaševič, M. (1957). Kulturversuche mit einigen Arten der Gattung *Leptosphaeria* Ces. et de Not. *In* Phytopath. Z. **29**: 287–294.

Neergaard, P. (1945). Danish species of *Alternaria* and *Stemphylium*. Copenhagen.

Oudemans, C. A. J. A. (1921). Enumeratio systematica Fungorum **3**.

Petrak, F. (1921). Mykologische Notizen III (124): Über *Sphaeronema senecionis* Syd. *In* Ann. mycol., Berl. **19**: 191–192.

—— (1924). Mykologische Notizen VII (354): Übersicht und Kritik der bisher bekannten Sclerophomaceen Gattungen. *In* Ann. mycol., Berl. **22**: 87–104.

Pound, G. S. (1947). Variability in *Phoma lingam*. *In* J. agric. Res. **75**: 113–133.

PREUSS, C. G. T. (1862). *In* Sturm, Deutschl. Fl., Abt. III, Pilze Deutschl. **6**. Halle.

ROSTRUP, E. (1902). Plantepatologi. Haandbog i Laeren om Plantesygdomme for Landbrugere Havebrugere og Skovbrugere. København.

SMITH, H. C. (1956). *Leptosphaeria napi*, the perithecial form of *Phoma lingam* causing dry-rot disease of Brassicas. *In* New Zeal. Sci. Rev. **14**: 116–117.

SNYDER, W. C. (1946). Phytopathological notes. Spermagonia versus pycnidia in *Mycosphaerella brassicicola*. *In* Phytopathology **36**: 481-484.

VANG, J. (1945). *Typhula* species on agricultural plants in Denmark. *In* K. VetHøjsk. Aarsskr. **1945**: 1–46.

WEIMER, J. L. (1926). Ringspot of crucifers caused by *Mycosphaerella brassicicola* (Fr.) Lindau. *In* J. agric. Res. **32**: 97–132.

WINTER, G. (1887). *In* KryptFl. Deutschl., Ed. 2, **1** (2).

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REMARKS ON THE GENUS HYMENOSCYPHUS S. F. GRAY, WITH OBSERVATIONS ON SUNDRY SPECIES REFERRED BY SACCARDO AND OTHERS TO THE GENERA HELOTIUM, PEZIZELLA OR PHIALEA

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(With 57 Text-figures)

The author proposes to replace the generic name *Helotium* Pers. ex. St. Amans, revived by Fries in 1849, by *Cudoniella* Sacc. but to transfer most of the species commonly assigned to the genus to *Hymenoscyphus* S. F. Gray. Eighty-four species referred to genera of Helotiaceae by Saccardo and others are discussed in the light of the types or other authentic material. Finally there is appended a list of 102 accepted species, distributed in *Cudoniella* (3), *Hymenoscyphus* (77 arranged in 7 series), *Ciboriella* (3), *Phaeohelotium* (2), *Sphagnicola* (5), *Discinella* (4) and *Ciboriopsis* (8).

Donk (1962) has pointed out that the commonly accepted ascomycete genus *Helotium* Fr. 1849 is a later homonym of *Helotium* Tode ex Leman 1821, a genus of Agaricales accepted by Fries (Systema mycologicum **3**: 94. 1832). Donk suggested the desirability of conserving the name *Helotium* for the ascomycete genus of 1849 but there seems to be little justification for such a proposal. The latter genus has to be typified by *Helvella acicularis* Bull. and Boudier long ago indicated the desirability of segregating this from the great majority of species referred by authors to *Helotium* Fr. Instead of attaching the latter name to its type species, however, Boudier transferred the latter to the later genus *Cudoniella* Sacc., a procedure which becomes acceptable once *Helotium* Fr. 1849 is rejected as a later homonym. Evidently, however, for those who follow Boudier another generic name is required for the large residue of the old ascomycete genus *Helotium* and Dennis (1962) suggested this could be found in *Hymenoscyphus* S. F. Gray 1821.

The latter genus, which Gray did not ascribe to any earlier author, was proposed with nine species, several of them apparently arbitrarily renamed by himself, thus:

1. *H. rapaeformis* = *Peziza rapula* Pers. = *Stromatinia rapulum* (Bull. ex Fr.) Boud. the type species of *Stromatinia* Boud.
2. *H. fibulaeformis* = *Helvella fibuliformis* Bolt., a dubious species, probably *Vibrissea truncorum* A. & S. ex Fr. according to Nannfeldt (*in* Trans. Brit. mycol. Soc. **23**: 247. 1939).
3. *H. tubaeformis* = *Peziza tuba* Bolt., also a dubious species but interpreted as a "*Helotium*" by Rehm and by Boudier.

4. *H. infundibuliformis* = ?*Peziza infundibulum* Batsch = *P. calyculus* Sow. = *Helotium calyculus* (Sow. ex Fr.) Fr. = *Hymenoscyphus infundibulum* (Batsch) O.K.
5. *H. fructigenus* = *Peziza fructigena* "Sow.", "Pers." = *Helotium fructigenum* (Bull. ex Mérat) Fuck.
6. *H. radiatus* = *Peziza coronata* Bull., *P. radiata* Pers. etc. = *Cyathicula coronata* (Bull. ex Mérat) De Not., lectotype of *Cyathicula* De Not.
7. *H. cyathoideus* = *Peziza cyathoidea* Bull. = *Phialea cyathoidea* (Bull. ex Mérat) Gillet, lectotype of *Phialea* (Fr.) Gillet.
8. *H. tenellus* = *Peziza tenella* Batsch, probably a synonym of the above.
9. *H. chrysocomus* = *Peziza chrysocomus* "Sow.", generally interpreted as an *Orbilia*.

In selecting a lectotype for *Hymenoscyphus* it is obviously desirable to avoid numbers 1, 6 and 7, already employed as type species of other generic names; number 8 is to be avoided on similar grounds. Number 2 is of uncertain interpretation but its adoption might lead to *Hymenoscyphus* being rejected as a synonym of *Vibrissea*, a genus accepted by Fries in Systema mycologicum volume 2, 1822. Number 9 is also dubious and its adoption might lead to *Hymenoscyphus* replacing the long accepted name *Orbilia* Fr. 1835. This leaves for consideration numbers 3, 4 and 5, a homogeneous group of species, all referred to the same genus, *Helotium*, by most modern authors.

Fries [Systema mycologicum **2** (1): 117. 1822] used the name Hymenoscyphae for his Tribus IX of Series 3, Phialia, in his comprehensive genus *Peziza*. The tribus included 33 species, of which number 5 was *P. fructigena* Bull., under which *P. calyculus* Sow. was cited as a synonym. It would seem desirable, therefore, to select one of these two species as lectotype of *Hymenoscyphus* S. F. Gray and of Fries' tribus Hymenoscyphae and Dennis (1962) proposed *P. fructigena*. This has the advantage of being a wellknown fungus not subject to diverse interpretation in the past and apparently also familiar to Gray, since he noted for it a popular use, "Used in decoction in hooping cough."

Phillips (1887), in reviving *Hymenoscyphus*, as "*Hymenoscypha* Fr.", recognised four subgenera:

Sclerotinia with seven species.
Ciboria with twelve species. .
Trichoscypha with one species, *Cyathicula coronata*.
Cyathoidea with thirty species.

If it can be avoided it is undesirable to select a lectotype for *Hymenoscypha* (Fr.) Phill. from among the species of the first three subgenera, all long since raised to generic rank, and it is satisfactory to find that *H. fructigenus* and *H. calyculus* both occur in subgenus *Cyathoidea*.

O. Kuntze (1898) recognised *Hymenoscyphus* Nees 1817, S. F. Gray 1821, accepting as belonging to it Gray's species 3 [as *H. tuba* (Bolt.) Phill.], 4 [as *H. infundibulum* (Batsch) O.K.], 5, 7 [as. *H. solani* (Pers.) O.K.] and 8.

Peziza fructigena would appear to be an acceptable lectotype for *Hymenoscyphus* as interpreted by all the above authors. There is, however, a rival interpretation, that of Schroeter (1893) and in Engler & Prantl (1896). For him *Hymenoscypha* Fr. is a genus distinct from *Helotium* Fr., "Meist auf Pflanzenteilen vorkommende, winzige Pilze von heller Farbe, die sich durch das häutige Fruchtgehäuse von *Helotium* unterscheiden". As such it comprised two subgenera, *Pezizella* Fuck. and *Phialea* Fr. and the only one of S. F. Gray's nine foundation species retained in it was *H. cyathoidea* "(Bull.) Phill." The author citation shows that Schroeter was unaware of Gray's genus and his action can, therefore, scarcely be taken as implying selection of this species as lectotype for the genus of 1821.

I propose here to accept *Peziza fructigena* as lectotype of *Hymenoscyphus* S. F. Gray and to transfer to that genus the majority of the species referred to *Helotium* by Dennis (1956) and in subsequent papers dealing with the Helotiaceae of tropical America, Australia, New Zealand etc.

Before any real progress can be made in ascomycete taxonomy it is necessary to discover the structure and systematic position of the very numerous species left to encumber the literature by nineteenth century authors who published names without adequate descriptions or figures. Attempts to redispose these species without reexamination of the types, as made by Boudier (1907) and Seaver (1951) have led to the wildest errors, involving confusion between families within the Helotiales and even confusion between operculate and inoperculate ascomycetes. Only when the structure of a high proportion of the named species is known will one be in a position to assess the validity of the genera already proposed and the reality of the discontinuities between them. An important contribution to this end was made by Massee (1897, 1901) in two papers on species earlier published by Berkeley. Massee's work was most reliable and only in a few instances have I been led to disagree with him, notably in regard to *Helotium agaricicola* and *H. rufocorneum*. In interpreting apothecial structure I have had the advantage of a freezing microtome to cut accurate sections, whereas Massee had to depend on crushed mounts or hand sections.

The following notes relate to type or authentic material in Kew herbarium, with the addition of a number of species borrowed from other herbaria, notably those of New York and Stockholm, which I have had an opportunity of examining in recent years. Even so the true affinities of many species with a light coloured pseudoparenchymatous excipulum are still far from clear. Nannfeldt (1932) declined to assign places in his system to several genera with this kind of structure and the suggestions made below for the disposition of such species must, therefore, be treated as more than usually tentative and subject to revision.

Dasyscyphus aconiti (Rehm) Dennis, *comb. nov.*—Fig. 1

Pezizella aconiti Rehm *in* Ber. naturh. Ver. Augsburg **26**: 43. 1881 (basionym). — *Pezizella rehmii* Sacc., Syll. Fung. **8**: 282. 1889.

Apothecia scattered, superficial, about 0.5 mm diameter, disc flat, pinkish especially when dry, receptacle cupulate, yellowish, with downy white hairs especially towards the incurved margin. Hairs cylindrical to clavate, up to 20 × 5–6 μ, thin-walled, hyaline, finely granulate, nonseptate; asci cylindric-clavate, 50–60 × 6–7 μ, 8-spored, the pore blued by Melzer's reagent; ascospores biseriate, narrowly elliptic-cylindric, 11–13 × 2–2.5 μ, nonseptate; paraphyses cylindrical with pointed tips, 2–2.5 μ wide and often about 5 μ longer than the asci.

On dead stems of *Aconitum napellus*, Dzurowa, near Teplicska.

The species is allied to *D. grevillei*, common on umbelliferous stems, but apparently distinct in its larger asci and ascospores (compare with Fig. 23).

There was an earlier *Peziza aconiti* Sauter apud Rabenhorst (Deutschl. Kryptog.-Fl. **1**: 344. 1844) which Saccardo (Syll. Fung. **8**: 290. 1889) wished to transfer to *Pezizella*. He accordingly printed for this the combination *Pezizella aconiti* (Sauter) Sacc. and renamed Rehm's fungus *Pezizella rehmii* Sacc. but by the existing rules of nomenclature *P. aconiti* (Sauter) Sacc. is a later homonym of *P. aconiti* Rehm and *P. rehmii* Sacc. is a superfluous name. On page 425 of the same volume of the Sylloge Saccardo combined Sauter's fungus name a second time in *Trichopeziza* as *T. aconiti* (Sauter) Sacc. Winter (*in* Hedwigia **20**: 134. 1881) commented thus: "*Peziza aconiti* Sauter, schon in Rabenhorst's Deutschlands Kryptogamenflora 1. pag. 344 beschrieben, ist eine *Pyrenopeziza* im Sinne Fuckel's. Asci anguste clavati, 70–75 μ longi, 5 μ lati; Sporae 8, inordinatae, oblongo-fusoideae, hyalinae, 7–11 μ longae, 1.5 μ crassae". It would seem that in combining the epithet "*aconiti* Sauter" twice over Saccardo intended to dispose of two different interpretations of the name but both are ascribed to Sauter and it was under the *Trichopeziza* that he cited Sauter's original collection.

Phaeociboria agaricicola (Berk. & Br.) Dennis, *comb. nov.*—Fig. 2

Helotium agaricicola Berk. & Br. *in* J. Linn. Soc. (Bot.) **14**: 107. 1873 (basionym). — *Bulgaria agaricicola* (Berk. & Br.) Massee *in* J. Linn. Soc. (Bot.) **31**: 474. 1896.

The diagnosis reads simply: "Cupulis breviter stipitatis, extus pulverulentis; hymenio vinoso; sporidiis uniseriatis cymbiformibus pallide fuscis (no. 13). On decaying Agarics. Peradeniya, Nov. 1867." The apothecia are 1–2.5 mm across, with a flat disc and shallow receptacle seated on a short cylindrical stalk. Massee thought there was an "hypothecium and excipulum composed of slender, violet-tinged, intricately interwoven hyphae which appear to be imbedded in mucilage when moist." My impression is different. The excipulum is formed of parallel hyphae 5–6 μ wide, with very delicate reddish-brown walls, lying at a low angle to the surface, while the flesh is composed of similar but less regularly arranged hyphae without a gelatinised matrix. If this is correct the fungus is not a *Bulgaria*. The asci are narrowly cylindric, 90 × 6 μ, 8-spored, with a rather flat apex and

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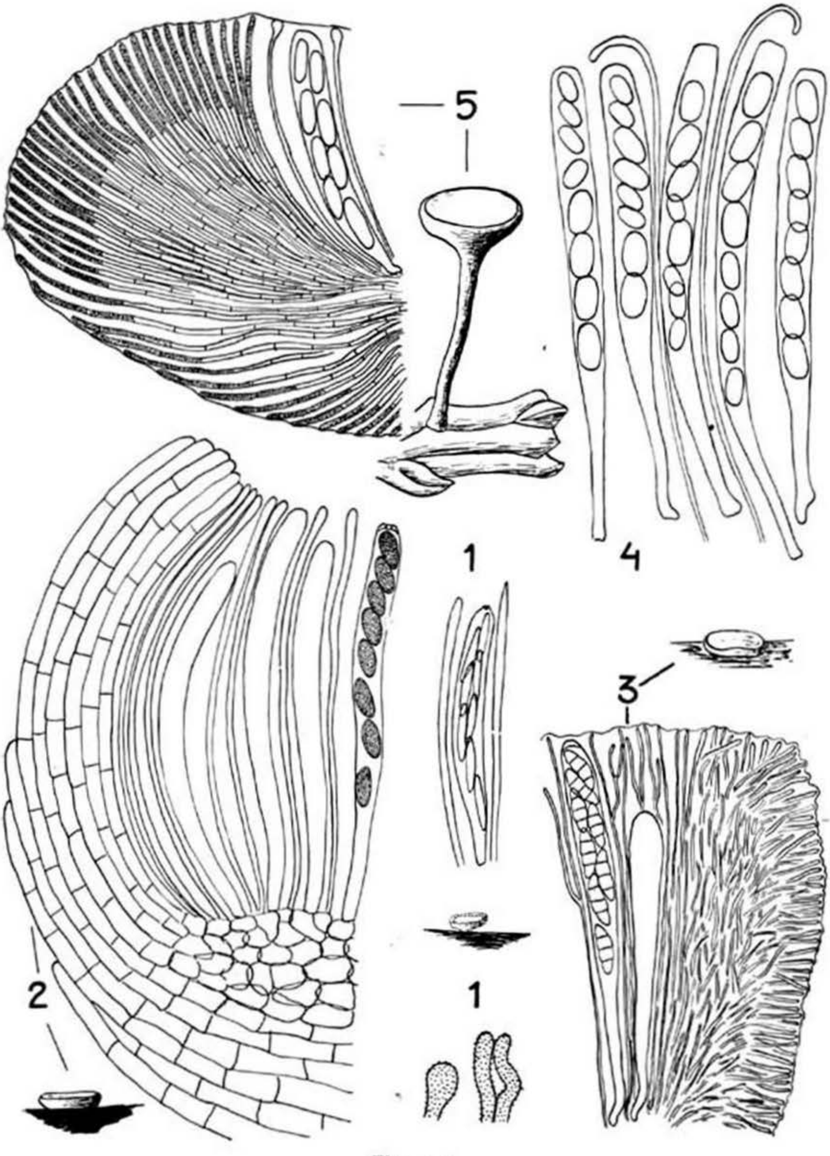
EXPLANATION OF FIGURES 1–5

Figs. 1–5. — 1. *Dasyscyphus aconiti*. Habit sketch (× 20), ascus, paraphysis and hairs (× 660). — 2. *Phaeociboria agaricicola*. Habit sketch (× 20), section (× 660). — 3. *Helotium albovirens*. Habit sketch (× 20), section (× 660). — 4. *Octospora alutacea*. Asci and paraphyses (× 660). — 5. *Chloroscypha alutipes*. Habit sketch (× 20), section (× 660).



Figs. 1–5

a pore outlined blue by Melzer's reagent; ascospores uniseriate, elliptical, 8–11 × 3.5–5 μ, brown; paraphyses cylindrical, obtuse, 2 μ thick.

HELOTIUM ALBOVIRENS Cke.—Fig. 3

Helotium albovirens Cke. *in* Bull. Buffalo Soc. nat. Sci. **2**: 299. March 1875.

Apothecia superficial, scattered, discoid, 0.5–1 mm diameter, pale gray-green when soaked up, black when dried, with a thin basal pad of whitish hyphae. Flesh gelatinous throughout, excipulum formed of slender undulating hyphae, almost at right angles to the surface except at the margin, where they turn up to become more or less parallel with the hymenial elements. Asci cylindric-clavate, 85 × 8 μ, 8-spored, apex not blued by Melzer's reagent; ascospores biseriate, fusoid, 3-septate and slightly constricted at the septa, hyaline, 11–13 × 3–3.5 μ (18 × 3 μ according to Cooke); paraphyses slender, cylindrical, branched, embedded in a gelatinous matrix.

On dead wood of maple, August, Newfield, New Jersey, U.S.A., *J. B. Ellis 2227*.

Evidently this is *Corynella prasinula* (Karst.) Boud., though no associated conidial state is apparent.

Octospora alutacea (Berk. & Br.) Dennis, *comb. nov.*—Fig. 4

Helotium alutaceum Berk. & Br. *in* J. Linn. Soc. (Bot.) **14**: 107. 1873 (basionym).

Apothecia solitary or in small clusters on dead wood, disc flat, dingy yellow, about 1 mm diameter, concave when dry, flat when moist and without a raised margin; receptacle shallow cupshaped, sessile on a broad base, paler than the disc, whitish at the margin, smooth, soft-fleshed. Excipulum composed of thinwalled globose cells, 10–12 μ diameter; asci narrowly cylindric-clavate, apex truncate, operculate, unstained by iodine, 105–120 × 9 μ, 8-spored but only occasionally do all eight mature, usually there are 4 mature ascospores, less often 2 or 6, the remainder remain smaller and thinner-walled; mature ascospores elliptical, 10–12 × 5–6.5 μ, without guttules, hyaline; paraphyses slender, longer than the asci and with conspicuously recurved tips 2 μ wide.

Peradeniya, Ceylon, November 1867, *Thwaites 65*.

Chloroscypha alutipes (Phill.) Dennis, *comb. nov.*—Fig. 5

Peziza alutipes Phillips *in* Grevillea **7**: 23. 1878 (basionym). — *Phialea alutipes* (Phill.) Sacc., Syll. Fung. **8**: 266. 1889. — *Kriegeria alutipes* (Phill.) Seaver, North Amer. Cup Fungi (Inop.) 103. 1951.

Apothecia scattered, disc flat, about 2 mm diameter, tan colour, drying black, with stout but not raised margin; receptacle cupulate with a long cylindrical stalk, concolorous, smooth, shrivelling on drying. Excipulum composed of slender parallel hyphae, 3 μ wide, embedded in a gelatinous matrix and curved outwards at a high angle to the surface, the two outermost cells brown, the remainder subhyaline. Asci cylindric-clavate, sessile, 90–110 × 12–15 μ, apex rounded, pore not blued by Melzer's reagent, 8-spored; ascospores biseriate, elliptic-cylindric, 16–22 × 5–6 μ; paraphyses cylindrical, abruptly enlarged to 4 μ at the tips.

On dead foliage of *Libocedrus decurrens*, California, *Harkness 993*.

As indicated in Kew Bulletin **9**: 410. 1954, I regard *Kriegeria* Rab. as not validly published and to be replaced by *Chloroscypha* Seaver.

PHIALEA AMPLA Ell. & Ev.

Phialea ampla Ell. & Ev. *in* Bull. Torrey bot. Cl. **24**: 135. 1897. — *Helotium amplum* (Ell. & Ev.) Seaver, North Amer. Cup Fungi (Inop.) 133. 1951.

As exemplified at Kew by Reliquiae Suksdorfiana 26, on wood of *Salix*, Mt. Adams, Washington, 17–18 Sept. 1894, said to be part of the type collection, this seems to me indistinguishable from *Helotium conscriptum* (Karst.) Karst., described on twigs of *Salix* in Finland.

Pseudonectria aquifoliae (Ckc. & Ellis) Dennis, *comb. nov.*—Fig. 6

Peziza (*Mollisia*) *aquifoliae* Ckc. & Ellis *in* Grevillea **6**: 91. March 1878 (basionym). — *Pezizella aquifoliae* (Ckc. & Ellis) Sacc., Syll. Fung. **8**: 288. 1889.

The type is on leaves of *Ilex opaca*, Newfield, New Jersey, *Ellis 2559* and Phillips has commented shrewdly on it, in a letter to Cooke of 22 . 6 . 1877, "I conclude you have satisfied yourself this is a *Peziza*. I am not satisfied of it from my own observation." Thus warned, Cooke and Ellis described the species as having "Cupulis sessilibus, concavis, margine incurvo, ad basim fibrillis albis radiantibus affixis", with the disarming comment, "A very curious species which seems to diverge in its firm texture and some other points from a true *Peziza*." The "other points" prove to be rather important for in fact the ascocarps are not apothecia but perithecia, about 150 μ broad and high, each with a flattened apex bearing a mat of short downy hairs. The perithecial wall is two-layered, the inner of compressed slender hyphae, the outer of about 2–3 layers of isodiametric cells which run out on the upper surface of the perithecium to form hyaline cylindrical hairs, about 10–12 × 2–3 μ. The asci are delicate, 8-spored, without any apical ring blued by iodine; ascospores biseriate, elliptic-cylindric, mostly nonseptate, hyaline, 7–8 × 2–2.25 μ.

Seaver, who monographed the North American Nectriaceae, left this species under doubtful species of *Mollisia*, with the comment that "The type in The New York Botanical Garden is too scant to permit of critical study". Perithecia are very abundant and uniform on the portion of the type collection at Kew.

PHIALEA ARENICOLA Ell. & Ev.

Phialea arenicola Ell. & Ev. *in* Amer. Nat. **31**: 426. May 1897. — *Helotium arenicola* (Ell. & Ev.) Seaver, North Amer. Cup Fungi (Inop.) 148. 1951.

On rootlets and plant debris buried in sandy soil amongst grass, Blackbird Landing, Delaware, U.S.A., 8 . 6 . 1896, *Commons 2784*, in herb. New York Bot. Garden.

This is typical *Dasyscyphus pygmaeus* (Fr.) Sacc., as already pointed out by White (*in* Amer. Midl. Nat. **28**: 522. 1942) long before Seaver made the redundant combination in *Helotium*.

PEZIZELLA ARISTOSPORA Bonar

Pezizella aristospora Bonar *in* Mycologia **34**: 183. 1942.

This fungus of dead *Sequoia* leaves is no *Pezizella*, nor Helotiaceous at all but apparently a Dermateaceous species somewhere near *Laetinaevia*.

HELOTIUM AURANTIACUM Cke. apud Phill.

Helotium aurantiacum Cke. *apud* Phillips *in* Grevillea **19**: 106. June 1891.

On decaying leaves, Newfield, New Jersey, U.S.A., Oct. 1875, *J. B. Ellis 75*. I see no reason to question White's (1943) statement that this is a synonym of the common *H. epiphyllum* (Pers. ex Fr.) Fr., though his opinion was ignored by Seaver (1951).

Rutstroemia belisense (Kanouse) Dennis, *comb. nov.*—Fig. 7

Helotium belisense Kanouse *in* Mycologia **33**: 465. 1941 (basionym).

Apothecia solitary, arising on the surface of small blackened areas of lamina, disc up to 2 mm diameter, concave to flat, with a prominently dentáte margin, light brown; receptacle saucershaped, with a slender cylindrical stalk, concolorous to reddish-brown when dry, base of stalk blackish. Excipular cells approximately isodiametric, cubical to polygonal, passing at the margin into parallel hyphae 5 μ wide, with thin brown walls, cohering to form the marginal teeth. Asci cylindric-clavate, 70–80 × 7 μ, apex flattened, pore blued by iodine according to the diagnosis, 8-spored; ascospores uniseriate, elliptical, 8–9 × 4–4.5 μ; paraphyses cylindrical, obtuse, 2 μ thick.

On under side of decaying *Ilex* leaves, El Cayo district, Valentin, British Honduras, 25 . 6 . 1936, *E. B. Mains 3603*, Herbarium of University of Michigan.

HELOTIUM BODENI P. Henn.

Helotium bodeni P. Henn. *in* Verh. bot. Ver. Prov. Brandenburg **42**: xvii. 1900. — *Pachydisca bodeni* (P. Henn.) Boud., Hist. Class. Discom. d'Europe 94. 1907.

The portion of the type collection in Sydow's herbarium at Stockholm is *Pezicula livida* (Berk. & Br.) Rehm, on *Larix leptolepis*, Hameln a Weser, Germany, 30 . 9 . 1900.

Laetinaevia carneopallida (Rob. apud Desm.) Dennis, *comb. nov.*—Fig. 8

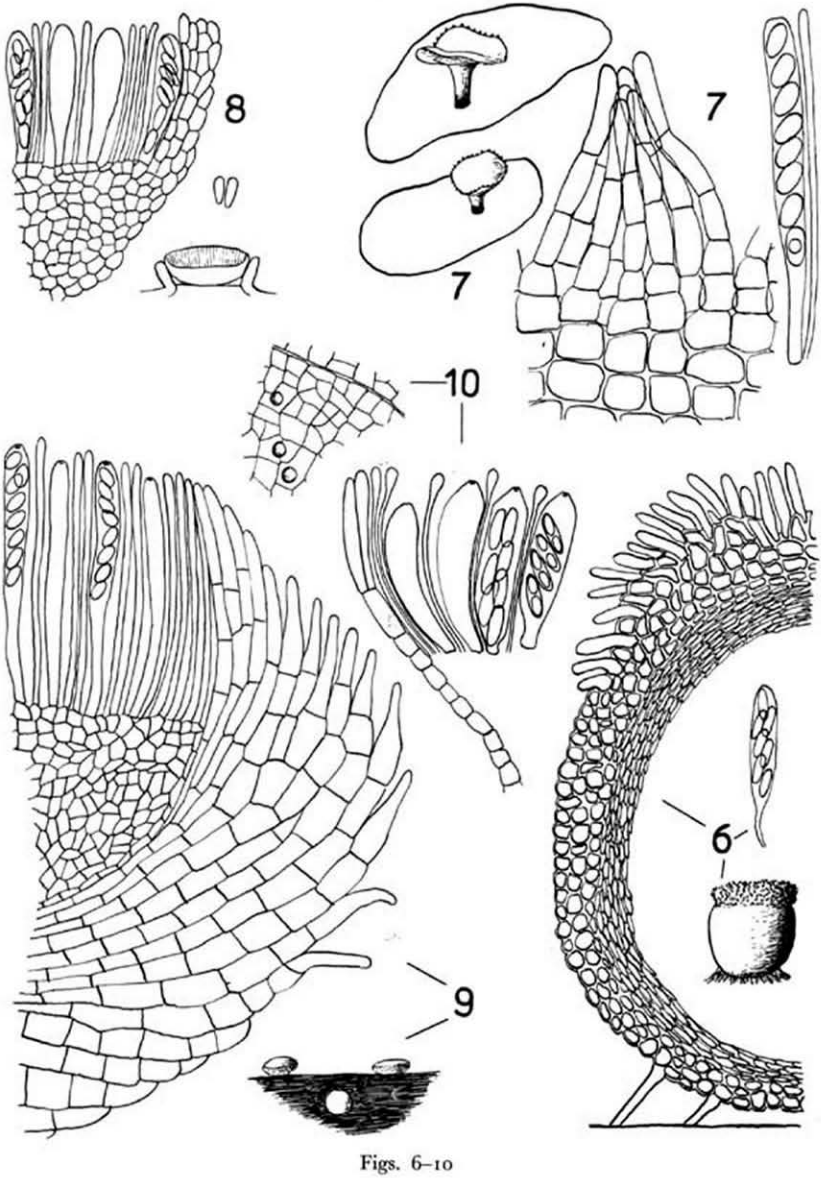
Peziza carneopallida Roberge *apud* Desmazières *in* Ann. Sci. nat. (Bot.), ser. 3, **16**: 326. 1851 (basionym). — *Pezizella carneopallida* (Rob. apud Desm.) Sacc., Syll. Fung. **8**: 285. 1889. — *Briardia carneopallida* (Rob. apud Desm.) Boud., Hist. Class Discom. d'Europe 170. 1907. — *Pseudopeziza carneopallida* (Rob. apud Desm.) Höhn. *in* Ann. mycol., Berl. **16**: 337. 1917.

Apothecia gregarious, erumpent, mostly from the lower epidermis of the host; disc flat or slightly convex, without a rim, about 180–200 μ diameter, pale flesh colour; receptacle shallow cupulate, sessile, soft, smooth, concolorous. Excipulum and flesh composed throughout of more or less isodiametric, rounded or polygonal, thinwalled cells, about 4–6 μ diameter. Asci clavate, 30–50 × 6–9 μ, 8-spored; ascospores irregularly biseriate, 6–7(–8) × 2–2.5 μ; paraphyses cylindrical, obtuse, 1.5–2 μ thick, equalling the asci in length.

On fallen leaves of *Ulmus* in spring. Desmazières Crypt. France 2009.

EXPLANATION OF FIGURES 6–10

Figs. 6–10. — 6. *Pseudonectria aquifoliae*. Perithecium (× 100), section (× 660). — 7. *Rutstroemia belisense*. Two apothecia with their stromatic areas (× 10), ascus, paraphysis and marginal tooth (× 660). — 8. *Laetinaevia carneopallida*. Diagrammatic section (× 75), section of margin and free ascospores (× 660). — 9. *Pezizella carneorosea*. Apothecia (× 20), section of margin (× 660). — 10. *Calycellina castanea*. Habit sketch (× 6), section of margin (× 660).



Figs. 6–10

Nannfeldt (1932) listed this as a probable *Laetinaevia* without actually making the combination under that genus.

PEZIZA CARNEOROSEA Cke. & Harkn.—Fig. 9

Peziza (*Mollisia*) *carneorosea* Cke. & Harkn. *in* Grevillea **9**: 130. June 1881. — *Pezizella carneorosea* (Cke. & Harkn.) Sacc., Syll. Fung. **8**: 284. 1889.

Apothecia occurring singly, superficial or slightly embedded at the base, disc flat or convex, without a rim, pale pink, 300 μ diameter; receptacle cupulate, sessile on a small base, concolorous or paler, minutely pruinose. Flesh composed of small, angular, closely packed cells; excipulum of rather broad, short-celled, thinwalled, parallel hyphae, curving outwards at a moderate angle to the surface, the terminal cells often protruding as short downy hairs. Asci cylindric-clavate, 60 × 5 μ, apex conical, with a small pore deeply blued by Melzer's reagent, 8-spored; ascospores elliptical, uniseriate or biseriate above, 5–6 × 3 μ; paraphyses cylindrical, obtuse, 2 μ thick.

On *Eucalyptus* twigs, California, *Harkness 2164*.

The appropriate genus is not clear to me. *Discohainesia* seems excluded by the iodine-positive ascus pores and the stout simple paraphyses, *Pezizella* by the cellular flesh. Seaver's (1951) comment "Apparently an *Orbilia*" is merely ridiculous. If the free hyphal tips are called hairs it will key to *Cistella* beside *C. trabinella* (Karst.) Nannfeldt but I prefer not to propose a recombination until something is known of the life history.

Calycellina castanea (Sacc. & Ellis) Dennis, *comb. nov.*—Fig. 10

Helotium castaneum Sacc. & Ellis *in* Michelia 2: 572. December 1882 (basionym). — *Calycina castanea* (Sacc. & Ellis) O. Kuntze, Rev. Gen. Pl. 3 (2): 448. 1898.

Apothecia scattered, superficial, disc flat, 250 μ diameter, chestnut brown, without a raised margin; receptacle saucer-shaped on a broad base, concolorous, smooth, soft-fleshed. Excipulum composed of short-prismatic thinwalled cells, about 6 × 4 μ, passing towards the margin into parallel brown hyphae, 2–3 μ wide, without hairs. Asci cylindric-clavate, sessile, 35–40 × 9 μ (45 × 16 μ Saccardo), the small pore blued by Melzer's reagent, 8-spored; ascospores mostly biseriate, elliptic-cylindric, hyaline, 10–11 × 3 μ (11–14 × 3–4 μ Saccardo), with 2 oil bodies; paraphyses cylindrical, about 1 μ thick, obtuse and often somewhat enlarged at the tip.

On lower surface of living *Quercus laurifolia* leaves, often on patches apparently damaged by insects, Green Cove Springs, Florida, 1881, Ellis N. American Fungi 994.

Though not part of the type this material is authentic for the name and agrees with the diagnosis.

PEZIZA CHLORINELLA Ces.—Fig. 11

Peziza chlorinella Cesati *in* Bot. Ztg **12**: Col. 186. March 1854. — *Pezizella chlorinella* (Ces.) Sacc., Syll. Fung. **8**: 278. 1889. — *Hyalinia chlorinella* (Ces.) Boud., Hist. Class. Discom. d'Europe 104. 1907.

The diagnosis reads simply "Minutissima, viridula, gregaria, semipellucens. Ad herbarum caules. Vercellis. Ces." and is repeated *in* Flora **12**: 203. April 1854. The species was distributed as Klotzsch Herb. viv. myc. Ed. 1, 1812 (1854), issued with the diagnosis and the slightly amplified information "sero autumno, ad caules putrescentes herbarum majorum in nemoribus humistratos." The scanty diagnosis is sufficient to validate the name, unfortunately since no one could recognise the species from it and it has accordingly been virtually ignored, even Rehm did not cite it.

The apothecia are gregarious, superficial, with a flat, cream coloured disc, about 0.5 mm diameter, a greenish tint is no longer apparent; receptacle cupulate, smooth, sessile concolorous. Excipulum with rows of short-prismatic, thinwalled, hyaline cells, the terminal ones clavate, up to 10 × 3 μ, passing at the margin into short parallel hyphae. Asci cylindric-clavate, 45–50 × 4–5 μ, apex conical, with a small pore blued by Melzer's reagent, 8-spored; ascospores biseriate, rodshaped, straight or slightly curved, 5 × 1 μ; paraphyses rather stout, cylindrical, rounded above, equalling the asci.

Superficially this resembles *Dasyscyphus grevillei* but the distinctly cylindrical obtuse paraphyses forbid one to treat it as a state of that species. The asci are not those of a *Hyalinia* nor is the anatomy that of a *Mollisia*. The choice of a genus would seem to lie between *Cistella*, for which the "hairs" seem underdeveloped, and *Calycellina* but it would be well to see recent material that matches the type before making the decision.

HELOTIUM CONSANGUINEUM Ell. & Ev. apud Seaver

Helotium consanguineum Ell. & Ev. *apud* Seaver, North Amer. Cup Fungi (Inop.) 143, 1951.

Apothecia gregarious, erumpent singly or in pairs, disc flat, light yellow, 0.5 mm diameter; receptacle concolorous, shallow cupulate, subsessile, smooth or very minutely pruinose. Excipulum composed of slender parallel hyphae, 3 μ wide, with short prismatic cells, lying at a high angle to the surface on the under side of the receptacle but curving round parallel to the surface at the margin, terminal cells freestanding, clavate, 6–10 × 3–4 μ. Asci clavate, 8-spored, 45–60 × 7–8 μ, pore deep blue in Melzer's reagent; ascospores uniseriate to biseriate, ellipticfusoid, 7–11 × 2–2.5 μ, nonseptate; paraphyses cylindrical, obtuse, 3–4 μ wide.
On dead stems of *Tephrosia virginiana*, Newfield, New Jersey, Feb. 1879, in herb. New York Bot. Garden.

This remained a manuscript name in the Ellis herbarium until published by Seaver long after Ellis' death and it seems likely the latter had decided it to be too near *H. herbarum* to be worth a name. The material differs from typical *H. herbarum* in its smaller non-septate ascospores. It may be immature, however, and I do not feel confident it represents a distinct species but if it does it is a synonym of *H. humile* Sacc.

Rutstroemia coracina (Dur. & Lév.) Dennis, *comb. nov.*—Fig. 12

Peziza coracina Dur. & Lév. Expl. sci. d'Algérie, Atlas 10, Tab. 28 fig. 4 (basionym). — *Helotium coracinum* (Dur. & Lév.) Sacc., Syll. Fung. **8**: 237. 1889. — *Ciboria coracina* (Dur. & Lév.) Boud., Hist. Class. Discom. d'Europe 106. 1907.

Apothecia scattered, superficial, not associated with blackening of the substrate, disc concave, about 0.5 mm diameter, with a prominent toothed margin; receptacle cupulate with a short cylindrical stalk, smooth, black. Excipulum composed of parallel hyphae with glassy walls, lying parallel to the surface, the outermost layer having dark brown walls and so giving the dark colour to the receptacle. Asci cylindric-clavate, 125 × 10–12 μ, apex flattened with a small pore blued by Melzer's reagent, 8-spored; ascospores mostly uniseriate, elliptical, 11–13 × 5–6 μ; paraphyses cylindrical, slightly enlarged upwards to 5 μ diameter, obtuse.

On veins of dead leaf of *Quercus ilex*, Algeria, herb. Paris.

PEZIZA CRAGINIANA Ell. & Ev.

Peziza craginiana Ell. & Ev. *in* J. Mycol. **1**: 47. March 1885. — *Phialea craginiana* (Ell. & Ev.) Sacc., Syll. Fung. **8**: 258. 1889. — *Hymenoscyphus craginianus* (Ell. & Ev.) O. Kuntze, Rev. Gen. Pl. **3** (2): 485. 1898. — *Helotium craginianum* (Ell. & Ev.) Seaver, North Amer. Fungi (Inop.) 144. 1951.

Nothing of the fungus remains in the type packet in New York Botanical Garden and it is impossible to assess the true systematic position of the species, which remains known only from Ellis' brief description. The redispositions by Saccardo, O. Kuntze and Seaver were purely literary exercises, not based on examination of the fungus.

Hymenoscyphus crastophilus (Sacc.) Dennis, *comb. nov.*—Fig. 13

Helotium crastophilum Sacc. *in* Ann. mycol., Berl. **10**: 312. 1912 (basionym).

Only a single apothecium could be found in the type collection in the Saccardo herbarium and no anatomical details were recovered from it. According to Saccardo the excipulum has "contextu anguste prosenchymatico" and the species appears to be a normal *Hymenoscyphus*. An ascus recovered from it measured 140 × 14 μ, with conico-truncate apex tipped by a rather broad pore deep blue in Melzer's reagent and containing eight biseriate ascospores. The latter were tapered at each end, not clavate or hooked as in *Helotium scutula* var. *suspecta* (Nyl.) Karst., and measured 19–24 × 5 μ, with two oil globules. The paraphyses were cylindrical, obtuse, 2.5 μ wide. This would appear to be a good species, distinguished by its combination of relatively small apothecia, 400 μ high, 250 μ broad, with large asci and ascospores.

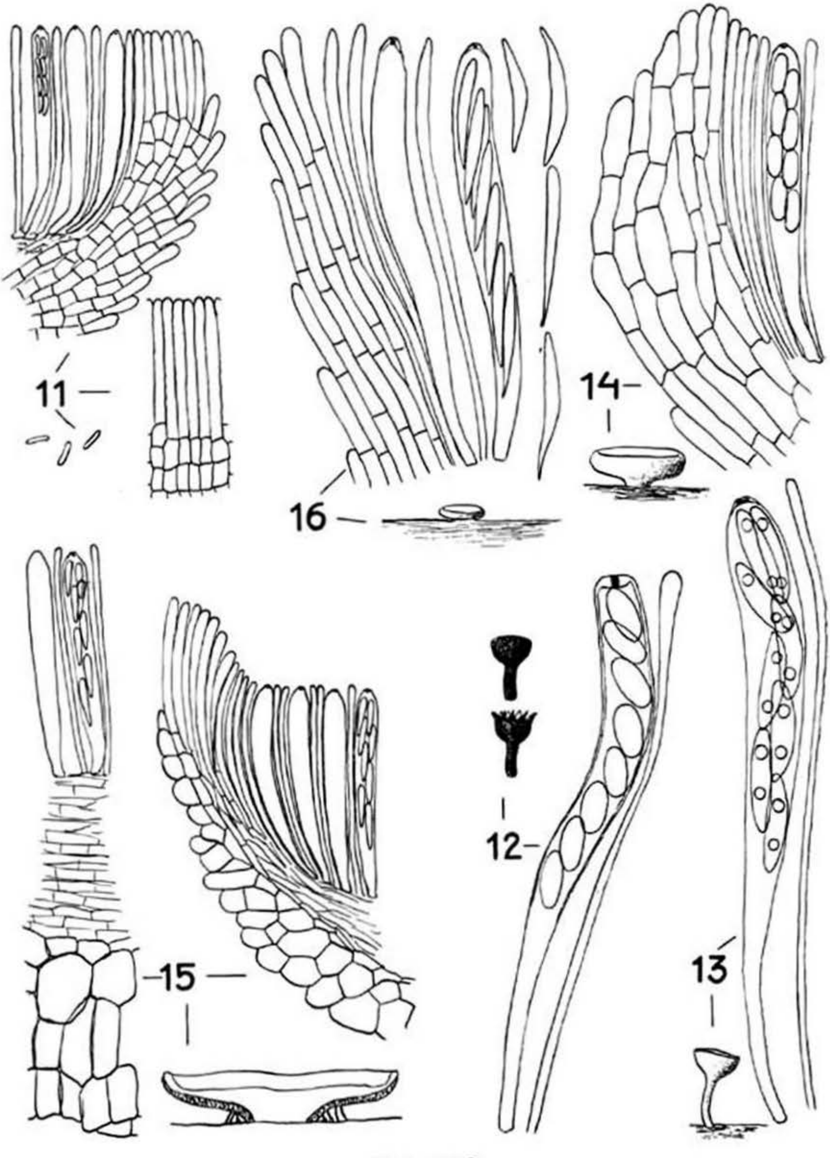
"In caulibus graminum, vetustis, dejectis", Lyndonville, New York, 30 . 10 . 1911, *Fairman 10*.

PEZIZA CUCURBITAE Ger.

Peziza cucurbitae Gerard *in* Bull. Torrey bot. Cl. **5**: 26. 1874. — *Pezizella cucurbitae* (Ger.) Sacc., Syll. Fung. **8**: 285. 1889. — *Orbilia cucurbitae* (Ger.) Seaver, North Amer. Cup Fungi (Inop.) 155. 1951.

EXPLANATION OF FIGURES 11–16

Figs. 11–16. — 11. *Pezizella chlorinella*. Margin in surface view and in section (× 660). — 12. *Rutstroemia coracina*. Apothecia, the upper dry, the lower expanded when soaked up (× 15), ascus and paraphysis (× 660). — 13. *Hymenoscyphus crastophilus*. Apothecium (× 20), ascus and paraphysis (× 660). — 14. *Hymenoscyphus cyathiformis*. Apothecium (× 15), section of margin (× 660). — 15. *Mollisia dakotensis*. Diagrammatic section of apothecium (× 25), detailed sections (× 660). — 16. *Hymenoscyphus dearnessii*. Apothecium (× 10), section of margin and free spores (× 660).



Figs. 11–16

"Cups sessile, when moist waxy, scutellate, disc pale tan color, margin entire, when dry contorted, somewhat horny and disc dark purple-brown; spores simple, oval, .0004′ long. On dried rinds of squash (*Cucurbita*) in company with *Phoma cucurbitacearum*. Poughkeepsie, September." The ascospore length .004 inches equals about 10.5 μ. The authentic material at Kew, sent by Gerard to M. C. Cooke, yields cylindrical operculate asci, 145 × 8 μ, not blued by Melzer's reagent, containing elliptical, eguttulate, uniseriate ascospores, 10–11 × 6–7 μ, and mixed with slender, cylindrical, obtuse paraphyses 2 μ thick. This is *Pseudombrophila deerata* (Karst.) Seaver or a closely allied fungus with slightly smaller ascospores. Comment on the transfer to *Orbilia* seems superfluous.

HELOTIUM CUDONIOIDES Seaver

Helotium cudonioides Seaver *in* Mycologia **37**: 267. 1945.

On rotten wood, Cleveland, Ohio, November 1938, *M. Walters*.

The type, at New York Botanical Garden, has been annotated "*Helotium aciculare* Fr., *Cudoniella acicularis* (Fr.) Schroet. by E. B. Mains, January 1955 and this opinion is obviously correct.

HYMENOSCYPHUS CYATHIFORMIS (Rehm) O. Kuntze.—Fig. 14

Phialea cyathiformis Rehm *in* Rabenhorst, Kryptog.-Fl. ed. 2, **1** (3): 712. 1892. — *Hymenoscyphus cyathiformis* (Rehm) O. Kuntze, Rev. Gen. Pl. **3** (2): 485. 1898.

Apothecia scattered, superficial, disc flat with a low rounded rim, up to 1.5 mm diameter, whitish, drying yellowish; receptacle cupulate, sessile on a small base, smooth concolorous. Excipulum composed of parallel thinwalled hyphae, 5–6 μ wide at the margin, almost parallel with the surface, becoming enlarged up to 15 μ wide in a zone a little below the surface of the flanks of the receptacle; flesh of narrower thin-walled hyphae. Asci cylindric-clavate, 8-spored, 70 × 8–10 μ, pore blued by Melzer's reagent; ascospores biseriate, elliptical, 7–10 × 3 μ, becoming 1-septate according to Rehm; paraphyses cylindrical, up to 3 μ wide.
On decorticated wood, Albachten bei Munster, *Lindau*, in herb. Stockholm.

This seems closely allied to *H. imberbis* and is not a *Phialea* in the sense of von Höhnel, nor a *Calycella* as I interpret the genus.

Mollisia dakotensis (Rehm) Dennis, *comb. nov.*—Fig. 15

Pezizella dakotensis Rehm *in* Ann. mycol., Berl. **11**: 396, Oct. 1913 (basionym). — *Helotium dakotense* (Rehm) Seaver, North Amer. Cup Fungi (Inop.) 132. 1951.

Apothecia scattered, superficial, disc concave and yellowish when dry, flat and pellucid light gray, up to 1.5 mm diameter when moist; receptacle saucer-shaped, sessile, brown, with a whitish margin. Subhymenium about 40 μ thick on the flanks of the receptacle, formed of slender hyaline hyphae, passing into a compact hyaline tissue occupying the centre of the base. Excipulum composed of 3 to 4 layers of rounded to angular cells, up to 15 × 10 μ, with thin brown walls, passing at the margin into parallel, slender, hyaline hyphae and bearing a few brown anchoring hyphae towards the base. Asci cylindric-clavate, 45–60 × 5–6 μ, 8-spored, the small pore blued by Melzer's reagent; ascospores biseriate, clavate, 8–13 × 1.5–2 μ; paraphyses cylindrical, 2 μ thick, rounded at the tip.

On dead fallen twigs of *Symhoricarpos occidentalis*, Kulm, N. Dakota, 18 . 7 . 1913, *Brenkle*. Type in Herb. Rehm, Stockholm.

Though I feel this keys to *Mollisia* it closely resembles *Psilachnum lanceolato-paraphysatum* both externally and structurally, apart from the paraphyses, and it is not surprising Rehm referred them to the same genus, though this should not be *Pezizella* in the sense of *P. vulgaris* (Fr.) Höhn. Nothing can be said for the transfer to *Helotium*.

HYMENOSCYPHUS DEARNESSII (Ell. & Ev.) O. Kuntze—Fig. 16

Phialea dearnessii Ell. & Ev. *in* Proc. Acad. nat. Sci. Philad. 146. April 1893. — *Hymenoscyphus dearnessii* (Ell. & Ev.) O. Kuntze, Rev. Gen. Pl. **3** (2): 484. 1898. — *Helotium dearnessii* (Ell. & Ev.) White *in* Mycologia **34**: 167. 1942.

Apothecia scattered, erumpent, disc flat or slightly convex, 0.75 mm diameter, subolivaceous, becoming nearly sulphur yellow, without a raised margin; receptacle shallow cupulate on a short, stout, stemlike base, smooth, concolorous. Excipulum composed of parallel thinwalled hyphae, 3–4 μ wide, rather sparingly septate, lying at a low angle to the surface, hyaline towards the margin, brownish towards the base. Asci cylindric-clavate, subsessile, 75–95 × 9–10 μ, apex conical, the pore blued by Melzer's reagent, 8-spored; ascospores fusoid, rounded above, tapered to a point below, nonseptate, biguttulate, 25–35 × 3–3.5 μ; paraphyses cylindrical, rounded above, 3 μ thick.

On dead stems of *Steironema ciliatum*, London, Ontario, June 1890, *Dearness*, in Ellis & Everhart, North American Fungi Ser. 2, 2624. The type was on *Monarda* from the same locality, May 1890.

As already indicated by White (sub *Helotium*) this is a good species of *Hymenoscyphus*.

HELOTIUM DESTRUCTOR White

Helotium destructor White *in* Mycologia **34**: 163. 1942.

See *Hymenoscyphus subcarneus* (Cke. & Peck) O. Kuntze.

HELOTIUM EICHLERI Bres.—Fig. 17

Helotium eichleri Bres. *in* Ann. mycol., Berl. **1**: 120. 1903.

This seems structurally very like *Helotium lutescens* (Hedw. ex Fr.) Fr. [*Hymenoscyphus lutescens* (Hedw. ex Fr.) Phill.] on the same substrate. The stated difference lies in the broader ascospores, 10–13(–15) × 4–5(–6) μ instead of 10–15 × 3–4 μ. The thick mucous coating of the ascospore mentioned by Bresadola is not now obvious to me and I am dubious about the validity of *H. eichleri* as a species.

Typus on cone scales of *Pinus silvestris*, Poland, July, in herb. Bresadola, Stockholm.

The soft short-celled structure of the subsessile apothecia is perhaps rather that of a *Phaeohelotium* than a *Hymenoscyphus*.

HELOTIUM EPISPHAERICUM Peck

Helotium episphaericum Peck *in* Rep. N.Y. St. Mus. **40**: 66. 1888. — *Calycina episphaerica* (Peck) O. Kuntze, Rev. Gen. Pl. **3** (2): 448. 1898.

I have not seen the type, presumably at Albany, New York and not accessible, but as determined by Cash, on *Xylaria scruposa*, Barro Colorado island, Panama

Canal Zone, 18 . 7 . 1945, *G. W. Martin 6089*, this is *Patinellaria cubensis* (Berk. & Curt.) Dennis (*in* Kew Bull. **1954**: 315–316). White's (1942) description of Peck's material bears out this synonymy.

PEZIZA ESCHSCHOLTZIAE Phil. & Harkn.—Fig. 18

Peziza (*Hymenoscypha*) *eschscholtziae* Phil. & Harkn. *in* Bull. Calif. Acad. Sci. **1**: 22. 1884. — *Phialea eschscholtziae* (Phil. & Harkn.) Sacc., Syll. Fung. **8**: 271. 1889. — *Helotium eschscholtziae* (Phil. & Harkn.) Seaver, North Amer. Cup Fungi (Inop.) 129. 1951.

Apothecia scattered, superficial, disc concave, up to 0.75 mm diameter, pale yellowish, with a prominent brown margin; receptacle cupulate on a short stemlike base, dark brown and minutely pruinose throughout. Excipulum composed of parallel, hyaline, hyphae with strongly gelatinised walls, lying at rather a high angle to the surface and passing out into short, cylindrical, brown hairs, about 15–20 × 4 μ, with finely encrusted walls. Asci cylindric-clavate, 65 × 6 μ, pore not distinctly blued by Melzer's reagent, 8-spored; ascospores mostly uniseriate, elliptic-cylindric, straight or slightly curved, 8–10 × 1.5–2 μ; paraphyses cylindrical, obtuse, 3–4 μ thick, with oily contents.

On dead stems of *Eschscholtzia californica*, *Harkness 2615*.

This is doubtfully distinct from the cosmopolitan *Phialea cacaliae* (Pers. ex Fr.) Gillet.

Peziza exarata Berk.

Peziza exarata Berk. *in* Grevillea **3**: 160. June 1875. — *Phialea exarata* (Berk.) Sacc., Syll. Fung. **8**: 268. 1889.

On decorticated wood, South Carolina, *Curtis 2119*.

This is *Guepiniopsis buccina* (Pers. ex Fr.) Kennedy.

PEZIZA EXIDIELLA Berk. & Curt. apud Cke.—Fig. 19

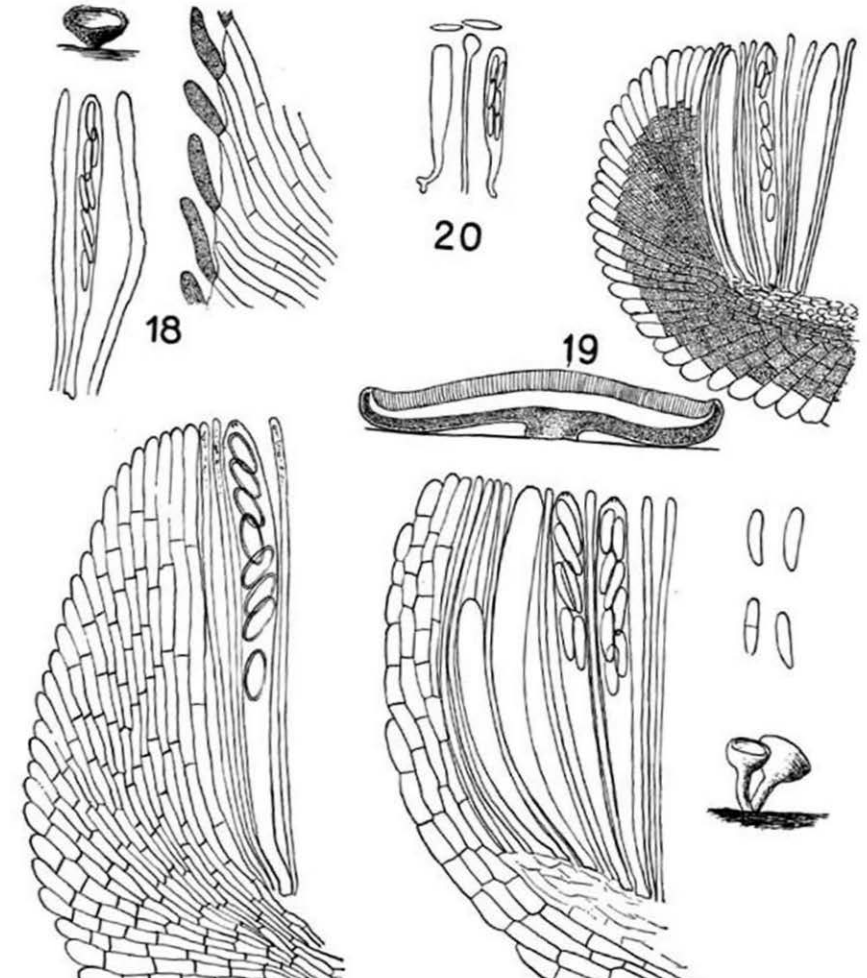
Peziza exidiella Berk. & Curt. *apud* Cooke *in* Bull. Buffalo Soc. nat. Sci. **2**: 297. March 1875. — *Pezizella exidiella* (Berk. & Curt. apud Cke.) Sacc., Syll. Fung. **8**: 288. 1889.

"On herbaceous stems, gregarious, regular, externally and internally rufous yellow. Asci clavate, sporidia oblong, narrow, hyaline, (.00028 inches). Conn(ecticut) Wright."

The apothecia have a flat disc 0.5–1 mm diameter, surrounded by a low obtuse margin and borne on a shallow, smooth, saucer-shaped receptacle with small but well defined stemlike base; the whole has dried dark brown. Radial sections show an excipulum formed of radiating rows of short prismatic cells with thin brown walls, the surface layer paler. Asci narrowly cylindric, apex conical with small pore blued by Melzer's reagent, 8-spored, 60 × 4.5–5 μ; ascospores elliptic-cylindric to ovoid, 5–6 × 2 μ; paraphyses cylindrical, obtuse, 2 μ thick.

EXPLANATION OF FIGURES 17–21

Figs. 17–21. — 17. *Helotium eichleri*. Apothecium (× 10), section of margin (× 660). — 18. *Phialea eschscholtziae*. Apothecium (× 15), ascus, paraphyses and portion of excipulum in section (× 660). — 19. *Pezizella exidiella*. Diagrammatic section (× 60), section of margin (× 660). — 20. *Peziza exigua*. Asci, paraphysis and spores (× 660). — 21. *Hymenoscyphus flavo-fuscescens*. Apothecia (× 10), section of margin and free ascospores (× 660).



Figs. 17–21

There has been some confusion over this species for the name was published a second time as *Peziza* (*Mollisia*) *exidiella* Berk. & Curt. (*in* Grevillea **3**: 158. June 1875) "On *Cornus florida*. Car. Inf. No. 2474". The host and number are evidently here cited in error for in Curtis' manuscript list of collections sent to Berkeley number 2474 is entered as "*Pez. miltophthalma*", which is the next species (*in* Grevillea **3**: 158) cited with the same substrate and number. The number cited for *P. exidiella* should have been Curtis 5625, which is the Connecticut specimen collected by Wright, under which number the name *Peziza exidiella* is duly entered in the manuscript list.

Peziza exidiella is hardly a typical *Mollisia* or a typical *Pezizella* and is probably to be assigned either to *Cistella* or *Calycellina*, compare *P. chlorinella* Ces. above.

PEZIZA EXIGUA Cke.—Fig. 20

Peziza (*Mollisia*) *exigua* Cooke *in* Hedwigia **14**: 83. June 1875. — *Pezizella exigua* (Cke.) Sacc., Syll. Fung. **8**: 283. 1889. — *Mollisia exigua* (Cke.) Seaver, North Amer. Cup Fungi (Inop.) 207. 1951.

Apothecia scattered, superficial, disc flat, 200 μ diameter, pink; receptacle smooth discoid, seated on a small base. Excipular cells isodiametric, with thin colourless walls, about 8–12 μ diameter. Asci cylindric-clavate, flat-topped, not blued by Melzer's reagent, with slender stalks, 8-spored, 35 × 5 μ; ascospores elliptic-cylindric or tapered below, 6–8 × 1.5 μ; paraphyses cylindrical with subglobose abruptly swollen heads 4 μ diameter.

On old stems of *Erigeron canadense*, Newfield, New Jersey, Aug. 1873, *Ellis 1016*.

Obviously this is a good *Orbilia* but unfortunately there is already an *Orbilia exigua* Velenovský 1934 and it seems unwise to propose a new name for the species until there is a modern revision of the genus with an adequate treatment of synonymy. It is astonishing that Seaver, who made several ridiculous combinations in *Orbilia*, did not recognise a genuine species of the genus when he saw it but combined the name in *Mollisia*, though he claims to have seen part of the type!

Hymenoscyphus flavo-fuscescens (Bres.) Dennis, *comb. nov.*—Fig. 21

Helotium flavo-fuscescens Bres. *in* Broteria **2**: 90. 1903 (basionym).

Apothecia solitary or in small clusters, superficial, disc concave, up to 2 mm diameter, light yellow; receptacle cupulate, smooth, concolorous, seated on a cylindrical stalk up to 1 mm long and 350 μ thick. Flesh soft, composed of closely packed, delicate, thinwalled, hyaline hyphae, 3–4 μ wide; excipulum about 20 μ thick, formed of shortcelled hyphae almost parallel to the surface, 4–7 μ broad, with very thin walls stained red-brown by Melzer's reagent. Asci cylindric-clavate, 8-spored, 80–100 × 7 μ, the small pore stained blue by Melzer's reagent; ascospores biseriate, elliptical or slightly clavate, straight or slightly curved, 11–15(–18) × 3–3.5(–4) μ, rarely 1-septate; paraphyses cylindrical, obtuse, 2 μ thick.

On bark of *Eucalyptus globulus* in Portugal, Nov. 1902, *Torrend*. Typus in herb. Bresadola, Stockholm.

This may prove not distinct from *Helotium vitigenum* De Not. but on the available evidence it is to be separated by its smaller asci and ascospores.

HELOTIUM GRACILE Cke. & Peck

Helotium gracile Cke. & Peck *in* Rep. N.Y. St. Mus. **26**: 83. 1874. — *Phialea gracilis* (Cke. & Peck) Sacc., Syll. Fung. **8**: 265. 1889. — *Hymenoscyphus gracilis* (Cke. & Peck) O. Kuntze, Rev. Gen. Pl. **3** (2): 485. 1898.

White (1942) has already correctly indicated this to be a synonym of the cosmopolitan *H. scutula* (Pers.) Karst. but noted he was unable to find ciliate ascospores in the portion of the type in the Peck herbarium. The portion sent to Cooke and now at Kew yields mature ascospores 19–26 × 4–5 μ, with the typical apical and basal cilia, indistinguishable from those of typical *H. scutula*.

HELOTIUM HUMILE Sacc.—Fig. 22

Helotium humile Sacc. *in* Michelia **2**: 78. April 1880.

Apothecia scattered or in small groups, erumpent; disc flat, 0.25–0.3 mm diameter, buff, with a prominent paler margin; receptacle cupulate, sessile, slightly paler than the disc, very minutely pruinose. Excipulum composed of slender parallel hyphae, 3–4 μ wide, with thick hyaline walls, lying at a high angle to the surface and terminating in minute, clavate, thinwalled, smooth, hyaline hairs, 10–12 × 3 μ. Asci clavate, subsessile, apex conical with a small pore blued by Melzer's reagent, 50–65 × 6–7 μ, 8-spored; ascospores biseriate, fusoid, 10–12 × 2.5–3 μ (15 × 2–3 μ Saccardo), nonseptate; paraphyses cylindrical, obtuse, 1.5 μ thick.

On branches of *Genista scoparia*, Normandy, typus in herb. Saccardo.

This is evidently akin to *Helotium herbarum* (Pers. ex Fr.) Fr. but the excipular hyphae seem thicker-walled and less closely septate and the ascospores are nonseptate. The species was also reported on capsules of *Aesculus*, on which normal *H. herbarum* sometimes occurs.

PEZIZELLA HUNGARICA Rehm—Fig. 23

Pezizella hungarica Rehm *in* Flora N.S. **30**: 526. 1872.

On rotting stems of Umbelliferae, Kaposvar (Somogy), Hungary, *Lojka*, 12.7.1871, Rehm Ascomyceten 64.

This appears to me to be typical *Dasyscyphus grevillei* (Berk.) Massee.

PEZIZA INCARNATA Cke.

Peziza (*Mollisia*) *incarnata* Cke. *in* Grevillea **1**: 131. March 1873. — *Mollisia incarnata* (Cke.) Phill., Brit. Discom. 191. 1887. — *Pezizella incarnata* (Cke.) Sacc., Syll. Fung. **8**: 285. 1889. — *Hyalinia incarnata* (Cke.) Boud., Hist. Class. Discom. d'Europe 103. 1907.

The typus, on needles of *Pinus silvestris*, *A. Jerdon*, presumably in Roxburghshire, is *Pseudohelotium pineti* (Batsch ex Fr.) Fuck., as already indicated by Nannfeldt (*in* Trans. Brit. mycol. Soc. **20**: 195. 1936).

HELOTIUM KARSTENII Roum.—Fig. 24

Helotium karstenii Roum., Fungi selecti galliaei exsiccati 65, 1879.

Sur une toile de lin pourrissante, Toulouse, Dec. 1872.

This is an *Orbilia*, with asci 35 × 3–4 μ, knob-headed paraphyses and slender rodshaped ascospores, usually accepted as a synonym of *O. luteo-rubella* (Nyl.) Karst.

HYMENOSCYPHUS LACTEUS (Cke.) O. Kuntze—Fig. 25

Helotium lacteum Cooke *in* Grevillea **8**: 63. Dec. 1879. — *Pezizella lactea* (Cke.) Sacc., Syll. Fung. **8**: 280. 1889. — *Hymenoscyphus lacteus* (Cke.) O. Kuntze, Rev. Gen. Pl. **3** (2): 485. 1898.

Apothecia solitary, superficial, disc flat, 3 mm across, margin not prominent, white when fresh, drying isabelline; receptacle saucer-shaped, sessile, smooth, concolorous. Excipulum formed throughout of parallel hyphae with thin hyaline walls, 3–6 μ wide, broader towards the surface. Asci cylindric-clavate, apex conical, truncated by a broad pore with the plug stained blue by Melzer's reagent, 175 × 12μ, 8-spored; ascospores uniseriate, elliptic-fusoid, rounded at the ends, 20–28 × 5–6 μ, without septa or large oil globules but with a somewhat granular cytoplasm; paraphyses cylindrical, obtuse, 2 μ wide.

On very rotten wood (perhaps charred?), Maungaroa, New Zealand, *Berggren 387*.

The habit, asci and ascospores suggest *H. pateriforme* (Berk.) Cke. but that appears to have a different excipular structure.

Hymenoscyphus ellisii Dennis, *nom. nov.*—Fig. 26

Helotium lacteum Ell. & Ev. *in* J. Mycol. **4**: 56. 1888 (basionym); non Cooke 1879 nec *Hymenoscyphus lacteus* (Cke.) O. Kuntze 1898. — *Dasyscypha lactea* (Ell. & Ev.) Sacc., Syll. Fung. **8**: 436. 1889. — *Helotiella lactea* (Ell. & Ev.) Sacc., Syll. Fung. **11**: 415. 1895. — *Belonioscypha lactea* (Ell. & Ev.) Seaver, North Amer. Cup Fungi (Inop.) 177. 1951.

Apothecia gregarious, superficial, disc "Milk white", drying yellowish, 0.5 mm diameter, flat; receptacle shallow cupulate on a short slender stalk, concolorous, minutely pruinose. Excipulum in the receptacle formed of parallel hyphae about 3 μ wide, hyaline, lying at a low angle to the surface, their tips running out as short, cylindrical, obtuse, smooth-walled hairs; surface of the stipe covered by a layer about 20 μ thick of small isodiametric cells. Asci slender-clavate, 4-spored, 110–135 × 7–8 μ, apex conical with a small pore blue in Melzer's reagent; ascospores fusoid, tapered below, 1-septate, 15–18(–22) × 3–3.5 μ; paraphyses cylindrical, obtuse, 2 μ thick.

On decorticated wood, Cazenovia, New York, U.S.A., Oct. 1887, *O. F. Cook*, typus in herb. New York Bot. Garden.

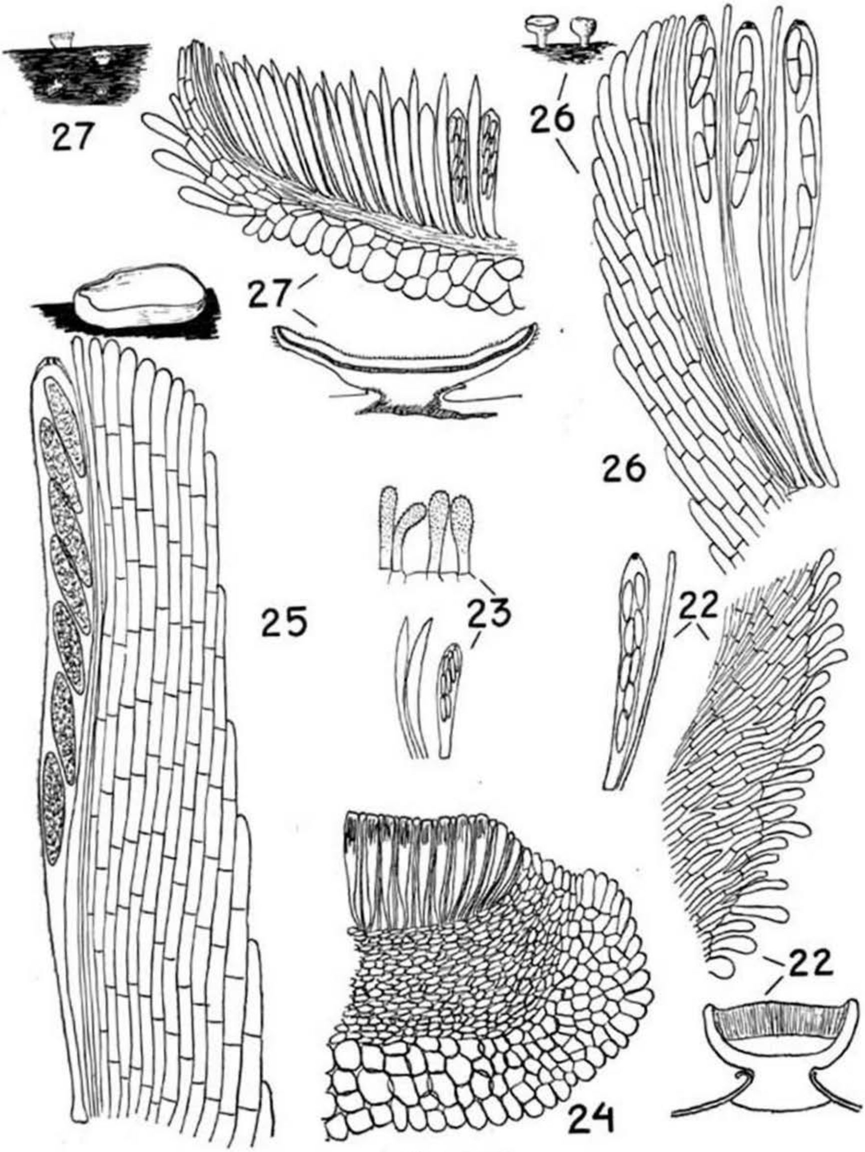
This seems to be a 4-spored analogue of *Helotium parile* (Karst.) Karst. The name *H. lacteum* Ell. & Ev. was published a second time, with the same type, *in* Proc. Acad. nat. Sci. Philad. 145. April 1893.

Psilachnum lanceolato-paraphysatum (Rehm) Dennis, *comb. nov.*—Fig. 27

Pezizella lanceolato-paraphysata Rehm *in* Ann. mycol., Berl. **6**: 316. Aug. 1908 (basionym). — *Helotium lanceolato-paraphysatum* (Rehm) Seaver, North Amer. Cup Fungi (Inop.) 145. 1951.

EXPLANATION OF FIGURES 22–27

Figs. 22–27. — 22. *Helotium humile*. Diagrammatic section (× 70), ascus, paraphysis and section of excipulum (× 660). — 23. *Pezizella hungarica*. Ascus, paraphyses and hairs (× 660) (Compare with Fig. 1). — 24. *Helotium karstenii*. Section of margin (× 500). — 25. *Hymenoscyphus lacteus*. Apothecium (× 7), section of margin (× 660). — 26. *Hymenoscyphus ellisii*. Apothecia (× 10), section of margin (× 660). — 27. *Psilachnum lanceolato-paraphysatum*. Apothecia (× 6), section of margin (× 660), diagrammatic section (× 75), hatched areas stain blue with Melzer's reagent.



Figs. 22–27

Apothecia gregarious, erumpent, sessile, disc concave, up to 0.8 mm diameter, cream coloured; receptacle saucershaped when moist, becoming cupulate when dry, light brown, with downy white hairs towards the margin. Subhymenium formed of slender agglutinated hyphae which stain blue in Melzer's reagent; excipulum composed of rounded to angular, thinwalled, light brown cells about 7–10 × 5–7 μ, bearing near the margin hyaline, cylindrical, obtuse, 0—1-septate hairs with thin smooth walls, up to about 25×4 μ. Asci sessile, cylindric-clavate, 30 × 5 μ, the pore blued by Melzer's reagent; ascospores biseriate, slender clavate, 6–8 × 1 μ; paraphyses lanceolate, 2–2.5 wide, up to 10 μ longer than the asci. An apparently gelatinised or at least agglutinated ring round the base of the apothecium stains blue with iodine.

On dead stems of *Spiraea filipendula*, Lyndonville, New York, 2nd June 1908, typus in herb. Rehm, Stockholm.

Sphagnicola laricina (Ell. & Ev.) Dennis, *comb. nov.*—Fig. 28

Pseudohelotium laricinum Ell. & Ev. *in* Proc. Acad. nat. Sci. Philad. 349. 1894 (basionym). — *Helotium laricinum* (Ell. & Ev.) Seaver, North Amer. Cup Fungi (Inop.) 139. 1951.

Apothecia scattered, superficial, patellate, disc flat, up to 5 mm diameter, orange, margin evidently toothed when fresh; receptacle smooth, concolorous, soft-fleshed. Excipulum formed of broad thinwalled hyphae, up to 10 μ wide, with short-prismatic cells, sheathed in the lower part by a layer of slender interwoven hyphae with more or less gelatinised walls. Asci cylindrical, 120–160 × 6–9 μ, 8-spored, apex obtusely rounded, the pore not blued by Melzer's reagent; ascospores uniseriate, or biseriate above, elliptical, not narrowed below, without guttules, 8–10 × 4–5 μ; paraphyses slender cylindric, obtuse, 2 μ wide.

On a mat of fallen *Larix* needles, Tamarack swamp, Northfield, Michigan, U.S.A., 6 . 10 . 1893, *L. N. Johnson 657*, in herb. New York Bot. Garden.

The symmetrical ascospores suggest an operculate ascus but I think these are inoperculate. A toothed margin occurs in the type species of *Sphagnicola*, *S. ciliifera* (Karst.) Vel., which has slightly larger ascospores and lacks the orange pigment. At first sight *S. laricina* recalls *Helotium epiphyllum* (Pers. ex Fr.) Fr. but the ascospores are very different; the otherwise rather similar *Hel. citrinum* subsp. *turfaceum* Karst. has ascospores twice the size. The gelatinised stratum at the base of the apothecium is less conspicuous in the present species than in *S. ciliifera* and in this as in excipular structure it seems transitional to *Discinella* Boud. so that it may eventually prove impracticable to separate these two genera.

Chloroscypha limonicolor (Bres.) Dennis, *comb. nov.*

Helotium limonicolor Bres., Fungi tridentini **2**: 81. Aug. 1898 (basionym).

Apothecia scattered, superficial, light yellow, drying yellowish brown, disc concave up to 2 mm diameter; receptacle cupulate, concolorous, smooth, with a short cylindrical stalk. Flesh soft, of thinwalled nongelatinised hyphae; excipulum formed of closely packed hyphae about 3 μ wide, almost parallel to the surface, with slightly thickened walls which remain hyaline in cotton blue and then give a slightly phialeoid aspect to the longitudinal section. The three outer layers of hyphae are brownish, the remainder subhyaline. Asci cylindric-clavate, 110 × 13 μ, 8-spored, the pore blued by Melzer's reagent; ascospores biseriate, fusoid or slightly clavate but pointed at each end, with 2 guttules and finely granular cytoplasm; paraphyses cylindrical, obtuse, 2 μ thick, with yellowish contents.

On dead leaves of *Thuja orientalis*, Tyrol, June 1896, typus in herb. Bresadola, Stockholm.

There seems nothing but colour to separate this from *Chloroscypha jacksoni* Seaver (*in* Mycologia **23**: 249. 1931) described as "yellowish with a greenish tint", on *Thuja occidentalis* in Canada and I suspect they are the same.

Hymenoscyphus limonium (Cke. & Peck) Dennis, *comb. nov.*—Fig. 29

Helotium limonium Cke. & Peck *in* Rep. N.Y. St. Mus. **26**: 83. 1874 (basionym). — *Calycina limonium* (Cke. & Peck) O. Kuntze, Rev. Gen. Pl. **3** (2): 448. 1898.

On herbaceous stem, Center, New York, October.

White (1942) has fully redescribed the species but as Seaver (1951) has nevertheless subsequently cited it in synonymy under *Helotium cyathoideum* (Bull. ex Fr.) Karst. it seems desirable to record that the type has an excipulum of parallel thinwalled hyphae, 4 μ wide, lying at a low angle to the surface. It bears no resemblance to *H. cyathoideum* nor is it a *Phialea*. The ascus pore is blued by Melzer's reagent.

ALLOPHYLARIA MACROSPORA (Kirschst. apud Jaap) Nannf.

Phialea macrospora Kirschst. *apud* Jaap *in* Verh. bot. Ver. Brandenburg **64**: 12. 1922. — *Allophylaria macrospora* (Kirschst. apud Jaap) Nannf. *in* Nova Acta Soc. Sci. upsal., ser. 4, **8**: 291. 1932.

In 1869 Karsten published a full description of a minute discomycete he called *Peziza sublicoides*, found in October on dead stems of *Artemisia vulgaris* at Mustiala in Finland. This was one of the foundation species of his subgenus *Allophylaria* and was subsequently selected as lectotype of the genus *Allophylaria* (Karst.) Karst. by Nannfeldt. In 1871 Karsten reprinted the diagnosis and recorded the additional hosts *Anthriscus silvestris* (as *Cerefolium*) and *Chamaenerium angustifolium*.

When, therefore, Mr. Bramley forwarded me in 1956 a tiny *Allophylaria* on dead *Chamaenerium* stems from Yorkshire it seemed natural to accept it as Karsten's species. There were, however, small differences between this and Karsten's type collection on *Artemisia* which led me to refrain from publishing the record. He has now forwarded a further abundant collection on the same substrate which shows these differences to be constant. The *Chamaenerium* fungus agrees more closely with the nearly related *Phialea macrospora* Kirschstein, described from *Populus canadensis* twigs in north Germany. Nannfeldt, who collected Kirschstein's species on *Populus tremula* in Sweden, transferred it to *Allophylaria*. The salient characters of these attractive fungi are summarised below:

	Peziza sublicoides	Yorkshire fungus	*Phialea macrospora*
Apothecial dimensions	0.3 mm tall 0.1–0.2 mm wide	0.5 mm tall 0.5 mm wide	0.5 mm tall 0.25–0.4 mm wide
Asci	160–170 × 11–15 μ	125 × 11–14 μ	95–125 × 9–10 μ
Ascospores	15–26 × 6–7 μ	17–24 × 4–5 μ	18–22 × 4–5 μ
Ascus pore reaction to iodine	—	+	+

The differences are seen to lie mainly in the length of the asci and the width of the ascospores, it is probably unwise to lay stress on the apparent difference in pore reaction until that of *P. sublicoides* has been confirmed on fresh collections. In all three characters, however, the Yorkshire fungus agrees better with *A. macrospora*, having distinctly shorter asci and narrower ascospores than typical *P. sublicoides*. In spite of the difference in substrate, therefore, it seems better to adopt for this fungus on *Chamaenerium* in England the name *Allophylaria macrospora* (Kirschst.) Nannfeldt.

On *Chamaenerium angustifolium*, Kingthorpe, Pickering, Yorkshire, 13.11.1955; 1.11.1961, *W. G. Bramley*.

HELOTIUM MACULOSUM Ellis & Martin—Fig. 30

Helotium maculosum Ellis & Martin in Amer. Nat. **17**: 1284. Dec. 1883. — *Calycina maculosa* (Ellis & Martin) O. Kuntze, Rev. Gen. Pl. **3** (2): 448. 1898. — *Erinellina maculosa* (Ellis & Martin) Seaver, North Amer. Cup Fungi (Inop.) 293. 1951.

Apothecia scattered, superficial, about 200 μ diameter, disc flat, fawn; receptacle saucer-shaped, sessile on a broad base, dark brown. The margin is fringed with subhyaline, thinwalled, cylindrical to pointed hairs, about 20 × 2.5 μ, which cohere to form small triangular teeth; excipular structure poorly preserved but apparently of small, thinwalled, prismatic cells. Asci cylindric-clavate, sessile, 8-spored, 50 × 11 μ (55 × 12 μ Ellis), iodine reaction doubtful; ascospores uniseriate to biseriate, narrowly elliptical, hyaline, 3-septate, 16–20 × 3–4 μ (–5 μ Ellis); paraphyses cylindrical, obtuse, 2–3 μ wide.

On dead patches in living leaves of *Persea palustris*, Florida, ex herb. Ellis.

The basal, brown, bristly hairs referred to in the diagnosis appear to be extraneous to the apothecia; a number of more or less erect, dark brown, septate hyphae are commonly associated with them, which may be conidiophores, though no conidia have been seen on them. The hairs hardly seem those of a *Hyaloscypha* and the species may belong rather in *Calycellina* but the material available is not well preserved and study of fresh specimens would be desirable before making a transfer.

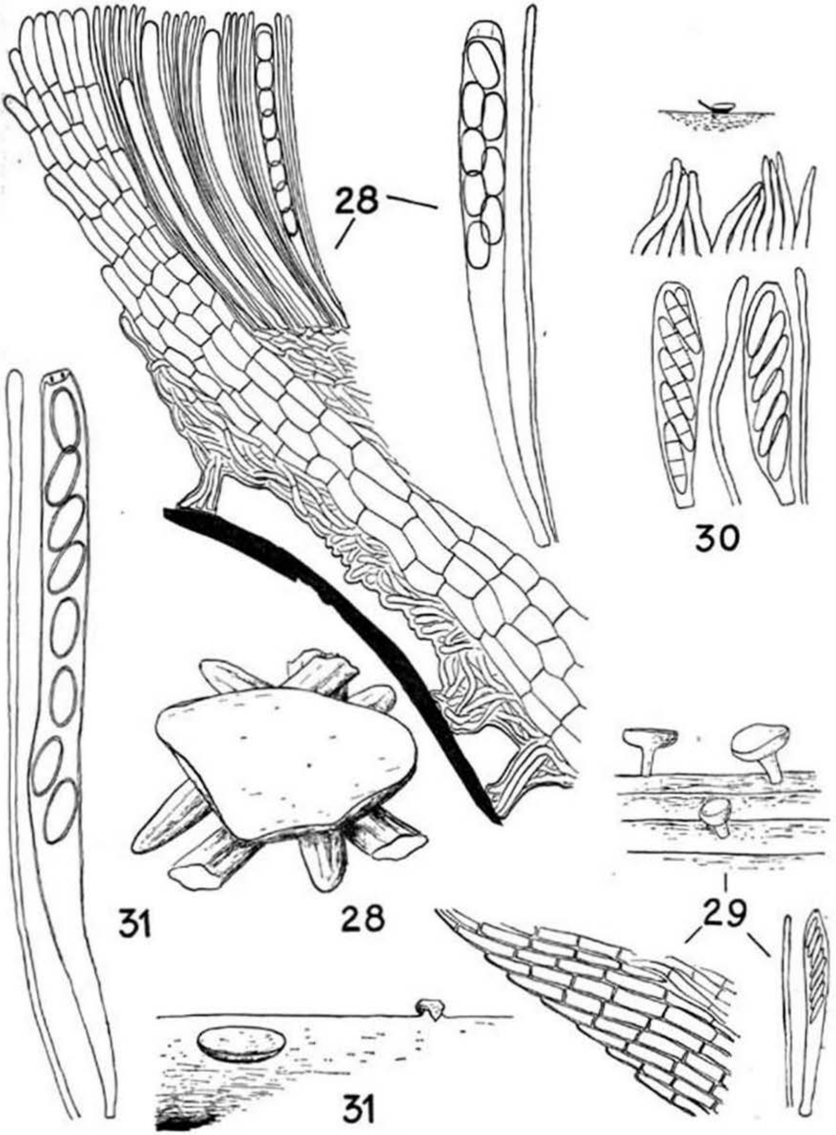
Rutstroemia maritima (Rob. apud Desm.) Dennis, *comb. nov.*—Fig. 31

Peziza maritima Roberge *apud* Desmazières *in* Ann. Sci. nat. (Bot.) ser. 3, **3**: 366. 1845 (basionym). — *Helotium maritimum* (Rob. apud Desm.) Sacc., Syll. Fung. **8**: 234. 1889.

Apothecia solitary or occasionally up to three in a cluster, erumpent; disc slightly convex when soaked up, without a rim, about 1 mm across, cinnamon; receptacle shallow cupulate, concolorous or with a darker margin, very soft, seated on a short stem-like base, not more than 0.3 mm high according to Desmazières. Excipular cells short prismatic, with thin brown walls, passing into parallel brown hyphae

EXPLANATION OF FIGURES 28–31

Figs. 28–31. — 28. *Sphagnicola laricina*. Apothecium (× 20), section of margin (× 400), ascus and paraphysis (× 660). — 29. *Hymenoscyphus limonium*. Habit sketch (× 10), ascus, paraphysis and portion of excipulum (× 660). — 30. *Helotium maculosum*. Apothecium (× 20), marginal hyphae, asci and paraphyses (× 660). — 31. *Rutstroemia maritima*. Apothecia on marram leaf (× 15), ascus and paraphysis (× 660).



Figs. 28–31

at the margin. Asci cylindric-clavate, 165 × 13 μ, with broad flat top and pore blued by iodine, 8-spored; ascospores elliptical, 14–17 × 5.5–7 μ, nonseptate and not budding in the ascus; paraphyses cylindrical, obtuse, slightly enlarged to 4 μ thick upwards.

On dead leaves of *Psamma arenaria*, usually erumpent from the outer face, dunes of Lyon-sur-mer, Calvados, Desmazières Crypt. France 1418.

This seems congeneric with but probably distinct from *Rutstroemia calopus* (Fr.) Rehm.

Hymenoscyphus montaniensis (Ell. & And.) Dennis, *comb. nov.*—Fig. 32

Helotium montaniense Ellis & Anderson *in* Bot. Gaz. **16**: 45. 1891 (basionym). — *Calycina montaniense* (Ell. & And.) O. Kuntze, Rev. Gen. Pl. **3** (2): 448. 1898.

Apothecia scattered, superficial, disc concave, "pale flesh colour", drying yellowish brown, 1–1.5 mm across; receptacle cupulate on a stout stem-like base or almost sessile, smooth, margin prominent, obtuse, even, often lobed or undulating. Excipulum composed of slender parallel hyphae, 2–4 μ wide, lying at a low angle to the surface, the outer layers in the lower part of the receptacle formed of short prismatic cells. Asci clavate, 8-spored, 65–85 × 7–9 μ, pore blued by Melzer's reagent; ascospores uniseriate or becoming biseriate above, ellipsoidal, with small polar guttules, nonseptate, 8–10 × 3.5–4.5 μ; paraphyses cylindrical, obtuse, 2 μ thick.

On wet sticks by a spring, Sand Coulee, Cascade Co., Montana, 25th May 1889, *F. W. Anderson 490*, typus in herb. New York Bot. Garden.

Phaeohelotium monticola (Berk.) Dennis, *comb. nov.*—Fig. 33

Helotium monticola Berk. *in* Grevillea **4**: 1. Sept. 1875 (basionym).

Apothecia solitary or in small clusters, disc convex when moist, slightly concave or dimpled when dry, dingy yellow, about 1 mm diameter; receptacle sessile, shallow cupulate, concolorous, smooth, soft-fleshed. Excipulum composed of hyphae at a high angle to the surface, broken up into short prismatic to rounded cells with thin hyaline walls. Asci narrowly cylindric-clavate, the pore slightly blued by Melzer's reagent, 95–100 × 7–10 μ, 8-spored; ascospores biseriate, elliptic-cylindric or slightly tapered below, long remaining hyaline and nonseptate but eventually becoming 1-septate and brown-walled, 12–18 × 4–5 μ; paraphyses cylindrical, obtuse, about 2 μ thick.

On decorticated wood, mountains of North Carolina, 22.7.1856, *M. A. Curtis 4471*.

Berkeley cited the number in error as *470* but *Curtis 470* is an Agaric. Obviously this is an earlier name for *Phaeohelotium flavum* Kanouse (see Kew Bull. **1958**: 343). Massee [*in* J. Linn. Soc. (Bot.) **30**: 474. 1896] commented "Allied to *Helotium citrinum*, distinguished by the different structure of the ascophore and the 2-seriate

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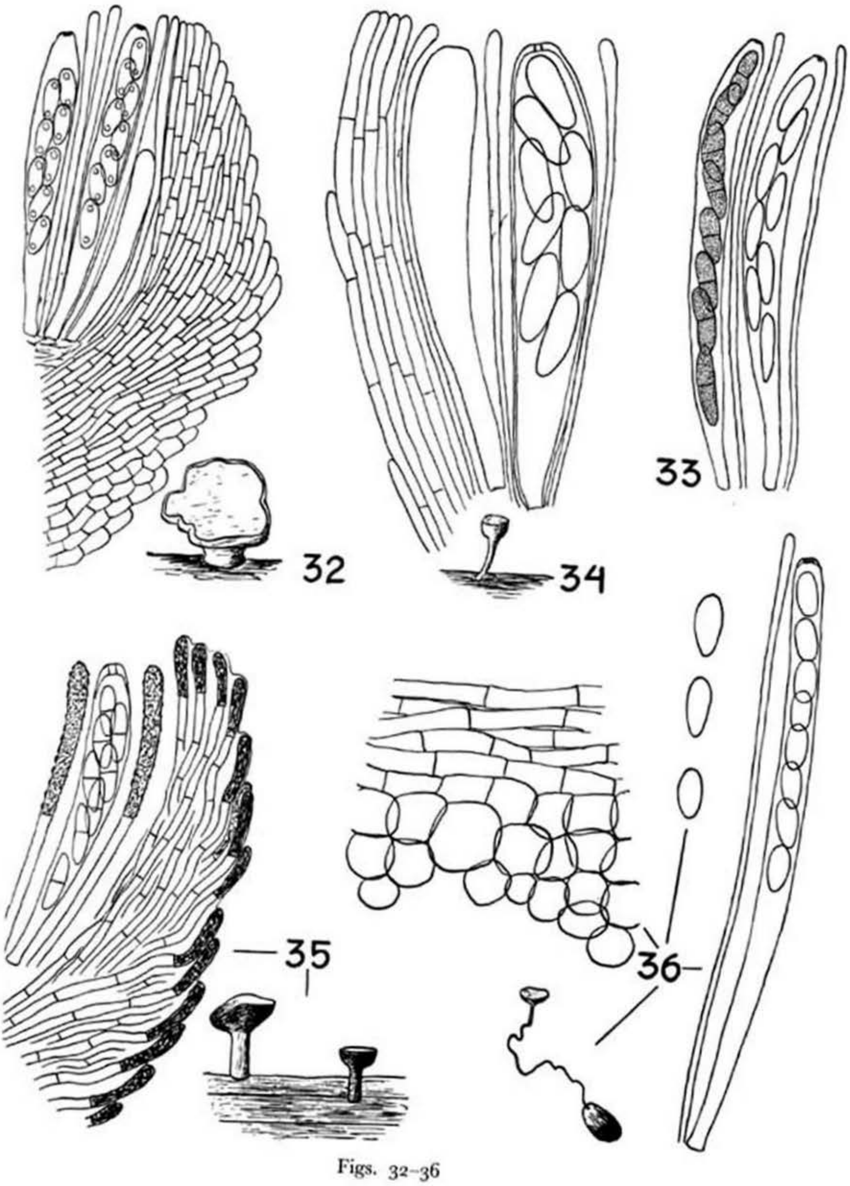
EXPLANATION OF FIGURES 32–36

Figs. 32–36. — 32. *Hymenoscyphus montaniensis*. Apothecium (× 20), section of margin (× 660). — 33. *Phaeohelotium monticola*. Paraphyses and asci with coloured and colourless ascospores from the same hymenium (× 660). — 34. *Allophylaria myricariae*. Apothecium (× 20), section of margin (× 660). — 35. *Phialea nigrescens*. Apothecia (× 10), section of margin (× 660). — 36. *Ciboria nyssogena*. Apothecium (× 1), details (× 660).



Figs. 32–36

larger spores" but he did not note that the spores turned brown. The following collections also belong here:

On wood, Windsor Great Park, Berkshire, England, 3.10.1962, *D. A. Reid.*
On wood of *Parrotia persica*, Lenkoran district, Azerbaijan S.S.R., 15.10.1962, *Raitvir 43224.*

Allophylaria myricariae (Keissler) Dennis, *comb. nov.*—Fig. 34

Phialea myricariae Keissler *in* Öst. bot. Z. **73**: 126. 1924 (basionym).

Apothecia scattered, superficial, disc light brown, flat, up to 0.2 mm wide; receptacle cupulate, smooth, concolorous, seated on a rather long, slender, often darker stalk. Excipulum composed of slender, parallel, thinwalled, septate, almost hyaline hyphae, 3 µ wide. Asci clavate, subsessile, 8-spored, 105–120 × 18–20 µ, pore outlined blue in Melzer's reagent; ascospores elliptic-cylindric to ovoid, nonseptate, without guttules, 18–22 × 6–7 µ; paraphyses cylindrical, slightly enlarged to 5 µ at the rounded tip.

3750 m, on dead branches of *Myricaria rosea*, Doker La, 28°15′, Tibetan border of Yunnan, 16 . 9 . 1915, *Handel Mazzetti 1492*, issued from Vienna as Iter Sinense 8034.

Allophylaria is somewhat doubtfully separable from *Pezizella* on a basis of its large asci and ascospores but as long as it can be maintained this species clearly will belong in it rather than in *Hymenoscyphus* or *Pezizella*. The structure is not that of a *Phialea* in the restricted sense of von Höhnel.

Phialea nigrescens (Cke.) Dennis, *comb. nov.*—Fig. 35

Peziza nigrescens Cooke *in* Bull. Buffalo Soc. nat. Sci **2**: 295. March 1875; *in* Hedwigia **14**: 83. June 1875 (basionym). — *Helotium nigrescens* (Cke.) Rehm *in* Ber. naturh. Ver. Augsburg **26**: 77. 1881.

Apothecia scattered, superficial, disc concave, gray, 0.5 mm diameter; receptacle cupulate, black, smooth, seated on a cylindrical, gray to dark brown, smooth stalk. Excipulum composed of slender, parallel, septate hyphae, embedded in a gelatinous matrix, the terminal cells coated by a brown incrustation to give the dark colour to the surface. Asci clavate, 60–73 × 9 µ, 8-spored, pore not blued by Melzer's reagent; ascospores biseriate, elliptic-fusoid or inequilateral, 13–15 × 3 µ, 1-septate; paraphyses rather stout, cylindrical, slightly enlarged upwards to 4 µ diameter, apical cell coated by a dark brown incrustation.
On stems of *Erigeron*, Newfield, New Jersey, Aug. 1873, *Ellis 1022.*

PEZIZA NYSSAEGENA Ell.—Fig. 36

Peziza nyssaegena Ellis *in* Bull. Torrey bot. Cl. **8**: 73. 1881. — *Ciboria nyssogena* (Ell.) Sacc., Syll. Fung. **8**: 207. 1889. — *Sclerotinia nyssaegena* (Ell.) Rehm *in* Ann. mycol., Berl. **4**, 338. 1906.

Growing from old drupes of *Nyssa multiflora*, buried under decaying leaves in muddy places, Newfield, New Jersey, Sept.—Oct. 1879, typus in herb. New York Bot. Garden and issued as North american Fungi 389.

There is no sclerotium, the excipulum is composed of globose, thinwalled cells, 8–15 μ diameter and the fungus appears to be a good *Ciboria*, though not listed as such by Whetzel (1945). The name *Helotium nyssogenum* Ell., printed in error in synonymy by Saccardo, seems not to have been validly published.

HELOTIUM NYSSICOLA Seaver

Helotium nyssicola Seaver *in* Mycologia **30**: 79. 1938.

On seeds of *Nyssa sylvatica*, New York Bot. Garden, 22 . 9 . 1930.

Seaver commented that this resembled *Hel. fructigenum* (Bull. ex Mérat) Fuck. but differed in habitat and in its slightly larger ascospores. The ascospores measure 15–20 × 3–4.5 μ, are clavate but not beaked or ciliate and become 1-septate with age whereas those of *Hel. fructigenum* in Europe measure 13–21 × 3–4 μ and I see nothing to separate the two fungi.

PEZIZA OENOTHERAE Cke. & Ell.—Fig. 37

Peziza (*Mollisia*) *oenotherae* Cooke & Ellis *in* Grevillea **6**: 90. March 1878. — *Pezizella oenotherae* (Cke. & Ell.) Sacc., Syll. Fung. **8**: 278. 1889. — *Helotium oenotherae* (Cke. & Ell.) Höhn. *in* Mitt. bot. Inst. tech. Hochsch. Wien **3**: 105. 1926. — *Discohainesia oenotherae* (Cke. & Ell.) Nannf. *in* Nova Acta Soc. Sci. upsal., ser. 4, **8** (2): 88. 1932. — *Mollisia oenotherae* (Cke. & Ell.) Seaver, North Amer. Cup Fungi (Inop.) 211. 1951.

Apothecia scattered, erumpent from the host epidermis, associated with a *Hainesia* conidial state, disc convex when moist, up to 1 mm diameter, white when fresh, pale ochraceous when dried; receptacle cupulate to discoid, with a short stem-like base, smooth, concolorous. Excipulum composed of isodiametric, thinwalled, subhyaline cells up to 12 μ diameter, passing into short parallel hyphae at the margin. Asci cylindric-clavate, apex conical but with the pore not blued by Melzer's reagent, 70 × 5–6 μ, 8-spored; ascospores biseriate, clavate, 9–11 × 2–2.5 μ; paraphyses filiform, branched, 1 μ thick, not enlarged at the tip.

On *Oenothera*, Newfield, New Jersey, *J. B. Ellis 2681*.

This is the type species of *Discohainesia* and, though Dermateaceous, is clearly separated from *Mollisia* by its slender branched paraphyses, iodine-negative asci, lack of olive pigment and habit as well as by the peculiar conidial state, *Hainesia lythri* (Desm.) Höhn. The latter has been fully described by Shear & Dodge (*in* Mycologia **13**: 135–170. 1921), according to whom the apothecia occur commonly on old leaves of *Castanea*, *Gaura*, *Prunus*, *Rubus*, *Salix* and *Steironema* as well as *Oenothera* and the conidial state also on *Acer*, *Ampelopsis*, *Cercis*, *Cornus*, *Duchesnia*, *Epilobium*, *Eucalyptus*, *Fragaria*, *Gaultheria*, *Geranium*, *Hicoria*, *Jambosa*, *Lythrum*, *Nyssa*, *Pelargonium*, *Populus*, *Potentilla*, *Quercus*, *Rhus*, *Ribes*, *Rosa*, *Smilax*, *Ulmus*, *Vaccinium* and *Vitis*.

Allophylaria ogrensis (Kirschst.) Dennis, *comb. nov.*—Fig. 38

Poculopsis ogrensis Kirschstein *in* Ann. mycol. Berl. **33**: 204. 1935 (basionym).

I have not seen the type but the following collection agrees so closely with Kirschstein's description, apart from having slightly larger ascospores, that I feel justified in using the name for it.

Apothecia scattered, erumpent, disc flat, less than 500 μ across, yellow when fresh, drying dark brown; receptacle cupulate on a short cylindrical stalk, smooth, concolorous. Excipulum composed of parallel hyphae, 3–4 μ wide. Asci clavate, 100–107 × 12–14 μ, subsessile, 8-spored, apex flattened, the pore outlined blue in Melzer's reagent; ascospores biseriate, elliptical, 16–21 × 6–7.5 μ with two large guttules; paraphyses cylindrical, enlarged to 3 μ wide at the rounded tip.

On dead leaves of *Lycopodium clavatum*, in a bog near the saeter Nystolen, c. 1000 m, between Hallingdal and Aurdal, Buskerud fylke, Norway, 3 . 8 . 1956.

Presumably *Helotium fulvum* Boud. (*in* Bull. Soc. mycol. France **13**: 16. 1897), on a moss, is someting similar, though with much longer asci. The very soft texture and broad elliptical ascospores suggest affinity with the Ciborioideae but there is no sclerotium and no blackening of the substrate.

PEZIZA PASTINACAE Schw.

Peziza pastinacae Schwein. *in* Trans. Amer. phil. Soc. N.S. **4**: 176. 1832. — *Pezizella pastinacae* (Schw.) Sacc., Syll. Fung. **8**: 290. 1889.

The fragment sent under this name by Schweinitz to Berkeley bears a single apothecium, externally indistinguishable from those of *Pezizella albotincta* Rehm as distributed in Sydow, Mycotheca germanica 127. It yields 8-spored asci, 100 × 7 μ, with the pore blued by Melzer's reagent and containing biguttulate, straight or slightly curved ascospores, 12–15 × 2 μ. The paraphyses are obtusely cylindric, 2 μ thick and the excipular hyphae hyaline, with short prismatic cells about 5–9 × 3 μ. Von Höhnel held that *P. albotincta* was but a state of *Hel. herbarum* and so, I think, is *P. pastinacae*, which Schweinitz himself annotated "Affinis *P. herbarum*".

PHIALEA PHAEOCONIA Fairman—Fig. 39

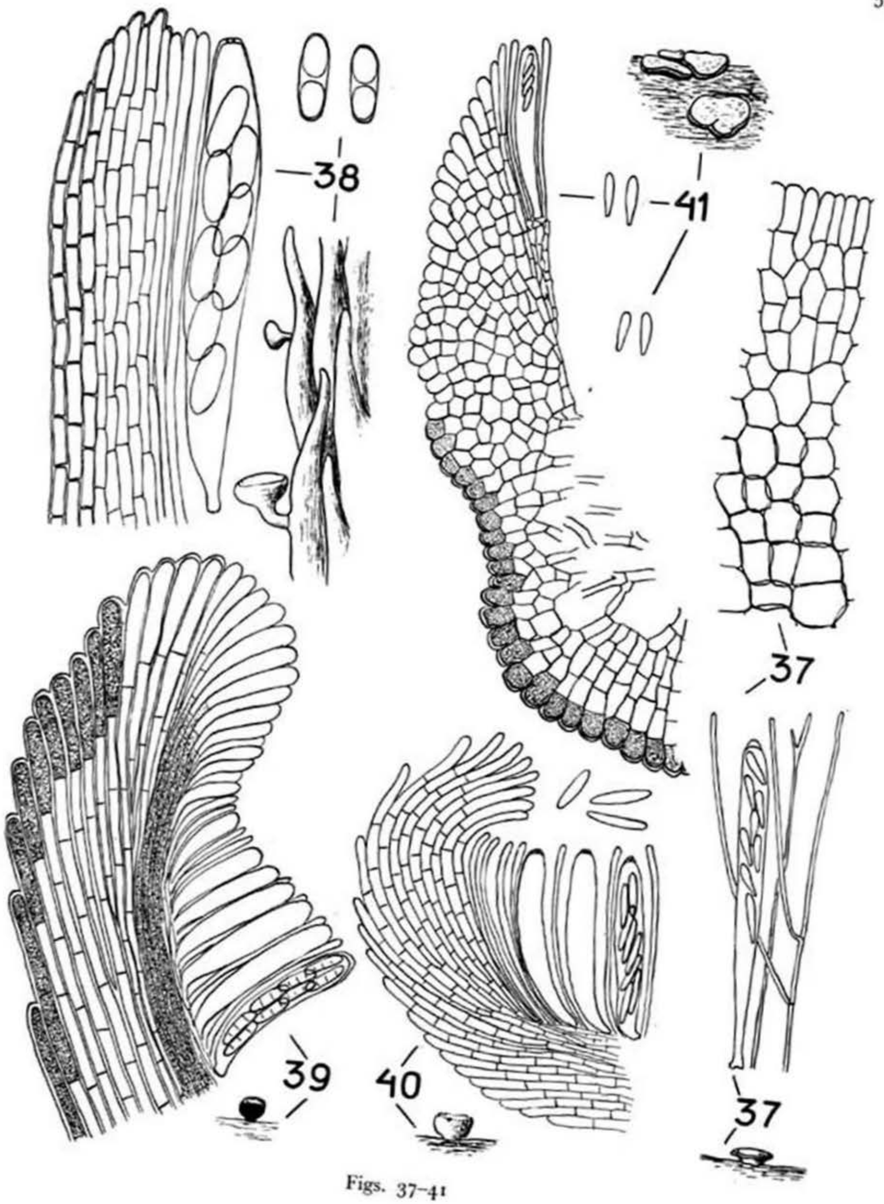
Phialea phaeoconia Fairman *in* Ann. mycol., Berl. **9**: 151. 1911. — *Helotium phaeoconium* (Fairman) Seaver, North Amer. Cup Fungi (Inop.) 129. 1951.

The minute black apothecia are erumpent from the under side of faded leaves, cupulate 250 μ diameter, smooth, with short, stout, mainly immersed stalk and light gray incurved margin. The excipulum is typically phialeoid, formed of parallel hyphae, with glassy walls and thin cross septa, the outer cells dark brown with finely granular pigment and there is an equally dark brown zone of slender hyphae forming the hypothecium. Asci with pore blued by Melzer's reagent, 30–40 × 8 μ (50 × 10 μ Fairman); ascospores elliptic-cylindric, 10–11 × 2.5 μ (10–13 × 3–4 μ Fairman), now appearing 3-septate but described as continuous when fresh; paraphyses cylindrical, 1.5 μ thick, obtuse.

On *Antennaria plantaginifolia*, Lyndonville, New York, 12 . 5 . 1910, typus in herb. Cornell University.

EXPLANATION OF FIGURES 37–41

Figs. 37–41. — 37. *Discohainesia oenotherae*. Apothecia (× 7), excipulum in surface view, ascus and paraphyses (× 660). — 38. *Allophylaria ogrensis*. Habit sketch (× 20), section of margin and free ascospores (× 660). — 39. *Phialea phaeoconia*. Apothecium (× 15), section of margin (× 660). — 40. *Pezizella phymatodes*. Apothecium (× 15), section of margin and free ascospores (× 660). — 41. *Mollisia propinqua*. Habit sketch (× 15), section of margin (× 660).



Figs. 37–41

Because of the ultimate septation of the ascospores this will key to *Belonioscypha* but I am not enthusiastic about genera based solely on ascospore septation and am content to leave it in *Phialea* for the present.

PEZIZA PHYMATODES Phill.—Fig. 40

Peziza (*Mollisia*) *phymatodes* Phillips *in* Grevillea **5**: 117. March 1877. — *Pezizella phymatodes* (Phill.) Sacc., Syll. Fung. **8**: 285. 1889. — *Orbilia phymatodes* (Phill.) Seaver, North Amer. Cup Fungi (Inop.) 156. 1951.

Apothecia scattered, superficial, disc concave, with incurved margin; receptacle cupshaped, sessile on a small base, 300–400 μ diameter, "reddish flesh colour", smooth or slightly pruinose at the margin, soft-fleshed. Excipulum formed of slender parallel hyphae, 2–3 μ wide, with thin walls, their tips sometimes slightly protruding. Asci cylindric-clavate, apex conical, with small pore blued by Melzer's reagent, 45 × 7 μ, 8-spored; ascospores biseriate, elliptic-cylindric, 11–15 × 2–3 μ; paraphyses cylindrical, obtuse, 2 μ wide.

On "reeds", apparently some soft swamp grass, not *Phragmites*, Blue Canon, Sierra Nevada, California, *Harkness 437*.

The structure is consistent with Saccardo's relegation of the species to *Pezizella* and it may be left there for the present. The transfer to *Orbilia* was ridiculous since the species exhibits no character of the genus, beyond being a discoid ascomycete.

HELOTIUM PRASINUM Massee

Helotium prasinum Massee *in* Kew Bulletin **1901**: 159. 1901.

On dead wood, Tasmania, *Rodway 565*.

This proves to be an older name for *H. novae-zelandiae* Dennis. It is noteworthy that, though Massee found "asci . . . apice iodo haud tincti" and I made a similar observation with the type of *H. novae-zelandiae*, the asci of *Rodway 565* now give a distinct blue reaction with Melzer's reagent in the inner portion of the pore plug.

Mollisia propinqua (Sacc. & Ell.) Dennis, *comb. nov.*—Fig. 41

Helotium propinquum Saccardo & Ellis *in* Michelia **2**: 572. Dec. 1882 (basionym). — *Calycina propinqua* (Sacc. & Ell.) O. Kuntze, Rev. Gen. Pl. **3** (2): 448. 1898.

Apothecia solitary or in small clusters, erumpent, becoming superficial; disc flat, 0.5–0.75 mm across, pallid, drying ochraceous; receptacle patellate, sessile on a small base, without a subiculum, the upper half pallid, the lower half blackish-brown, smooth. Excipulum composed of short prismatic to isodiametric cells in rows at right angles to the surface, passing into a few parallel hyphae at the margin, walls thin, pale, the surface layer of cells over the lower half of the receptacle filled with dark brown matter. Asci clavate, 55 × 6–7 μ, pore deep blue in Melzer's reagent; ascospores slender clavate, nonseptate, 9–12 × 2–2.5 μ; paraphyses cylindrical, slightly enlarged to 3 μ at the obtuse tip.

On dead twigs of *Cornus*, Pennsylvania, *Ellis 3545*, typus in herb. New York Bot. Garden.

Mollisia pullata (Ger. apud Cke.) Dennis, *comb. nov.*—Fig. 42

Helotium pullatum Gerard *apud* Cooke *in* Bull. Buffalo Soc. nat. Sci. **2**: 298. 1875 (basionym).

Apothecia scattered, superficial, disc concave, 0.5 to 2 mm diameter, with a broad low rim, "dingy ochre when fresh", drying dark brown, receptacle cupulate, sessile on a short stout base, smooth, soft. Excipulum composed of parallel short-celled hyphae lying at a high angle to the surface, with thin brown walls, more distinctly pseudoparenchymatous on the under side of the cup, with an outer zone of about 4–5 layers of isodiametric cells, 10–15 μ diameter, separated from the flesh of paler compact hyphae by a darker zone about 3 cells thick of smaller somewhat flattened cells. Asci cylindric-clavate, 110 × 6 μ, apex conical, truncated by a pore deeply blued by Melzer's reagent, 8-spored; ascospores elliptic-cylindric or tapered below, 7–11 × 2.5 μ, nonseptate; paraphyses cylindrical, slightly enlarged to 2.5 μ at the rounded tip.

On dead *Vitis* in damp places, New York, *Gerard 42*.

This is nothing like an *Orbilia*, as suggested by Seaver (1951), nor a *Hymenoscyphus*, but it is not a typical *Mollisia* either and I only refer it there for want of a better idea. *Orbiliopsis* Höhn., to which it might be assigned, is unfortunately an invalid name.

Calycellina pulviscula (Cke.) Dennis, *comb. nov.*—Fig. 43

Peziza (*Mollisia*) *pulviscula* Cooke *in* Hedwigia **14**: 84. June 1875 (basionym). — *Pezizella pulviscula* (Cke.) Sacc., Syll. Fung. **8**: 278. 1889. — *Orbilia pulviscula* (Cke.) Seaver, North Amer. Cup Fungi (Inop.) 160. 1951.

Scattered, superficial, disc flat with a low minutely denticulate rim, 300–400 μ diameter, light yellow; receptacle cupulate, concolorous, sessile on a small base with a brown basal ring. Excipulum composed of rows of short prismatic cells, the basal layer brown-walled, the remainder hyaline, passing into parallel hyphae 20 × 2.5–3 μ at the margin. Asci cylindric-clavate, apex conical with a very small pore probably blued by Melzer's reagent, 33 × 4 μ, 8-spored; ascospores rodshaped, straight or curved, 5–6 × 0.5 μ; paraphyses cylindrical, obtuse, 2–2.5 μ thick.

On stems of *Phytolacca*, Poughkeepsie, New York, *Gerard 33*.

The small rod-shaped ascospores certainly suggest an *Orbilia* but the conical-tipped asci and simple cylindrical paraphyses preclude the possibility of referring the species to that genus. The anatomy seems to suggest *Calycellina* rather than *Hyalinia*.

PEZIZA REGALIS Cke. & Ell.

Peziza (*Mollisia*) *regalis* Cooke & Ellis *in* Grevillea **6**: 91. March 1878. — *Pezizella regalis* (Cke. & Ell.) Sacc., Syll. Fung. **8**: 284. 1889.

On apple bark, Newfield, New Jersey, *Ellis 2778*.

This seems to be an *Orbilia* and Massee has annotated it as a synonym of *Peziza cruenta* Schwein. = *Orbilia cruenta* (Schw.) Seaver. I do not see ripe ascospores and am not prepared to comment on the synonymy.

HELOTIUM RHIZICOLA Seaver

Helotium rhizicola Seaver, North Amer. Cup Fungi (Inop.) 143. 1951.

Apothecia scattered, superficial, disc 1–2 mm diameter, "yellowish or with a tinge of salmon when moist", drying ochraceous to brownish and concave with a low rim;

receptacle shallow cupulate, light yellow, smooth, seated on a slender, smooth, cylindrical stalk. Excipular hyphae thinwalled, hyaline, 5–6 μ wide, lying at a rather high angle to the surface, narrower at the margin. Asci narrowly cylindric, about 100 × 6 μ, 8-spored, the pore only feebly blued by Melzer's reagent; ascospores uniseriate, subcylindric, tapered below, nonseptate, 8–10 × 2–2.5 μ; paraphyses cylindrical, obtuse, 2–2.5 μ wide.

On exposed roots of *Collinsonia canadensis*, New York Botanical Garden, Sept. 1930.

It should be noted that in the place cited Seaver gave a detailed English description followed by a brief Latin diagnosis which does not refer to the present species "Apotheciis . . . extus pilis brunneis vestitis . . . sporis . . . 4 × 13–15 μ . . . ." Evidently the diagnosis of this species and that of *Lachnella populina* Seaver on p. 270 were carelessly transposed when his manuscript went to press. Apparently the fact that the published Latin diagnosis does not apply to the species does not invalidate the name. However, *H. rhizicola* appears to me doubtfully distinct from *H. robustius* (Karst.) Karst., which also characteristically develops pinkish tints.

HELOTIUM RUBENS Sacc. & Roum.

Helotium rubens Sacc. & Roum. *in* Rev. Mycol. **6**: 28. 1884.

The Kew example contains only a *Tapesia* with asci J +, 65 × 6 μ and straight, or slightly curved, cylindric-fusoid ascospores 11–12 × 2 μ. It seems doubtful if this was the fungus described.

Hymenoscyphus rufocorneus (Berk. & Br.) Dennis, *comb. nov.*—Fig. 44

Helotium rufocorneum Berk. & Br. *in* J. Linn. Soc. (Bot.) **14**: 108. 1873 (basionym).

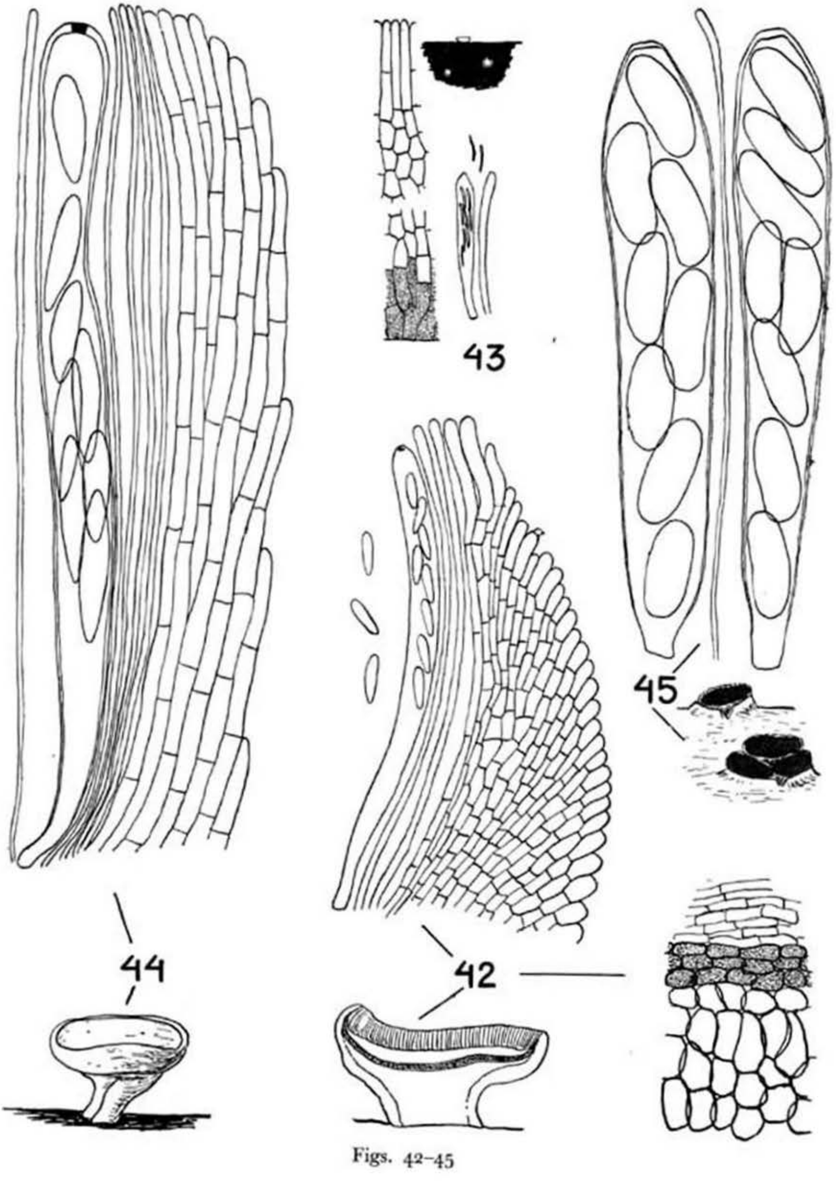
Apothecia scattered, superficial, disc concave, about 2 mm diameter, drying dark reddish brown, with a low raised margin; receptacle cupulate, with a cylindrical stalk about as long as the diameter of the disc, smooth, wrinkling when dry, yellowish-brown. Excipulum composed of parallel hyphae lying at a very low angle to the surface, about 5 μ wide, with thin hyaline walls. Asci cylindric-clavate, 195 × 15 μ, rather thickwalled, pore plug deep blue in Melzer's reagent, 8-spored; ascospores biseriate, fusoid or clavate and tapered below, nonseptate, hyaline, 25–35 × 6–7 μ; paraphyses slender cylindrical, obtuse, 2 μ wide.

On dead wood, Ceylon, *G. H. K. Thwaites 282*.

Massee has endorsed the sheet "= *Peziza crocata* Mont." but, according to authentic material of that species at Kew, it has much smaller asci and more slender ascospores, 21–27 × 3 μ. Madame Le Gal (1953) has already rejected Massee's suggestion and *Helotium rufocorneum* would appear to be a good species of *Hymenoscyphus*.

EXPLANATION OF FIGURES 42–45

Figs. 42–45. — 42. *Mollisia pullata*. Diagrammatic section (× 40), section of margin and of excipulum from the flanks (× 660). — 43. *Calycellina pulviscula*. Apothecia (× 5), marginal and basal portion of excipulum in surface view, ascus, paraphysis and spores (× 660). — 44. *Hymenoscyphus rufocorneus*. Apothecium (× 10), section of margin (× 660). — 45. *Pezicula sepium*. Habit sketch (× 10), asci and paraphysis (× 660).



Figs. 42–45

HELOTIUM SCUTELLATUM Kalchbr. & Cke.

Helotium scutellatum Kalchbrenner & Cooke *in* Grevillea **19**: 72. March 1891.

On dead coriaceous leaves, Cape of Good Hope, *MacOwan*.

The type is in very poor condition but does not appear to be Helotiaceous. It bears the note "1098 MacOwan", with a further annotation by Cooke "Call it 9801". Eventually no number was cited.

HELOTIUM SCUTULA (Pers. ex Fr.) Karst. var. AESCULICARPA Syd.

Helotium scutula (Pers. ex Fr.) Karst. var. *aesculicarpa* Sydow *in* Ann. mycol., Berl. **19**: 141. 1921.

Sydow described this variety as follows: "Unterscheidet sich von der Hauptart durch sehr kleine, zarte, 0.3–1 mm breite, gelblichweisse oder gelblichbräunliche Apothezien mit zarten 1–3 mm hohen Stiel, ähnelt demnach der var. *Menthae* Phill. Sporen 15–21 × 4–5.5 μ. Auf faulenden Fruchthüllen von *Aesculus hippocastanum*".

Part of the type collection, Schlossgarten zu Tamsel, Brandenburg, *P. Vogel*, 15 . 11 . 1914, was distributed as Sydow, Mycotheca germanica 1637. The Kew example duly yields ascospores 15–18 × 4 μ in asci 100 × 8 μ, with the pore blued by Melzer's reagent and paraphyses equal to the asci in length, slightly enlarged upwards to 3 μ broad at the rounded tip. The ascospores are the typical shape of those of *H. scutula*, almost hooked at the obtuse upper end and pointed below and in one free ascospore there is a very short basal bristle about 2 μ long. The asci and ascospores are both a little short for those of *H. scutula* var *scutula* and suggest rather *H. caudatum* (Karst.) Vel. Mr. Bramley has forwarded to Kew three Yorkshire collections on *Aesculus* which are of interest in this connection. Their essential features may be summarised as follows, with a contemporary collection on *Rubus* cited for comparison:

No.	Substrate	Apothecia	Asci	Ascospores
19	*Aesculus* petioles	Whitish 0.75 mm diam.	95–105 × 9–10 μ	16–20 × 4–4.5 μ becoming 1-septate.
17	*Aesculus* petioles	Whitish to yellow 0.75 mm	95–100 × 8 μ	18–25 × 3–4 μ nonseptate.
10	*Aesculus* capsules	Yellow, up to 1.25 mm	95–100 × 8 μ	19–22 × 3–4 μ
9	*Rubus caesius* canes	Yellow, about 1 mm	100–112 × 9 μ	20–25 × 3.5–4 μ

Number 19 might be placed in *H. caudatum* but if so it is exceptional in having the ascospores septate at maturity. Numbers 16 and 17 are clearly the same race, collected the same day in the same locality, the race on *Rubus* differs only in having slightly longer asci. None of these collections show distinct bristles on the ascospores. Little value can be attached to the colour of the apothecia, small apothecia tend to dry whitish, more massive ones dry yellow to yellow-brown.

In the first place it is evident there is no one race or variety of *H. scutula* peculiar to *Aesculus* capsules. Numbers 16 and 17 are the same race growing indifferently on fallen petioles and capsules, with the apothecia tending to be smaller and paler on the less abundant nutrient supply from the petioles and they are very doubtfully distinct from the fungus collected in the same district on *Rubus caesius*. They do not agree with variety *aesculicarpa* because of their more slender ascospores but collection 19, on petioles, could be referred to it. White (1943) recognised *H. caudatum* as a species but admitted: "It is doubtfully distinct from *H. scutula* (Pers. ex Fr.) Karst., which is common and widely distributed on dead herbaceous stems, while generally more delicate and less deeply coloured than the latter, it appears difficult nevertheless to find any morphological characters . . . on which to make a really meaningful distinction, and the separation here maintained, for the present at least, is largely arbitrary, those forms on leaves being referred to *H. caudatum* and those on herbaceous stems to *H. scutula*." It would seem more in accordance with the facts to regard *H. scutula* as a collective species, including many races with broader or narrower ascospores, with or without distinct bristly appendages, but with them always asymmetrical, more or less hooked above and pointed below, 15–27 × 3–5 μ.

Pezicula sepium (Desm.) Dennis, *comb. nov.*—Fig. 45

Peziza sepium Desmazières *in* Ann. Sci. nat. (Bot.), ser. 3, **14**: 111. 1850 (basionym). — *Helotium sepium* (Desm.) Sacc., Syll. Fung. **8**: 229. 1889. — *Pachydisca sepium* (Desm.) Boud., Hist. Class. Discom. d'Europe 93. 1907.

As exemplified at Kew by Desmazières, Crypt. France 2006 this is a *Pezicula* with 8-spored asci, 135–145 × 22–25 μ, the pore iodine-negative; ascospores elliptic-cylindric to reniform, 22–28 × 8–12 μ, nonseptate. I suppose it to be the same as *Tympanis crataegi* Lasch 1861 = *Ocellaria aurantiaca* (Rehm) Rehm var. *crataegi* (Lasch) Rehm, though the Kew example of Rabenhorst, Fungi europaei 353, probably immature, yields ascospores only 18–21 × 10–12 μ. Rehm gives the ascospores as 18–25 × 6–9 μ for *O. aurantiaca* and quotes from Hazslinszky ascospores 22–24 × 10 μ for the var. *crataegi*. Groves (1952) agrees that Rab., Fung. eur. 353 is a *Pezicula*.

Ciboriopsis simulata (Ell.) Dennis, *comb. nov.*—Fig. 46

Peziza (*Hymenoscyphae*) *simulata* Ellis *in* Bull. Torrey bot. Cl. **8**: 73. July 1881 (basionym). — *Phialea simulata* (Ell.) Sacc., Syll. Fung. **8**; 254. 1889. — *Hymenoscyphus simulatus* (Ell.) O. Kuntze, Rev. Gen. Pl. **3** (2): 137. 1898.

Apothecia scattered, arising from veins, with no trace of a sclerotium, stroma or stromatic lines in the substrate; disc "dull watery white", convex, drying gray and flat, 0.5 mm diameter, without a raised rim; receptacle concolorous, thin, discoid, smooth, seated on a slender smooth stalk. Excipulum composed of thinwalled isodiametric cells, about 8 μ diameter, passing into parallel hyphae at the margin. Asci cylindric-clavate, rounded above, the small pore blued by Melzer's reagent, 8-spored, 75 × 6 μ; ascospores uniseriate, ellipsoidal, 7–8 × 3–4 μ; paraphyses cylindrical, obtuse, 2 μ wide.

On maple leaves decaying on wet ground in the swamp, Newfield, New Jersey, June 1879, typus in herb. New York Bot. Garden.

Ellis gave the ascospore size as .0005 inches long = 12.5 μ. The combination *Helotium simulatum* Ell. was printed in error in synonymy by Saccardo and was not validly published.

Hymenoscyphus spadiceo-atra (Mont.) Dennis, *comb. nov.*—Fig. 47

Peziza (*Phialea*) *spadiceo-atra* Mont. *in* Ann. Sci. nat. (Bot.), ser. 2, **3**: 352. 1835 (basionym). — *Helotium spadiceo-atrum* (Mont.) Sacc., Syll. Fung. **8**: 236. 1889.

The diagnosis runs simply "Spadicea, cupula hypocrateriformis planiuscula, disco nigro, stipite brevi".

The authentic material at Kew has scattered superficial apothecia with disc flat when soaked up, 1–2 mm diameter, dark brown to black; receptacle cupulate with a short cylindrical stalk, smooth, dark brown, yielding a reddish-purple stain in KOH solution. Excipulum composed of broad, rectangular, thinwalled cells, about 20 × 10 μ, passing at the surface into about two layers of parallel slender hyphae, 3–5 μ thick, heavily encrusted with reddish-brown matter. Asci much collapsed and not measured, 8-spored and 75 μ long according to Montagne; ascospores elliptical, 9–10 × 3 μ; paraphyses cylindrical, obtuse, 2.5 μ thick, with reddish-brown oily contents.

On dead leaves of *Gunnera scabra*, Juan Fernandez, May 1830, *Bertero 1704*.

Calycellina spiraeae (Rob. apud Desm.) Dennis, *comb. nov.*—Fig. 48

Peziza spiraeae Roberge *apud* Desmazières *in* Bull. Soc. bot. France **4**: 859. 1857 (basionym); non *Peziza spiraeae* Kirchner *in* Lotos **6**: 246. 1856. — *Pezizella spiraeae* (Rob. apud Desm.) Sacc., Syll. Fung. **8**: 290. 1889. — *Urceolella spiraeae* (Rob. apud Desm.) Boud., Hist. Class. Discom. d'Europe 129. 1907.

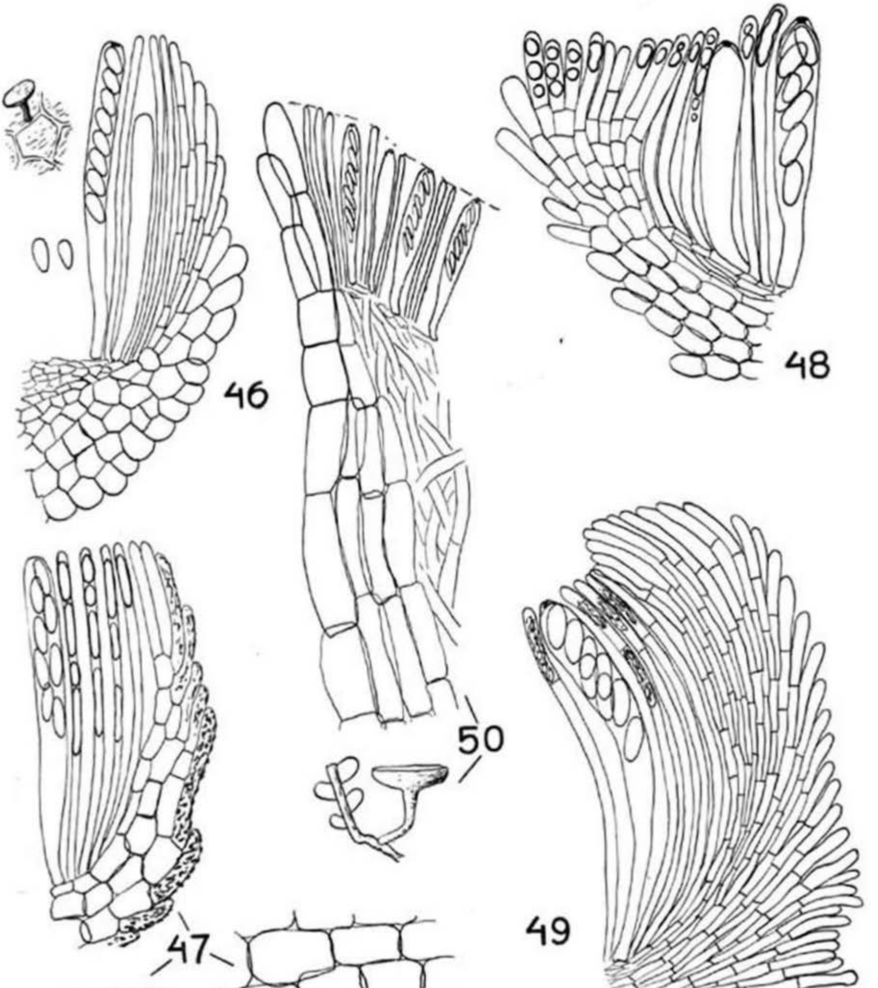
Apothecia mainly hypophyllous and embedded among the hairs of the host. "Le duvet cotonneux qui couvre ordinairement la face inférieure des feuilles de la Reine des prés, empêche souvent de l'apercevoir, et ce n'est que lorsque cette face est glabre, ou à peu près, qu'on la distingue bien." Disc flat at maturity, gray when moist, reddish-brown when dry, about 200 μ diameter; receptacle cupulate when young, discoid when old, seated on a small obconical base, concolorous, smooth, margin even or denticulate. Asci cylindric-clavate, 55–70 × 8–10 μ, 8-spored, pore blued by Melzer's reagent; ascospores uniseriate or biseriate above, elliptic-cylindric to ovoid, 10–12 × 3–4 μ; paraphyses stout, cylindrical, rounded above, 4–5 μ thick, with oily contents. Excipular cells rounded to rectangular, soft, thinwalled, running out at the margin into short hyphae, with oily contents similar to the paraphyses.

On dead leaves of *Filipendula ulmaria*, neither season nor locality indicated.

Were it not for the pale excipulum the fungus might be sought in *Pyrenopeziza*.

EXPLANATION OF FIGURES 46–50

Figs. 46–50. — 46. *Ciboriopsis simulata*. Apothecium (× 10), section of margin (× 660). — 47. *Hymenoscyphus spadiceo-atra*. Apothecium (× 10), details (× 660). — 48. *Calycellina spiraeae*. Section of margin (× 660). — 49. *Calycella strumosa*. Apothecia (× 10), section of margin (× 660). — 50. *Hymenoscyphus subcarneus*. Apothecium (× 20), section of margin (× 660).



Figs. 46–50

Calycella strumosa (Ell. & Ev.) Dennis, *comb. nov.*—Fig. 49

Helotium strumosum Ellis & Everhart *in* J. Mycol. **4**: 56. June 1888 (basionym). — *Pseudohelotium strumosum* (Ell. & Ev.) Sacc., Syll. Fung. **8**: 300. 1889.

Apothecia gregarious, sessile, disc up to 0.3 mm diameter, flat when moist, slightly concave, ochraceous, with a low paler margin when dry ("bright lemon yellow" E. & E.); receptacle discoid, seated on a broad base, with a few white anchoring hyphae, paler than the disc, minutely pruinose. Excipular hyphae thinwalled, hyaline, 2–3 μ wide, lying at a fairly high angle to the surface, their tips protruding as short, cylindrical, obtuse, smooth-walled hairs. Asci clavate, 8-spored, 80–90 × 9–12 μ, apex conical, the pore deep blue in Melzer's reagent; ascospores irregularly biseriate, ellipsoidal, nonseptate, 10–12 × 4–4.5 μ; paraphyses cylindrical, septate, obtuse, 3 μ wide, with oily yellow contents.

On old *Dichaena strumosa* Fr., Newfield, New Jersey, 20.12.1887, typus in herb. New York Bot. Garden.

According to Ellis and Everhart the fresh ascospores are 2 to 3-guttulate and become 1-septate, they are much broader than those of *C. sulfurina* (Quél.) Boud., commonly found on stromatic ascomycetes.

HYMENOSCYPHUS SUBCARNEUS (Cke. & Peck) O. Kuntze—Fig. 50

Peziza subcarnea Cooke & Peck *in* Bull. Buffalo Soc. nat. Sci. **2**: 295. 1875. — *Phialea subcarnea* (Cke. & Peck) Sacc., Syll. Fung. **8**: 265. 1889. — *Hymenoscyphus subcarneus* (Cke. & Peck) O. Kuntze, Rev. Gen. Pl. **3** (2): 486. 1889; non *Hymenoscyphus subcarneus* (Schum.) Schroet. 1893.

Helotium destructor White *in* Mycologia **34**: 163. 1942; non *Helotium subcarneum* [Schum.] Sacc. *in* Michelia **2**: 260. 1881.

"On Jungermanniae, Indian Lake, New York, July", *C. H. Peck 319*.

To the full description provided by White it will suffice to add that the excipulum is composed of broad parallel hyphae, with thinwalled cells about 20–30 × 10 μ, lying at a very low angle to the surface and covering a flesh formed of more slender loosely woven hyphae. The ascus pore is blued by iodine. It is a normal *Hymenoscyphus*.

HELOTIUM SUBCONFLUENS Bres.

Helotium subconfluens Bres. *in* Ann. mycol., Berl. **1**: 120. 1903. — *Calycella subconfluens* (Bres.) Boud., Hist. Class. Discom. d'Europe 95. 1907.

The typus, at Stockholm, appears to me the same as *Calycella subpallida* (Rehm) Dennis, though the ascus pore is certainly blued by iodine.

HELOTIUM SUBTRABINELLUM Bres.

Helotium subtrabinellum Bres. *in* Ann. mycol., Berl. **1**: 120. 1903.

I see no grounds for separating this from *Cistella trabinella* (Karst.) Nannf. The excipulum has the same structure, of rows of short prismatic cells at a high angle to the surface and terminated by small, smooth-walled, clavate hairs, 12–22 × 5–7 μ; the ascus pore is blued by Melzer's reagent, though Bresadola says "jodo vix tinctis." The ascospores are predominantly nonseptate, 10–16 × 4–5 μ, occasionally 1-septate — Bresadola saw a few 3-septate — and Karsten said of *H. trabinellum*

"Sporae demum saepe spurie tenuiter unisepatae, plerumque 10 mmm longae et 4 mmm crassae." The substrate of *H. subtrabinellum* is *Alnus* wood, in Poland, October; that of *H. trabinellum* was ?*Alnus*, in Finland, September to October.

PHIALEA TETRASPORA Feltgen—Fig. 51

Phialea tetraspora Feltgen *in* Rec. Soc. bot. Luxemb. **15**: 51. 1902.

Apothecia gregarious, superficial or with the base slightly inserted in the substrate, disc flat with a low rim, about 200 μ diameter (–400 μ Feltgen), light yellow; receptacle shallow cupulate, with a short stout stalk, smooth or appearing very minutely pruinose when dry, concolorous. Excipulum composed of parallel hyphae, 4–5 μ wide, lying at rather a high angle to the surface but turning up parallel with it towards the margin, terminal cells protruding slightly. Asci clavate, 4-spored, pore blued by Melzer's reagent, 50 × 7 μ; ascospores fusoid to clavate, 8–11 × 2.5 μ (10–13 × 3.5–5 μ Feltgen); paraphyses cylindrical, obtuse, 1 μ thick.

On the inner surface of decaying capsules of *Aesculus hippocastanum*, Luxembourg Glacis, Oct. 1900, *Feltgen*, typus in Musée d'Histoire naturelle, Luxembourg.

This seems to me indistinguishable from *Phialea winteri* Rehm, on stems of *Aconitum*.

PEZIZA TRANSLUCENS Gill. apud Pat.

Peziza translucens Gillet *apud* Patouillard, Tab. anal. Fung. 36. 1883. — *Mollisia translucens* (Gill. apud Pat.) Gill., Champ. France, Discom., Suppl. 212. 1883. — *Pezizella translucens* (Gill. apud Pat.) Sacc., Syll. Fung. **8**: 287. 1889.

Patouillard cited Roumeguère, Fungi gallici exsiccati 2382, which was published as "*Peziza* (*Mollisia*) *translucens* Gill. in litt., sur bois pourri (chêne, hêtre etc.) Poligny (Jura), Juillet 1882. The Kew example of this is *Orbilia auricolor* (Bloxam & Berk.) Sacc.

PEZIZELLA TYROLENSIS Rehm—Fig. 52

Pezizella tyrolensis Rehm *in* Ber. naturh. Ver. Augsburg **26**: 30. 1881.

Apothecia scattered, superficial; receptacle cupulate, about 0.5 mm diameter, sessile on a small base, yellow to orange when fresh, drying pinkish, with a minutely fimbriate whitish margin. Excipular cells prismatic, thinwalled, running out at the margin into cylindrical, obtuse, simple or rarely forked, hyaline hairs, up to 30 × 4 μ, with thin smooth walls. Asci 40 × 5 μ (–60 × 8 μ Rehm), pore blued by Melzer's reagent; ascospores 6–8 × 1.5 μ (6–9 × 2.5 μ Rehm); paraphyses varying from cylindrical to narrowly lanceolate, 1.5–3 μ wide, slightly longer than the asci.

On rotting stems of *Cirsium spinosissimum*, 700', Tyrol, Aug. 1872, Rehm Ascom. 116.

Von Höhnel (1926) concluded "*Pezizella tirolensis* Rehm mit den mehrfach ausgegebenen Stücken dieses Pilzes stimmt Persoon's Beschreibung seiner *Peziza micacea* volkommen überein. Auch die Nahrpflanzen sind verwandt (Cirsium — Carduus) es ist daher kein Zweifel, dass beide Pilze zusammenfallen." He regarded it as a *Pezizella* in the sense of *P. vulgaris* (Fr.) Höhn. Nannfeldt (1932), on the other hand, concluded that "Ferner gehören die zwei von v. Höhnel als typische *Pezizella* Arten bezeichneten *P. micacea* (Pers.) Rehm (= *P. tyrolensis* Rehm) und *P. saxonica*

Rehm ebenfalls zu *Lachnum*." I agree with this when *Dasyscyphus* (= *Lachnum*) is taken in the broad sense. As subdivided by Dennis (1962) *P. micacea* Pers. will be a *Psilachnum*, viz. *Psilachnum micaceum* (Pers.) Dennis, basionym *Peziza micacea* Pers., Mycologia europaea **1**: 268. 1822 and Fries, Syst. mycol. **2**: 105. 1822.

PEZIZELLA VOGELII Syd.—Fig. 53

Pezizella vogelii Sydow *in* Ann. mycol., Berl. **14**: 246. 1916.

On dead petioles of *Robinia pseudacacia*, Tamsel, Brandenburg, 16.7.1913, *P. Vogel*, issued as Sydow, Mycotheca germanica 1349.

This is a *Calycellina* and for me not distinct from *C. populina* (Fuck.) Höhn., which White (1943) recorded on this substrate.

PEZIZA VULGARIS Fr. var. MYCETICOLA Berk. & Curt.—Fig. 54 left

Peziza (*Mollisia*) *vulgaris* Fr. var. *myceticola* Berk. & Curt. *in* Grevillea **3**: 159. June 1875. — *Pezizella vulgaris* (Fr.) Sacc. var. *myceticola* (B. & C.) Sacc., Syll. Fung. **8**: 279. 1889.

"On decaying Polypores, Santee River, No. 1571, on oak Car. Inf. No. 2683. More concave than the usual form. It occurs on Polypores in England."

I take No. 1571, on a Polypore, as lectotype. This is an *Orbilia* with asci 22 × 2.5–3 μ and rod-shaped ascospores 5 × 0.25 μ and is presumably *O. epipora* (Nyl.) Karst. Berkeley interpreted *Peziza vulgaris* Fr. as an *Orbilia* but it is generally understood today in the interpretation of von Höhnel, as a *Pezizella*.

PEZIZA VULGARIS Fr. var. SANGUINELLA Berk. & Curt.—Fig. 54 right

Peziza (*Mollisia*) *vulgaris* Fr. var. *sanguinella* Berk. & Curt. *in* Grevillea **3**: 159. 1875. — *Pezizella vulgaris* (Fr.) Sacc. var. *sanguinella* (B. & C.) Sacc., Syll. Fung. **8**: 279. 1889.

"White externally, disc pale orange. On *Liquidambar* Car. Inf. No. 2180; New England, Sprague, No. 5372, 5380."

Number 2180 is also an *Orbilia*, quite distinct from *O. epipora*, with much thicker and fleshier context, asci 35 × 4 μ; the ascospores are not well seen but appear to be fasciculate and about 8 × 0.5 μ.

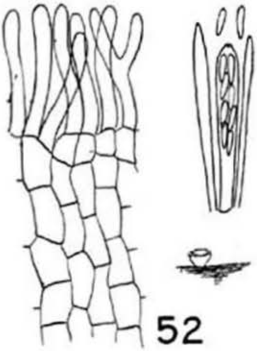
Pezizella winteri (Rehm) Dennis, *comb. nov.*—Fig. 55

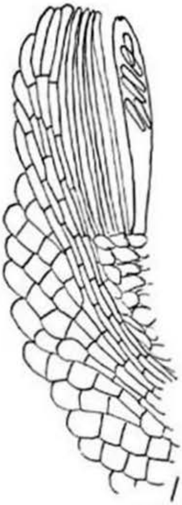
Phialea winteri Rehm *in* Rabenhorst, Kryptog.-Fl., ed. 2, **1** (3): 726. 1893 (basionym).

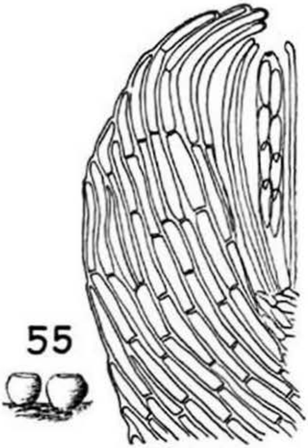
Apothecia gregarious, superficial, disc flat, yellowish, with a low rim, about 250 μ diameter; receptacle cupulate, with a short stout stalk, concolorous, smooth.

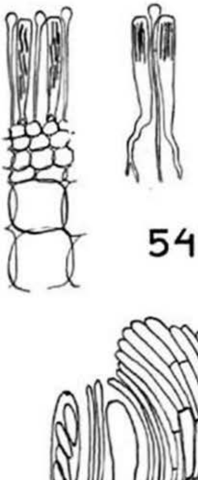
EXPLANATION OF FIGURES 51–56

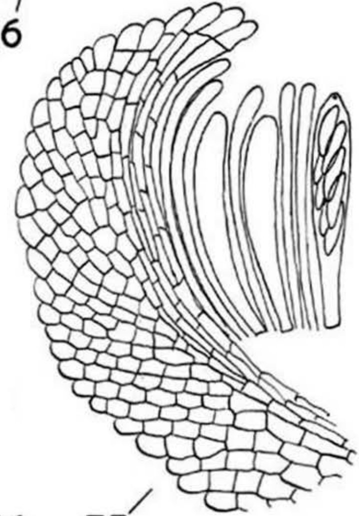
Figs. 51–56. — 51. *Phialea tetraspora*. Apothecium (× 40), section of margin (× 660). — 52. *Psilachnum micaceum* (as *Pezizella tyrolensis*). Apothecium (× 7), margin in surface view, ascus, paraphyses and spores (× 660). — 53. *Calycellina populina* (as *Pezizella vogelii*). Diagrammatic section (× 25), section of margin (× 660). — 54. *Peziza vulgaris* (left: var. *myceticola*; right: var. *sanguinella*). Asci and paraphyses (× 660). — 55. *Pezizella winteri*. Apothecia (× 30), section of margin (× 660). — 56. *Helotium xeroplasticum*. Apothecium (× 5), section of margin and strip of excipulum in surface view (× 660).











Figs. 51–56

Excipulum composed of parallel hyphae, 5 μ wide, lying at a high angle to the surface, with moderately thick white walls. Asci clavate, 60 × 7 μ, 4-spored according to Rehm but some, at least, are 8-spored, pore blued by Melzer's reagent; ascospores biseriate, elliptic-fusoid to clavate, 10–11 × 3 μ; paraphyses cylindrical, obtuse, 1.5 μ wide.

On dead stems of *Aconitum*, Albula Pass, Switzerland, July 1882, *Winter*, in herb. Rehm, Stockholm.

HELOTIUM XEROPLASTICUM Rehm—Fig. 56

Helotium xeroplasticum Rehm *in* Hedwigia **20**: 37. 1881. — *Pezizella xeroplastica* (Rehm) Rehm *in* Rabenhorst, Kryptog.-Fl., ed. 2, **1** (3): 674. 1892.

Apothecia scattered, superficial; disc concave, light yellow, drying isabelline, up to 3 mm diameter; receptacle cupulate, sessile, smooth, concolorous with a paler margin. Excipulum composed of approximately isodiametric, polygonal to rounded, thinwalled, subhyaline cells, 8–12 μ diameter, becoming smaller and then arranged in radial rows on the flanks of the receptacle, margin of slender parallel hyphae, arising from an inner brownish band in the excipulum. Asci cylindric-clavate, 50 × 6 μ, 8-spored, pore blued by Melzer's reagent; ascospores irregularly biseriate, about 9 × 1.5 μ, nonseptate; paraphyses cylindrical, obtuse, 2 μ thick.

1500 m, on dead stems of *Adenostylis*, Bauernalpkopf in Allgäu, July 1879, *Britzelmayr*, Rehm Ascomyceten 565.

This seems to be Dermateaceous, not Helotiaceous at all.

* * *

There follows a redisposition of such species of "*Helotium* Fr." as I have seen or have been adequately figured, in accordance with the ideas set out above. It will be understood that the arrangement is still tentative and that the generic limits are still not fixed to my entire satisfaction.

CUDONIELLA Sacc.

Cudoniella Sacc., Syll. Fung. **8**: 41. 1889.

The genus was proposed with four species, on which Nannfeldt (1932: 314) commented: "Die erste Art der Gattung, *Phallus marcidus*, ist überhaupt höchst unsicher, wahrscheinlich ist sie jedoch mit *Leotia lubrica* (Scop.) Pers. identisch. Die zweite Art, *Cudonia Queletii* Fr., ist ebenfalls unsicher, wahrscheinlich aber mit *Helotium aciculare* (Bull.) Pers. identisch. Die dritte Art, *Cudonia stagnalis* Quél., ist zweifelhaft. Die vierte Art, *Leotia aquatica* Lib., die später zur Typusart der Gattung *Haplocybe* Clem. gewählt wurde, ist wahrscheinlich mit *Ombrophila clavus* (A. & S.) Cke identisch."

Nannfeldt cited *Phallus marcidus* as "Pseudotypus" and hence referred the genus to Geoglossaceae but Boudier (1907: 90) had clearly designated *Cudonia queletii* Fr. as lectotype and identified it with *Hel. aciculare*. Schroeter (1893) had earlier accepted *Cudoniella* with only two species, *C. aquatica* (Lib.) Sacc. and *C. acicularis* but in his case it could be argued that the other two foundation species were not excluded, merely omitted as not being known to occur in the region dealt with in his work. He placed *Cudoniella* in Geoglossaceae, next to *Leotia*, and did not cite *Phallus* *marcidus* in synonymy under the latter. Schroeter in Engler & Prantl (1894) adopted a similar treatment and here the objection that he was dealing only with a restricted flora does not hold. Clements and Shear (1931) accepted *C. acicularis* as lectotype and I feel justified in doing so here until its identity with *C. queletii* Fr. has been disproved.

The accepted species then are:

Cudoniella acicularis (Bull. ex Fr.) Schroet. *in* Cohn, Kryptog.-Fl. Schles. **3** (2): 21. 1893.

C. clavus (A. & S. ex Fr.) Dennis, *comb. nov.* — *Peziza clavus* A. & S. *ex* Fr., Syst. mycol. **2** (1): 137. 1822 (basionym).

C. clavus var. **grandis** (Boud.) Dennis, *comb. nov.* — *Ombrophila clavus* var. *grandis* Boud., Icon. mycol. **4**: 249. 1910 (basionym).

C. rubicunda (Rehm) Dennis, *comb. nov.* — *Mollisia, rubicunda* Rehm *in* Hedwigia **21**: 103. 1882 (basionym).

It seems improbable Rehm's fungus on cones of conifers was the same as *Peziza ianthina* Fr., a renaming of *Octospora violacea* Hedwig, on old rotting trunks of *Salix*. In making the combination in *Cudoniella* I rely on a collection referred here by Mr. W. D. Graddon, on *Pinus silvestris* cones, Delamere forest, Cheshire, August 1955, for no apothecia remain on the Kew example of Rehm Ascomyceten 558, cited by him as this species.

HYMENOSCYPHUS S. F. Gray

Hymenoscyphus S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 673. 1821.

I have tried various arrangements of the species on a purely morphological basis, especially on ascospore characters, but have found none more practical than the traditional artificial disposition according to the substrate. One must aim eventually to abandon this, however, for its leads to a wide separation of closely allied species, as in the *H. scutula* series, and may be responsible for an unneccessary proliferation of specific names.

SERIES 1. *Hymenoscyphus*. Stalked apothecia on wood and bark

I. Ascospores 0-1-septate

A. Ascospores over 15 μ long

a. North temperate species

H. carmichaeli Phill. *in* Grevillea **19**: 106. 1891. Spores 20–30 × 4–6 μ.

H. serotinus (Pers. ex Fr.) Phill., Brit. Discom. 125. 1887. Spores 18–30 × 3–4 μ.

H. salicellus (Fr.) Dennis, *comb. nov.* — *Peziza salicella* Fr., Syst. mycol. **2** (1): 133. 1822 (basionym). Spores 20–30 × 4.5–7 μ.

H. calyculus (Sow. ex Fr.) Phill., Brit. Discom. 136. 1887. Spores 15–22 × 3–4.5 μ.

H. fructigenus (Bull. ex Fr.) S. F. Gray, op. cit. 1821. Spores 13–21 × 3–4 μ.

H. laetus (Boud.) Dennis, *comb. nov.* — *Pachydisca laeta* Boud. *in* Bull. Soc. mycol. France **4**: 78. 1888 (basionym). Spores 17–25 × 5–6.5 μ.

H. subferrugineus (Nyl.) Dennis, *comb. nov.* — *Peziza subferruginea* Nyl. *in* Not. Sällsk. F. Fl. fenn. **10**: 43. 1861 (basionym). Spores 15–21 × 4–6 μ.

H. infarciens (Ces.) Dennis, *comb. nov.* — *Peziza infarciens* Ces. *in* Rabenhorst, Fungi europaei 515. 1863 (basionym). [= *Hymenoscyphus laburni* (Berk. & Br.) Phill., Brit. Discom. 135. 1887]. Spores 18–22 × 6–7 μ.

H. vitigenus (De Not.) Dennis, *comb. nov.* — *Helotium vitigenum* De Not. *in* Comm. Soc. critt. ital. **2**: 377. 1861 (basionym). Spores 16–20 × 5–6 μ.

H. ellisii Dennis, supra p. 48. Spores 15–22 × 3–3.5 μ.

b. Tropical species

H. rufocorneus (Berk. & Br.) Dennis, supra p. 62. Spores 25–35 × 6–7 μ.

H. subserotinus (P. Henn. & Nym.) Dennis, *comb. nov.* — *Helotium subserotinum* P. Henn. & Nym. *in* Monsunia **1**: 33. 1900 (basionym). Spores 27–32 × 4–5 μ (up to 50 × 8 μ Le Gal).

H. velhaensis (P. Henn.) Dennis, *comb. nov.* — *Ciboria velhaensis* P. Henn. *in* Hedwigia **41**: 28. 1902 (basionym). Spores 28–40 × 4.5–6.5 μ.

H. miniatus (Pat. apud Duss) Dennis, *comb. nov.* — *Helotium miniatum* Pat. *apud* Duss, Champ. Guadeloupe 65. 1903 (basionym). Spores 30–36 × 5.5–6 μ.

H. fuscopurpureus (Rehm) Dennis, *comb. nov.* — *Helotium fuscopurpureum* Rehm *in* Hedwigia **39**: 94. 1900 (basionym). Spores 29–31 × 5–7 μ.

H. camerunensis (P. Henn.) Dennis, *comb. nov.* — *Helotium camerunense* P. Henn. *in* Bot. Jb. **22**: 73. 1895 (basionym). Spores 25–35 × 4–5 μ.

B. Ascospores under 15 μ long

H. flavo-fuscescens (Bres.) Dennis, supra p. 46. Spores 11–15(–18) × 3–4 μ.

H. parilis (Karst.) Dennis, *comb. nov.* — *Peziza parilis* Karst. *in* Not. Sällsk. F. Fl. fenn. **10**: 146. 1869 (basionym). [= *Hymenoscyphus emergens* Cke. & Phill. *apud* Phill., Brit. Discom. 139. 1887]. Spores 10–15(–17) × 2 μ.

H. fagineus (Pers. ex Fr.) Dennis, *comb. nov.* — *Peziza faginea* Pers. *ex* Fr., Syst. mycol. **2** (1): 136. 1822 (basionym). Spores 8–16 × 4–5 μ.

H. byssigenus (Berk.) O. Kuntze, Rev. Gen. Pl. **3** (2): 485. 1898. [= *Helotium pezizoideum* Cke. & Phill. *in* Grevillea **19**: 72. 1891]. Spores 10–14 × 2.5–3 μ.

H. subsordidus (Dennis) Dennis, *comb. nov.* — *Helotium subsordidum* Dennis *in* Kew Bull. **15**: 310. 1951 (basionym). [= *Helotium sordidum* Phill. *in* Grevillea **15**: 17. 1886; non *H. sordidum* (Fuck.) Rehm 1881 nec *Hymenoscyphus sordidus* (Fuck.) Phill. = *Pezizella vulgaris* (Fr.) Höhn.]. Spores 7–8 × 4 μ.

H. atrosubiculatus (Seaver & Waterston) Dennis, *comb. nov.* — *Helotium atrosubiculatum* Seaver & Waterston *in* Mycologia **32**: 397. 1940 (basionym). Spores 6–7 × 2–2.5 μ.

II. Ascospores 3-septate

Hymenoscyphus sclerogenus (Berk. & Curt.) Dennis *in* Persoonia **2**: 190. 1962. Spores 32–39 × 5–6 μ.

H. lasiopodium (Pat.) Dennis, op. cit. 1962. Spores 25–30 × 5 μ.

H. musicola (Dennis) Dennis, op. cit. 1962. Spores 17–25 × 5–6.5 μ.

H. parilis and *H. ellisii* are closely allied and form a transition to Series 5 *Herbarum*.

SERIES 2. *Imberbis*. Subsessile apothecia on woody substrata, mostly with short broad excipular cells and with elliptical ascospores less than 15 μ long

H. lutescens (Hedw. ex Fr.) Phill., Brit. Discom. 131. 1887. Spores 10–15 × 3–4 μ.

H. imberbis (Bull. ex St. Amans) Dennis, *comb. nov.* — *Peziza imberbis* Bull. *ex* St. Amans, Fl. agen. 532. 1821 (basionym). Spores 8–11 × 3–4 μ.

H. cyathiformis (Rehm) O. Kuntze, Rev. Gen. Pl. **3** (2): 485. 1898. Spores 7–10 × 3–4 μ.

H. cortisedus (Karst.) Dennis, *comb. nov.* — *Peziza cortiseda* Karst., Fungi fennici 544. 1866 (basionym). Spores 8–12 × 3–3.5 μ.

H. lasseri (Dennis) Dennis, *comb. nov.* — *Helotium lasseri* Dennis *in* Kew Bull. **14**: 432. 1960 (basionym). Spores 10–12 × 4 μ.

H. gratus (Berk. apud Hook.) Dennis, *comb. nov.* — *Peziza grata* Berk. *apud* Hook., Fl. Tasmaniae **2**: 275. 1860 (basionym). Spores 13 × 3 μ.

H. brevisporus (Cke. & Phill. apud Cke.) Dennis, *comb. nov.* — *Helotium brevisporum* Cke. & Phill. apud Cke. *in* Grevillea **8**: 63. Dec. 1879 (basionym). Spores 8–12 × 3–4 μ.

H. montaniensis (Ell. & And.) Dennis, supra p. 54. Spores 8–10 × 3.5–4.5 μ.

SERIES 3. *Scutula*. Stipitate apothecia on dead leaves or herbaceous stems, structurally like series 1

A. On stems

H. scutula (Pers. ex Fr.) Phill. var. *fucatus* Phill., Brit. Discom. 137. 1887. Spores 24–34 × 5–7 μ.

H. scutula var. *scutula*; Phill., op. cit. p. 136. Spores 18–27 × 3.5–5 μ.

H. scutula var. *menthae* Phill., op. cit. p. 137. Spores 12–16 × 3–3.5 μ.

H. dearnessii (Ell. & Ev.) O. Kuntze, Rev. Gen. Pl. **3** (2): 484. 1898. Spores 25–35 × 3.5 μ.

H. sublateritius (Berk. & Br.) Dennis, *comb. nov.* — *Helotium sublateritium* Berk. & Br. *in* Ann. Mag. nat. Hist. Ser. 4, **15**: 38. 1875 (basionym). Spores 17–19 × 4–5 μ.

H. pileatus (Karst.) O. Kuntze, Rev. Gen. Pl. **3** (2): 485. 1898. Spores 16–32 × 2.5–4 μ.

H. juncisedus (Vel.) Dennis, *comb. nov.* — *Helotium juncisedum* Vel., Monogr. Discom. Bohem. 198. 1934 (basionym). Spores 9–14 × 2.5–4 μ.

H. robustior (Karst.) Dennis, *comb. nov.* — *Peziza rhodoleuca* Fr. subsp. *robustior* Karst. *in* Not. Sällsk. F. Fl. fenn. **10**: 139. 1869 (basionym). Spores 7–14 × 3–5 μ.

H. repandus (Phill.) Dennis, *comb. nov.* — *Helotium repandum* Phill., Brit. Discom. 161. 1887 (basionym). Spores 8–13 × 2–2.5 μ.

H. limonium (Cke. & Peck) Dennis, *comb. nov.* — *Helotium limonium* Cke. & Peck *in* Rep. N.Y. St. Mus. **26**: 83. 1874 (basionym). Spores 8 × 1.5 μ.

B. On cladodes of *Acacia*

H. ceratinus (Berk.) O. Kuntze, Rev. Gen. Pl. **3** (2): 485. 1898. Spores 18–20 × 4–4.5 μ.

C. On fallen leaves of trees

H. crocatus (Mont.) O. Kuntze, Rev. Gen. Pl. **3** (2): 485. 1898. Spores 21–30 × 2.5–3 μ.

H. caudatus (Karst.) Dennis, *comb. nov.* — *Peziza caudata* Karst., Fungi fenn. exs. 547. 1866 (basionym). Spores 15–21 × 4–5.5 μ.

H. leucopus (Mont. apud Gay) Dennis, *comb. nov.* — *Helotium leucopus* Mont *apud* Gay, Hist. de Chile, Bot. **7**: 410. 1850 (basionym). Spores 18–22 × 4.5–5.5 μ.

H. fraternus (Peck) Dennis, *comb. nov.* — *Helotium fraternum* Peck *in* Rep. N.Y. St. Mus. **32**: 47. 1879 (basionym). Spores 15–20 × 3–4 μ.

H. albidus (Rob.) Phill., Brit. Discom. 138. 1887 [= *Helotium robergei* Dennis 1956 = *Hel. albidum* (Rob.) Pat. 1885 non Crouan 1867]. Spores 13–17 × 3–5 μ.

H. albopunctus (Peck) O. Kuntze, Rev. Gen. Pl. **3** (2): 485. 1898. Spores 14–17 × 3–4.5 μ.

H. cereus (Rick) Dennis, *comb. nov.* — *Ciboria cerea* Rick *in* Broteria (Bot.) **25**: 119. 1931 (basionym). Spores 13–16 × 3–3.5 μ.

H. phyllogenus (Rehm) O. Kuntze, Rev. Gen. Pl. **3** (2): 485. 1898. Spores 11–14 × 4–5 μ.

H. phyllophilus (Desm.) O. Kuntze, Rev. Gen. Pl. **3** (2): 485. 1898. Spores 11.5–16 × 3–4 μ.

H. immutabilis (Fuck.) Dennis, *comb. nov.* — *Helotium immutabile* Fuck., Symb. mycol., Nachtr. 1: 50. 1871 (basionym). Spores 10–14 × 4–4.5 μ.

H. titubans (Mont. apud Gay) Dennis, *comb. nov.* — *Helotium titubans* Mont. *apud* Gay, Hist. de Chile, Bot. **7**: 408. 1850 (basionym). Spores 10–13 × 3–3.5 μ.

H. lividus (Mont. apud Gay) Dennis, *comb. nov.* — *Helotium lividum* Mont. *apud* Gay, Hist. de Chile, Bot. **7**: 407. 1850 (basionym). Spores 8 × 2 μ.

H. caracasensis (Dennis) Dennis, *comb. nov.* — *Helotium caracasensis* Dennis *in* Kew Bull. **1958**: 463. (basionym). Spores 5–8 × 1.5–2 μ.

D. On Gramineae, Cyperaceae (see also *H. pileatus* above)

H. magnificus (Vel.) Dennis, *comb. nov.* — *Helotium magnificum* Vel., Monogr. Discom. Bohem. 198. 1934 (basionym). Spores 25–32 × 4.5–6 μ.

H. airae (Vel.) Dennis, *comb. nov.* — *Helotium airae* Vel., op, cit. 199. 1934 (basionym). Spores 16–19 × 4–6 μ.

H. crastophilus (Sacc.) Dennis, supra p. 40. Spores 19–24 × 5 μ.

E. On Pteridophyta

H. cejpi (Vel.) Dennis, *comb. nov.* — *Helotium cejpi* Vel., op cit. 207. 1934 (basionym). Spores 20–26 × 3.5–4.5 μ.

H. rhodoleucus (Fr.) Phill., Brit. Discom. 131, 1887. Spores 9–12 × 3–4 μ.

F. On Bryophyta

H. procerus (Karst.) Dennis, *comb. nov.* — *Helotium procerum* Karst., Mycol. fenn. **1**: 130. 1871 (basionym). Spores 10–12 × 2 μ.

H. subcarneus (Cke. & Peck) O. Kuntze, Rev. Gen. Pl. **3** (2): 486. 1898. Spores 5–6 × 2 μ.

H. titubans should possibly be referred elsewhere because of its dark hyphae. *Helotium lentrisporum* Kirschst. on *Typha* (*in* Ann. mycol., Berl. **34**: 182. 1936) and *Discorehmia hyalina* Kirschst. on *Betula* leaves (*in* Ann. mycol., Berl. **37**: 123. 1939), neither of which I have seen, presumably belong here also.

SERIES 4. *Epiphyllum*. Subsessile apothecia on dead leaves or thalli

H. epiphyllus (Pers. ex Fr.) Rehm *apud* Kauffm. *in* Pap. Mich. Acad. Sci. **9**: 177. 1929.

H. marchantiae (Berk.) Dennis, *comb. nov.* — *Peziza marchantiae* Berk. *in* Smith, Engl. Fl. **5** (2): 204. 1836 (basionym).

H. vasaensis (Karst.) Dennis, *comb. nov.* — *Peziza vasaensis* Karst. *in* Not. Sällsk. F. Fl. fenn. **10**: 150. 1869 (basionym).

For somewhat similar apothecia on woody substrata see *Phaeohelotium*.

SERIES 5. *Herbarum*. Subsessile apothecia erumpent from herbaceous stems, with minutely downy excipulum composed of short-celled hyphae at rather a high angle to the surface

H. herbarum (Pers. ex Fr.) Dennis, *comb. nov.* — *Peziza herbarum* Pers. *ex* Fr., Syst. mycol. **2** (1): 136. 1822 (basionym). Spores 13–17 × 2.5–3 μ.

H. separabilis (Karst.) Dennis, *comb. nov.* — *Helotium separabile* Karst., Mycol. fenn. **1**: 118. 1871 (basionym). Spores 10–15 × 2–2.5 μ.

H. humuli (Lasch) Dennis, *comb. nov.* — *Peziza humuli* Lasch *in* Bot. Ztg **3**: col. 66. 1845 (basionym). Spores 14–17 × 3.5–4 μ.

SERIES 6. *Cupreum*. Stipitate tropical or South temperate species on woody substrata, with excipulum of parallel hyphae, asci mostly I + and small rod-like spores

H. cupreus (Bres.) Dennis, *comb. nov.* — *Helotium cupreum* Bres. *in* Hedwigia **35**: 295. 1896 (basionym). Spores 6–8 × 2–2.5 μ.

H. leucopsis (Berk. & Curt.) Dennis, *comb. nov.* — *Peziza leucopsis* Berk. & Curt. *in* J. Linn. Soc. (Bot.) **10**: 368. 1868 (basionym). Spores 7–10 × 2–2.5 μ.

H. quintiniae (Dennis) Dennis, *comb. nov.* — *Helotium quintiniae* Dennis *in* Kew Bull. **15**: 309. 1961 (basionym). Spores 5 × 2 μ.

H. javanicus (P. Henn.) Dennis, *comb. nov.* — *Cudoniella javanica* P. Henn. *in* Monsunia **1**: 173. 1899 (basionym) (= *Helotium gedeanum* Dennis 1954 non *Helotium javanicum* Penz. & Sacc.). Spores 7–11 × 2–2.5 μ.

SERIES 7. *Prasinum*. Stipitate species with a large-celled inner excipulum covered by dark encrusted hyphae or at least with brown walled hyphae covering the stipe

The series shows affinities with *Rutstroemia* but I think its addition to that genus inadvisable.

H. prasinus (Massee) Dennis, *comb. nov.* — *Helotium prasinum* Massee *in* Kew Bull **1901**: 159 (basionym) (= *Helotium novae-zelandiae* Dennis *in* Kew Bull. **15**: 307. 1961). Spores 6–7 × 2–2.5 μ.

H. microspermus (Speg.) Dennis, *comb. nov.* — *Helotium microspermum* Speg. *in* Bol. Acad. Cienc. Córdoba **11**: 132 (reprint). 1887 (basionym). Spores 3–5 × 1.5–2.5μ.

H. metrosideri (Dennis) Dennis, *comb. nov.* — *Helotium metrosideri* Dennis *in* Kew Bull. **15**: 306. 1961 (basionym). Spores 14–17 × 4–5 μ.

H. spadiceo-atra (Mont.) Dennis, supra p. 66. Spores 9–10 × 3 μ.

H. vernus (Boud.) Dennis, *comb. nov.* — *Ombrophila verna* Boud. *in* Bull. Soc. mycol. France **4**: 77. 1889 (basionym) (= *Helotium vernale* Dennis 1956 non *Hel. vernum* Vel. 1934). Spores 8–12 × 3–4 μ.

CIBORIELLA Seaver

Ciboriella Seaver, North Amer. Cup Fungi (Inop.) 107. 1951.

Soft-fleshed species with reddish tints, reminiscent of Sclerotiniaceae but with an excipulum composed of short-celled parallel hyphae and with no sclerotium or stromatic tissue; asci I +, on dead leaves.

C. rufescens (Kanouse) Seaver, op. cit. 107. 1951. Spores 7–11 × 3.5–4 μ.

C. griseliniae (Dennis) Dennis, *comb. nov.* — *Helotium griseliniae* Dennis *in* Kew Bull. **15**: 304. 1961 (basionym). Spores 12–14 × 4–5 μ.

C. subcinnabarina (Dennis) Dennis, comb. *nov.* — *Helotium subcinnabarinum* Dennis *in* Kew Bull. **15**: 310. 1961 (basionym). Spores 8–9 × 2–2.5 μ.

PHAEOHELOTIUM Kanouse

Phaeohelotium Kanouse *in* Pap. Mich. Acad. Sci. **20**: 75. 1935.

Subsessile apothecia with flesh of closely woven hyphae covered by an outer excipulum of thinwalled isodiametric rounded to angular cells, ascospores sometimes becoming septate and brownish with age. Mostly on woody substrata.

Phaeohelotium monticola (Berk.) Dennis, supra p. 54 (= *P. flavum* Kanouse, op. cit. 1935).

P. recurvum (Rodway) Dennis *in* Kew Bull. **1958**: 339.

Pachydisca subturbinata (Rehm) Le Gal, which I have not seen, perhaps belongs here; so probably do *Helotium obconicum* Höhn., *H. pateriforme* (Berk.) Cke., *H. quisquiliarum* Berk. & Curt., *H. tasmanicum* Rodway, many species of *Pachydisca* etc., but the group needs much further study.

SPHAGNICOLA Vel.

Sphagnicola Vel., Monogr. Discom. Bohem. 111. 1934.
Pseudodiscinella Dennis *in* Kew Bull. **1955**: 567. 1956.

Sessile apothecia with pseudoparenchymatous excipulum, sheathed at least towards the base by a zone of slender gelatinised hyphae.

Sphagnicola ciliifera (Karst.) Vel., op. cit. 111. 1934.

S. fergussoni (Sacc.) Dennis, *comb. nov.* — *Helotium melleum* Berk. & Br. *in* Ann. Mag. nat. Hist., ser. 4, **15**: 38. Jan. 1875 [non *H. melleum* Berk. & Br. *in* J. Linn.

Soc. (Bot.) **14**: 107. Dec. 1873]. — *H. fergussoni* Sacc., Syll. Fung. **8**: 233. 1889 (basionym).

S. iodocyanescens Dennis & Korf *in* Kew Bull. **13**: 181. 1958.

S. laricina (Ell. & Ev.) Dennis, supra p. 50.

S. obstricta (Karst.) Dennis, *comb. nov.* — *Peziza obstricta* Karst. *in* Not. Sällsk. F. Fl. fenn. **11**: 243. 1870 (basionym).

S. marchantiae Vel. and *S. rivularis* Vel. are dubious species.

DISCINELLA Boud.

Discinella Boud. *in* Bull. Soc. mycol. France **1**: 112. 1885.

Terrestrial sessile apothecia with excipulum of soft, broad, parallel hyphae.

SERIES A. Ascospores permanently colourless

Discinella boudieri (Quél.) Boud., Icon. mycol., Ser. 2, Livr. 6. tab. 446. 1905.

D. margarita Buckley *in* Trans. Brit. mycol. Soc. **6**: 347. 1920.

D. menziesi Boud. *in* Trans. Brit. mycol. Soc. **4**: 323. 1914.

SERIES B. Ascospores ultimately brown

D. terrestris (Berk. & Br.) Dennis *in* Kew Bull. **1958**: 342.

Though said to have grown on rotten wood *Pseudohelotium undulatum* Rodway appears scarcely separable from *D. terrestris*. *Helotium lutisedum* Karst. possibly belongs here, in series A., but I would like to see it fresh before proposing the transfer. The structure of *D. margarita* and *D. menziesi* needs further investigation on fresh material for comparison with species of *Sphagnicola*.

CIBORIOPSIS Dennis

Ciboriopsis Dennis in Kew Bull. **16**: 319. 1962.

Small long-stalked apothecia, without a sclerotium or basal stroma, but with an excipular structure approaching textura globulosa and small rod-shaped ascospores, typically on fallen leaves or herbaceous stems.

Ciboriopsis advenula (Phill.) Dennis, op. cit. 319. 1962.

C. bramleyi Dennis, op. cit. 319. 1962.

C. cecropiae (P. Henn.) Dennis, op. cit. 320. 1962.

C. lenta (Berk. & Br.) Dennis, op. cit. 319. 1962.

C. microspora (Berk. & Br.) Dennis, op. cit. 319. 1962.

C. phlebophora (Pat.) Dennis, op. cit. 319. 1962.

C. simulata (Ell.) Dennis, supra p. 65.

C. uleana (Rehm) Dennis, op. cit. 319. 1962.

Of species still unassigned *Helotium phormium* Cke. is perhaps a *Rutstroemia*. *Helotium chlorosplenioides* Speg. and *H. pseudociliatum* Phill. seem to be congeneric and both have been transferred to *Cyathicula*, though I am not entirely satisfied with this. *H. allantosporum* Dennis shows affinity with *Chlorosplenium*.

Addendum

Pezizella minutula (Bres. apud Strasser) Dennis, *comb. nov.*—Fig. 57

Phialea minutula Bres. *apud* Strasser *in* Verh. zool.-bot. Ges. Wien **55**: 612. 1905; non *Phialea minutula* Sacc. *in* Malpighia **11**: 268. 1897.

No apothecia could be found on the holotype in Bresadola's herbarium at Stockholm but a few remain on the isotype in Strasser's herbarium at the Natural History Museum, Vienna.

Apothecia scattered, superficial, disc flat, 250 μ diameter, white, receptacle discoid, thin, white, very minutely pruinose, seated on a slender, smooth, yellowish stalk. Excipulum composed of thinwalled, hyaline, parallel hyphae, 3–5 μ diameter, the terminal cells protruding, expecially towards the margin, as cylindric-clavate, smooth, thinwalled hairs, up to 20 × 4 μ. Asci cylindric-clavate, sessile, 30(–40) × 4.5–5 μ, apex conical with minute pore blued by Melzer's reagent, 8-spored; ascospores biseriate, narrowly ellipsoidal, 5–6 × 1.5–2 μ (5–7 × 2.5 μ Bresadola); paraphyses cylindrical, as long as the asci, rounded above, 1.5–2 μ thick.

On decorticated wood of some broad-leaved tree, Sonntagberg, Austria, 8.3.1902, *P. Strasser*.

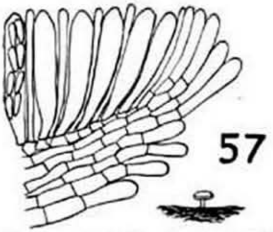


Fig. 57. *Pezizella minutula*. Habit sketch (× 12), section of margin (× 660).

The structure is exactly that of *Pezizella eburnea* (Rob.) Dennis and not at all that of a *Phialea* sensu von Höhnel.

LITERATURE CITED

BOUDIER, E. (1907). Histoire et Classification des Discomycètes d'Europe. Paris.

CLEMENTS, F. E. & SHEAR, C. L. (1931). The genera of Fungi. New York.

DENNIS, R. W. G. (1956). A revision of the British Helotiaceae .... *In* Commonw. mycol. Inst. mycol. Pap. **62**.

—— (1962). A reassessment of *Belonidium* Mont. & Dur. *In* Persoonia **2**: 171—191.

DONK, M. A. (1962). The Generic Names proposed for Agaricaceae. *In* Nova Hedwigia, Beih. **5**.

GROVES, J. W. (1952). The genus *Tympanis*. *In* Canad. J. Bot. **30**: 571—651.

HÖHNEL, F. VON (1926). Über die Gattung *Pezizella* Fuckel. *In* Mitt. bot. Inst. tech. Hochsch. Wien **3**: 54–108.

KUNTZE, O. (1898). Revisio generum plantarum **3** (2). Leipzig.

LE GAL, M. (1953). Les Discomycètes de Madagascar. Paris.

MASSEE, G. (1897). Redescriptions of Berkeley's Types of Fungi. *In* J. Linn. Soc. (Bot.) **31**: 462–525.

—— (1901). Redescriptions of Berkeley's Types of Fungi Part II. *In* J. Linn. Soc. (Bot.) **35**: 90.118.

NANNFELDT, J. A. (1932). Studien über die Morphologie und Systematik der nicht-lichenisierten inoperculaten Discomyceten. *In* Nova Acta Soc. Sci. Upsal., Ser. 4, **8** (2).

PHILLIPS, W. (1887). A manual of the British Discomycetes. London.

SCHROETER, J. (1893). Pilze. *In* Kryptogamen-Flora von Schlesien **3** (2). Breslau.

—— (1894–6). Pilze. *In* Die Natürlichen Pflanzenfamilien **1** (1).

SEAVER, F. J. (1951). The North American Cup Fungi (Inoperculates). New York.

WHETZEL, H. H. (1945). A synopsis of the genera and species of the Sclerotiniaceae, a family of stromatic Inoperculate Discomycetes. *In* Mycologia **37**: 648–714.

WHITE, L. (1942). Studies in the genus *Helotium* I. *In* Mycologia **34**: 154–179.

—— (1943). Studies in the genus *Helotium* III. *In* Farlowia **1**: 135–170.

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ON SOME WHITE-SPORED GEOGLOSSACEAE

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(With 22 Text-figures)

Some genera of Geoglossaceae, characterized by colourless spores and positive iodine reaction of the ascus pore, are compared with respect to the structure of the stipe. *Ochroglossum* is reduced to the synonymy of *Microglossum*. *Mitrula* is regarded as a monotypic genus. The generic name *Heyderia* is restored. *Thuemenidium* is reintroduced to replace *Corynetes*. *Nothomitra* is proposed as a new genus to accomodate *N. cinnamomea*, a new species.

Early in 1963, Mr. J. T. Palmer, Woodley (near Stockport), sent me two collections of a geoglossaceous fungus. The specimens had been collected in Austria and showed colourless spores and a positive iodine reaction of the ascus pore. According to Nannfeldt's key (1942), these characters are common to three genera of Geoglossaceae: *Corynetes*, *Microglossum*, and *Mitrula*. *Corynetes* was immediately ruled out, as the Austrian material was not black and the fertile head differently shaped, but it was impossible to decide in favour of either of the two remaining genera. The specimens resembled *Mitrula* as to the shape of the fertile head, but the spores were rather those of a *Microglossum*. It was decided to search for other criteria by which it would be possible to distinguish the two genera without ambiguity. This led to some unexpected results. It was found that (i) there existed no generally agreed opinion on the generic limits between *Corynetes*, *Microglossum*, and *Mitrula*; (ii) the generic name *Corynetes*, although universally used, was not the correct name; (iii) *Mitrula* as understood in Europe and North America proved most heterogeneous; (iv) the Austrian material did not fit any described genus; (v) the structure of the stipe proved a useful additional character in the distinction of genera.

To facilitate the identification of the genera treated, the following key is proposed, but the reader is advised that it does not include *Cudonia* Fr., *Leotia* Pers. ex S. F. Gray,[1] and *Spathularia* Pers. ex Fr. which are characterized by the negative iodine reaction of the ascus pore. It should also be kept in mind that the descriptive part merely describes the structure of the stipe. For the descriptions to be comparable, I consistently used the part of the stipe half way between its top and base. Finally, it may be noted that, as this is not a monographic treatise, exhaustive lists of generic and subgeneric synonyms are beyond its scope.

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[1] *Leotia* is here conventionally enumerated along with the two geoglossaceous genera, but I agree with Korf that it is better at home in the Helotiaceae, compare p. 86.

KEY TO THE GENERA TREATED

1. Paraphyses with colourless cell-walls, apically never united into an epithecium by brown amorphous matter. Axis of stipe not composed of a dense network of narrow hyphae entwining more or less inflated longitudinal hyphae.

  2. Fertile head continuous with stipe.

    3. Stipe never white. Hyphae of axis of stipe not exceeding 10 μ in width. Spores finally many-celled.

      4. Head compressed, at least when mature. Hymenium on two opposite sides extending farther down the stem than on the two other (compressed) sides. Hyphae of axis of stipe agglutinated, inseparable . . . . . . *Microglossum*

      4. Head not compressed. Hymenium separated from stipe by a straight line at right angles to stipe. Hyphae of axis of stipe easily separable . . . . *Nothomitra*

    3. Stipe white. Hyphae of axis of stipe much inflated, up to 20-30 μ wide. Spores finally 2-celled . . . . *Mitrula*

  2. Fertile head separated from stipe by sterile disk or groove. Hyphae of axis of stipe agglutinated, inseparable. Spores finally 2-celled . . . . *Heyderia*

1. Paraphyses either apically with brown cell-walls or united into an epithecium by brown amorphous matter. Axis of stipe composed of a dense network of narrow hyphae entwining more or less inflated longitudinal hyphae . . . . *Thuemenidium*

MICROGLOSSUM Gill.—Figs. 1–5

Microglossum Gill., Champ. France, Discomyc. 25. 1879; not *Microglossum* Sacc. *in* Bot. Zbl. **18**: 214. 1884 (= *Thuemenidium* O. Kuntze). — Type species: *Geoglossum viride* Pers. ex Fr.

Leptoglossum § *Xanthoglossum* Sacc., Syll. Fung. **8**: 48. 1889. — *Xanthoglossum* (Sacc.) O. Kuntze, Rev. Gen. Pl. **2**: 875. 1891. — Type species: *Geoglossum luteum* Peck (= *G. rufum* Schw.), here selected.

Microglossum sect. *Ochroglossum* S. Imai *in* Bot. Mag., Tokyo **52**: 421. 1938. — *Ochroglossum* (S. Imai) S. Imai *in* Sci. Rep. Yokohama nat. Univ. (Sect. 2) No. 4: 6. 1955. — Type species: *Geoglossum rufum* Schw. (see Imai *in* J. Fac. Agric. Hokkaido Univ. **45**: 186. 1941).

MATERIAL EXAMINED: *Microglossum viride* (Pers. ex Fr.) Gill. (FRANCE, Lougres; L 956.110–294); *M. olivaceum* (Pers. ex Fr.) Gill. (JAPAN, Hokkaido, Nopporo forest; L 937.217–108); *M. rufum* (Schw.) Underw. (JAPAN, Hokkaido, Mt. Meakan; L 937.217–103).

The axis of the stipe in *Microglossum viride* is composed of strongly agglutinated hyphae which are inseparable except by tapping forcibly on the cover-glass. These hyphae (Fig. 1) are 4.5–5.3 μ wide, thin-walled, not or little constricted at the septa, occasionally branched. At the periphery of the stipe the hyphae are darker-coloured and form an ill-defined cortex. They are strongly agglutinated, 2.7–4.5 μ wide, moderately thick-walled (cell-walls up to about 1 μ thick), and the septa are usually spaced at shorter intervals (Fig. 2).

The structure of the stipe in *Microglossum olivaceum* is very much the same, only differing in that the hyphae in the axis are up to 10 μ wide.

The structure of the stipe in *Microglossum rufum* is largely the same. The hyphae of the axis of the stipe, taken from near its apex, are 2.7–3.6 μ wide, very thin-walled (cell-walls 0.5 μ thick), not inflated, not constricted at the septa (Fig. 3). Farther down the stipe the hyphae are up to 6.3 μ wide, somewhat thicker-walled, and slightly constricted at the septa (Fig. 4). At the periphery of the stipe (Fig. 5) the hyphae are strongly agglutinated, of the same width as those in the axis of the stipe, moderately thick-walled (cell-walls up to 1 μ thick), little constricted at the septa.

The squamules, which are scattered over the surface of the stipe, are composed of hyphae branched off from the peripheral hyphae and curved outward. These side-branches become increasingly torulose toward the tip of the squamule, and their cell-walls may be slightly over 1 μ thick.

Imai (1955: 3) differentiated *Ochroglossum* from *Microglossum* as follows: —

1. Ascophores usually olivaceous or green when matured; spores usually shorter than 40 μ in length; paraphyses usually straight or slightly curved at the apices . . . . . *Microglossum*
2. Ascophores usually yellow, brown or cinnamon-brown when matured; spores usually longer than 40 μ in length; paraphyses usually strongly curved or circinate at the apices *Ochroglossum*

The repeated use of the word "usually" indicates that Imai had difficulty in drawing a sharp line between *Microglossum* and *Ochroglossum*. In fact, each of the characters ascribed to one genus also occurs in at least one species of the other. This fact coupled with the very similar structure of the stipe leads me to the conclusion that *Ochroglossum* cannot be separated generically from *Microglossum*, and is equally difficult to maintain as a section of the latter.

Microglossum (inclusive of *Ochroglossum*) and *Mitrula* have been distinguished from each other by (i) the relative size of the spores (Durand 1908, Nannfeldt 1942, Mains 1956a), (ii) the shape of the spores (Durand, Nannfeldt, Imai 1941, 1956), (iii) the septation of the spores (Durand, Nannfeldt, Imai), and (iv) the shape of the ascigerous portion (Mains, Imai 1956).


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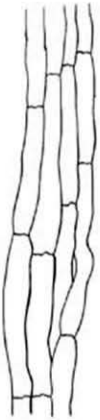
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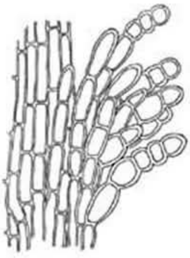
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Figs. 1, 2. *Microglossum viride*. — 1. Hyphae from axis of stipe. — 2. Hyphae from periphery of stipe (× 700).

Figs. 3-5. *Microglossum rufum*. — 3. Hyphae from axis of stipe taken from near its apex. — 4. Hyphae farther down the axis. — 5. Hyphae from periphery of stipe (× 700).

Ad (i). — The length of the spores of *Microglossum viride*, as measured by Durand, Imai 1941, and Mains, is (12–) 14–22 (–37) μ. In closely related *M. olivaceum* the spore length is 10–18 (–20) μ. According to the same authors, the spore length in *Mitrula paludosa* is 10–18 (–20) μ.

Ad (ii). — The shape of the spores in *M. viride* was variously described as cylindrical-oblong, elliptical-oblong, oblong-clavate (Durand), cylindraceo-oblongis, oblongo-clavatis vel longe fusiformibus (Imai), allantoid, subfusoid, cymbiform (Mains). The same holds for *M. olivaceum*. The spores in *Mitrula paludosa* were described as cylindrical, clavate-cylindrical (Durand), cylindraceis, clavato-cylindraceis vel subfusiformibus (Imai), clavate, subcylindric, subfusoid, cymbiform (Mains).

Ad (iii). — The spores in *Microglossum viride* and *M. olivaceum* are long continuous, but become 3–4–septate (Durand, Imai) or are usually multiguttulate (Mains). The spores in *Mitrula paludosa* are continuous (Durand) or finally rarely 1–septate (Imai, Mains).

Ad (iv). — The shape of the ascigerous portion in *Microglossum viride* was described as lanceolate to elliptical, strongly compressed (Durand, Imai), clavate (Mains). The head of *Mitrula paludosa* was described as elliptical, elliptical-oblong, piriform, often somewhat compressed (Durand, Imai), obovoid, cylindric, subgloboid (Mains).

From the above it appears that it is impossible to distinguish *Microglossum* from *Mitrula* (as the latter was currently understood) on the basis of the size or shape of the spores. Septation of the spores in general does not seem to be a reliable criterion for the distinction of genera, and this is particularly true in the Geoglossaceae. The bilaterally compressed condition of the ascigerous portion in *Microglossum* seems to have some value as a differential character against *Mitrula*, but the distinction fails when such species as *Microglossum capitatum* Tai and *M. tetrasporum* Tai are considered.

While few people will dispute that *Microglossum viride* and *Mitrula paludosa* are generically distinct, it seems strange that it should be so difficult to distinguish the genera. In my opinion, part of the trouble lies in the fact that *Mitrula* has been taken too inclusively. *Mitrula* as here defined is taken to contain only its type species.

MITRULA Fr. — Figs. 6, 7

[*Mitrula* Pers. sensu Fr. *apud* Liljebl., Utk. Svensk Fl. 664. 1816. —] *Mitrula* Fr., Syst. mycol. **1**: 463, 491. 1821; not *Mitrula* Pers. *ex* S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 659. 1821 = *Heyderia* (Fr.) Link. — Lectotype: *Mitrula paludosa* Fr. ex Fr. (see Sacc. *in* Bot. Zbl. **18**: 214. 1884).

MATERIAL EXAMINED: *Mitrula paludosa* Fr. ex Fr. (NETHERLANDS, Renkum; L 955.096–337).

The hyphae of the axis of the stipe in *Mitrula paludosa* are more or less coherent but fairly easy to separate by tapping on the cover-glass. They are strongly inflated (Fig. 6), up to 20–30 μ wide, very much constricted at the septa, fairly thin-walled for their size (cell-walls up to 1 μ thick). The hyphae at the periphery of the stipe (Fig. 7) are fairly loosely woven and easily loosened by tapping on the cover-glass.

They are narrow (the narrowest being 1.5–1.8 μ wide), thin-walled (cell-walls about 0.5 μ thick), little constricted at the septa, frequently branched and anastomosing. The narrow hyphae of the periphery gradually pass into the wider hyphae of the central part of the stipe.

Mitrula has apparently always been considered a convenient depository for a wide variety of species, some ill-known or otherwise misunderstood.

Massee (1897) united all the species of *Corynetes*, *Microglossum*, and *Mitrula* into a single genus, *Mitrula*.

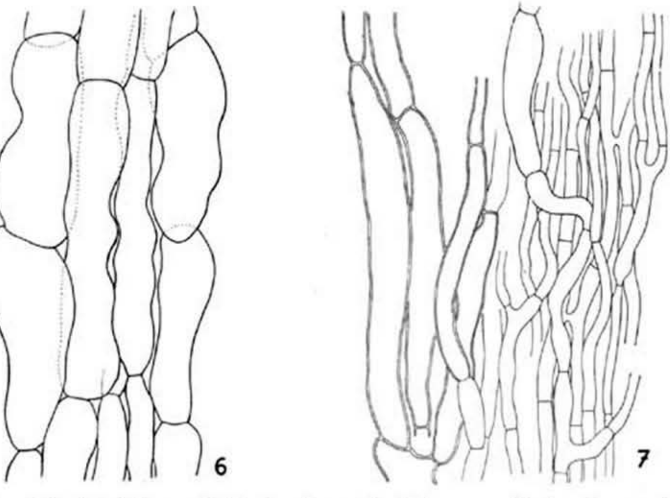
Durand (1908) distinguished between these genera, but he also included in *Mitrula* the two species (*Geoglossum irregulare* Peck and *G. vitellinum* Bres.) which are now commonly regarded as constituting the genus *Spragueola* Massee.

Imai (1941) recognized that *Mitrula abietis* ought to be separated from the genus *Gymnomitrula*. He regarded *Mitrula* as monotypic.

Mains (1956) reunited *Gymnomitrula* with *Mitrula*.

On the whole it can be said that in North America and Europe the conception of *Mitrula* as usually accepted is still the same as Nannfeldt's (1942).

Benedix (1962) took up a somewhat extreme position in reuniting at one fell swoop *Corynetes*, *Microglossum*, *Mitrula*, *Gymnomitrula*, and even the totally unrelated *Ascocorynium* S. Ito & S. Imai (= *Spragueola*) into a single genus, *Mitrula*, which he subdivided into the following subgenera: subgen. *Physomitrula* Benedix, subgen. *Heyderia* Fr., subgen. *Microglossum* Gill., and subgen. *Geomitrula* Schroet.



Figs. 6, 7. *Mitrula paludosa*. — 6. Hyphae from axis of stipe. — 7. Hyphae from periphery of stipe (× 700).

In connection with Benedix's paper, the following remarks do not seem out of place. Benedix typified *Mitrula* by *M. cucullata* (Batsch ex Fr.) Fr. (a synonym of *M. abietis* Fr.), a view also held by Durand (1908: 397), but (i) as early as 1884 Saccardo had chosen *M. paludosa* as type species of *Mitrula*, and (ii) Fries himself (1821: 492) had explicitly excluded *M. cucullata* (as a synonym of *M. abietis*) from *Mitrula* proper and made it a member of his subgenus *Heyderia*. Subgenus *Physomitrula* Benedix, according to Art. 22 of the Code, must be renamed subgen. *Mitrula*, as it includes the type species. Benedix erred in thinking that Gillet had described *Microglossum* as a subgenus. From his citation it is by no means clear whether Benedix was aware that he was making a new combination. Finally, it may be pointed out that it was not Schroeter but Saccardo (Syll. Fung. **8**: 36. 1889) who described *Geomitrula* as a subgenus of *Mitrula*.

Mitrula, as currently understood, contains several species that I feel should be placed elsewhere, but here we touch the very awkward problem of the distinction between the Geoglossaceae and Helotiaceae as defined by Nannfeldt (1932: 73) or the Geoglossaceae, Helotiaceae, and Sclerotiniaceae as defined by Korf (1958: 11, 16). The mutual connection between these families, and between them and *Mitrula* may not be apparent at first sight, but the problem comes into view when approached from the following angles.

1. Some Sclerotiniaceae lack a sclerotium or even a stromatized portion of the substrate from which they spring, and this renders it hard to separate them from the Helotiaceae.
2. The position of *Verpatinia* Whetzel & Drayton is uncertain. Dennis (1956: 161) thinks it a member of the Helotiaceae subfam. Ciborioideae (= Sclerotiniaceae in the sense of Korf), but according to Imai (1956: 5) and, independently, Mains (1956a: 874) it belongs to the Geoglossaceae.
3. Korf (1958: 17) transferred *Leotia* Pers. ex S. F. Gray from the Geoglossaceae to the Helotiaceae.

Several species as yet assigned to *Mitrula*, as far as they are known at present (which is not far), would fit any of the families mentioned above. Of these species, *Mitrula abietis*, discussed in the next chapter, is perhaps best known. It is as yet conventionally retained in the Geoglossaceae, but differs from the true *Geoglossum* habit in the sterile excipulum-like groove separating the stipe from the fertile head, and might well be better placed in the Helotiaceae in the neighbourhood of *Pezizella* Fuck. However, such a transfer would inevitably undermine the position of *Cudonia* Fr., a genus I have not studied. A remark such as that made by Mains (1956b: 694) invites further study. The possession of an excipulum, or a structure resembling it, may perhaps not be considered sufficient reason to exclude a genus from the Geoglossaceae, but, in the few examples examined, I found that no species exhibiting this character proved in any way related to *Mitrula*. Species possessing this character are *Mitrula brassicae* Hammarlund, *M. sclerotipus* Boud., *M. sclerotiorum* (Rostr.) Rostr., *M. gracilis* P. Karst., and *M. multiformis* (E. Henn.) Massee.

In *M. brassicae* the sterile zone on the underside of the head was not described by Hammarlund, but his figure (1932: pl. 1 fig. 7) is suggestive of the presence of one. The size of the spores, the positive iodine reaction of the asci, the shape of the head, and the presente of a sclerotium seem to indicate that *Mitrula brassicae* is a *Verpatinia*.

Mitrula sclerotipus, also described as springing from a sclerotium, has a head resembling that of a species of *Verpatinia*, but I agree with Dennis (1956: 162) that it probably is not a member of that genus. My grounds are the negative iodine reaction of the asci and the fact that the sterile underside of the head does not seem to be pseudoparenchymatous (compare Whetzel, 1945: fig. 29).

Mitrula sclerotiorum, although at first described as developing from a sclerotium, was later thought (Röed, 1954: 81) to be parasitic on the sclerotia of *Sclerotinia trifoliorum* Erikson. The position of the species is unknown. Imai (1941: 177) transferred it and *M. sclerotipus* to his genus *Scleromitrula* (type species: *Microglossum shiraianum* P. Henn.), but apart from the fact that both species are not congeneric, I also very much doubt the correctness of the transfer. There is nothing in Hennig's description (nor in Imai's either) to suggest that the fertile head in *M. shiraianum* is separated from the stipe by a sterile zone.

Mitrula gracilis is discussed under *Heyderia abietis*.

Mitrula multiformis seems to consist of two different species. No suggestion is here offered as to the taxonomic position of either.

In addition to the above species, there is a further species, *Mitrula omphalostoma* Benedix, which looks like a *Mitrula* all right, but is rather puzzling in that its author (1962: 402) stated that "eine nennenswerte Jodreaktion an den Ascusspitzen nicht zu beobachten war."

Although the above list by no means exhausts all the species that have at one time been included in *Mitrula*, the few examples shown have convinced me that for the time being the genus is best accepted with only one species, the type species.

HEYDERIA (Fr.) Link — Figs. 8–11

Mitrula B. [= subgen.] *Heyderia* Fr., Syst. mycol. **1**: 464, 492. 1821. — *Heyderia* (Fr.) Link, Handb. Erkenn. Gewächse **3**: 311. 1833; Lév. *in* Orbigny, Dict. univ. Hist. nat. **8**: 116 (reprint) 1846; Boud. *in* Bull. Soc. mycol. France **1**: 110. 1885; not *Heyderia* C. Koch, Dendrologie **2** (2): 177. 1873 [Coniferae]. — *Gymnomitrula* S. Imai *in* J. Fac. Agric. Hokkaido Univ. **45**: 172. 1941 (name change). — Lectotype: *Mitrula abietis* Fr. (see Imai, l.c.).

Mitrula Pers. *in* Neues Mag. Bot. **1**: 116. 1794 (= Tent. Fung. 36. 1797); *ex* S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 659. 1821; not *Mitrula* Fr., Syst. mycol. **1**: 463, 491. 1821. — Type species: *Mitrula heyderi* Pers. = *Mitrula abietis* Fr.

MATERIAL EXAMINED: *Heyderia abietis* (Fr.) Link (ESTONIA, Lihula, Virusaar; L 960.113–540. — SWITZERLAND, Neuchâtel, Vanel; L 957.154–118); *Mitrula gracilis* P. Karst. (SWEDEN, Torne lappmark, Kiruna & Fungi exs. Suec. praes. upsal. No. 1784; S).

The hyphae of the axis of the stipe in *Heyderia abietis* are agglutinated, 4.5–7.2 μ wide (Estonian collection) or up to 12.5 μ wide (Swiss collection), thin-walled (cell-walls about 0.5 μ thick), not or little constricted at the septa in the narrower hyphae, somewhat more constricted in the inflated hyphae (Fig. 8, drawn from the Estonian collection). At the periphery of the stipe (Fig. 9, same specimen) the hyphae are agglutinated, 1.8–3.6 μ wide, thick-walled (cell-walls brownish, 1 μ thick or more), not or little constricted at the septa, the outermost hyphae producing ampullaceous cells up to 9 μ (Estonian collection) or 12.5 μ (Swiss collection) wide and with thick brown walls.

The structure of the stipe in *Heyderia abietis* is not unlike that in *Microglossum*, but the peripheral hyphae in the former have a much narrower lumen, their septa (staining dark red in Congo Red) show up with remarkable clarity in a mount, and the ampullaceous cells occur all over the surface of the stipe, in contradistinction to the tufted growth of the outward-curved hyphae in *Microglossum*.

The excipulum has the same structure as the peripheral part of the stipe, but the free ends of the hyphae decrease in size and gradually loose their ampullaceous form toward the margin.

A species which since its description has been almost universally held to be a *Mitrula* is *M. gracilis* P. Karst. Imai (1941: 175) was the only author to have a different opinion. He transferred the species to *Gymnomitrula*. It is true that at least when dried *Heyderia abietis* and *Mitrula gracilis* have such features in common as (i) the brownish colour of the fruit-body, (ii) the capitate head with free margin over-

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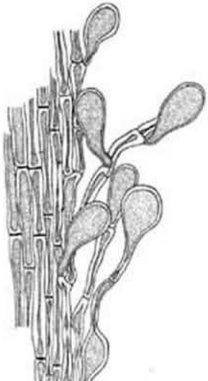

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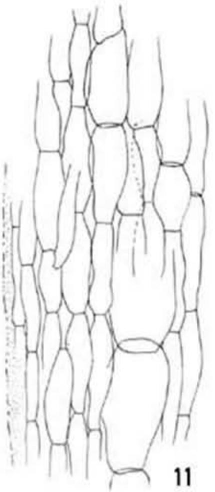

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Figs. 8, 9. *Heyderia abietis*. — 8. Hyphae from axis of stipe. — 9. Hyphae from periphery of stipe (Estonian collection; × 700).

Figs. 10, 11. *Mitrula gracilis*. — 10. Hyphae from axis of stipe. — 11. Hyphae from periphery of stipe (Kiruna collection; × 700).

hanging the apex of the stipe, and (iii) the dimensions of the spores, but the structure of the stipe in both species is entirely different: —

The hyphae of the axis of the stipe in *M. gracilis* (Fig. 10) are agglutinated, 3–5.4 μ wide, thin-walled (cell-walls less than 0.5 μ wide), not or little constricted at the septa, many of which are oblique. Toward the periphery of the stipe (Fig. 11) the cells increase in width, becoming up to 17 μ wide, to decrease again near the surface, where the hyphae are covered with mucilaginous matter and hard to distinguish.

A further difference between the two species lies in the sterile zone under the ascigerous portion. In *Heyderia abietis* this zone is a continuation of the stipe, but in *Mitrula gracilis* it seems to have come into being by the disruption of the ascigerous portion from the apex of the stipe. I presume that the disruption is not only caused by artificial desiccation, but occurs in nature as well, and may be regarded as a sign of old age. The photographs published by Mains (1948: 721) clearly show the fertile head to be continuous with the stipe, much in the same way as is seen in *Mitrula paludosa*, with which the species has frequently been confused. On the other hand, Favre's figure (1949: 144) shows several specimens with the hymenium heavily folded, which may well be the initial phase of the process that ends in disruption of the head from the stipe.

Whatever the cause of the sterile zone under the ascigerous portion, I am satisfied that the very different structure of the stipe in itself is sufficient proof that *Mitrula gracilis* is not a *Heyderia*. I am not so sure, however, as to its relation to *Mitrula*. Here is one of those cases in which fresh material would be a great help.

THUEMENIDIUM O. Kuntze—Figs. 12–15

Geoglossum subgen. *Leptoglossum* Cooke, Mycogr. 250. 1879. — *Leptoglossum* (Cooke) Sacc. *in* Bot. Zbl **18**: 214. 1884; not *Leptoglossum* P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **32**: xvii, 242. 1879. — Lectotype: *Geoglossum microsporum* Cooke & Peck (see Saccardo, l.c.).

Geoglossum subgen. *Corynetes* Hazsl. *in* Mag. Tud. Akad. Értek. term. Kör. **11** (19): 7. 1881. — *Corynetes* (Hazsl.) Dur. *in* Ann. mycol., Berl. **6**: 412. 1908; not *Corynites* Berk. & Curt. *in* Ann. Mag. nat. Hist., ser. 2, **11**: 136. 1853. — Lectotype: *Geoglossum microsporum* Cooke & Peck (see Durand, l.c.).

Microglossum Sacc. *in* Bot. Zbl. **18**: 214. 1884; not *Microglossum* Gill., Champ. France, Discomyc. 25. 1879. — *Thuemenidium* O. Kuntze, Rev. Gen. Pl. **2**: 873. 1891 (name change). Lectotype: *Geoglossum hookeri* Cooke (see Saccardo, l.c.).

Microglossum sect. *Melanoglossum* S. Imai *in* J. Fac. Agric. Hokkaido Univ. **45**: 192. 1941. — Type species: *Microglossum atropurpureum* (Pers. ex Fr.) P. Karst.

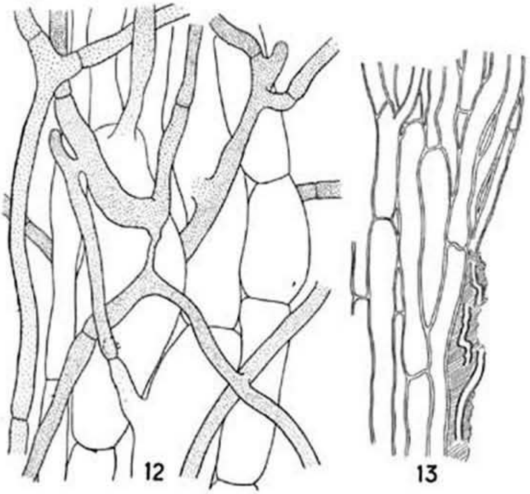
MATERIAL EXAMINED: *Thuemenidium atropurpureum* (Batsch ex Fr.) O. Kuntze (NETHERLANDS, Voorst; L 960.113–668). — *Corynetes arenarius* (Rostr.) Dur. (NETHERLANDS, Terschelling, Lies: L 958.140–533). — '*Corynetes*' *globosus* (Sommerf.) Dur. (NORWAY, Nordland, Saltdalen, type; Finnmark, Alta, *Eckblad 61–159*; Finnmark, Kistrand, *Eckblad 61–193*; all in O).

The hyphae of the axis of the stipe in *Thuemenidium atropurpureum* seem to be of two kinds: very much inflated longitudinal hyphae interlaced by narrower hyphae which are united into a dense network (Fig. 12). Closer observation shows that the narrow hyphae arise as side-branches from the inflated ones. The latter are more or less agglutinated, up to 22.5 μ wide, thin-walled (cell-walls 0.5 μ thick or less, dark brown), constricted at the septa. The narrower hyphae are frequently branched and connected with each other and with the inflated hyphae by anastomosis. Toward the periphery the hyphae rapidly diminish in width. Close to the surface (Fig. 13) they are 2.7–9 μ wide, very much agglutinated and embedded in dark amorphous matter, fairly thick-walled (cell-walls 0.5–1 μ thick, very dark brown), somewhat constricted at the septa, collapsed at the surface.

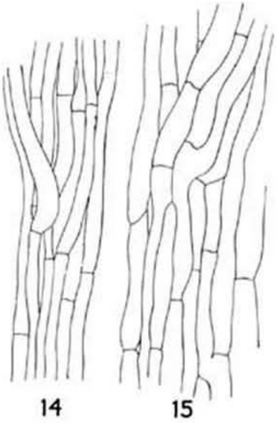
In *Corynetes arenarius* the structure of the stipe is somewhat different in that the longitudinal hyphae are less inflated (up to 9 μ wide), much fewer in number, and far less conspicuous because of the extremely dense and intricately reticulated fabric of the narrower hyphae. The greater part of the tissue is whitish in younger specimens, but becomes brown with age. Sharply contrasting with the axial part, the peripheral hyphae form an almost black cortex, composed of densely woven, short-celled, thick-walled hyphae, the tips of which project freely into the air.

The character which both species have in common is the dense network of branching and anastomosing hyphae.

Since the time of Durand '*Corynetes*' *globosus* (Sommerf.) Dur. has always remained a member of that genus, even with Eckblad who was the first to express some doubt: "... in shape rather out of place in *Corynetes*" (1963:144). Indeed, the species is not a *Corynetes* at all, differing from the species of that genus both in gross morphology and structurally.



Figs. 12, 13. *Thuemenidium atropurpureum*. — 12. Hyphae from axis of stipe. — 13. Hyphae from periphery of stipe (× 700).



Figs. 14, 15. '*Corynetes*' *globosus*. — 14. Hyphae from axis of stipe. — 15. Hyphae from periphery of stipe (*Eckblad 61-193*; × 700).

In some, probably rather young, specimens of '*C.*' *globosus* (*Eckblad 61–159*) the fertile head gives the impression of being continuous with the stipe, but in others the margin of the hymenium has receded so far from the stipe as to reveal that the globose head is hollow in the lower half, the roof of the annular cavity being formed by what seems to be an excipulum which in the centre is supported by the stipe. Whether this roof is a true excipulum or merely caused by the rupture of tissues is hard to determine from dried material, but the resulting vaulted-peltate head is quite different from the club-shaped clavula in *Corynetes*.

The hyphae of the axis of the stipe in '*Corynetes*' *globosus* (type and *Eckblad 61–193*) are agglutinated, 2.7–5.4 μ wide, thin-walled, not or little constricted at the septa (Fig. 14[2]). The hypae at the periphery (Fig. 15) are likewise agglutinated and differ only in being somewhat wider, up to 6.3 μ.

The name of the present genus has been generally believed to be *Corynetes* Hazsl., the reason probably being that Hazslinszky (l.c.) concluded his comments on *Geoglossum* with the following sentence (translated): "On this basis I subdivide the *Geoglossum*-type into the following genera . . . [followed by the names *Eugeoglossum*, *Cibalocoryne*, *Helote*, and *Corynetes*]." His use of the word genus is unfortunate and awkward, but fully in keeping with the inadequate terminology of his descriptions. He would have used 'taxon' had he lived in the present time, and I do not doubt that in his case 'genera' was employed for want of a better word. There is no uncertainty, however, as to the meaning of Hazslinszky's final remark (translated): "As there are few *Geoglossum*-species known yet from this country, I adhere to Persoon's *Geoglossum* and maintain the genera proposed in the rank of subgenera." I am not convinced that Hazslinszky meant to publish alternative names, although it could be defended that from a technical point of view he did. However, in deciding what rank should be attributed to *Corynetes*, Hazslinszky's last remark must not be ignored.

Apart from the above consideration, there is a further reason why *Thuemenidium* is here being used. Even if *Corynetes* Hazsl. were acceptable as a generic name, it would have to be rejected as an orthographic variant and a later homonym of *Corynites* Berk. & Curt.

I refrained from transferring *Corynetes arenarius* to *Thuemenidium*, because it is by no means established yet that the genus is an independent taxon. Nannfeldt (1942: 8) already expressed his misgivings, and such species as *Geoglossum alveolatum* (Rehm) Dur., *G. littorale* (Rostr.) Nannf., and *Corynetes geoglossoides* Eckblad (1963: 141) render it virtually impossible to separate *Corynetes* (= *Thuemenidium*) from *Geoglossum* on the basis of the colour of the spores. This would leave the septation of the spores as the only criterion, which is not a very good one either.

Nothomitra Maas G., *gen. nov.*[3]—Figs. 16–22

Ascomata carnosa, e capitulo stipiteque formata. Capitulum mitratum, haud compressum, cum stipite continuum vel super stipitis apicem paulo demissum, intus farctum, hymenio a

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[2] Drawings made from the type had to be withdrawn, but as the type and *Eckblad 61-193* are exactly alike structurally, the figures of the latter must suffice.

[3] Etymology: νόθος, spurious; μίτρα, oriental head-dress; an allusion to the resemblance to *Mitrula*.

stipite bene rectangulariter separato undique obductum. Stipes gracilis, farctus. Asci cylindraceo-subclavati, inoperculati, octospori, poro jodi ope coerulescente. Sporae oblique 2-seriatae, oblongo-clavatae, raro subfusiformes, hyalinae, leves, longe continuae, dein multiguttulatae, demum multiseptatae. Paraphyses filiformes, septatae, ramosae, apice parum incrassatae, curvulae, recurvatae vel uncinatae, an conglutinatae?, parietibus hyalinis. — Typus generis: *N. cinnamomea* Maas G.

Fruit-bodies fleshy, consisting of fertile head and stipe. Fertile head mitrate, not compressed, continuous with the stipe or its underside somewhat sagging below the apex of the stipe, solid, covered on all sides by the hymenium. Hymenium separated from the stipe by a straight (or almost straight) line across the stipe, with age becoming detached below. Stipe slender, solid. Asci cylindrical-clavate, inoperculate, 8-spored, the pore blued by Melzer's reagent. Spores obliquely 2-seriate, oblong-clavate, somewhat pointed below, rounded above, more rarely subfusiform, colourless, smooth, long remaining 1-celled, then multiguttulate, finally becoming up to 6-celled. Paraphyses filiform, septate, branched, at the apex somewhat widened, curved or hooked, with colourless cell-walls, possibly conglutinated (which is difficult to determine). Flesh made up of hyphae which are coherent to rather loosely woven in the axis of the stipe, agglutinated at its periphery. Hyphae in the axis of the stipe easily separable by tapping on the cover-glass, narrow (the narrowest being 0.9 μ wide) but often much swollen on the distal side of each septum (up to 7.2 μ wide), very thin-walled (cell-walls less than 0.5 μ), frequently branched and anastomosing (Fig. 21). Hyphae near the periphery of the stipe (those from the surface proper being hard to distinguish) inseparable, 1.8–2.7 μ wide, very thin-walled (Fig. 22). Type species: *N. cinnamomea* Maas G.

The more or less free edge at the junction of hymenium and stipe is very suggestive of remnants of a veil, but this structure is not shown in even the youngest specimens in Mr. Palmer's drawing.

Nothomitra cinnamomea Maas G., *sp. nov.*

Ascomata usque ad 3 cm alta. Capitulum versiforme, mitratum, obovatum, subglobosum vel superne applanatum, interdum undulato-lobatum, centro saepe depressum, glabrum, dilute cinnamomeum, aetate obscurascens, 2.5-6 mm altum, 2.5-8 mm latum. Stipes rectus vel flexuosus, teres vel subcompresso-lacunosus basinque versus sensim attenuatus, glaber vel in summa parte minute squamulosus, dilute ochraceus, 5-27 mm longus, 1-4.5 mm latus. Caro mollis, stipiti concolor, odore saporeque ignotis. Asci 100-155 × 8-10 μ. Sporae 32.5-47.3 × 3.9—5 μ. Paraphyses ascos parum superantes, materia oleaginosa flavescente repletae, non facile separandae, 1-1.5 μ crassae, sursum 1.8-2.7 μ. Sphagnicola, autumno. Typus: L 962. 271-144; isotypus: LIVU Myc. 2543 (= *Palmer 11391*).

Fruit-bodies up to 3 cm high (Figs. 16, 17). Fertile head variously shaped, mitrate, obovate, subglobose or flattened apically, sometimes with broad wavy lobes, often depressed in centre, glabrous, pale cinnamon, darkening with age, 2.5–6 mm high, 2.5–8 mm broad. Stipe straight or flexuous, terete or somewhat compressed and with shallow longitudinal groove, tapering towards the base, glabrous or minutely squamulose above, pale ochraceous, 5–27 mm long, 1–4.5 mm broad. Flesh soft, concolorous with the stipe (whitish in the dried material). Odour and taste unknown. Asci 100–155 × 8–10 μ (Fig. 18). Spores 32.5–47.3 × 3.9–5 μ (Fig. 19). Paraphyses somewhat exceeding the asci, filled with yellowish oily matter, not easily separable, 1–1.5 μ wide, at the apex enlarged to 1.8–2.7 μ (Fig. 20). Growing among or on *Sphagnum*, autumnal. Type: L 962. 271–144; isotype: LIVU Myc. 2543 (= *Palmer 11391*).

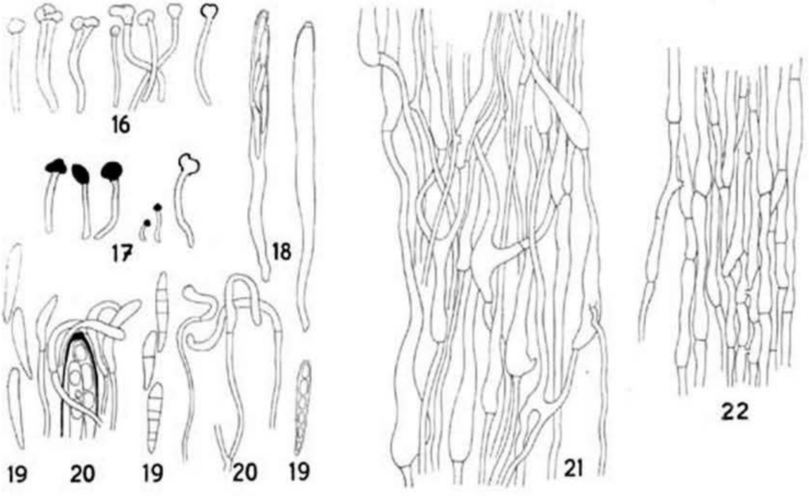
MATERIAL EXAMINED: AUSTRIA, Attergau, Fehra Moos, SW of St. Georgen, 29 IX 1962, *J. T. Palmer* (L 962.271-144, type; LIVU Myc. 2543, isotype; LIVU Myc. 2544).

The chemical behaviour of *Nothomitra cinnamomea* is out of the ordinary. Mounted in Melzer's reagent, only the ascus pore stains blue, but if previously boiled in a solution of KOH the entire hymenium turns blue.

Several species in *Microglossum* and *Mitrula* have been described as possessing more or less globose heads and it seems advisable to compare them with *N. cinnamomea.*

bermudianus. — *Mitrula bermudiana* Waterston *apud* Waterston & al. *in* Mycologia **37**: 35, fig. 1. 1945.

A species hardly likely to be encountered in Europe but which nevertheless should be compared with *N. cinnamomea* because the description of the fertile head suggests some similarity: "distinct from stem below ... hygrophanous tan in color ..." However, the spores are obliquely uniseriate, much smaller (9–15 × 3–4 μ), ellipsoid, and the paraphyses nearly straight and simple. Mains (1956: 855) thought it might belong to *Microglossum olivaceum.*



Figs. 16-22. *Nothomitra cinnamomea.* — 16. Habit sketch of type collection (L 962.271-144 and LIVU Myc. 2543; after Palmer; × ½). — 17. Habit sketch of LIVU Myc. 2544 (after Palmer; × ½). — 18. Asci (× 200). — 19. Spores (× 300). — 20. Paraphyses (× 700). — 21. Hyphae from axis of stipe (× 700). — 22. Hyphae from near periphery of stipe (× 700) (Figs. 18-22 drawn from holotype).

capitatus. — *Microglossum capitatum* Tai *in* Lloydia **7**: 147, figs. 2, 17. 1944. — *Ochroglossum capitatum* (Tai) Imai *in* Sci. Rep. Yokohama nat. Univ. (sect. 2) No. 4: 7. 1955.

This species differs from *Nothomitra cinnamomea* in the following characters: (i) the head is stated to be more or les compressed, (ii) the hymenium is little distinct from the stipe, (iii) head and stipe are concolorous or the stipe is somewhat darker, (iv) the asci are 4-spored, and (v) the spores are 14–16–celled, although the author appeared uncertain about this number owing to indistinct septation.

fechtneri. — *Microglossum fechtneri* Vel., Monogr. Discomyc. Bohem. 375, pl. 28 figs. 10, 11. 1934.
This is ruled out on account of the black colour of both head and stipe. It certainly belongs in *Thuemenidium*, and its author stressed its affinity to *Leptoglossum tremellosum* (Cooke) Sacc. which is a synonym of *T. atropurpureum.*

fusisporus. — *Mitrula fusispora* Preuss *in* Linnaea **24**: 147. 1851.
The description strongly suggests *Heyderia abietis*. Benedix (1962: 405) came to the same conclusion.

lateritio-roseus. — *Mitrula lateritio-rosea* Vacek *in* Studia bot. čechosl. **10**: 135, fig. 6. 1949.
The free edge of the globose head, the iodine-negative ascus pore, and the much smaller spores (5–8 × 2 μ) distinguish this species from *N. cinnamomea.*

minor. — *Microglossum minus* Vel., Monogr. Discomyc. Bohem. 375, pl. 31 fig. 27. 1934.
Differing from *N. cinnamomea* in the green colour of both head and stipe, as well as in the shorter spores (16–18 μ long). This is probably a depauperate form of *Microglossum viride.*

morchelloides. — *Mitrula morchelloides* Mains *in* Pap. Mich. Acad. Sci. **20**: 83, pl. 16 fig. C. 1935.
Although not mentioned in the original description, the photograph gives the impression of the head being free from the stipe. This character and the much smaller spores (5–7 × 2–2.5 μ) distinguish the species from *N. cinnamomea.*

niger. — *Sarcoleotia nigra* S. Ito & S. Imai *in* Trans. Sapporo nat. Hist. Soc. **13**: 182, pl. 7 figs. 23–27. 1934.
This species differs from *N. cinnamomea* in the free edge of the hymenium, the iodine-negative ascus pore, and the straight paraphyses. Eckblad (1963: 144) thought the species close to '*Corynetes*' *globosus.*

omphalostoma. — *Mitrula omphalostoma* Benedix *in* Kulturpfl., Beih. No. 3: 402, pl. 1 figs. a–e. 1962.
The pink colour of the fertile head, its large internal cavity, the white stipe, and the shorter spores (12–14(–16) × 3–4 μ) make this a very different species from *N. cinnamomea.*

rehmii. — *Mitrula rehmii* Bres., Fungi trident. **2**: 41, pl. 147 fig. 2. 1892.

As far as Bresadola's description is concerned, his species is distinct on account of the morchelloid head, straight paraphyses, and the much smaller and finally 2-celled spores (8–13 × 2.5–3 μ). Nannfeldt (1942: 50) pointed out that at least part of the material redescribed by Heim & Remy (1932: 68) under that name also contained *Mitrula gracilis*.

saccardous. — *Mitrula saccardoa* Bagnis *in* Atti Accad. Lincei, ser. 3, **1**: 13, pl. 1 fig. 5. 1877 (not seen). — *Bagnisimitrula saccardoa* (Bagnis) S. Imai *in* Bot. Mag., Tokyo **56**: 525. 1942.

In view of the vinaceous and asperulate spores, this species probably does not even belong to the Geoglossaceae.

sphaerocephalus. — *Mitrula sphaerocephala* Bres., Fungi trident. **1**: 66, pl. 72 fig. 2. 1884. — *Mitrula cucullata* var. *sphaerocephala* (Bres.) Vel., Monogr. Discomyc. Bohem. 374. 1934; not *Mitrula paludosa* var. *sphaerocephala* Roum. *in* Rev. mycol. **8**: 148. 1886 (nomen nudum).

Differing from *N. cinnamomea* on account of its straight paraphyses, smaller and subcylindric spores (15–18 × 6–7 μ), and growth on larch needles.

tetrasporus. — *Microglossum tetrasporum* Tai *in* Lloydia **7**: 147, figs. 1, 16. 1944. — *Ochroglossum tetrasporum* (Tai) S. Imai *in* Sci. Rep. Yokohama nat. Univ. (sect.2) No. 4: 8. 1955.

Much of what has been said of *Microglossum capitatum* also applies, with slight alterations, to the present case.

I herewith express my indebtedness to Mr. J. T. Palmer for putting his collections and water-colour drawings at my disposal and for linguistic advice, as well as to the Director of the Botanical Museum at Oslo for the loan of the type and later collections of '*Corynetes*' *globosus*.

REFERENCES

BENEDIX, E. H. (1962). *In* Kulturpfl., Beih. No. 3: 389-410.
DENNIS, R. W. G. (1956). *In* Mycol. Pap. No. 62.
DURAND, E. J. (1908). *In* Ann. mycol., Berl. **6**: 387–477.
ECKBLAD, F. E. (1963). *In* Nytt Mag. Bot. **10**: 137–158.
FAVRE, J. (1949). *In* Schweiz. Z. Pilzk. **27**: 143–146.
FRIES, E. M. (1821), Systema mycologicum **1**. Lundae.
HAMMARLUND, C. (1932). *In* Ark. Bot. (A) **25** (3).
HEIM, R. & L. REMY (1943). *In* Bull. Soc. mycol. France **48**: 53–75.
IMAI, S. (1938). *In* Bot. Mag., Tokyo **52**: 417–424.
—— (1941). *In* J. Fac. Agric. Hokkaido Univ. **45**: 155–264.
—— (1955). *In* Sci. Rep. Yokohama nat. Univ. (sect. 2). No. 4: 1–11.
—— (1956). *In* Sci. Rep. Yokohama nat. Univ. (sect. 2). No. 5: 1–8.
KORF, R. P. (1958). *In* Sci. Rep. Yokohama nat. Univ. (sect. 2). No. 7: 7–35.
LIND, J. (1913), Danish fungi as represented in the herbarium of E. Rostrup. Copenhagen.

MAINS, E. B. (1948) *In* Mycologia **40**: 717–723.
—— (1956a). *In* Mycologia **47**: 846–877. 1955.
—— (1956b). *In* Mycologia **48**: 694–710.
MASSEE, G. (1897). *In* Ann. Bot., Lond. **11**: 225–306.
NANNFELDT, J. A. (1932). *In* Nova Acta Soc. Sci. upsal., ser. 4, **8** (2).
—— (1942). *In* Ark. Bot. (A) **30** (4).
RÖED, H. (1954). *In* Acta Agric. scand. **4**: 78–84.
WHETZEL, H. H. (1945). *In* Mycologia **37**: 648–714.

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NOTES ON SOME FUNGI OF MICHIGAN—I

'Cyhellaceae'

pL

Derek A. Reid

(*With 52 Text-figures*)

This paper is based largely on collections made by the author in Michigan, U.S.A. The genera represented among these collections are *Flagelloscypha* Donk (with 1 species), *Lachnella* Fr. emend. Donk (1), *Cyphellopsis* Donk (1), *Merismodes* Earle (1), *Henningsomyces* O. Kuntze (1), *Calathella* Reid, gen. nov. (2), *Cellypha* Donk (1), *Pellidiscus* Donk (1), *Stromatocyphella* W. B. Cooke emend. Reid (1), *Plicaturopsis* Reid, gen. nov. (1). The generic differences between *Cyphellopsis*, *Merismodes* and *Phaeocyphellopsis* W. B. Cooke are critically discussed; the latter genus is reduced to the synonymy of *Merismodes*. Full accounts are given of all the species, including an unidentified sterile Cyphelloid fungus and two new taxa viz. *Henningsomyces pubera* var. *americana* Reid and *Calathella davidii* Reid.

The present study is based largely on collections made by the author from June—August 1961 during a visit to the Biological Station of the University of Michigan at Pellston. It could perhaps be argued that any discussion of the Cyphellaceae of the United States, on a relatively localized regional basis, has been rendered unnecessary and superfluous by the publication of a monograph on these fungi by W. B. Cooke *(1961)*. Unfortunately, the author finds himself at variance with Cooke on so many matters that it has become essential to redefine the genera and publish detailed descriptions of the species collected. It should be noted that there has been no attempt to arrange the genera in any systematic order.

The specimens cited are preserved in the Kew herbarium, unless otherwise stated. The herbaria are indicated by the abbreviations used by Lanjouw & Stafleu (*1959*).

FLAGELLOSCYPHA Donk apud Sing.

Fructifications gregarious, white, villose, cupulate, becoming globular when dry. *Hyphal structure* monomitic, consisting of thin-walled, narrow, branched, hyaline, generative hyphae with clamp-connexions at the septa. The exterior surface of the fruitbody is covered by long, narrow, continuous hairs, with slightly thickened walls which thin out toward the tapering, whip-like apex and toward the base. These hairs which arise anywhere on the outer surface are densely covered with detersile rod-like crystals except toward the very tip and base. When mounted in potassium hydroxide solution the crystalline material dissolves but the hairs are otherwise unaffected. They may narrow somewhat toward the base and can be traced back to a thin-walled hypha to which they are joined by a clamp-connexion. The hairs are unaffected by Melzer's reagent. *Cystidia* and *gloeocystidia* absent. *Basidia* clavate rather large. *Spores* smooth, thin-walled, hyaline, nonamyloid, varying in shape from subcylindric, elliptic, pip-shaped or subglobose to amygdaliform and in size from small to very large.

Flagelloscypha citrispora (Pilát) Reid, *comb. nov.*—Figs. 1–11

Cyphella citrispora Pilát *in* Ann. mycol., Berl. **22**: 209–210. 1924.
Cyphella citrispora forma *crataegi* Pilát *in* Ann. mycol., Berl. **23**: 155. 1925.
Cyphella citrispora forma *lobata* Pilát *in* Ann. mycol., Berl. **23**: 155. 1925.
Cyphella janchenii Pilát *in* Ann. mycol., Berl. **22**: 210. 1924.
Cyphella punctiformis var. *corticola* Bourd. & Galz., Hym. France 161. 1928.
? *Cyphella rosicola* Pilát *in* Ann. mycol., Berl. **22**: 208. 1924.

Sphorophores gregarious, forming small scattered colonies. In the fresh condition the fruitbodies are pure white throughout, very minutely tomentose, and deeply cupulate, but on drying they tend to become globular and the hymenial surface may become cream coloured. The fruitbodies in some collections appear to be associated with a fine arachnoid mycelium. Fructifications vary considerably in size but when mature they may reach 500 μ in both height and width. *Structure*: the fruitbody is very thin and delicate, with the walls rarely exceeding 40 μ in thickness (excluding the hairs). The context is reduced to a zone consisting of only a few hyphae wide and varies from 5–10 μ in thickness. The hyphae, 2.5–4 μ in width, are thin-walled, hyaline, branched and bear clamp-connexions at the septa. They are composed of short segments, are densely compacted, perhaps even somewhat agglutinated and have a more or less parallel, longitudinal orientation. It should also be noted that each hypha tends to be slightly swollen at the septa giving a knee-bone-like junction. From the outermost hyphae of the flesh there arise numerous hairs which clothe the fruitbody. These hairs originate at any point on the outer surface of the sporophore. They are elongated structures, 2.5–3(–3.5) μ wide, which taper gradually to a very fine whip-like apex and also, to a lesser extent toward the base. They have slightly thickened walls which thin out toward the tip and sometimes toward the base, although some hairs have the thickened wall extending to the extreme base. The hairs are covered, except for their extremities, with conspicuous, detersile, rod-like or needle-like crystals which dissolve rapidly in 10% potassium hydroxide solution. If traced back to their point of origin, these hairs, which may reach a length of 210 μ, can be seen to arise from ordinary vegetative hyphae at a clamped basal septum. From the innermost hyphae of the context certain hyphae grow out at right angles to form a narrow, loosely organised subhymenial layer, up to 8 μ in width. This layer in turn gives way to a palisade of basidia, 13–20 μ wide. *Basidia* 18 × 5.5 μ, 4-spored, clavate with a basal clamp-connexion. *Spores* (6.2–)8–12.2 × (3–)4–5(–5.75) thin-walled, hyaline, non-amyloid, varying considerably in shape according to the degree of maturity. Fully mature spores, as seen in a spore print, measure (7.5–)8.75–12.2 × × 4–5 μ and vary in side view from amygdaliform with a rather pronounced snout-like apex, to elliptical but in surface view they appear more or less navicular.

HABITAT: The American collections were all made on very rotten, fallen trunks, but in Europe this fungus occurs on both woody and herbaceous debris.

COLLECTIONS EXAMINED: AMERICA: Cross Village, Mich., coll. D. A. Reid, 5 July 1961; Colonial Point, Burt Lake, Mich., coll. D. A. Reid, 7 July 1961; Pellston, Mich., coll. D. A. Reid, 20 July 1961; Harbor Springs Hills, Mich., coll. D. A. Reid, 27 July 1961; Berry Creek, Wolverine, coll. D. A. Reid, 31 July 1961; Berry Creek, Wolverine, coll. D. A. Reid, 1 Aug. 1961 (3 different gatherings). Asia: U. S. S. R.: On *Zelkova*, Azerbaydzhan, coll. A. Raitviir (No. 43153), 13 Oct. 1962. EUROPE: British Isles: On oak bark, Elland Park Wood, Halifax, Yorks., 4 July 1892; on *Petasites*, Elland Park Wood, Halifax, coll. H. T. Soppitt, 2 Nov. 1894; on *Eupatorium*, La Bouvée, Channel Isles, coll. E. A. Ellis, 16 June 1947 (assigned to this species with some doubt); on herbaceous stems, Wicken Fen, Cambs., coll. P. K. C. Austwick, 28 Feb. 1951; on *Pteridium aquilinum*, Cambs. (?), coll.

A. F. Parker-Rhodes, 1952; on *Ulex europaeus*, Kinlock, Isle of Rhum, coll. R. W. G. Dennis, 3 Oct. 1961. Czechoslovakia: On *Viola adorata* etc., Mnichovice, Central Bohemia, coll. J. Velenovský, July 1923 (TYPE of *Cyphella janchenii*, PR); on *Rosa canina*, Prague, July 1924 (det. Pilát as *Cyphella janchenii*); on *Alnus glutinosus*, Mníšek, Central Bohemia, July 1923 (TYPE of *Cyphella citrispora*; PR No. 174147); on *Alnus* and *Epilobium angustifolium*, Mnichovice, Sept. 1924 (TYPE of *Cyphella citrispora* f. *lobata*; PR No. 174148); on *Crataegus oxyacantha*, Mnichovice, Sept. 1924 (TYPE of *Cyphella citrispora* f. *crataegi* K, PR No. 174152;) on *Rosa canina*, Mnichovice, coll. J. Velenovský, Sept. 1923 (TYPE of *Cyphella rosicola*; PR). France: On fallen branches of "Prunellier" (*Prunus spinosa*), St. Priest, Moulin-Moutrat, 17 Aug. 1910 (Pl. de l'Allier No. 15744, det. Bourdot as *Cyphella punctiformis* var. *corticola*); on dead stems of *Rumex*, coll. Corbière (No. 40bis) (Champignons de la Manche No. 32781, det. Bourdot as *Cyphella punctiformis* var. *corticola* and hereby selected as LECTOTYPE of this name), on bark of *Ulmus*, St. Priest, 15 Sept. 1913 (Champignons de l'Allier No. 15746, det. Bourdot as *Cyphella punctiformis* var. *corticola*; on rotten wood (*Crataegus*?), Croix Moulicon, coll. Bourdot and Guillermin, 13 Aug. 1924 (det. Bourdot as *Cyphella punctiformis* var. *corticola*).

The first impression gained from an examination of the collections cited above is that there are two taxa involved. In fact the differences between them would seem to be more apparent than real, since any separation is dependent upon spore size and shape and these characters vary considerably according to the degree of maturity of the spores in question.

The Michigan material appears to represent a single taxon characterized by rather elongated spores varying in shape from elliptic to amygdaliform. In a spore print from one of the collections (Berry Creek, Wolverine, 1 Aug. 1961, No. 1a) elongated amygdaliform spores predominate. Furthermore many of these amygdaliform spores have prominent snout-like apices. Examination of the spores of the other collections, obtained by squashing entire fruitbodies, also revealed some amygdaliform spores but the percentage was very variable and often far smaller than that found in the spore print referred to above. Similarly there was also greater variation in spore size. In fact in one collection (Berry Creek, Wolverine, 31 July 1961), where spores were particularly scanty and obviously somewhat immature, the spore size was such that the length of the longest spores seen was equal to the length of the smallest spores observed in the print from the other collection. Nevertheless some amygdaliform spores were present and I therefore regard this small spored collection as belonging to the same taxon as the other Michigan gatherings and interpret the small spores as being immature. The spore measurements of the Michigan material are set out in Table I.

Turning to a consideration of the European and Asian gatherings we see that the collections tend to fall into two ill defined groups (1) with elongated elliptical or amygdaliform spores and (2) with short, very broadly elliptical or very broadly amygdaliform spores. The differences become rather obscured in tables giving spore measurements since the short, broad spores frequently have a prominent apiculus which as to be included when the spores are measured. Even if allowances are made for this factor, however, collections with spores of an intermediate shape are still found. Again

TABLE I

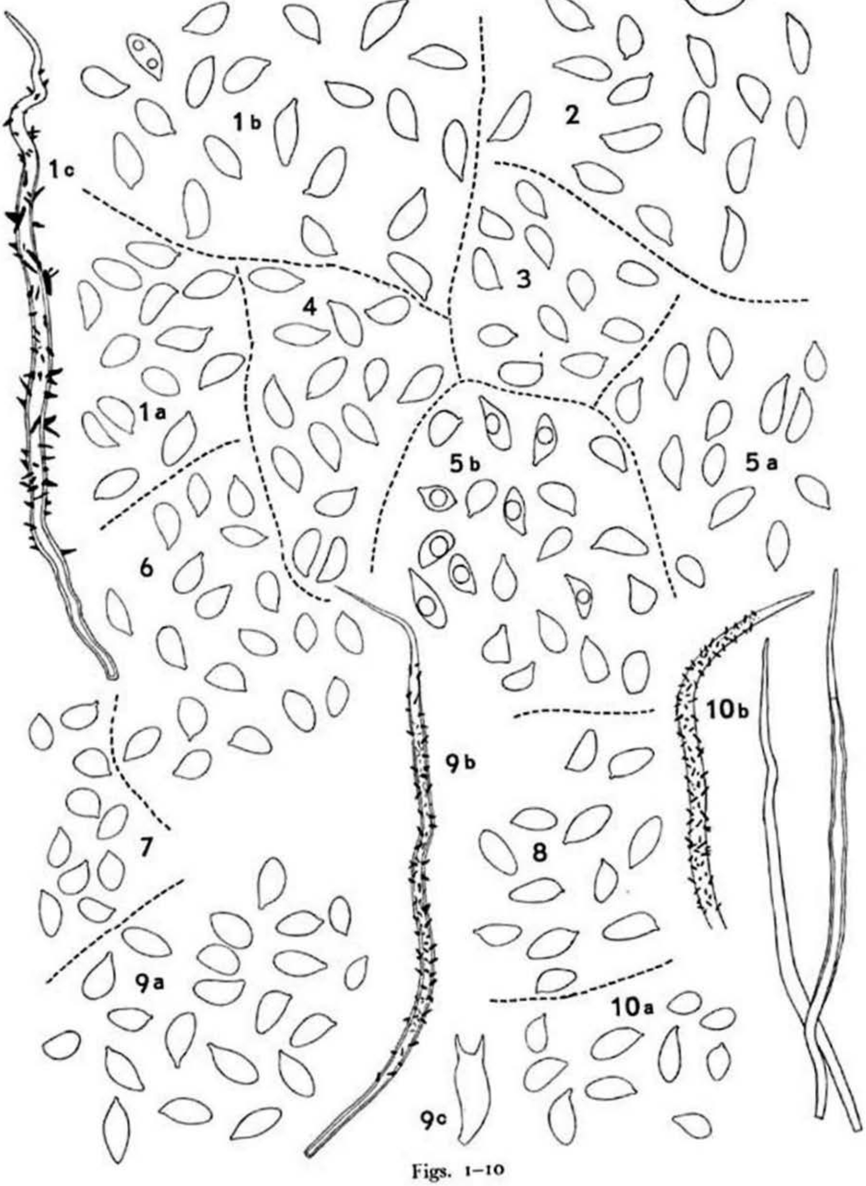
Spore measurements of Michigan material of *Flagelloscypha citrispora*

Collection data	Spore size
Colonial Point, 7 July 1961	8–10.2 × 3.5–4.75 μ
Pellston, 20 July 1961	6.5–12 × 3.75–4 μ
Harbor Springs Hills, 27 July 1961	8–12 × 3.75–4.75 μ
Berry Creek, 1 Aug. 1961, No. 1a.	(7.5–)8.75–12.2 × 4–5 μ (from print)
Berry Creek, 31 July 1961	7.2–8.75 × 3.75–4 μ

this variation would appear to depend upon the maturity of the spores rather than to any fundamental specific difference. (In this connexion it should be noted that in any gathering examined there are many fruitbodies on which it is impossible to find spores.) Evidence for this view can be found in the case of the type collection of *C. citrispora* Pilát for Pilát in his original account of the species described the spores as "late fusiformibus, apice posticeque acutis, 8–10 μ longis, 4–5 μ crassis, hyalinis, uni-, bi-, vel triguttulatis, saepe uno latere compressis, vel apice subobtusis" and figured them as distinctly elongated amygdaliform with snout-like apices. In other words, as figured by Pilát the spores of *C. citrispora* are of the same type as those found in the Michigan material. However, examination of the type collection of *C. citrispora* has shown only a very few elongated spores, 8.75–9.5 × 3.5–4 μ; the majority are of the short broadly elliptical or broadly amygdaliform kind and measure 7.2–8.75 × 4–5 μ. Similarly for the type of *C. citrispora* forma *crataegi* the the spores were described as 9–13 × 6–7 μ but in the portion of the type collection preserved in the Kew Herbarium (no fruitbodies could be found on the type collection borrowed from the Prague Herbarium) only spores of the short, broad kind, 6.5–8 × 4–5 μ were found. When describing *C. citrispora* forma *lobata* Pilát merely stated that the microstructure was similar to that of the type species, but here an examination of the type specimen of forma *lobata* did reveal spores of predominantly elongated amygdaliform shape measuring (8–)9.75–12 × 4–4.75(–5.2) μ on *Epilobium*

EXPLANATION OF FIGURES 1–10

Figs. 1–10. *Flagelloscypha citrispora*. — 1. Berry Creek, Wolverine, 1 Aug. 1961, No. 1. a. Spores in 10 % KOH solution. b. Spores from spore-print in Melzer's solution. c. Hair. — 2. Harbor Springs Hills, 27 July 1961. Spores in Melzer's solution. — 3. Berry Creek, Wolverine, 31 July 1961. Spores. — 4. Colonial Point, Burt Lake, 7 July 1961. Spores. — 5. Pellston, 20 July 1961. a. Spores. b. Same as previous collection but spores from a different fruitbody. — 6. Type collection (PR 174147). Spores. — 7. Type collection of *Cyphella citrispora* f. *crataegi* (specimen in K). Spores. — 8, 9. Type collection of *Cyphella citrispora* f. *lobata* (PR 174148). 8. Specimen on *Alnus*. Spores. 9. Specimen on *Epilobium angustifolium*. a. Spores. b. Hair. c. Basidium. — 10. Type collection of *Cyphella janchenii* (PR). a. Spores. b. Hairs, two with encrustation not shown. — All figures × 866.



Figs. 1–10

angustifolium and 8–10.75 × 4–4.2 μ on *Alnus*. Again, Pilát (*1924*) described the spores of *C. rosicola* as "ellipsoideis in cuspidem contractis, hyalinis, circ. 3.5 × 8 μ" whereas the author finds them to be elongated amygdaliform, 9–12 × 3.75–4 μ on the type material. The most likely explanation of the discrepancies in the spore size between Pilát's measurements and those obtained by the author is surely that we must have been examining fruitbodies bearing spores in different stages of maturity. This also accounts for the variation in the spore size of the European gatherings summarized in the following table:—

TABLE II

Shape and size of spores of European material of *Flagelloscypha citrispora*

Collection data	Spore shape and size
Russia	
On *Zelkova*, Azerbaydzhan, coll. Raitviir, 13 Oct. 1962.	Spores mostly broadly elliptical 6.2-8.75 × 4–4.75 μ, but a few more elongated elliptical or amygdaliform 7.2–9.75 × 3.75–4.75 μ.
Czechoslovakia	
*On *Rosa canina*, Mnichovice, coll. Velenovský, Sept. 1923 (TYPE of *Cyphella rosicola*).	Spores elongated amygdaliform, 9–12 × 3.75–4 μ.
On *Viola odorata*, etc., Mnichovice, coll. Velenovský, July 1923 (TYPE of *Cyphella janchenii*).	Spores mostly elongated elliptical, a few amygdaliform, 6.2–10.2 × 3.75–4.75 μ.
On *Rosa canina*, Prague, July 1924 (det. Pilát as *Cyphella janchenii*).	Spores very scanty, elongated elliptical or elongated amygdaliform, 9.75–11.2 × 4.5 μ mixed with others which are obviously immature and of the short broadly elliptical type appearing obovate in surface view, 7.2–8 × 4.2–5(–5.75) μ.
On *Alnus glutinosus*, Mnišek, July 1923 (No. 174147) (TYPE of *Cyphella citrispora*).	Spores mostly short, broadly amygdaliform or broadly elliptical 7.2–8.75 × 4–5 μ; a few elongated amygdaliform 8.75–9.5 × 3.5–4 μ.
Mnichovice, Sept. 1924 (No. 174148) (TYPE of *Cyphella citrispora* f. *lobata*).	
(a) On *Alnus*.	Spores elongated amygdaliform or elongated elliptical, 8–10.75 × 4–4.2 μ.
(b) On *Epilobium angustifolium*.	Spores mostly elongated amygdaliform or elongated elliptical, 8–12 × 4–4.75(–5.2) μ, a very few elliptical, 7.2–9.75 × 4–4.75 μ.
On *Crataegus oxyacantha*, Mnichovice, Sept. 1924 (TYPE of *Cyphella citrispora* f. *crataegi*).	Spores mostly short, broadly amygdaliform or elliptical, 6.2–7.5 × 3.75–5 μ, a few elongated amygdaliform 8 × 4 μ.

Collection data	Spore, shave and size
France	
On *Ulmus*, St. Priest, 15 Sept. 1913 (No. 15746).	Spores very scanty, elongated amygdaliform, 8–9.75 × 4.2 μ.
On *Rumex*, coll. Corbière, 14 Sept. 1921 (No. 32781) (LECTOTYPE of *Cyphella punctiformis* var. *corticola*).	Spores mostly elongated amygdaliform, 8–11.2 × 3.75–4.5 μ, mixed with others which are immature, short and broadly ellipical, 6.2–7.2 × 3.75–4.2 μ.
Britain	
On oak bark, Elland Park Wood, Halifax, Yorkshire, 4 July, 1892.	1st fruitbody. Spores mostly short, elliptical, appearing obovate or pyriform in surface view 6.75–9.75 × 3.2–4 μ; a few elongated elliptical 9.75–11.2 × 4–5 μ. 2nd fruitbody. Spores mostly short, varying from very broadly elliptical or obovate to pyriform, 7.2–9.75 × 4.2–5.75 μ; a few elliptical 9–9.75 × 4.2–5.75 μ; a few elliptical 9–9.75 × 4.2 and others amygdaliform 8.75 × 4.2 μ. 3rd fruitbody. Spores mostly elongated amygdaliform with snout-like apices or elongated elliptical 8–10 × 3–3.75(–4) μ with an occasional broadly elliptical spore 6.75–7 × 3.75–4.5 μ.
On *Petasites*, Elland Park Wood, coll. H. T. Soppitt, 2 Nov. 1894.	Spores elliptical, 6.2–8.75 × 3.75–4 μ.
*On *Eupatorium*, La Bouvée, Channel Isles, coll. E. A. Ellis, 16 June 1947.	Spores elliptical, 7.2–8 × 3.2–3.75 μ.
Wicken Fen, coll. P. K. C. Austwick, 28 Feb. 1951.	Spores short, broadly amygdaliform, 7.5–8.75 × 4.2–4.75 μ.
On *Pteridium aquilinum*, Cambridgeshire (?), coll. A. F. Parker-Rhodes.	Spores short, broadly amygdaliform, 7–10 × 4.5–5 μ.
On *Ulex europaeus*, Kinloch, Isle of Rhum, coll. R. W. G. Dennis, 3 Sept. 1961.	Spores short, broadly amygdaliform to broadly elliptical, 8–9 × 4.75–5 μ.

*Assigned to this species with some doubt.

As in the majority of species of *Flagelloscypha*, hair length is of little use as a specific character since it varies within such wide limits. Thus in one of the Michigan collections (Berry Creek, Wolverine, 1 Aug. 1961) the hairs are up to 208 μ long and 2.5–3(–3.5) μ wide. In the type of *C. janchenii* the hairs are up to 106 μ in length and 2.5 μ wide. In the type of *C. citrispora* forma *lobata* they are up to 195 μ in length on the fruitbodies on *Alnus* and up to 109 μ in length on the fruitbodies of *Epilobium angustifolium*. In the type of *C. citrispora* forma *crataegi* the hairs were said to be 100–150 μ long and in the type of *C. citrispora* the hairs are up to 250 μ long and are

2–2.5 μ wide. Finally in the type of *C. rosicola* the hairs are up to 130 μ long and 2.5–3 μ wide [150–200 × 2–2.5 μ according to Pilát (*1924*)].

In his monograph of the Cyphellaceous fungi W. B. Cooke (*1961*) used the name *Flagelloscypha faginea* (Lib.) W. B. Cooke for the fungus discussed above and included as synonyms *C. janchenii*, *C. citrispora*, and *C. citrispora* forma *lobata*. He apparently forgot to list *C. citrispora* forma *crataegi* in synonymy but listed it amongst the type specimens he had examined at the end of his account of *F. faginea*. In my opinion it seems a little premature to use the epithet *faginea* for this fungus since the collection on which this name was based consists of fruitbodies which are mostly sterile or which bear very scanty spores. These spores, although probably immature, are uniformly elliptical and measure 6.75–8.5 × 3–3.5 μ in the portion of the type preserved at Kew. [Pilát (*1925*) has noted the spores on a portion of the type in the Prague Herbarium as being elliptical and measuring 6 × 3 μ.] Furthermore a recent British collection assigned to *F. faginea* and growing on dead beech leaves, as did the type, bears abundant elliptical spores, 8–11.75 × 3.5–3.75 μ. Likewise a gathering form Armenian Russia on a leaf of *Fagus orientalis* had elliptical spores measuring 7.2–9 × 2.5–3.75 μ on one of the fruitbodies examined and 8–12.75 × 2.75–4(–4.75) μ on a second sporophore. The spores from the first fruitbody were presumable immature but they closely matched the spores of the type collection of *F. faginea*. Another gathering from Azerbaydzhan on sappy stems of *Sambucus* has spores 6.2–11.2(–13) × 2.75–3.75(–4) μ, while a collection on leaves of *Quercus* (Landshut, Isar, coll. Killermann, herb. Donk) has spores measuring 7.2–10.75 × 3.3–3.75 μ. In all these gatherings the immature spores are elongated elliptical or narrowly elliptical while the mature spores are elongated elliptical or narrowly amygdaliform, and the hairs are encrusted with rather small acicular crystals which may sometimes appear almost granular. It therefore seems that *F. faginea* may differ from *F. citrispora* in having narrower spores which are never broadly elliptical, broadly agmydaliform or ovate when immature, and also in a tendency toward having hairs with a less coarse crystaline encrustation.

Cooke assigned *C. rosicola* Pilát to synonymy under *F. trachychaeta* (Ell. & Ev.) W. B. Cooke noting that this species has spores which are "ellipsoid, apiculate, flattened on one side (3–)6–7.5 × 2.5–4(–5) μ". This disposition would appear to be erroneous if Cooke's published spore data for *F. trachychaeta* is correct, for the type of *C. rosicola* has elongated amygdaliform spores, 9–12 × 3.75–4 μ [Pilát (1924) described them as "ellipsoideis, in cuspidem contractis, hyalinis, circ. 3.5 × 8 μ, saepe biguttulatis".] However, since these tend to be on the narrow side one cannot exclude the possibility that *C. rosicola* will ultimately prove to be a synonym of *F. faginea* rather than of *F. citrispora*.

Of the British collections of *F. citrispora* listed above which have been annotated by Cooke, the following were determined by him as *F. faginea*—Elland Park Wood, Halifax, 4 July 1892; on *Pteridium aquilinum*, Cambridgeshire (?), coll. A. F. Parker-Rhodes. However, the collection from Elland Park Wood, coll. H. T. Soppitt, 2 Nov. 1894 was referred by Cooke to *Lachnella ciliata* (Sauter) W. B. Cooke, but this determination is obviously incorrect since the fruitbodies are covered with typical *Flagelloscypha*-type hairs which are not at all like the long, stiff, spreading hairs of *L. ciliata*. Another collection—Wicken Fen, coll. P. K. C. Austwick, 28 Feb. 1951—was erroneously determined by Cooke as *F. abieticola* (Karst.) W. B. Cooke. Unfortunately Cooke seems to have completely misinterpreted this species in his monograph. The type of *F. abieticola* was described by Karsten as having elliptical spores, 6–8 × 2.5–3 μ and these measurements were confirmed by an examination of the type of Karsten's species preserved in the Kew Herbarium. In fact the author found the spores on Karsten's material (Fung. Fenn. No. 718) to be narrowly elliptical, 6.5–8 × 2–2.5 μ. By contrast Cooke interprets this fungus, apparently without seeing the type collection (!), as having broad spores. Unfortunately the spore range as given by Cooke varies slightly, as so often happens in his monograph (!), according to whether one looks in the key to the species of *Flagelloscypha* (7–7.5 × 4–4.5 μ) or in the text under the specific description (7–8 × 3.5–4 μ).

Finally it should be noted that Cooke in his monograph (p. 61) claims to have examined the type collections of both *C. janchenii* Pilát and *C. citrispora* Pilát. However, it would seem that he has failed to check his type citations with the original descriptions, for neither of the specimens cited under these epithets can be regarded as type material.

LACHNELLA Fr. emend. Donk

Fructifications villose, pure white with pale cream or violaceous hymenia, cupulate, becoming globular or turbinate when dry, narrowed below to form a rather broad, well defined or very reduced stipe-like base; either scattered or densely crowded in small or very extensive colonies. *Hymenium* lining a shallow saucer-shaped depression. *Hyphal structure* monomitic, consisting of densely compacted, often indistinct, hyaline generative hyphae, which frequently appear to be somewhat agglutinated especially in the extreme basal portion of the fruitbody of certain species [*L. tiliae* (Peck) Donk apud Sing.; *L. subfalcispora* Reid]. The exterior surface of the fruitbody is enveloped in a sheath of very long, more or less adpressed, cylindrical, stiff, granule encrusted hairs, which overarch and completely obscure the hymenium during dry conditions. Most of these hairs arise near the extreme base of the fructifications, sometimes on a basal tubercle-like swelling, but in some species at least there appears to be a ring of hairs developed just beneath the rim of the cup. The hairs, which are pseudoamyloid, have thickened hyaline walls which thin out towards the obtuse, often slightly swollen apices and also towards the extreme base. They frequently develop secondary septa along their entire length and are heavily encrusted with a fine granular substance which is soluble in potassium hydroxide solution. When mounted in the latter reagent the hairs become very swollen and distorted, either locally or in their entirety. *Cystidia* and *gloeocystidia* absent, but spindle-shaped basidioles may be present [*L. villosa* (Pers. ex Schw.) Gillet.; *L. tiliae*]. *Basidia* large, clavate, with 2–4 prominent, curved, horn-like sterigmata. *Spores* large (10–20 μ long), smooth, hyaline, nonamyloid, obovate, irregularly obovate or subfalcate (broadest toward the base) with prominent oblique or lateral apiculus.

As defined above the genus is restricted in application to a natural group of related species. This circumscription was first proposed by Donk (*1959*) who, in common with other mycologists, regards the species of *Lachnella* sensu rest. as having a close relation to members of the Agaricoid genera *Chaetocalathus* Sing. and *Crinipellis* Pat. However, if one follows W. B. Cooke's delimitation of *Lachnella*, discordant elements are admitted and the 'natural' status of the genus is lost. For the same reason I am unable to follow Singer's (*1962*) treatment of *Lachnella*, which he places in the Tricholomataceae, tribus Marasmieae, subtribus Cyphellopsidineae, for he includes in this genus species with gigantic metuloids (*L. cecropiae*) and also *Marasmius pulcher* (Berk. & Br.) Petch. The latter species, in particular, bears little if any structural resemblance to the species of *Lachnella*; the only feature which it shares with the species of this genus is the pseudoamyloid reaction, but the elements involved in this reaction (peculiar broom cells in *M. pulcher* and long thick-walled, granule encrusted hairs in *Lachnella* spp.) are in no way comparable.

LACHNELLA TILIAE (Peck) Donk apud Sing.—Fig. 12

Peziza tiliae Peck *in* Rep. N.Y. St. Mus. nat. Hist. **24**: 96. 1872. — *Trichopeziza tiliae* (Peck) Sacc., Syll. Fung. **8**: 428. 1889. — *Cyphella tiliae* (Peck) Cooke *in* Grevillea **20**: 9. 1891. — *Lachnella tiliae* (Peck) Donk *apud* Sing. *in* Lilloa **22**: 245. 1951.

Sporophores often densely gregarious in colonies which may be quite small or which may extend over many square feet, sometimes covering entire trunks with hundreds of thousands of fructifications. The cupulate fruitbodies, which are up to 1 mm. in diam., are entirely white when fresh and appear minutely villose-tomentose, especially under a lens. A striking feature of the fresh sporophores is that unlike *L. villosa* (Pers. ex Schw.) Gillet and *L. alboviolascens* (A. & S. ex Fr.) Fr. the very shallowly concave disc is fully exposed, and even in dried material, although the fruitbodies tend to enroll, the disc is still often visible as a creamy-yellow coloured layer. It was also noted that on living material there appeared to be an inconspicuous marginal fringe of hairs which were shorter than those covering the rest of the fruitbody. *Structure* monomitic. In section the sporophores can be seen to have a broad tubercular stipe-like base formed of densely arranged, much branched hyaline hyphae 2.5–3 μ wide. These hyphae, which appear to be strongly agglutinated, have highly refractive and distinctly thickened (or internally gelatinized?) walls. They bear clamp-connexions at the septa and are vertically orientated. This tubercular basal portion bursts through the bark of the host and expands into a shallow saucer-shaped disc. Toward the top of the tubercle the hyphae have thinner-walls and many diverge to form the sides of the cup. Here the hyphae are thin-walled, hyaline, clamped and up to 3.5 μ wide. They are parallel and more or less agglutinated. The sides of the cup or saucer-shaped portion of the fruitbody thin out rapidly and near the margin they are only a few hyphae wide. Toward the outermost regions of the flesh of both cup and tubercle arise the hairs which clothe the fruitbody. Since the fructifications are so shallow it is difficult to be certain exactly where these hairs arise. It has not been possible to ascertain whether they form in two distinct areas on the fruitbody as in *L. subfalcispora* Reid i.e. from the basal tubercle and from the margin. No evidence of such an arrangement was seen in section, and in fact the hairs seemed to arise at any point on the surface of the fruitbody. In fresh material,

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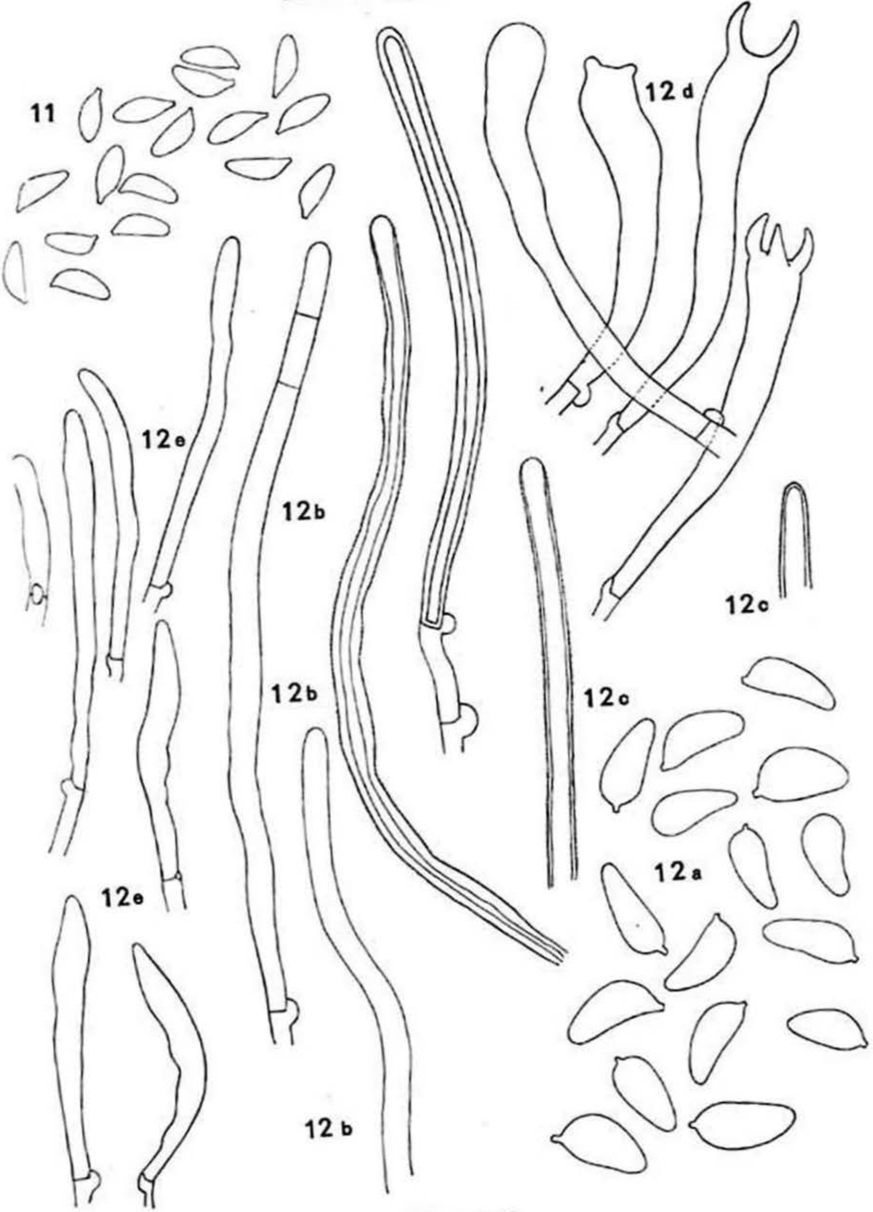
EXPLANATION OF FIGURES 11, 12

Figs. 11, 12. — 11. *Cyphella rosicola*. Type collection (PR). Spores. — 12. *Lachnella tiliae*. Pellston Hills, 17 July 1961. a. Spores. b. Hairs in 10 % KOH solution, some with encrustation not shown. c. Hairs in Melzer's solution. d. Basidia. e. Basidioles. — All figures × 866.



Figs. 11–12

however, a marginal rim of hairs was noticed. The hairs, up to 260 μ long and 4–5.5 μ wide, are long cylindrical structures with slightly thickened walls covered by a fine granular encrustation which is soluble in potassium hydroxide solution. These hairs do not always become very markedly distorted in the latter reagent, although they do appear to have very much thicker walls when examined in this solution. They are usually of equal diameter above even to the broadly rounded apex, but sometimes they may narrow slightly near the very tip. It should also be noted that on rare occasions one may observe hairs with transverse septa in the apical portion. Towards the base the hairs are often, but by no means always, prolonged into a narrow 'tail' before terminating at a clamped septum where they arise from a vegetative hypha. There is no distinct subhymenium, instead the hyphae of the innermost region of the flesh appear to give rise to basidia which together with certain sterile elements form a distinct hymenium up to 58 μ wide. *Basidia* up to 80 μ long and 10 μ wide [78–125 × 10.5–14 μ—Donk (*1959*)], 2 or 4-spored, clavate with a basal clamp-connexion. The sterigmata are very prominent and horn-shaped and may exceed 10 μ in length. At the base of the shallow hymenial layer the basidia are distinctly shorter than those nearer the margin in which region they tend to have more elongated bases curving round parallel to the curvature of the hymenium. *Basidioles* present amongst the basidia in considerable numbers, often exceeding the basidia in abundance. They are very variable in size and shape but tend to grade toward the basidia. However, they are thin to very slightly thick-walled and are either cylindrical, somewhat clavate or more commonly lanceolate. They vary from 25–70 μ (possibly more) in length and are 3.5–6.2 μ wide. They also vary in regard to the position in the hymenium where they are formed. Some arise almost at the level of the basidia while others arise at various levels from hyphae growing up between the basidia. Similar lanceolate basidioles are found in *L. villosa*. *Spores* 13–19 × 6.2–7.2 μ as measured in a spore print (white), thin-walled, hyaline, appearing subfalcate in side view and amygdaliform when viewed from above. There is a very prominent apiculus.

HABITAT: This fungus which is only known from North America is almost confined to branches and trunks of *Tilia*. It has, however, been reported on *Juglans regia*, *Acer* spp., *Populus tremuloides* and *Ulmus*, but W. B. Cooke (*1961*) notes that "In some instances, at least, the *Acer* determinations of host material have been in error."

COLLECTIONS EXAMINED: Knowersville, New York, coll. C. H. Peck (No. 366) (TYPE of *Peziza tiliae*); Clyde, New York, coll. O. F. Cook (No. 451), July 1887; Emma, Missouri, coll. C. H. Demetrio, May 1891 (Rabenhorst, Winter & Pazschke, Fungi europaei No. 3942); Bell's Lake, North Parry Sound, Ontario, coll. H. S. Jackson (No. 6877), 20–22 Sept. 1934; Pellston Hills, Michigan, coll. D. A. Reid, 17 July 1961.

CYPHELLOPSIS Donk emend. Reid

Maireina (Pilát) W. B. Cooke *in* Beih. Sydowia **4**: 83. 1961.

Fructifications solitary or densely gregarious and then emerging from a subiculum formed of erect hyphae resembling the surface hairs which clothe the fruitbodies. The individual sporophores are yellowish or brownish with pale coloured hymenia, and may be cupulate, turbinate or urceolate. They are either sessile or narrowed below into a broad stipe-like base and are covered exteriorly with numerous brown hairs which usually overarch and completely cover the hymenium of dried specimens. *Hymenium* lining a shallow depression. *Hyphal structure* monomitic, consisting of rather narrow, hyaline, branched generative hyphae with clamp-connexions at some, if not all, of the septa. Toward the outer surface of the cups the hyphae develop slightly thicker brownish walls, and from these hyphae arise the hairs which cover the fruitbodies. These hairs, which are not distorted by potassium hydroxide solution, have slightly thickened brown walls, and are covered with a fine granular encrustation. Frequently they develop strongly enrolled apices which may be thin-walled and hyaline; the actual apices vary in shape from acute or obtuse to irregularly clavate or capitate. Toward the base these hairs may narrow slightly or they may remain much the same width throughout. *Basidia* clavate. *Spores* hyaline or yellowish, varying in shape from subcylindric, elliptical or broadly elliptical to subglobose.

In any discussion of the genus *Cyphellopsis* one has to consider two closely related genera viz. *Merismodes* Earle and *Phaeocyphellopsis* W. B. Cooke. If an attempt is made to use W. B. Cooke's keys for the separation of these genera it is soon found that these keys are quite unworkable. In the first instance it has to be decided (p. 14) whether the spores are hyaline or coloured. If they are assumed to be hyaline one arrives at the tribe Solenieae (which includes *Merismodes* and *Cyphellopsis*) whereas if they are assumed to be coloured one arrives at the tribe "Chromosolenieae" (which includes *Phaeocyphellopsis*). [Here it should be noted that Cooke keys out the tribe with coloured spores as Chromosolenieae (p. 14) but publishes it as Phaeosolenieae (p. 113)!!] However, Cooke (p. 120) himself describes the spores of *Phaeocyphellopsis ochracea* (Hoffm. ex Pers.) W. B. Cooke as being "at first hyaline, becoming brown, in some collections more than half the spores brown, in others very few brown" and later, "The brown colour of the spores is apparently not developed before spore discharge." In my experience one rarely finds coloured spores in *P. ochracea* and it is significant that such authors as Bresadola (*1903*), Pilát (*1924*), and Bourdot & Galzin (*1928*) make no mention of the presence of coloured spores in this species. In any event it is not unusual to find pale yellowish brown spores in *Cyphellopsis anomala* (Pers. ex Fr.) Donk, and Bresadola (*1903*) actually described the spores of this fungus as "hyalino-stramineae" while Donk (*1931*) noted that they were "kleurloos of zeer licht gekleurd".

It therefore seems futile to attempt to separate *Phaeocyphellopsis*, simply on the colour of the spores, especially when, as in Cooke's monograph, this results in it being widely separated from closely related genera. If one tries to use Cooke's key to the genera which he places in the tribe Solenieae (p. 15) one has to decide between whether the fruitbodies are "fasciculate or conglobate" (*Merismodes*) or "separate, rarely occurring so close together as to appear fasciculate or congloboate, or rarely with branched stipes" (*Cyphellopsis*). Examination of a series of collections of species belonging to these two genera will show just how impracticable this separation can be in reality, especially when it is remembered that under *C. anomala* Cooke includes collections in which fruitbodies are scattered over a subiculum and clearly distinct one from another and others in which a number of fruitbodies share a common stalk!

Finally Cooke notes certain differences in the hairs of the species belonging to *Cyphellopsis* and *Merismodes*. Considering this character in more detail we see that according to Cooke the hairs of species belonging to *Cyphellopsis* "usually" have inflated tips. This is certainly not of generic importance and may not be wholly reliable at specific level, since it is confined to relatively few hairs in any given collection. Finally in the hitherto monotypic genus *Merismodes* the hairs are said to be spirally coiled in the outer portion but this spiral coiling often involves relatively few of the hairs and is frequently very lax so as to appear as little more than undulations or slight twisting at a casual glance.

In all three genera (*Cyphellopsis*, *Phaeocyphellopsis* and *Merismodes*) the species have brown fruitbodies with pallid hymenia and these fructifications are produced on a brown subiculum of erect hyphae. Further, the individual sporophores are clothed with brown granule-encrusted hairs. With all this in mind it is perhaps pertinent to consider Cooke's diagnoses of the three genera involved in this discussion. They are:—

(1) *Cyphellopsis.*—"Receptacles brown, cupulate to urceolate, subsessile to stipitate, with varying degrees of brown subiculum similar to the surface hairs, surface hairs brown, straight to weakly curved, usually with inflated tips."
(2) *Merismodes.*—"Receptacles fasciculate, brown with cream-coloured hymenium, covered with brown hairs at least some of which are spirally twisted in the outer portion."
(3) *Phaeocyphellopsis.*—"As in *Cyphellopsis* but receptacles paler, honey-coloured; spores ovate, finally brown, and surface hairs without observable knob-like tips."

It is clear from the discussion so far, that there are no satisfactory characters whereby these genera may be separated. Does this mean that we should recognise but one genus for these closely related fungi? For the present I am of the opinion that only two genera can be justifiably maintained—i.e. *Cyphellopsis* and *Merismodes* (syn. *Phaeocyphellopsis*). However, I have only recognised *Cyphellopsis* after some misgivings. If we are to distinguish between these two genera it seems that any separation must be based on the way the hymenium lines a relatively shallow depression in species of *Cyphellopsis* whereas in *Merismodes* it lines a deep cavity extending almost to the base of the fruitbody. If this distinction, admittedly slight, although possibly fundamental, should fail I see no alternative but to use the generic name *Merismodes* for all these fungi.

Cyphellopsis confusa (Bres.) Reid, *comb. nov.*—Figs. 13, 15

Solenia confusa Bres. *in* Ann. mycol., Berl. **1**: 84. 1903.

Sporophores densely crowded in cushion-shaped colonies 1.5–3.5 mm in diam.; the colonies often consisting of well over 50 fruitbodies. The fructifications which are up to 400 μ high and 300 μ wide when examined in potassium hydroxide solution, appear turbinate in section since they narrow below into a stipe-like base up to 200 μ long and 100 μ wide. When fresh, the fruitbodies are entirely yellowish-grey in colour and appear distinctly villose-tomentose under a lens. In the dried condition the margin of the sporophores enrolls and covers the hymenium. The outer surface of the young specimens appears greyish-white owing to their being covered with granule encrusted hairs. Old sporophores have a browner appearance and fully mature fruitbodies become snuffbrown in colour. Examination of sections shows that the individual fructifications arise in a subiculum up to 200 μ thick, formed of erect hyphae, 2.5 μ wide. These hyphae, which are identical with the surface hairs of the fruitbody, have thickened brown walls, but retain a narrow lumen with occasional indistinct secondary septa. They also possess long, hyaline, often flexuous tips. The fruitbodies grow such that the cupulate portion protrudes beyond the subiculum while the stipe-like base remains entirely immersed. *Structure*: in section the fruitbodies can be seen to consist of an outer layer 20–30 μ thick consisting of the densely crowded bases of hairs. These hairs originate anywhere on the surface of the fructification. They remain more or less closely appressed to the sides of the fruitbody and their tips tend to curve inward over the hymenium. The hairs are 2.5 μ wide and arise from ordinary vegetative hyphae to which they are joined by a basal clamp-connexion. They are very elongated and those forming the subiculum may reach 200 μ in length. They have thickened brown walls, but long, thin-walled, hyaline, granule encrusted apices and are secondarily septate. The encrustation is very fine, amorphous, and soluble in potassium hydroxide solution. The tips of the hairs are mostly obtusely rounded but in some instances they are variously inflated. In the latter event the apices may become gradually enlarged and clavate or the swelling may be abrupt and result in a capitate head. Again in those hairs with a clavate apex one may find the swollen portion constricted and divided by the development of a secondary septum. Furthermore, although these swollen apices are usually thin-walled and hyaline, there are occasional hairs in which the inflated portion becomes thick-walled and brown in colour. The outer zone of hair-bases gives way to a context layer of thin-walled, hyaline hyphae. This layer is up to 26 μ wide at the base of the sides of the cupulate portion of the fruitbody but narrows rapidly and is often only 1–2 hyphae wide near the margin. Beneath the cup this zone is continuous with the hyphae forming the tissue of the stipe-like base. In fact the hyphae of this stipe-like base diverge to form the context of the cupulate portion. This tissue in both stipe and cup is formed of densely compacted, narrow hyphae, up to 2(–3) μ wide. In both sections and squashes these hyphae are very indistinct and the tissue appears granular. Toward the outermost region of the flesh, in the vicinity of the hairs, the hyphae tend to become wider, reaching 3 μ in diam. The context in turn gives way to an hymenium, up 36 μ wide, lining a relatively shallow depression. There is no well developed subhymenial layer. *Cystidia* and *gloeocystidia* absent. *Basidia* up to 27 μ long and 5.5 μ wide, hyaline, narrowly clavate, 4–spored and with a basal clamp-connexion. *Spores* (5.5–)7–8.2 × 2–2.2 μ, thin-walled, hyaline, varying in shape from narrowly elliptical or subcylindric to slightly allantoid.

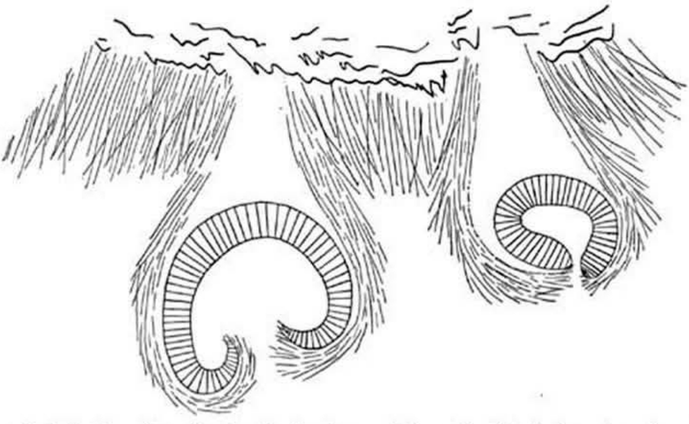


Fig. 13. *Cyphellopsis confusa.* Garden Peninsula, 14 July 1961. Vertical section through two fruitbodies. × 160 approx.

HABITAT: This fungus, which is known from Europe and North America, occurs on twigs and small branches of deciduous trees and appears to burst out of the lenticels but in fact the colonies are usually associated with erumpent but effete stromata of various Pyrenomycetes.

COLLECTIONS EXAMINED: On *Alnus*, Garden Peninsula, Michigan, coll. D. A. Reid, 14 July 1961; also numerous European collections.

The above collection agrees well with the European gatherings of *C. confusa* (e.g. Jaap, Fungi selecti exsiccati, Suppl. No. 121, Triglitz). However, European collections do exhibit a number of minor variations from the above description, notably that in some gatherings the fruitbodies are more distinctly differentiated into cup and stipe, but even so some are turbinate. Again in certain European gatherings the whole fruitbody, including much of the stipe, projects beyond the subiculum and there is a tendency for the hairs to have more definitely incurved tips (crook-shaped), and a less elongated flexuous, hyaline, apical portion. The clamp-connexions at the base of the hairs are also more readily demonstrated than in the American collection.

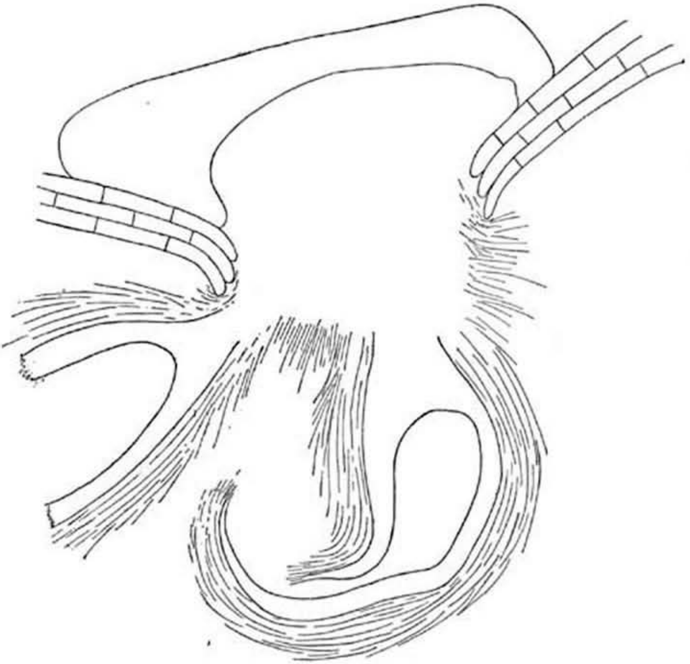


Fig. 14. *Merismodes fasciculatus*. Garden Peninsula, 14 July 1961. Vertical section through two fruitbodies. × 160 approx.

In his monograph W. B. Cooke assigns *C. confusa* to synonymy under *C. anomala.* However, in my opinion Cooke's treatment of *C. anomala* is far from satisfactory. He takes far too wide a view of this species and has lumped together, in a rather arbitrary manner, all taxa belonging in the genus *Cyphellopsis* under one species, in spite of the fact that it is possible to distinguish many of these taxa on habit and spore size. Cooke himself has drawn attention to the fact that he found it possible to recognise a number of groupings based on spore size, within his concept of *C. anomala.* He even goes so far as to include under one species, taxa with narrowly cylindric spores, broadly elliptical spores and ovate or subglobose spores! I see no useful purpose in attempting to solve the admittedly difficult taxonomic problems concerning the genus *Cyphellopsis* in this way.

Cooke's treatment of *C. anomala* is even more remarkable when compared with his treatment of *Merismodes fasciculatus* (Schw.) Donk apud Sing. for in this latter species he recognises no less than five varieties (three of which he proposed as new taxa) based on variations in spore size! Yet these variations in spore size are, if anything, less marked than those which Cooke notes under *C. anomala!*

According to Cooke's account, the Michigan collection described above, would seem to come close to his conception of typical *C. anomala.* However, this interpretation of *C. anomala* is at variance with that of most European mycologists who have attempted to recognise more than one species amongst these fungi (Fuckel, *1871*; Winter, *1884*; Patouillard, *1886*, *1900*; Bresadola, *1903*; W. G. Smith, *1908*; Bourdot & Galzin, *1928*; Donk, *1931* to name but a few). Just why it has been necessary to abandon this well established tradition is left unexplained. In fact as interpreted by most of these authors *C. anomala* has broader elliptical spores 6–11 × 4–5 μ.

MERISMODES Earle

Phaeocyphellopsis W. B. Cooke *in* Beih. Sydowia **4**: 119. 1961.

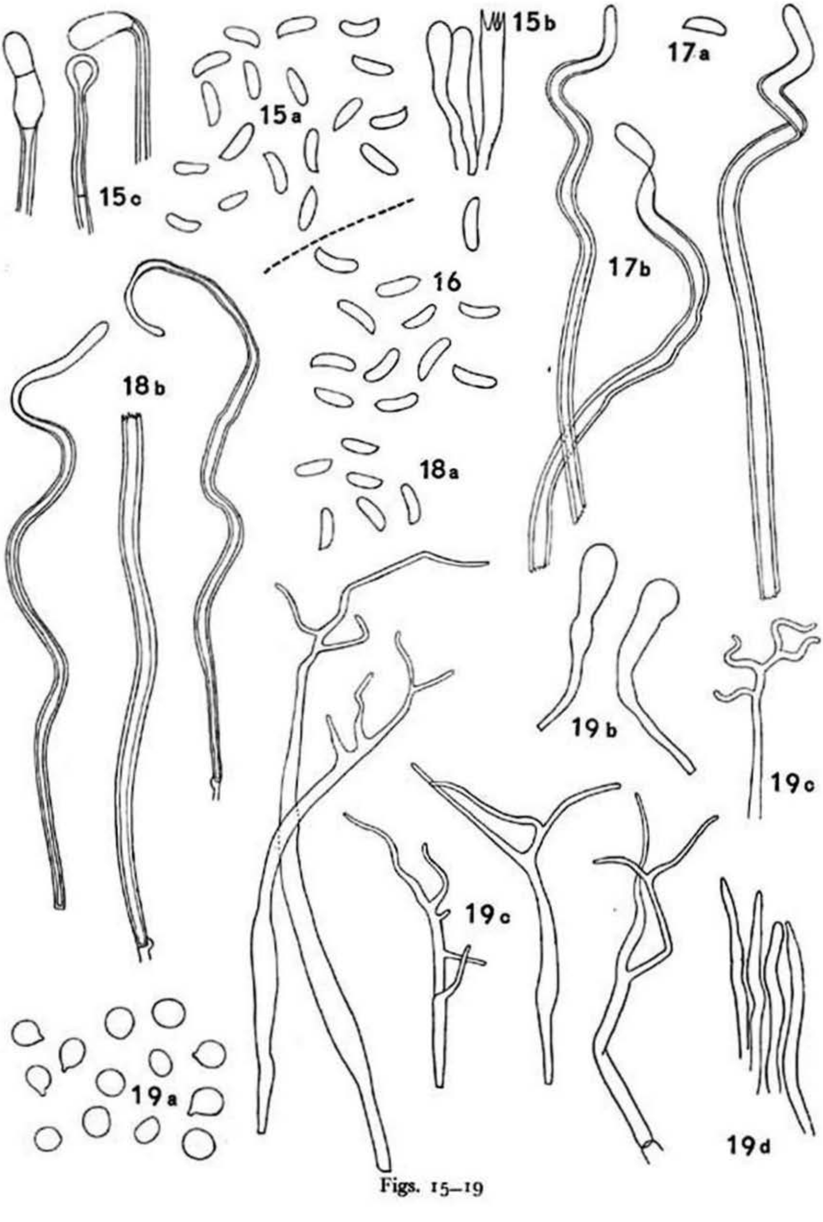
Fructifications solitary, in scattered groups or in densely crowded colonies of 20 or more sporophores, and emerging from a more or less well developed subiculum formed of erect hyphae resembling the surface hairs which clothe the fruitbodies. The individual fructifications are yellowish-brown to brown with pale coloured hymenia and vary in shape from cylindrical to cupulate or deeply tubular-campanulate. They are either sessile or narrowed below into a distinct stipe-like base, and are covered exteriorly with numerous brown hairs which often overarch and more or less cover the hymenium of dried specimens. *Hymenium* lining a deep cavity, often extending almost to the base of the fruitbody. *Hyphal structure* monomitic, consisting of hyaline, branched generative hyphae with clamp-connexions at the septa. From the outermost layers of the fruitbody arise the hairs. These hairs, which are not distorted by potassium hydroxide solution, have distinctly thickened brown walls, except toward the apical portion which is often thin-walled, hyaline, and sometimes coiled in a loose spiral but not conspicuously inflated at the tip. The hairs, which may develop secondary septa along their entire length, have a basal clamp-connexion. *Basidia* clavate. *Spores* hyaline or yellowish, varying in shape from narrowly subcylindric or slightly allantoid to elliptical.

The relationships of this genus have already been discussed at length under *Cyphellopsis* Donk (see p. 110). All that need be said here is that any attempt to distinguish between the genus *Merismodes* [type species—*M. fasciculatus* (Schw.) Donk apud Sing.] and *Phaeocyphellopsis* [type species—*P. ochracea* (Hoffm. ex Pers.) W. B. Cooke] would have to involve a separation based on the inconspicuous apical coiling of some of the hairs of *M. fasciculatus*. This would perhaps be coupled with slight differences in shape of the fruitbody—deeply cupulate or tubular-campanulate in *Merismodes* as against cylindric or cylindric-funnel-shaped in *Phaeocyphellopsis*, and similar slight differences in spore shape—cylindric or allantoid in *Merismodes* as opposed to elliptical in *Phaeocyphellopsis*. However, since these differences do not appear to have any significance at generic level the genus *Phaeocyphellopsis* W. B. Cooke has been reduced to synonymy under *Merismodes* Earle.

At this point it is necessary to note that W. B. Cooke's description of *P. ochracea* is highly misleading and inaccurate. Because of this it could be argued that the generic description as outlined above fails to include *P. ochracea* as interpreted by Cooke. The chief fault with Cooke's account of this species is that he describes the spores as ovate and notes that they are (5–)6–8(–10.5) × 3–5.5 μ. In fact they are elliptical and as observed in a collection from M. C. Cooke's herbarium preserved at Kew and labelled "ex Fries ipse" they are mostly hyaline, 4.75–7.5 × 3.2–4.2 μ with a few brown spores present, 7.2–7.5 × 4–4.2 μ. It is, thus, rather misleading for Cooke to claim that this same specimen "agrees with the material on which the description above [his own description—D.A.R.] was based." Examination of an exsiccatum distributed by Pilát (on *Salix alba*, Radotin, near Prague, 6 Sept. 1924), which matches extremely closely Hoffmann's account and coloured figure of his *Peziza ochracea*, also shows spores which are entirely hyaline, elliptical, 6.2–7.2 × (3–)3.75–4.2 μ. Cooke also noted that the hairs of *P. ochracea* are tapered to a point. If this is so it is unusual for the collections I have examined have bluntly rounded apices. It should also be stressed that all the British collections in the Kew Herbarium which Cooke has determined as *P. ochracea* are wrongly named and belong to various taxa which Cooke places in synonymy under *C. anomala* (the majority probably belong to *C. anomala* sensu Bresadola). Again it has to be pointed out that the inclusion of *Cyphella mellea* Burt in synonymy under *P. ochracea* by Cooke seems to be unjustified since it has very broadly-ellipsoid-ovate spores, 4.5–7 × 3.5–5.25μ (*fide* Donk in litt.), which are quite unlike those of the European fungus. In fact *C. mellea* belongs in the genus *Cyphellopsis* and has been transferred to that genus by Reid (*1961*).

EXPLANATION OF FIGURES 15–19

Figs. 15–19. — 15. *Cyphellopsis confusa*. Garden Peninsula, 14 July 1961. a. Spores. b. Basidia. c. Inflated tips of the hairs. — 16–18. *Merismodes fasciculatus*. — 16. Rock Harbor, Isle Royale, 15 July 1904. Spores. — 17. Garden Peninsula, 14 July 1961. a. Spore. b. Hairs. — 18. Bell's Lake, N. Parry Sound, Ontario, 20–22 Sept. 1934. a. Spores. b. Hairs. — 19. *Henningsomyces pubera* var. *pubera*. Type collection (S 12140). a. Spores. b. Basidia. c. Hairs. d. Unbranched hyphae from the rim of the fruitbody. — All figures × 866.



Figs. 15–19

Since I have reduced the genus *Phaeocyphellopsis* W. B. Cooke to synonymy under *Merismodes* Earle, I now formally transfer *P. ochracea* to the genus *Merismodes*: **Merismodes ochraceus** (Hoffm. ex Pers.) Reid, *comb. nov.* (basionym, *Solenia ochracea* Hoffm. ex Pers. *in* Myc. europ. **1**: 334. 1822).

MERISMODES FASCICULATUS (Schw.) Donk apud Sing.—Figs. 14, 16–18

Cantharellus fasciculatus Schw. *in* Trans. Am. phil. Soc. II **4**: 153. 1832. — *Cyphella fasciculata* Berk. & Curt. *apud* Berk. *in* Grevillea **2**: 6. 1873.

Sporophores solitary, in small groups of twos and threes or in densely crowded colonies of 20 or more fruitbodies. Solitary fructifications tend to reach the largest size and may be up to 1 mm. in height and width as measured from dried material. The sporophores, which may be either sessile or stalked, are produced on a pustule which breaks out from beneath the bark. Fruitbodies borne toward the outside of a crowded colony often become pushed over to one side and these frequently develop very distinct stipes. Individual sporophores are deeply tubular-campanulate or horn-shaped and appear minutely villose-tomentose under a lens. These fruitbodies are separated one from another by the development of erect, brown subicular hyphae resembling the surface hairs which clothe the fructification. In very dense colonies the subicular hyphae are often less evident. The fruitbodies when dried are snuff-brown with a pale yellowish or cream coloured hymenium; living plants have a similar aspect. However, old weathered specimens often appear greyish and may be somewhat lobed and grooved. *Hymenium* lining a very deep cavity extending almost to the base of the fruitbody, at least in sessile fructifications. *Structure*: the pustular base on which the sporophores are borne is formed of irregularly kinked and branched, hyaline hyphae, up to 5 μ wide, with clamp-connexions at the septa. These hyphae have distinctly thickened, highly refractive, glassy walls which look as if they may be inwardly gelatinized. Further they are often somewhat constricted at the septa and are rather irregularly arranged. In section the walls of the fruitbody can be seen to be formed of similar hyphae, 2.5–3 μ wide, but they are more regularly arranged and parallel. The walls of the sporophore are rather thin with the context reaching 50 μ wide toward the base, but thinning out rapidly nearer the rim and in this region often only 1 or 2 hyphae wide. From the outermost hyphae of the context arise the surface hairs which clothe the fruitbody. These hairs, which are densely arranged arise at any point on the surface of the fructification and their crowded bases form what is virtually an outer layer to the fruitbody up to 50 μ in width. The hairs, up to 450 μ long and 3.5(–4) μ wide, have distinctly thickened brown walls except for the apical portion which is often thin-walled and hyaline. Toward the obtuse, uninflated apex some of the hairs become undulated or coiled in a loose spiral, but this may be difficult to demonstrate in certain collections. The hairs usually narrow slightly toward the base before terminating at a clamped septum. Furthermore they may develop occasional secondary septa. Many fruitbodies show no trace of a subhymenial layer. However, in some gatherings (e.g. Bell's Lake, N. Parry Sound, Ontario, coll. H. S. Jackson) a subhymenium is differentiated as a zone up to 13 μ wide in certain of the sporophores but in other fruitbodies of the same collection it is apparently rudimentary or lacking. When present this zone is formed of hyaline hyphae 1.5–2 μ wide. Frequently the innermost hyphae of the context appear to give rise to basidia which form an hymenial layer 18–20 μ wide. *Cystidia* and *gloeocystidia* absent. *Basidia* clavate, 4-spored, and up to 20.8 × 5.5 μ. *Spores* 6.2–10.5 × 2–2.5 μ, thin-walled, hyaline or pale brown in colour, varying in shape from narrowly-subcylindric to slightly allantoid.

HABITAT: This species, which according to W. B. Cooke, is known from Europe, North America and Japan occurs on small twigs and branches of deciduous trees, especially *Alnus* spp.

COLLECTIONS EXAMINED: On *Alnus*, Rock Harbor, Isle Royale, Michigan, coll. E. T. & S. A. Harper, 15 July 1904 (ex Cryptogamic Herbarium Chicago Natural History Museum No. 990); on *Alnus*, Garden Peninsula, Michigan, coll. D. A. Reid, 14 July 1961; New York, coll. Torrey, Herb. Schweinitz [TYPE of *Cantharellus fasciculatus*]; on *Salix*, New York, coll. Sartwell (Herb. Berkeley No. 2659); on *Alnus*, Massachusetts (Herb. Berkeley); Bell's Lake, N. Parry Sound, Ontario, coll. H. S. Jackson (No. 6876), 20–22 Sept. 1934.

W. B. Cooke recognises five varieties of *M. fasciculatus* which differ one from another in spore size and shape. On this basis the Michigan collections would appear to belong to *M. fasciculatus* var. *fasciculatus*.

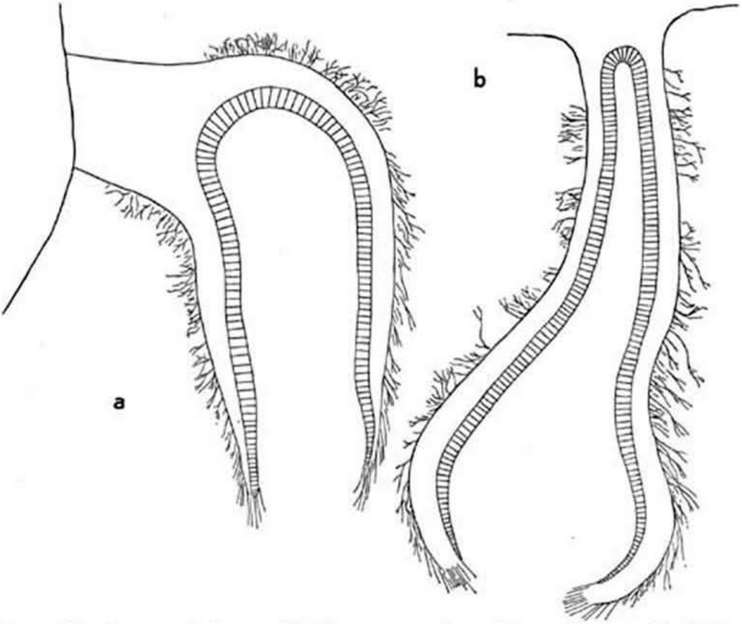


Fig. 20. *Henningsomyces pubera*. a. *H. pubera* var. *americana*. Type collection. Vertical section through a fruitbody. × 160 approx. b. *H. pubera* var. *pubera*. Type collection. Vertical section through a fruitbody. × 160 approx.

This species is very readily mistaken for *Cyphellopsis confusa* (Bres.) Reid especially if one happens to have a collection in which spiral coiling of the hairs is poorly developed. It is most easily separated from *C. confusa* by the manner in which the hymenium lines a deep cavity extending almost to the base of the fruitbody.

HENNINGSOMYCES O. Kuntze

Solenia Pers. *ex* Fr., Syst. mycol. **2**: 200. 1822 [non *Solena* Lour. (1790; Cucurbitaceae); nec *Solena* Willd. (1797; Rubiaceae)].

Henningsomyces O. Kuntze, Rev. Gen. Pl. **3**: 483. 1898 [non *Henningsomyces* Sacc. (1905; Ascomycetes)].

Fructifications scattered in small groups or densely gregarious in large colonies extending over many square inches. The individual sporophores which are white or yellow when fresh are tubular or somewhat barrel-shaped when young and may be produced on a rather indistinct cobweb-like subiculum. They are sessile and appear more or less glabrous to the eye but are often covered entirely, or at least toward the margin, with characteristic dichophytic hairs. However, in some species surface hairs are lacking. *Hymenium* lining a very deep tubular cavity. *Hyphal* structure monomitic, consisting of thin-walled, narrow, branched generative hyphae, which may or may not bear clamp-connexions at the septa. The hyphae are often indistinct, and when fruitbodies of certain species (*Solenia candida* Pers.) are mounted in potassium hydroxide solution the presence of copious oleaginous droplets in the flesh makes microscopic examination difficult. *Cystidia* and *gloeocystidia* absent. *Basidia* 2–4-spored, either clavate or more or less cylindrical, and in some species (*Solenia pubera* Rom. apud W. B. Cooke) drawn out into elongated tails. *Spores* smooth, hyaline, nonamyloid, varying in shape from broadly elliptical or ovate to subglobose.

In his monograph W. B. Cooke makes it clear that he is unwilling to accept Donk's (*1951*) contention that the generic name *Solenia* Pers. ex Fr. has to be treated as a later homonym of *Solena* Lour. 1790 and *Solena* Willd. 1797. However, after reference to examples of names which are to be regarded as orthographic variants as set out in the Code (Art. 75) I think the majority of authors will feel bound to accept Donk's view that *Solenia* Pers. ex Fr. is "impriorable on account of the earlier homonyms". It was for this reason that O. Kuntze (*1898*) introduced a new generic name *Henningsomyces* for these fungi i.e. because of the existence of *Solenia* Hill (1751) which has now become a devalidated name. Donk (l. c.) argued that the name *Henningsomyces* was validly published by a reference to "Hoffm. 1795" and many authorities would agree that this constitutes an indirect reference to the generic description of *Solenia* Pers. (1794), since although Hoffmann gave no generic description, but merely described and depicted two species (viz. *S. candida* and *S. ochracea*), he did refer, in an entirely disconnected bibliography of recently published literature, to Persoon's work "Neuer Versuch einer syst. Eintheil. der Schwämme in Neues Mag. für die Bot. 1794" in which a generic description of *Solenia* Pers. was printed. This shows that Hoffmann must have been aware of *Solenia* Pers. 1794 and was hardly likely to have been introducing a new genus '*Solenia* Hoffm.' However, Donk (in litt.) has stated that he no longer regards Kuntze's reference to "Hoffmann 1795" as constituting a direct or indirect reference to a generic description, but that he now considers Kuntze's reference "Die Arten sind nach Saccardo Sylloge von *Solenia* Hoffm ... übertragen" to be a reference to the generic description of *Solenia* Hoffm. in Saccardo's Sylloge Fungorum **6**: 424. 1888. It is therefore clear that no matter which of the two lines of reasoning is preferred the conclusion is that *Henningsomyces* O. Kuntze must be regarded as validly published with *H. candida* as the type species, and that it has to replace the generic name *Solenia* Pers. ex Fr.

It is the author's view that if Cooke's circumscription of the genus, which he prefers to call *Solenia* Pers. ex Fr., is accepted the resulting assemblage of fungi would form a distincly unnatural grouping. By contrast it is hoped that if the genus *Henningsomyces* is adopted as here defined it will form a very natural unit.

HENNINGSOMYCES PUBERA (Rom. ex W. B. Cooke) Reid[1]
var. **americana** Reid, *var. nov.*—Figs. 20a, 21

A var. *pubera* differt hyphis fibulatis. — TYPUS: Mud Lake Bog, Inverness, Michigan, coll. D. A. Reid, 12 July 1961.

Sporophores scattered in small groups or densely crowded in large colonies extending over sizeable areas, but in either instance without any obvious trace of a subiculum. The individual fruitbodies start as small, white, subglobose sporophores which gradually elongate to form tubular fructifications up to 800 μ in length. These are white when fresh but become cream or buff coloured on drying. They are more or less glabrous to the eye but appear very minutely scurfy-pruinose under a lens. Normally the sporophores are sessile and point vertically downward but some sporophores which are obliquely situated may narrow below into a stipe-like base which curves downward to bring the fructification into the vertical position. *Hymenium* lining a deep tubular cavity extending almost to the base of the fruitbody. *Structure*: in section the walls of the sporophore can be seen to be up to 40 μ wide, of which the context occupies about 26 μ. The context is formed of densely crowded hyphae with parallel longitudinal orientation. These hyphae, up to 2 μ wide, are thin-walled, hyaline and bear clamp-connexions at the septa (although very difficult to demonstrate in dried material). In squashes it is difficult to get the hyphae to separate and it seems probable they are somewhat agglutinated. Unlike *H. candida* there is very little development of oleaginous droplets in the flesh of this species, although in the St. Ignace collection there are crystalline masses in the tissue. Toward the outermost surface of the fruitbody some of the hyphae curve away from the wall and terminate as irregularly dichotomously branched hairs. These hairs which are produced anywhere on the surface of the fruitbody, except for the extreme margin, have bases up to 3.5 μ wide with very slightly thickened walls. There are also occasional secondary septa in this basal region of the hairs. Toward the very base of the fruitbody the hairs tend to have slightly thicker and more highly refractive walls and this thickening may extend into the branchlets, although there is still a very wide lumen. Furthermore in this basal portion of the fruitbody the hairs are more freely branched. Elsewhere branching is rather restricted and is often limited to one or two dichotomies near the apex of the hair. It is often found that the forking is unequal or that only one of the primary branches may fork a second time. The ultimate branchlets are often elongated, narrow and lax. The hairs taper from the unbranched base toward the branched apical portion and the ultimate branchlets are often less than 1 μ wide. If traced back the hairs can be seen to terminate at a basal clamped septum. These hairs are conspicuous in sections and form a loose tangled weft over the surface of the fruitbody. At the very margin of the tube there is normally a rim of hyphae which are 1.5–1.75 μ wide. These hyphae are somewhat irregular and often slightly kinked although usually unbranched or with an occasional lateral prong. The hairs, however, extend almost to the margin and must be carefully distinguished from the marginal

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[1] **Henningsomyces pubera** (Rom. ex W. B. Cooke) Reid, *comb. nov.* (basionym, *Solenia pubera* Rom. *ex* W. B. Cooke *in* Beih. Sydowia **4**: 26. 1961).

hyphae. Toward the innermost surface of the context the hyphae give way to a palisade of basidia, up to 15 μ wide, without any obvious subhymenium. However, the basidia are often much longer than this since they have long "tails" which curve away parallel to the hymenium. *Cystidia* and *gloeocystidia* absent. *Basidia* clavate, with elongated, narrow bases ending at a clamped septum. They are either 2- or 4-spored and may be up to 30 μ long and 8 μ wide. *Spores* 4.5–5.75 × 4–4.75 μ, thin-walled, hyaline, smooth, varying in shape from very broadly elliptical to subglobose with a short lateral or oblique apiculus.

HABITAT: on dead wood.

COLLECTIONS EXAMINED: Mud Lake Bog, Inverness, Michigan, coll. D. A. Reid, 12 July 1961 (TYPE of *H. pubera* var. *americana*); 10 miles north of St. Ignace, Michigan, coll. D. G. Reid, 14 Aug. 1961 on *Abies*, North of Bolton, Peel Co., Ontario, Canada, coll. R. F. Cain, 8 Oct. 1955 (TRTC No. 32501, det. as *Solenia polyporoidea* Peck in Herb.).

This variety would seem to differ from variety *pubera* solely in its hyphae having clamp-connexions at the septa. However, unlike W. B. Cooke who reports that the fruitbodies of the type collection of *H. pubera* var. *pubera* bear 4-spored basidia, I have only found 2-spored basidia on the sporophores which I have examined. If the type collection of variety *pubera* is regularly 2-spored then the lack of clamp-connexions may be due to its being haploid, and may not have any taxonomic significance. To solve this problem it will be necessary to study further collections as they become available.

In order to facilitate the comparison of future collections from North America with *H. pubera* var. *pubera* a short description of this taxon based on the type material [on *Betula*, Sdl. par. Tyresö: Bollmora (zwischen Hanviken—Alta), coll. L. Romell, 7 May 1922 (No. 12140; S)] is given below:—

HENNINGSOMYCES PUBERA var. PUBERA.—*Sporophores* densely gregarious in a large colony covering an area approximately 14 × 8 cm, on what must have been part of a trunk or sizeable limb. The individual fruitbodies, which are white in colour, appear minutely tomentose under a lens, but this is more easily seen under a dissecting microscope. They vary in shape but when normally developed they are elongated and tubular, reaching 800 μ in height and 120–200 μ in width. However, many of the fructifications develop a slightly enlarged terminal portion which is 250–350 μ wide. Yet others appear to have collapsed and then become compacted together to form an almost *Poria*-like mass, but this has probably occurred just prior to, or during drying. The immature fruitbodies are globular, but gradually elongate, sometimes passing through a phase when they appear to consist of an ovate or globular head borne on a narrower stipe-like portion. In section the fruitbodies

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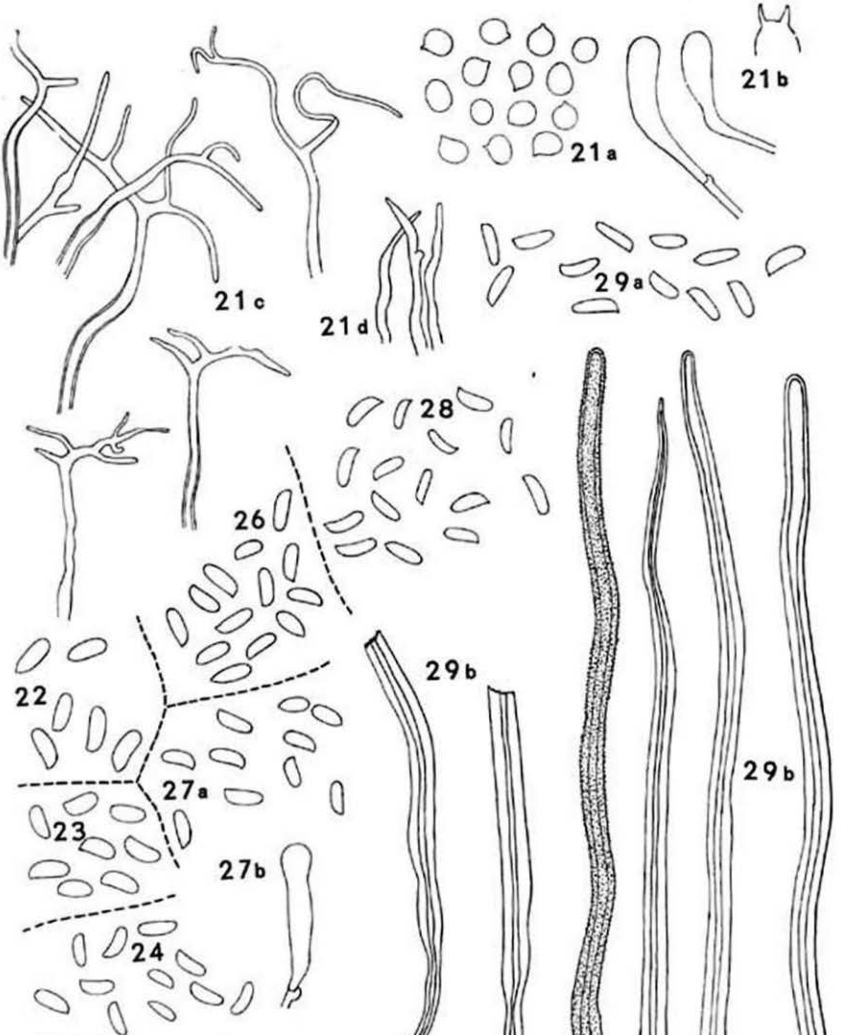
EXPLANATION OF FIGURES 21–29

Figs. 21–29. — 21. *Henningsomyces pubera* var. *americana*. Type collection. a. Spores. b. Basidia. c. Hairs. d. Unbranched hairs from rim of the fruitbody. — 22–29. *Calathella erucaeformis*. — 22. Fungi suecici No. 9735. Spores. — 23. Fungi suecici No. 1837. Spores. — 24 Bondkyrka, 20 Sept. 1928, leg. J. A. Nannfeldt No. 15999. Spores. — 25. Winnipeg, 1–5 June 1923, leg. G. R. Bisby No. 2008. Spores. — 26. Winnipeg, 1 Oct. 1923, leg. G. R. Bisby No. 1972. Spores. — 27. Maple River, 3 July 1961. a. Spores. b. Basidium. — 28. Pleasant Valley, Feb. 1882, leg. S. J. Harkness No. 108, as *Peziza campanula*. Spores. — 29. Type collection of *Stromatocyphella lataensis*. a. Spores. b. Hairs some with encrustation not shown. — All figures × 578.



Figs. 21–29

can be seen to have the same structure as that described for variety *americana*. The hairs which cover the fruitbody are exactly comparable with those of the American collections. These hairs have repent bases 3.5(–5) μ wide lying parallel to the walls of the fruitbody but they gradually curve outward to form a tangled weft, 30–60 μ wide, over the surface of the fructification. The individual hairs, which measured from the basal septum are up to 120 μ in length, show similar dichophytic branching and thickening of the walls to those of the variety *americana*. As in the American variety there is a marginal rim of virtually unbranched hyphae which are up to 2.5 μ wide. The context forms a layer 15–20 μ wide, consisting of thin-walled, hyaline, branched hyphae, up to 2.5 μ in diam., which lack clamp-connexions at the septa. These hyphae appear to be somewhat agglutinated. There is no well developed subhymenial layer, but the hymenium is up to 26 μ wide. *Basidia* clavate, and apparently regularly 2-spored. However, although basically clavate in shape they frequently have a rather irregular outline and are often distinctly constricted near the base, before tapering into an elongated 'tail'. As a result of this 'tail' the basidia, when measured to the basal septum, which lacks a clamp-connexion, are up to 40 μ in length and 8 μ in width. *Spores* 4.75–6.2 × 3.75–5 μ, varying in shape from more or less globose or subglobose to very broadly elliptical with an oblique apiculus. — Fig 20b.

In his description of this species Cooke makes a number of observations which cannot be confirmed by the author. Thus he indicates that the context hyphae are "more or less pseudoparenchymatous, 3.5–5 μ in diameter", in fact the hyphae have a perfectly normal appearance. He also states that the dichophytic hairs have bases 5.8–8.7 μ wide. If this is so Cooke must have examined very atypical fruitbodies since this is completely outside the size range of the hair bases as seen on a number of sporophores during the present investigation in which they were found to be 3.5(–5) μ wide. Other discrepancies involve Cooke's measurements of the basidia:— 24 × 7.5 μ as against a maximum of 40 × 8 μ, and his statement that these organs are 4-spored as against the author's observations that they are 2-spored, and finally his note that the spores are 5.8–8.7 × 5.8–8.7 μ as against 4.75–6.2 × 3.75–5 μ. These discrepancies are serious since they tend to upset Cooke's key to the genus *Solenia* on page 16 of his monograph at the fourth dichotomy, i.e.:

"4 Dichophyses with wide bases, spores reaching 8.5 μ long or in diameter . . . . *S. pubera*."
"4 Dichophyses with narrow bases, spores rarely 6 μ in length or diameter."

Henningsomyces pubera is easily separated from *H. candida* since its surface is covered with dichophytic hairs whereas the surface of *H. candida* is almost glabrous. The fruitbodies of *H. candida* do produce dichophytic hairs but these are confined to the region near the extreme margin.

Calathella Reid, *gen. nov.*

Sporophora solitaria vel gregaria, alba, tubulata, turbinata, anguste infundibuliformia vel cupulata, sub lente minute villosa. *Hymenium* sporophori usque ad basin conforme. *Hypharum systema* monomiticum. Hyphae generatoriae angustae, muris tenuibus hyalinae, ramosae, fibulatae. Superficies exterior pilis nonpseudoamyloideis, elongatis, plerumque granulis incrustatis, muris distincte crassiusculis, ornata. Pili muris hyalinis vel basin versus nonnunquam brunneis instructi, apice obtusi vel acuti, saepe septati. *Cystidia* et *gloeocystidia* absentia.

Basidia quadrispora, clavata. *Sporae* hyalinae, nonamyloideae, muris tenuibus, anguste subcylindricae vel subglobosae. — TYPUS: *Cyphella erucaeformis* Fr.

Fructifications solitary or gregarious in scattered colonies, and varying in shape from tubular, turbinate or narrowly infundibuliform to cupulate. The sporophores, which are often rather firm, are white and appear minutely hairy under a lens. *Hymenium* lining a deep cavity. *Hyphal structure* monomitic, consisting of narrow, thin-walled, hyaline, branched, generative hyphae with clamp-connexions at the septa. Toward the outermost layers of the context the hyphae give rise to long, narrow, granule encrusted hairs (which are not pseudoamyloid). These hairs which have thick walls except in the apical portion, are usually hyaline but in certain species they may become brownish toward the base. They are usually cylindrical with bluntly rounded tips but in certain species may narrow to an acute apex. When mounted in 10% potassium hydroxide solution the fine granular encrustation rapidly dissolves, but the hairs themselves do not always become distorted, although they may attain a greater width when soaked up in this reagent. Toward the base the hairs normally narrow before terminating at a clamped basal septum, while toward the apex they may develop a number of secondary septa. *Cystidia* and *gloeocystidia* absent. *Basidia* clavate, sometimes with rather long drawn out bases. *Spores* thin-walled, hyaline, nonamyloid varying in shape from narrowly subcylindric to subglobose.

Calathella erucaeformis (Fr.) Reid, *comb. nov.*—Figs. 22–29, 31

Cyphella erucaeformis Fr., Syst. mycol. **2**: 203. 1822. — *Solenia erucaeformis* (Fr.) Quél., Fl. mycol. Fr. 29. 1888. — *Chaetocypha erucaeformis* (Fr.) O. Kuntze, Rev. Gen. Pl. **2**: 847. 1891.

Cyphella albissima Pat. & Doass. *apud* Pat., Tab. anal. Fung. **1**: 203 *f. 464*. 1886 (*fide* Pilát 1933). — *Chaetocypha albissima* (Pat. & Doass. apud Pat.) O. Kuntze, Rev. Gen. Pl. **2**: 847. 1891. — *Solenia albissima* (Pat. & Doass. apud Pat.) Big. & Guill., Fl. Champ. sup. Fr., Comp. 488. 1913.

Cyphella albocarnea Quél. *in* Bull. Soc. bot. Fr. **25**: 290. 1878. — *Cyphella erucaeformis* var. *albocarnea* (Quél.) Quél., Ench. Fung. 215. 1886.

Peziza campanula J. B. Ell. *in* Bull. Torrey bot. Cl. **8**: 73. 1881 (non *Peziza campanula* Nees *ex* Pers., Mycol. europ. **1**: 284. 1822; Fries, Syst. mycol. **2**: 123. 1822). — *Lachnella campanula* (J. B. Ell.) Sacc., Syll. Fung. **8**: 396. 1889.

Cyphella eumorpha Karst. *in* Hedwigia **29**: 271. 1890.

Stromatocyphella lataensis W. B. Cooke *in* Beih. Sydowia **4**: 104. 1961.

Sporophores often widely scattered over the substrate, but sometimes occurring in groups of two or three. Occasionally fruitbodies may appear to be aggregated into small, dense colonies, but this is usually the result of single sporophores having proliferated from either the centre and/or margin, as in the type collection of *Stromatocyphella lataensis* (similar proliferation occurs in European collections of *C. erucaeformis*). The fruitbodies, which are up to 2 mm high and 2 mm wide, tend to be rather firm. They vary in shape from almost tubular or narrowly funnel-shaped when young, to campanulate or turbinate when mature, and narrow gradually to a broad, indistinct stipe-like base up to 150 μ high and wide. Furthermore, when growing in certain situations the fruitbodies may be pendulous. In old fructifications the margin often becomes conspicuously lobed and this may be such as to give the impression of a small colony of sporophores. The fruitbodies, which appear minutely hirsute under a lens, are at first white (with a pinkish hymenium?) but become dark grey or blackish from below in living material. *Hymenium* lining a deep cavity, extending almost to the base of the fruitbody. *Structure*: in section it can be seen that there is an outer covering of long, stiff, hairs which are densely encrusted with a fine granular deposit. This encrustation dissolves rapidly in 10% potassium hydroxide solution, in which reagent the hairs themselves swell up and burst, especially toward the apex. The hairs, which are up to 250 μ long and 2.5–3.5 μ wide when measured in aniline blue in lactic acid but up to 5 μ wide in 10% KOH, originate at any point on the outer surface of the fruitbody. They have thickened walls and a rather narrow, although distinct lumen except toward the apex where the walls may thin out. The walls of the hairs are hyaline but in older specimens they become brown toward the base. The hairs themselves are usually cylindrical with an obtuse apex and a long drawn-out narrow base terminating at a clamped septum; some hairs may taper gradually to an acute apex. Toward the base and especially where they are brownish in colour, the hairs become strongly agglutinated or even gelatinised and form a distinct outer layer to the fruitbody of very variable width. This layer of agglutinated hair-bases gives way to the context which is formed of parallel, thin-walled, hyaline, branched hyphae, up to 3 μ wide, with clamp-connexions at the septa. This layer is up to 46 μ wide near the base of the cup but thins out rapidly toward the rim. From the innermost portion of the context hyphae grow out at right-angles to form a subhymenial zone, varying in thickness from 8–26 μ. However, this zone also decreases in thickness toward the margin of the fruitbody. The subhymenium is formed of narrow, much branched, hyaline, clamped hyphae, 2–2.5 μ in diam. From this layer the basidia arise, and form a palisade 13–26 μ wide. *Cystidia* and *gloeocystidia* absent. *Basidia* 4-spored, clavate, 20–26 × 5–6 μ, often with a rather distinct 'tail' wich curves round parallel to the sides of the hymenial cavity. In one collection (*Peziza campanula*, on Quaking Asp. Pleasant Valley, Utah, coll. S. J. Harkness) some of the basidia are elongated-cylindric and measure 39 × 9 μ, but they appear rather abnormal. *Spores* 5–8(–10.2) × (1.75–)2–2.5(–2.75) μ, varying from subcylindric to very slightly allantoid, but sometimes tapered toward the apex.

HABITAT: This fungus, which is only known from Europe, North America and Turkey, is usually found on fallen branches of Aspen and other Poplars.

COLLECTIONS EXAMINED: On Quaking Asp, Pleasant Valley, Utah, coll. S. J. Harkness (TYPE of *Peziza campanula*; NY); Pleasant Valley, Utah, coll. S. J. Harkness (No. 108), Feb. 1882 (NY); Winnipeg, Canada, coll. G. R. Bisby (No. 2008), 1–5 June 1923 (det. W. B. Cooke as *Lachnella alboviolascens*!!); Winnipeg, Canada, coll. G. R. Bisby (No. 1972), 1 Oct. 1923 (det. W. B. Cooke as *L. alboviolascens*); on *Populus trichocarpa*, 5 miles south of Moscow, Idaho, coll. J. Erlich, A. Schade & R. K. Pierson (No. 875), 8 Dec. 1935 (TYPE of *Stromatocyphella lataensis*; NY); on *Populus tremuloides*, Maple River, Michigan, coll. D. A. Reid, 3 July 1961. Also 16 Swedish collections.

In North American collections of *C. erucaeformis* the spores are normally subcylindric to slightly allantoid and measure 5–8 (–10.2) × (1.75–)2–2.5(–2.75) μ. However, the data for the individual collections are summarized in Table III.

If this information is compared with that obtained from Finnish and Swedish material, summarized in Table IV, it will be seen that there is fairly close agreement, although the Swedish collections tend to have very slightly broader spores. The complete range of spore size of the Scandinavian material is (5–)5.75–8.2(–8.75) × (1.75–)2.2–3.2(–3.75) μ.

Despite the presence of slightly broader spores in the Scandinavian collections I believe that the fungus occurring in North America is conspecific with that found in Europe. Thus several of the North American gatherings would be difficult if not impossible to separate from some of the Swedish specimens. Then again the spores of of some of the North American collections were scanty and probably immature.

TABLE III

Spore data for North American collections of *Calathella erucaeformis*

Collection data	Spore data
On Quaking Asp, Pleasant Valley, Utah, coll. S. J. Harkness (TYPE of *Peziza campanula*).	7.2–10.2 × 1.75–2.2 μ, narrowly elliptical, slightly allantoid or occasionally subfalcate, sometimes narrowed toward the tip. Probably immature
Pleasant Valley, Utah, coll. S. J. Harkness (No. 108), Feb. 1882 (det. *Peziza campanula*).	5.75–7.5 × 1.75–2.2 μ, narrowly elliptical or subcylindric to slightly allantoid.
Winnipeg, Canada, coll. G. R. Bisby (No. 2008), 1–5 June 1923.	5–7.2 × 2–2.2 μ, narrowly elliptical or subcylindric to slightly allantoid.
Winnipeg, Canada, coll. G. R. Bidby (No. 1972), 1 Oct. 1923.	5.2–7.75 × 2–2.2 μ narrowly elliptical to subcylindric.
On *Populus tremula*, Fungi suescici, Upl., Ärentuna sn, Storvreta skog, leg. S. Lundell, 6 June 1924.	6–7.2 × 2–2.75 μ, elliptical or subcylindric.
On *Populus trichocarpa*, 5 miles S. of Moscow, Idaho, coll. Erlich, Schade & Pierson (No. 875), 8 Dec. 1935. TYPE of *Stromatocyphella lataensis*.	6–8 × 2–2.75 μ. narrowly elliptical or subcylindric to slightly allantoid.
On *Populus tremuloides*, Maple River, Michigan, coll. D. A. Reid, 3 July 1961.	5.2–7 × 2–2.2 μ narrowly elliptical to subcylindric.

However. it is very desirable that further North American material should be examined, and this should preferably be accompanied by spore-prints. In the event of the slight differences in spore size between the American and European fungi proving constant, the epithet *campanula* would have to be used for the former.

When W. B. Cooke described *Stromatocyphella lataensis* he stated that the receptacles were "grey, caespitose on a stroma, 2 to many in a fascicle." This description is misleading from the start since the majority of the fruitbodies of the type collection are single, discrete cups. A few of the sporophores do resemble stromatic colonies but here Cooke has been deceived by the superficial appearance of his material for when these 'stromatic colonies' are soaked up they can be clearly seen to consist of (1) conspicuously lobed fruitbodies and (2) fruitbodies which have proliferated from the margin and/or the centre of the cup (similar proliferation of the fruitbodies, occurs in *C. erucaeformis*). In all other respects *S. lataensis* is typical of *C. erucaeformis* [e.g. the fruitbodies which are clothed with granule encrusted hairs up to 250 μ long and 2.5–3.5 μ wide (up to 5 μ in 10% KOH) (not 5–8 μ wide as stated by Cooke) bear narrow subcylindric spores, 6–8 × 2.2–2.75 μ], and must therefore be regarded asa synonym of this species.

TABLE IV. Spore data for Finnish and Swedish collections of *Calathella erucaeformis*

Collection data	Spore data
On *Sorbus aucuparia*, Upl., Bondkyrka sn, Gottsundabergen, leg. G. Wahlenberg, 11 Sept. 1819.	6–8.2 × 2.75–3 μ, narrowly elliptical or subcylindric to slightly allantoid.
On *Salix* sp., Hollola, Finland, leg. P. A. Karsten, 28 March 1872, Herb. E. Fries (distributed as *C. alboviolascens*).	6.2–8.2 × 3–3.5 μ, elliptical or subcylindric.
On *Populus nigra*, Mustiala, Finland, leg. P. A. Karsten, August, Herb. E. M. Fries (distributed as *C. alboviolascens*).	5.75–7.5 × 2.2–3.2 μ narrowly elliptical of subcylindric to slightly allantoid.
Fungi exsiccati praesertim scandinavici No. 132, ad Stockholm, on *Populus balsamifera*, leg. L. Romell 12/6 1890.	5.2–8 × 2.2–3 μ narrowly elliptical or subcylindric to slightly allantoid.
Fungi exsiccati praesertim scandinavici No. 133, leg. L. Romell.	6.2–8 × 3–3.75 μ elliptical or subcylindric.
On *Populus*, Upl., Danmark. sn, Nantunalund, leg. N. Hylander & J. A. Nannfeldt, 24 May 1925.	5.2–8.2 × 2.2–3.5 μ, narrowly elliptical of subcylindric to slightly allantoid.
On *Populus tremula*, Fungi suecici No. 1837, Upl., Årentuna sn, Storvreta skog, leg. S. Lundell, 25 April 1927.	6.2–7.5 × 2.5–3.2μ , elliptical or subcylindric to very slightly allantoid.
Bondkyrka sn, Nosten strax, S. om, leg. J. A. Nannfeldt (No. 15999), 20 Sept. 1928.	5.75–6.75 × 1.75–2.75 μ, narrowly elliptical or subcylindric to slightly allantoid.
On *Populus tremula*, Fungi suecici No. 1836, Upl., Bondkyrka sn, Vårdsätra, leg. S. Lundell, 20 Jan. 1930.	5–8 × 2–3.2 μ, narrowly elliptical of subcylindric to slightly allantoid.
Upl., Vänge sn, Fiby urskog, leg. S. Lundell, 8 Sept. 1932.	5–8 × 2–2.75 μ, narrowly elliptical or subcylindric to slightly allantoid.
On *Populus tremula*, Fungi suecici, Upl. Arentuna sn. Storvreta skog, leg. S. Lundell, 6 June 1924.	6–7.2 × 2–2.75 o, elliptical or subcylindric.
On *Populus tremula*, Fungi suecici, Upl., Almunge sn, Kopphagen, leg. S. Lundell & E. Aberg, 26 April, 1936.	5.2–8 × 2–3.2 μ, narrowly elliptical or subcylindric.
On *Populus tremula*. Fungi suecici, Upl., Lohärad sn, nära Erkens limnologiska, leg. J. Eriksson No. 2718.	5.75–8 × 2–3.2 μ, narrowly elliptical or subcylindric.
On *Populus tremula*, Fungi suecici No. 9160, Uppl., Bondkyrka sn, Kvarnbolund nära Haggan bradd, leg. A. Munk & J. A. Nannfeldt, 25 May 1947.	5–6.2 × 2.2–2.75 μ, narrowly elliptical or subcylindric.
On *Populus tremula*, Fungi suecici No. 9735, Uppl., Börje sn, Hasselby skogspark, N. sidan, leg. J. A. Nannfeldt, 18 April 1948.	5.75–8.2 × 2.75–3.5 μ, narrowly elliptical or subcylindric to slightly allantoid.
On *Populus tremula*, Fungi suecici, Uppl., Funbo sn, c. ½ km N. of the railway station of Lövstahagen, leg. R. Santesson, 24 Aug. 1952.	6–8.75 × 2.5–3.2 μ, narrowly elliptical or subcylindric to very slightly allantoid.

Calathella davidii, Reid, *sp. nov.*—Figs. 30, 32

Sporophora gregaria, vix dense stipata, tubulata, usque ad 500 μ alta et 260 μ lata, alba, sub lente minute hirsuta. *Hypharum systema* monomiticum. Hyphae generatoriae usque ad 2 μ diam., haud distinctae, hyalinae, ramosae, fibulatae, muris tenuibus. Superficies exterior pilis elongatis, usque ad 260 μ longis et 2–3.5 μ latis, rigidis, ± adpressis, cylindricis, saepe septatis, muris crassis, vaginata. Pilis granulis haud incrustati. *Basidia* usque ad 30,2 μ longa et 8 μ lata, clavata, quadrispora. *Sporae* 6–8 × 5–6,5 μ, hyalinae, muris tenuibus, plerumque globosae vel raro subglobosae. —TYPUS: Pellston Picnic Area, Michigan, coll. D. G. Reid, 18 Aug. 1961.

Sporophores gregarious, but not usually densely crowded; the fruitbodies occur scattered in small colonies. The individual fructifications, up to 1000 μ high and 260 μ wide are tubular and have a narrow pore-like mouth. They are white, and under a lens appear very minutely hirsute. In dried material the hairs near the rim of the fruitbody curve inward and close the mouth of the tube. There is no evidence of a subiculum in this species. *Hymenium* lining a deep cavity which extends almost to the base of the fruitbody. *Structure*: in section the walls of the sporophore can be seen to be very thin, reaching 90 μ in width, including both the hymenium and an outer layer of adpressed hair-bases. The actual context is only 13–15 μ wide, and is formed of parallel, thin-walled, hyaline hyphae, up to 2 μ wide with clamp-connexions at the septa. These hyphae appear very indistinct in microscopic preparations

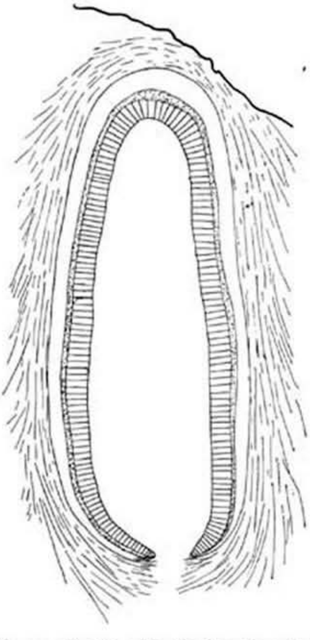


Fig. 30. *Calathella davidii.* Type collection. Vertical section through fruitbody. × 160 approx.

of squashed fruitbodies, and stain less deeply in aniline blue in lactic acid than do the hairs. Toward the outermost region of the context arise a dense layer of hairs. These hairs, which may be up to 260 μ long and 2–3.5 μ wide in potassium hydroxide solution, do not become distorted in the latter reagent. Further, they are neither amyloid nor pseudoamyloid and they lack any form of encrustation. They are more or less cylindrical in shape, although they often taper to a long drawn out, narrowed base, and may also be slightly narrower toward the obtuse apex. The degree of narrowing at the base is very variable, being pronounced in some hairs but not in others, furthermore there is often an irregular kinking in this extreme basal portion. However, the hairs, which have distinctly thickened walls, eventually terminate at a clamped basal septum. Toward the apex the wall thins out and some hairs develop secondary septa in this region. The hairs, which arise anywhere on the surface of the fruitbody, tend to remain more or less adpressed to the fructification, at least in their lower portions, and so form what is virtually an outer layer, up to 40 μ wide, to the wall of the sporophore. The hairs forming the rim of the fruitbody are similar to those covering the rest of the outer surface although distinctly shorter. From the innermost region of the context, hyphae grow out to form a very narrow and inconspicuous subhymenial zone, 2.5–4 μ wide. From this subhymenium arises a palisade of basidia, 13–20.8 μ in width. *Cystidia* and *gloeocystidia* absent. *Basidia* large, 4-spored, clavate organs which may be prolonged into a narrow 'tail'-like base terminating at a clamped basal septum. These basidia are up to 30.2 μ long and up to 8 μ wide. *Spores* thin-walled, hyaline, smooth, nonamyloid, varying in shape from globose (as in the vast majority) to slightly subglobose. They are 6–8 × 5–6.5 μ including a rather inconspicuous apiculus.

HABITAT: On dead wood.

COLLECTIONS EXAMINED: South Carolina, coll. H. W. Ravenel (No. 1215) (det. as *Solenia villosa*); Newfield, New Jersey, coll. J. B. Ellis (No. 2824) (det. as *Solenia villosa*); Newton, Massachusetts, Oct. 1875 (det. as *Solenia villosa*); Pellston Picnic Area, Michigan, coll. D. G. Reid, 18 Aug. 1961 (TYPE of *C. davidii*). In addition the the following collections, which appear to be sterile, probably belong to this species: New Jersey, coll. J. B. Ellis (No. 2510), Dec. 1876 (det. as *Solenia villosa*); Pennsylvania, Herb. M. C. Cooke (det. *Solenia villosa*).

Calathella davidii would seem to be the same fungus which W. B. Cooke has mistakenly described under the name *Solenia fasciculata* Pers., apparently without having seen authentic material. Unfortunately in his monograph Cooke has confused the issue regarding both the circumscription of the genus *Solenia* (= *Henningsomyces* of this publication) in general and of *S. fasciculata* in particular. Thus on page 15, in his key to the genera which he places in the tribe Solenieae one has to say at (5) that the fruitbodies have "special granule-encrusted surface hairs, hairs usually with thick walls" in order to arrive eventually at the genus *Solenia*, yet reference to Cooke's specific descriptions will show that in only 2 of the 24 species are the hairs stated to be encrusted! Then on pages 16–17, in the key to species one has to say at (1) that there are surface hairs present, at (2) that these hairs are "simple, rarely

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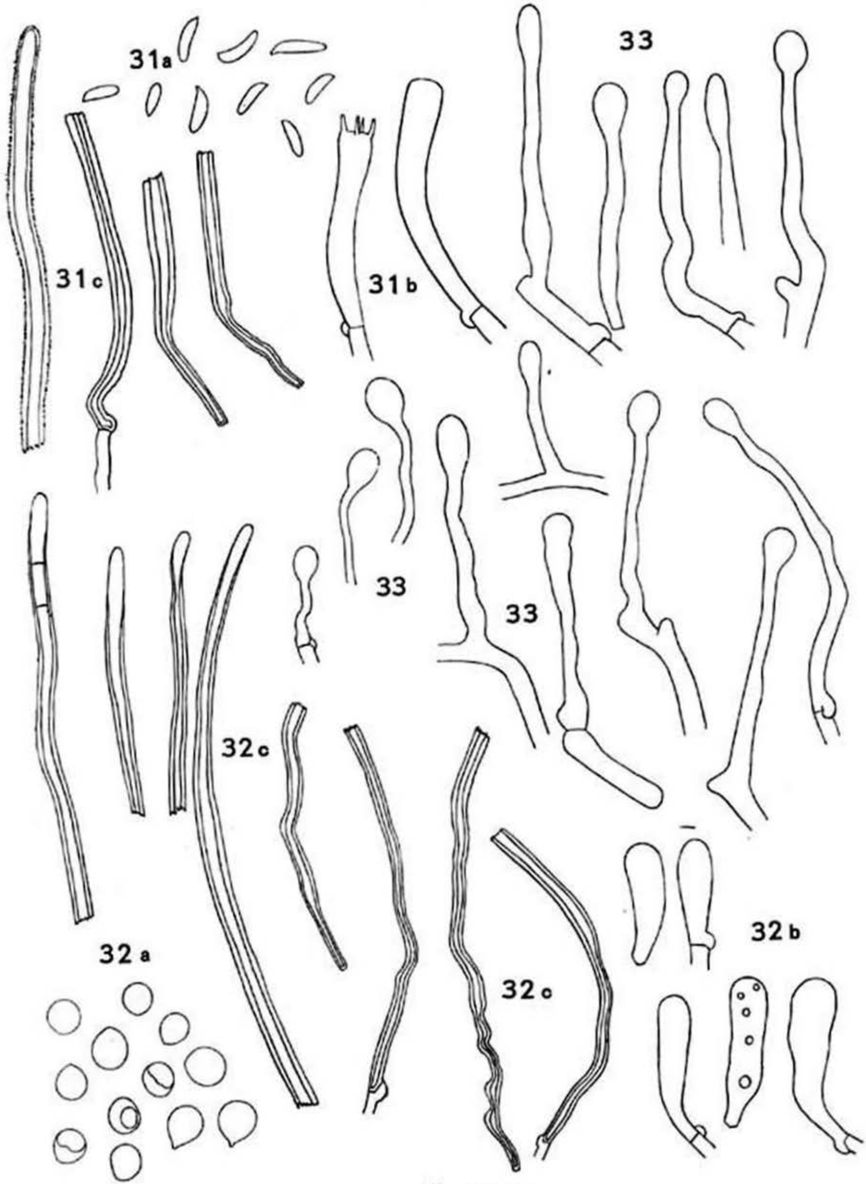
EXPLANATION OF FIGURES 31–33

Figs. 31–33. — 31. *Calathella erucaeformis*. Type collection of *Peziza campanula*. a. Spores. b. Basidia. c. Hairs. — 32. *Calathella davidii*. Type collection. a. Spores. b. Basidia. c. Hairs. — 33. *Cellypha goldbachii*. Onaway, 22 July 1961. Hairs. — All figures × 866.



Figs. 31–33

branched, usually elongate", at (8) that they are unbranched and at (9) that they are straight to flexuous in order to arrive eventually at *S. fasciculata* Pers. However in his description of this species Cooke makes no mention of surface hairs but merely states "surface hyphae hyaline, parallel to intertwined, rarely interwoven, rarely branched, appressed to surface of tubule, 30–100 × 2–5 μ." This description hardly suggests a species "with special granule-encrusted surface hairs". If one passes over this point and assumes that surface hairs are present one is then faced with the situation that, so far as I am aware, there is no evidence that a white, tubular *Solenia*, with large globose spores, 5–8 μ in diam., occurs in Europe, other than Cooke's statement that he has examined 6 specimens from France. However there is one collection in the Kew Herbarium, probably received from either Mougeot or Nestler, which has been determined by Cooke as *S. fasciculata* and is therefore presumably one of the six French specimens referred to above. This collection has broadly elliptical spores of the *Henningsomyces candidus* type!

Cooke also recognises "*S. fasciculata* sensu Boudot in herb.", which so far as I can ascertain is identical with *S. fasciculata* of Bourdot and Galzin (*1928*). In his description of this taxon Cooke describes the spores as "globose, 3–3.5 μ". He also states that he examined two collections, and that part of at least one of these is deposited at Paris, Prague and Kew. In the Kew Herbarium there is a Bourdot specimen annotated by Cooke as "*S. fasciculata* sensu Bourdot" (Herb. H. Bourdot, No. 24364. Champignons de l'Aveyron. Sur Châtaignier le Rec. Leg. Galzin, 1 Oct. 1916) but this has broadly elliptical or ovate spores, 4–5.2 × 3.2–3.75 μ which only appear globose when seen 'end-on'. These measurements agree well with those of Bourdot & Galzin (3–6 × 3–4 μ) but do not support those of Cooke. According to Cooke *S. fasciculata* sensu Bourdot in Herb. is intermediate between *S. minima* (from S. Africa!) and *S. fasciculata* in size "but the spores are small". In fact the Bourdot and Galzin material almost certainly represents the true European concept of *S. fasciculata*, and for this reason a brief description of Bourdot's material (No. 24364) as represented in the Kew Herbarium is given below:—

SOLENIA FASCICULATA Pers. sensu Bourd. (No. 24364; K).—*Sporophores* up to 3000 μ high and 330 μ wide, densely grouped and often contiguous on a well developed white, cottony subiculum. The individual fruitbodies are either white or slightly tinted with rose when fresh and appear minutely 'hirsute' under a lens. They are at first subglobose but gradually elongate and finally become cylindrical or tubular. According to Bourdot & Galzin the fruitbodies may also be somewhat broader at the base or they may be slightly fusiform. In section the walls of the fruitbody can be seen to consist of a context layer of parallel, hyaline, branched hyphae up to 2.5(–3) μ wide with clamp-connexions at the septa. These hyphae, which have slightly thickend walls are quite distinct in microscope preparations. Furthermore there are no oil droplets in the flesh to obscure the hyphal picture, as in *Henningsomyces candidus* (Pers.) O. Kuntze. Toward the surface of the fruitbody the context hyphae become more loosely arranged and tend to diverge to form the 'hirsute' covering of the sporophore. These surface hyphae which are not encrusted may have very slightly thicker walls than the remaining context hyphae but are otherwise similar. They bear clamp-connexions along their length and show occasional branching.

In my view these hyphae do not warrant the term 'surface hairs' since this implies a distinctly differentiated structure. Toward the innermost region of the flesh certain hyphae grow out to form a subhymenial layer up to 16 μ wide. This layer consists of highly branched, thin-walled, hyaline hyphae, 2–2.5 μ in diam., with clamp-connexions at the septa. From this zone the basidia are produced forming a palisade up to 20.8 μ wide. *Basidia* clavate, up to 20.8 × 5 μ, with 2- or 4-sterigmata. *Spores* thin-walled, hyaline, 4–5.2 × 3.2–3.75 μ (3–6 × 3–4 μ fide Bourdot & Galzin), varying in shape from very broadly elliptical, with an inconspicuous lateral apiculus, to ovate.

CELLYPHA Donk

Fructifications either scattered or densely gregarious, sometimes associated with an indistinct arachnoid subiculum. The individual fruitbodies are deeply cupulate or campanulate and are narrowed below to a very short, indistinct stipe-like base. Furthermore the sporophores, which appear minutely tomentose under a lens, are usually pendulous. *Hymenium* smooth, wrinkled, or ornamented with radiating gill-like folds, and appearing rather waxy. *Hyphal structure* monomitic, consisting of thin-walled, hyaline, branched hyphae with clamp-connexions at the septa. The surface of the fruitbody is clothed with characteristic thin-walled hairs. These are of variable length and usually taper very gradually from a clamped basal septum toward the apex which is itself either abruptly or gradually enlarged to from a distinct globose or clavate head. These hairs are occasionally capped with a gum-like exudate. *Basidia* clavate. *Spores* thin-walled, hyaline non-amyloid, varying in shape from subcylindric to narrowly elliptical with a curved base terminating in a prominent apiculus. The spores tend to be rather large reaching 18 μ in length.

W. B. Cooke has enlarged the scope of this genus very considerably to include numerous fungi which bear little, if any, relationship to the type species [*C. goldbachii* (Weinm.) Donk]. As a result the genus *Cellypha*, as emended by Cooke bears very little resemblance to the genus as conceived by the orginal author.

Donk (*1959*) has commented that the affinity of this genus is still uncertain but he has suggested that it is Mycenoid, a conclusion with which the present author is in complete accord.

CELLYPHA GOLDBACHII (Weinm.) Donk—Figs. 33, 34

Cyphella goldbachii Weinm., Hym.- Gastero-myc. ross. 522. 1836. — *Calyptella goldbachii* (Weinm.) Quél., Ench. Fung. 216. 1886. — *Cellypha goldbachii* (Weinm.) Donk *in* Persoonia **1**: 85. 1959.

Cyphella ochroleuca Berk. & Br. *in* Ann. Mag. nat. Hist. II **13**: 405. 1854. — *Chaetocypha ochroleuca* (Berk. & Br.) O. Kuntze, Rev. Gen. Pl. **2**: 847. 1891. — *Calyptella ochroleuca* (Berk. & Br.) Big. & Guill., Fl. Champ. sup. Fr., Compl. 483. 1913. — *Phaeocyphella ochroleuca* (Berk. & Br.) Rea, Brit. Bas. 704. 1922.

Cyphella rubi Fuckel *in* Jb. nassau. Ver. Naturk. **23–24**: 26. 1870. — *Chaetocypha rubi* (Fuckel) O. Kuntze, Rev. Gen. Pl. **2**: 847. 1891. — *Cyphella rubi* (Fuckel) Big. & Guill., Fl. Champ. sup. Fr., Compl. 483. 1913. — *Cyphella lactea* var. *rubi* (Fuckel) Pilát *in* Ann. mycol., Berl. **23**: 149. 1925. — *Phaeoglabrotricha rubi* (Fuckel) W. B. Cooke *in* Beih. Sydowia **4**: 117. 1961.

Cyphella caricina Peck *in* Rep. N.Y. St. Mus. **33**: 22. 1880.

Cyphella dumetorum Bomm. & Rouss. *in* Bull. Soc. Bot. Belg. **23**: 100. 1884. — *Chaetocypha dumetorum* (Bomm. & Rouss.) O. Kuntze, Rev. Gen. Pl. **2**: 847. 1891.

Cyphella lactea Bres., Fungi tridentini **1**: 61. 1884. — *Cyphella goldbachii* var. *lactea* (Bres.) Quél., Ench. Fung. 216. 1886. — *Chaetocypha lactea* (Bres.) O. Kuntze, Rev. Gen. Pl. **2**: 847. 1891. — *Calyptella lactea* (Bres.) Big. & Guill., Fl. Champ. sup. Fr., Compl. 482. 1913. — *Cellypha lactea* (Bres.) W. B. Cooke *in* Beih. Sydowia **4**: 55. 1961.

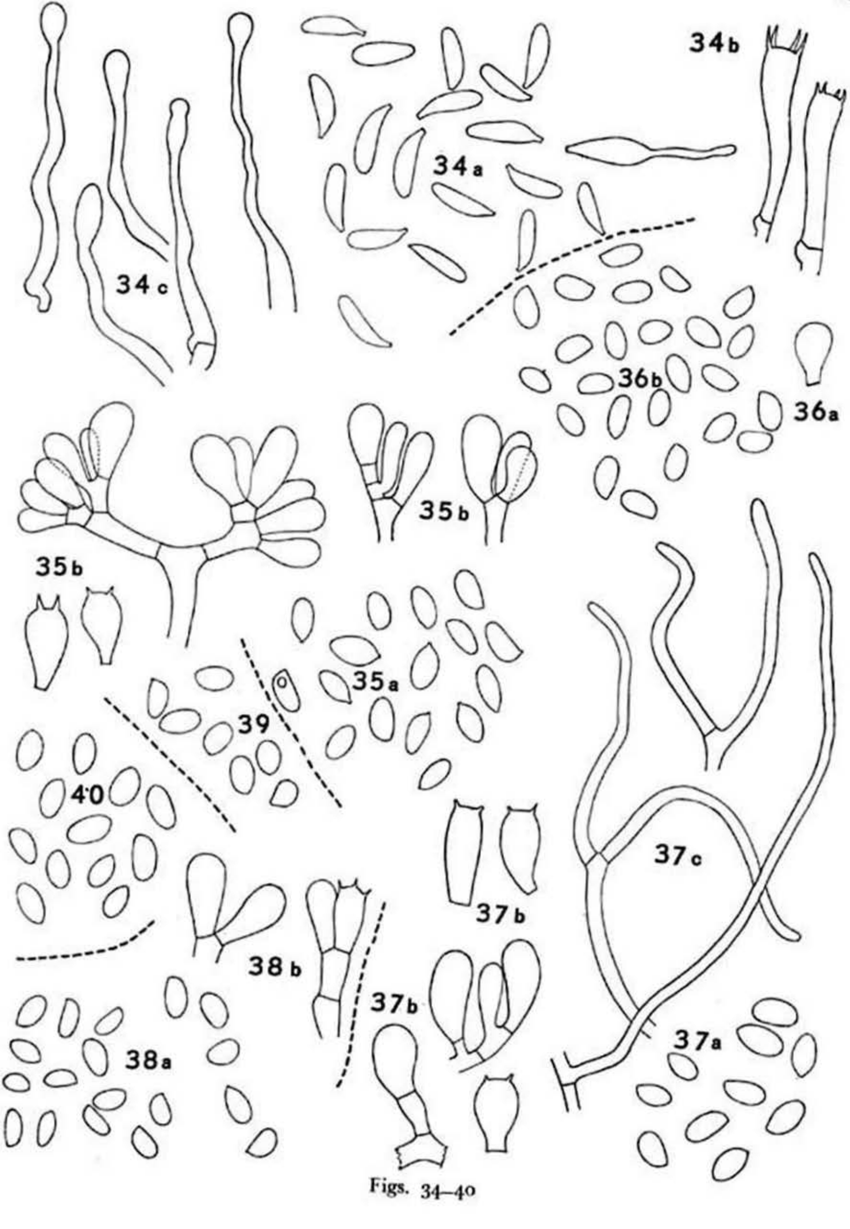
Cyphella malbranchei Pat., Tab. anal. Fung. **1**: 204. 1886.— *Solenia malbranchei* (Pat.) Pat., Hym. Eur., caption to Pl. 3 fig. 30. 1887. — *Chaetocypha malbranchei* (Pat.) O. Kuntze, Rev. Gen. Pl. **2**: 847. 1891.

Sporophores either scattered or in dense colonies, and sometimes associated with an indistinct arachnoid subiculum. The individual fruitbodies, up to 3 mm high, are deeply cupulate or campanulate and are narrowed below into a very short, indistinct or rudimentary stipe-like base. Furthermore the sporophores, which appear minutely tomentose under a lens, are usually pendulous. They are white to cream when fresh, but soon become deep cream, yellowish or pale ochre coloured in the herbarium. *Hymenium* lining a very deep cavity, The hymenial surface which appears waxy, is concolorous with the rest of the fructification and may be smooth, wrinkled or ornamented with radiating gill-like folds. *Structure*: in section the fruitbodies can be seen to have very thin walls, which are up to 75 μ in width in the American material. There is a very narrow context formed of thin-walled, hyaline, branched hyphae, 2.5–3(–3.5) μ in diam., with clamp-connexions at the septa. These hyphae are parallel and rather loosely arranged. Toward the outside of the cup, they give way to broader and more conspicuously branched hyphae, up to 5 μ wide. It is from these outermost hyphae that the hairs arise, either terminally or more frequently as lateral branches. These hairs, which originate anywhere on the outer surface of the fruitbody, vary considerably in length from 25–80 μ. They have wide, thin-walled bases up to 5 μ in diam., and narrow to a greater or lesser extent toward the swollen apex. In some the narrowing is pronounced and these hairs may be only 2 μ wide for most of their length, but in others on the same fruitbody the narrowing is less marked and these hairs, which are up to 4 μ wide, appear much stouter. Near the tip the hairs usually become abruptly inflated or gradually enlarged resulting in the formation of a spherical, oval or clavate head which may be up to 7 μ wide. Occasionally the head, which stains deeply in eosin, is cut off by the development of a septum which lacks a clamp-connexion and is therefore secondary. If traced back the hairs can be seen to terminate at a clamped basal septum. In the Onaway collection, cited below, the heads of the hairs are often capped with a gum-like exudate. Toward the innermost regions of the context certain hyphae grow out to form an indistinct subhymenium. This layer is formed of thin-walled, much-branched hyphae, up to 2.5 μ in diam. From this zone the basidia arise forming a palisade up to 32 μ wide. *Cystidia* and *gloeocystidia* absent. *Basidia* up to 31.2 × 7 μ, 4-spored, clavate with a basal clamp-connexion. *Spores* thin-walled, hyaline, nonamyloid, varying in shape from subcylindric to narrowly elliptical with a curved base terminating in a prominent apiculus. As measured from a copious white spore deposit, obtained from the Onaway specimen, the spore range was found to be 10–14 × 3–3.75 μ but on a British collection the spores were exceptionally up to 16 μ in length while Donk *(1959)* records them as reaching 18 μ in length in a French gathering [Puy-de-Dôme, leg. Brevière].

HABITAT: This fungus, which is known from Europe and North America, is most commonly found on the remains of grasses and sedges in marshy places, but it also occurs on dead herbaceous stems and on woody twigs of such plants as *Rubus* spp.

EXPLANATION OF FIGURES 34–40

Figs. 34–40. — 34. *Cellypha goldbachii*. Onaway, 22 July 1961. a. Spores. b. Basidia. c. Hairs. — 35–40. *Pellidiscus pallidus*. — 35. Tahquamenon, 2 Aug. 1961. a. Spores. b. Basidia. — 36. Roblín (PR 174299) as *Cyphella sarothamni*. a. Basidium. b. Spores. — 37. Karbuch (PR 487490) as *Cyphella disciformis*. a. Spores. b. Basidia. c. Hairs. — 38. Type collection of *Cyphella involuta* (PR 174178). a. Spores. b. Basidia. — 39. Probably part of type collection of *Cyphella sessilis* (K). Spores. — 40. Type collection of *Pellidiscus subiculosus*. Spores. — All figures × 866.



Figs. 34–40

COLLECTIONS EXAMINED: on *Typha latifolia* and grass remains, Onaway, Michigan, coll. D. A. Reid, 22 July 1961; on *Carex* sp., 10 miles N. of St. Ignace, Michigan, coll. D. A. Reid, 14 Aug. 1961. Also numerous British collections.

In his monograph W. B. Cooke has badly confused the issue regarding the taxonomy of *Cellypha goldbachii*. In the first instance one finds in his key to the species of *Cellypha* on page 51 that he distinguishes between *C. caricina* and *C. goldbachii* as follows:—

(6) Surface hairs geniculate, 30–35 × 2 μ	*C. caricina*
(6) Surface hairs straight, 20–25 × 1.5–3 μ	*C. goldbachii*

Yet in the text (p. 53) he lists *C. caricina* as a synonym of *C. goldbachii!* Cooke also recognised *C. lactea* as a distinct species, apparently because of its spore size, which according to Cooke is 5–6.5 × 2.5–3 μ as against his measurements of 10–15 × 3–5 μ for *C. goldbachii*. However, when Bresadola published *C. lactea* he described the spores as 12–15 × 3–3.5 μ and noted that the basidia were 30–35 × 6–7 μ. Furthermore, his illustration of the spores shows them to be very elongated, and certainly more than twice as long as they are broad. Since Cooke has seen fit to apply Bresadola's name to a fungus which bears little relation to Bresadola's original diagnosis one would have thought that an explanation was called for, yet none is forthcoming. More remarkable is the fact that the list of collections of *C. lactea* which Cooke has examined (p. 55), does not include Bresadola's type material! It is clear, therefore, that should a fungus answering to Cooke's diagnosis of *C. lactea* be found to exist in Europe, it will have to be described as new.

Cooke also included *C. malbranchei* Pat. in synonymy under *C. lactea*, once again, apparently without having examined the type specimen and despite Patouillard having described the spores of this fungus as 12–15 × 3–6 μ. Further, Donk (*1959*) reported that he had studied a collection of *C. malbranchei* which had been named by Patouillard, and that it proved to be *C. goldbachii*.

Cooke also recognised *Cyphella rubi* as a distinct taxon, but he transferred this species to one of his new genera—*Phaeoglabrotricha* which he placed in the tribe Phaeosolenieae as opposed to *Cellypha* which he placed in the tribe Solenieae. Thus *Cyphella goldbachii* and *C. rubi*, are placed in different tribes in Cooke's system of classification. Yet reference to Cooke's descriptions of *C. rubi* (p. 117) and *C. goldbachii* (p. 55) will show that the only difference between these species is that the former is said to have spores which are "hyaline, becoming brown while attached". However, since according to Cooke's own account all other characters show such complete agreement it seems ludicrous to separate these fungi into different tribes. A more logical action would have been to assume that if brown spores are indeed present in the type specimen of *C. rubi* as claimed by Cooke, that they had probably become accidentally stained in some way. It is interesting to note that the type specimen of *C. ochroleuca* Berk. & Br. was also collected on *Rubus* sp. but this material is typical *C. goldbachii* and shows no sign of brown coloured spores.

Finally it should be noted that Donk (*1959*) includes *C. velenovskyi* Pilát in synonymy under *C. goldbachii*, largely because Pilát himself had come to regard it as a synonym of *C. lactea* (= *Cellypha goldbachii*). However, a study of the type material preserved, in the Prague Herbarium, has shown it to be *Calyptella capula* (Holmsk. ex Pers.) Quél. Cooke also concluded that *C. velenovskyi* was a *Calyptella*, but he listed it in synonymy under *Calyptella gibbosa* (Lév.) Quél. However *Cyphella velenovskyi* has spores 7–8.75 × × 4–4.2 μ—not 10–12 × 2–3 μ as stated by Pilát (6–7 × 2.5–3 μ according to Cooke) whereas those of *Calyptella gibbosa* are 4–5 × 2.5–3 μ.

PELLIDISCUS Donk

Fructifications varying in appearance from shallowly cupulate or saucer-shaped to flattened-discoid, although according to Donk (*1959*) they are initially cup-shaped. When young the sporophores have a small central point of attachment but when flattened and discoid they become more or less completely adnate to the substratum except in some fruitbodies where there may be a narrow upturned margin. The fructifications are at first pure white throughout but the disc eventually becomes pale brown in colour. In cupulate sporophores this brown disc contrasts with the white exterior, which under a lens appears minutely tomentose. *Hyphal structure* monomitic, consisting of thin-walled, hyaline branched hyphae which lack clamp-connexions at the septa. Occasionally the hyphae may become locally inflated. The outer surface of the fruitbody is clothed with poorly differentiated 'hairs'. These 'hairs' which are thin-walled, hyaline, continuous and without encrustation taper from the base to a much narrower obtuse apex. Whether one considers the 'hairs' to be branched or whether one considers the branching to be part of the vegetative hyphae from which the hairs arise is a matter of personal opinion. However, the hairs on the marginal portion of the fruitbody often have a more distinctly differentiated swollen base. *Basidia* 2- or 4-spored, more or less clavate, although peculiarly short and squat, and with or without a narrowed stalk-like base. These organs arise from wedge-shaped segments of the subhymenial hyphae, and in fact these segments and indeed the entire subhymenium is reminiscent of the subhymenial structure found in many agarics. *Spores* at first hyaline and smooth but at length brown and roughened varying in shape from elliptical to amygdaliform, and with an indistinct apiculus.

Donk (*1959*) has commented on the affinities of this genus as follows, "I now incline to the view that *Pellidiscus* is perhaps a genus with 'reduced' fruitbodies very close to *Crepidotus* (Fr.) Staude" and Singer (*1962*) has included it in the Crepidotaceae.

W. B. Cooke places *Pellidiscus* in his tribe Phaeosolenieae and in his key to the genera comprising this tribe (p. 113) he separates *Pellidiscus* on the basis that the receptacles are without special surface hairs. Should one unwittingly interpret the hairs of *Pellidiscus* as 'specialized' one arrives at "*Asterosolenia*". Unfortunately this genus appears in the key as *Asterosolenia* but it is published in the text as *Asterocyphella* (p. 118).

PELLIDISCUS PALLIDUS (Berk. & Br.) Donk—Figs. 35–43

Cyphella pallida Berk. & Br. *in* Ann. Mag. nat. Hist. IV **11**: 343. 1873. — *Calyptella pallida* (Berk. & Br.) Quél., Ench. Fung. 216. 1886. — *Chaetocypha pallida* (Berk. & Br.) O. Kuntze, Rev. Gen. Pl. **2**: 847. 1891. — *Pellidiscus pallidus* (Berk. & Br.) Donk *in* Persoonia **1**: 90. 1959.

Cyphella bloxamii Berk. & Phill. *apud* Berk. & Br. *in* Ann. Mag. nat. Hist. V **7**: 129. 1881. — *Chaetocypha bloxamii* (Berk. & Br.) O. Kuntze, Rev. Gen. Pl. **2**: 847. 1891.

Cyphella housed disciformis Pilát *in* Ann. mycol., Berl. **22**: 212. 1924 (non *C. disciformis* P. Henn. *in* Bot. Jb. **22**: 85. 1895). — *Cyphella bloxamii* var. *disciformis* (Pilát) Pilát *in* Publ. Fac. Sci. Charles No. 29: 34. 1925.

Cyphella sarothamni Pilát *in* Ann. mycol., Berl. **23**: 149. 1925.

Cyphella involuta Pilát *in* Ann. mycol., Berl. **23**: 151. 1925.

Cyphella sessilis Burt *in* Ann. Mo. bot. Gdn **13**: 317–318. 1926. — *Phaeoglabrotricha sessilis* (Burt) W. B. Cooke *in* Beih. Sydowia **4**: 117. 1961.

Pellidiscus subiculosus W. B. Cooke *in* Beih. Sydowia **4**: 115. 1961.

Sporophores often widely scattered over the substrate and varying in appearance from cupulate or saucer-shaped to flattened-discoid. According to Donk *(1959)* the fruitbodies are initially cupulate but soon become discoid with an upturned margin. However, in herbarium material some collections consist of almost entirely cupulate fruitbodies whereas in others all the fruitbodies, even very small ones, are flattened. It should be noted that when the fruitbodies are first formed they have a small central point of attachment but when flattened and discoid they become more or less completely adnate to the substrate, except in some sporophores where the margin is slightly upturned. The fructifications, which vary considerably in size from 250–1000 μ [up to 2 mm or more according to Donk (l.c.)] are at first pure white throughout but the disc gradually becomes pale brown in colour, and in cupulate fruitbodies this contrasts with the white exterior, which under a lens appears minutely tomentose. In flattened sporophores the margin is often conspicuously crenulated or lobed (as in the type of *C. bloxamii*), and it may also appear minutely fringed with white radiating hyphae, although in fact this fringe is formed of hairs similar to those clothing the outer surface of the fruitbody. Occasionally adjacent flattened sporophores may become more or less fused. The Michigan collection consists of completely flattened discoid fructifications with a pale brown hymenium and a minutely 'fringed' white margin. *Structure*: This species is difficult to section owing to its extremely delicate texture. It has a total thickness of 26–39 μ and consists of little more than one or two hyphae forming a very thin flesh from which arise the erect, wedge-shaped subhymenial elements. From this subhymenial zone basidia are produced forming a palisade 13–20 μ wide. The hyphae lack clamp-connexions, are thin-walled, hyaline, branched and mostly 2.5–3.5 μ in diam. although the cuneate subhymenial elements are up to 8 μ wide. In potassium hydroxide solution, however, the walls of the hyphae, and especially of those hyphae forming the context, appear rather distinct. From these hyphae arise the surface 'hairs'. According to Donk (*1959*) "The 'hairs' from the marginal region (as described for the species) look very much like sterile bunches of basidia of which each 'basidium' develops an apical hyphal outgrowth. I would assume that by continued marginal growth of the fruitbody these hairs become displaced toward the sterile side of the fruitbody: this would imply that that side is covered by a trichoderm or, if one wishes to call it so, a hymenoderm, depending on the stress one lays on the swollen basal portion of

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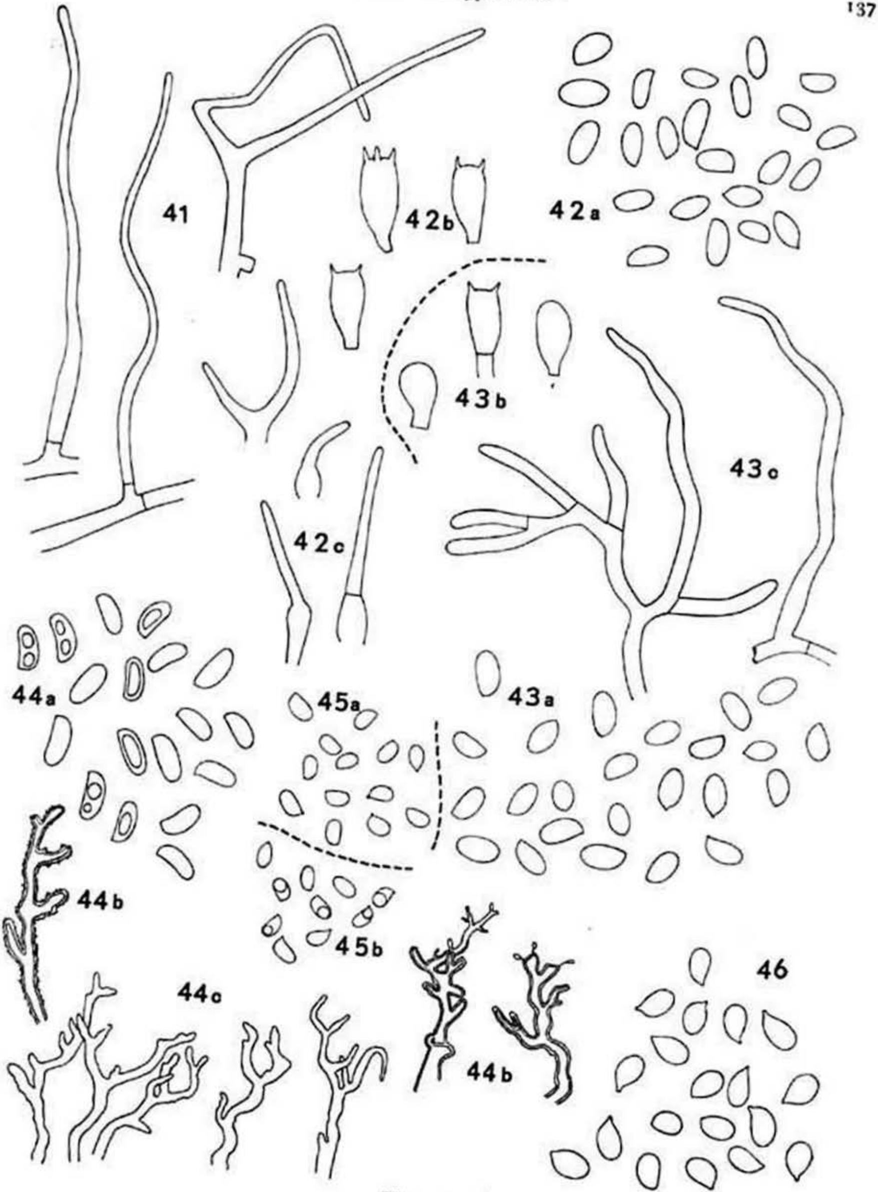
EXPLANATION OF FIGURES 41–46

Figs. 41–46. — 41–43. *Pellidiscus pallidus*. — 41, 42 Mnichovice, 15 May 1925 (PR 174179) as *Cyphella involuta*. 41. Hairs from outer surface of fruitbody. 42. a. Spores. b. Basidia. c. Hairs foom marginal zone of fruitbody. — 43. Type collection of *Cyphella sarothamni* (PR 174301). a. Spores. b. Basidia. c. Hairs. — 44. *Sromatocyphella conglobata*. Pike Lake, 12 Aug. 1961. a Spores. b. Hairs from the edge of the fruitbody. c. Hairs from the sides of the fruitbody. — 45. *Stromatoscypha fimbriata*. Harbor Springs Hills, 27 July 1961. a. Spores in Melzer's solution. b. Spores in 10 % KOH solution. — 46. *Leptoglossum* sp. Onaway, 22 July 1961. Spores. — All figures × 866.



Figs. 41–46

the hairs." These comments regarding the resemblance of the hairs in the marginal region to sterile basidia may apply to the hairs in a very narrow transitional zone between functional hymenium and the true hairy sterile exterior, but are not true of the hairs clothing the fruitbody as a whole. Some hairs with swollen bases were seen and these agreed with Donk's description, but the vast majority appeared to arise from ordinary vegetative hyphae and lacked a distinctly differentiated swollen base. These hairs, up to 117 μ long and 2–4 μ wide, taper gradually to an obtuse apex, 1.5–2.2 μ in diam. They are thin-walled, hyaline, continuous, and without encrustation. Whether one considers the hairs to be branched or whether one considers the branching to be part of the vegetative hyphae from which the hairs are formed, is a matter of personal opinion. *Cystidia* and *gloeocystidia* absent. *Basidia* 13–20 × 6–8 μ, more or less clavate but peculiarly short and squat, and either with or without a narrowed stalk-like base. These organs may be 2- or 4-spored. *Spores* (5–)6–8(–9) × (3.2–)3.5–4.5(–5) μ, at first smooth and hyaline, becoming pale brown and finally distinctly brown and roughened. They vary in shape from elliptical to distinctly amygdaliform, with a rather indistinct apiculus.

HABITAT: on dead wood, fallen branches, herbaceous stems, leaves and also on remains of grasses and sedges. This fungus is known from both Europe and North America.

COLLECTIONS EXAMINED: AMERICA: U. S. A.: on herbaceous stems, Newfield, New Jersey, coll. J. B. Ellis (No. 3134) (det. *Cyphella membranacea* Cooke & Ellis but seemingly never published); on rotten leaves of *Sabal blackburnianum*, Paget Marsh, Bermuda, coll. H. H. Whetzel, 8 Jan. 1922 (probable type or cotype of *Cyphella sessilis*); on *Carex* (?), Tahquamenon, Michigan, coll. D. A. Reid, 2 Aug. 1961. Canada: East of New Durham, Brant Co., Ontario, coll. R. F. Cain, Aug. 1941 (TRTC No. 18014; TYPE of *Pellidiscus subiculosus*). EUROPE: British Isles: on *Clematis vitalba*, Batheaston, Somerset, coll. C. E. Broome (Rabenhorst, Fungi europaei No. 1415) (TYPE of *Cyphella pallida*); Batheaston, Herb. Berk. (probably part of the type of *Cyphella pallida*); Batheaston, coll. C. E. Broome (probably part of the type collection of *Cyphella pallida* but determined by W. B. Cooke as *Phaeosolenia densa!*); Langridge, Somerset, coll. C. E. Broome, April; on *Ulex* sp., Twycross, Leicestershire, coll. A. Bloxam (TYPE of *Cyphella bloxamii*); on *Fraxinus*, Marlwood, Thornbury, Gloucestershire, coll. R. W. G. Dennis, 23 May 1950. Czechoslovakia: on *Sarothamnus scoparius*, Karbuch, Reinland (PR No. 487490 determined by Pilát as *Cyphella disciformis*); on *Sarothamnus vulgaris*, Řicǎny, 1923 (PR No. 174301 and hereby designated as LECTOTYPE of *Cyphella sarothamni*); on *Sarothamnus vulgaris*, Roblín, April 1924 (PR No. 174299 det. Pilát as *Cyphella sarothamni*); on *Corylus*?, Černošice, 31 March 1925 (PR No. 174178, and hereby designated as the LECTOTYPE of *Cyphella involuta*); on *Rubus suberectus*, Mnichovice, leg. J. Velenovský, 15 May 1925 (PR No. 174179 det. Pilát as *Cyphella involuta*). Norway: on *Salix* leaf, east slope of Vandefjell Hallingdal, Busherud, coll. R. W. G. Dennis, 7 Aug. 1956.

Donk (*1959*) predicted that a number of species of *Cyphella* described by Pilát would probably prove to be synonyms of *Pellidiscus pallidus* and in fact this has now been established in the case of *Cyphella sarothamni*, *C. involuta* and *C. disciformis*. However, examination of the type collection of *C. lloydiana* Pilát failed to reveal any fruitbodies. W. B. Cooke places *C. lloydiana* in synonymy under *Cellypha griseopallida* (Weinm.) W. B. Cooke, although his evidence for doing so is far from being conclusive. Cooke claims to have examined the type of *C. lloydiana* (see p. 55) but just how a specimen collected by Kotlaba in 1952 can be held to be the type of a species described by Pilát in 1925 is not clear!

W. B. Cooke (1961) recognises two species of *Pellidiscus:—P. pallidus* and *P. subiculosus* W. B. Cooke (fig. 40)—and attempts to key them out as follows:

Receptacles 0.5–1.0 mm. in diameter, spores 6.5–7 × 3–5 μ .... *P. pallidus*
Receptacles 0.1 mm. in diameter, spores 7–8 × 4–5 μ .... *P. subiculosus*

However, since the spore range of European gatherings of *P. pallidus* may be 5.5–9 × 3.2–5 μ (and Cooke himself includes under *P. pallidus*, European collections with spores ranging from 5.5–8 × 3.5–4.5 μ) the only remaining distinction appears to rest on the size of the fruitbody. This distinction also fails for sporophores up to 750 μ in diameter have been found amongst the type collection of *P. subiculosus*, while fruitbodies measuring only 250 μ in diameter are encountered in European gatherings of *P. pallidus*. It is clear, therefore, that *P. subiculosus* must be regarded as a synonym of *P. pallidus*.

It is extremely difficult to know what Cooke intends as the spore size for *P. pallidus* for in his key (p. 114) he cites the spores of this species as 6.5–7 × 3–5 μ while in the text he describes them as 8.5–9 × 3.5–4 μ! This situation is complicated by odd references to the spore size of collections from Czechoslovakia and Norway.

Cooke also states that the subhymenial hyphae of some specimens are clamped. This observation is extremely surprising and has not been verified in any of the collections examined by the present author.

Donk (*1959*) wrote of *P. pallidus* "The occurrence of such different substrata as are indicated above for *Pellidiscus pallidus* perhaps indicate that more than one species is involved. Romagnesi's quoted remark suggests the same. However, the available material is insufficient to decide the question but it certainly does not readily support such an assumption." Because of these remarks the spore size of the various type collections and other important gatherings are listed below (for fuller details of the specimens see under list of collections examined above):

Cyphella disciformis: collection so determined by Pilát (PR No. 487490): 6.2–9 × 3.75–4.5 μ.
C. sarothamni: lectotype (PR No. 174301): 6–8 × 3.2–4.5 μ.
  Collection so determined by Pilát (PR No. 174299): 6.2–8 × 3.5–4 μ.
C. involuta: lectotype (PR No. 174178): 5.75–7 × 3–4 μ.
  Collection so determined by Pilát (PR No. 174179): 6–9 × 3.2–4.75 μ.
C. bloxami: Type (K): 6–7.5 × 3.75–5 μ.
North American collections of *Pellidiscus pallidus*:
Newfield, New Jersey: 6–8 × 4–4-4.5 μ.
Paget Marsh, Bermuda: (5.2–)6–7.2 × 3.75–4 μ.
Tahquamenon, Michigan: 7–9 × 3.2–4.75(–5) μ.
Pellidiscus subiculosus: Type (TRTC): 6.5–8.2 × 3.5–4.5(–4.75) μ.

STROMATOCYPHELLA W. B. Cooke emend. Reid

Fructifications consisting of crowded cups borne on a common stroma. These cups become fused together and terminate at roughly the same level to form what look like small, circular poroid fruitbodies. These compound fructifications, which appear to be associated in many instances, and perhaps constantly, with effete stromata of pyrenomycetes, are usually sessile but when growing from the sides of twigs they may be narrowed below into a stipe-like base and then become somewhat pendulous and turbinate. *Hyphal structure* monomitic, consisting of more or less thin-walled hyaline, branched hyphae, with clamp-connexions at the septa. These hyphae which are loosely arranged and somewhat divergent appear to be held in a gelatinous matrix. Toward the innermost region of the flesh the hyphae may eventually become completely gelatinized forming a dark brown, almost structureless granular layer. The outer surface of the fruitbodies is clothed with hairs. These hairs are branched and coralloid and tend to have distinct brownish walls at least in their basal portion. They are also heavily encrusted with a granular substance which dissolves rapidly in 10% potassium hydroxide solution. The hairs which arise anywhere over the surface of the cups, stand out at right angles to form a distinct surface 'layer'. However, toward the base of the cups the hairs become progressively less specialized. *Basidia* 4-spored, hyaline, clavate, with a basal clamp-connexion. *Spores* thin-walled, hyaline, nonamyloid, varying in shape from subcylindrical or narrowly elliptical to slightly allantoid. The spores, which have an ill defined apiculus, frequently contain one large or two smaller guttules.

When W. B. Cooke described the genus *Stromatocyphella* (spelled *Stromatoscyphella* in his key on p. 15) with *Cyphella conglobata* Burt as the type species, he also included two additional fungi viz. *S. lataensis* W. B. Cooke and *S. aceris* W. B. Cooke. Unfortunately the two latter fungi bear no relationship to each other or to the type species of the genus. *Stromatocyphella lataensis* is nothing more than a synonym of *Calythella erucaeformis* Fr. Cooke's description of the receptacles of *S. lataensis* as "caespitose on a stroma, 2 to many in a fascicle" is inaccurate for when soaked up these 'stromatic colonies' can be seen to consist of single lobed sporophores or fruitbodies which have proliferated from the margin and/or the centre of the cup (for further details see this paper p. 125). In contrast *S. aceris* is a typical member of the genus *Cyphellopsis* Donk. Here again Cooke described the fungus as consisting of up to 50 receptacles in a cluster on a black stroma. However, the type collection shows no trace of a stroma. Furthermore there was no sign, in the hymenium, of the "infrequent irregular thick-walled ste rilebodies whose contents stain red in phloxine" as mentioned by Cooke in his original diagnosis. Unfortunately it was not possible to find spores in any of the fruitbodies examined, despite the fact that there were basidia present with four well developed sterigmata (these basidia measured 18–26 × 3.5–4 μ as opposed to Cooke's measurements of 10–15 × 3–4 μ). Nevertheless since Cooke described the spores as 5–6 × 2–2.5 μ there seems absolutely no reason why *S. aceris* should not be included under Cooke's exceptionlly wide concept of *Cyphellopsis anomala* (Pers. ex Fr.) Donk or even perhaps under *C. confusa* (Bres.) Reid of the present paper (see p. 110).

As introduced by Cooke the genus *Stromatocyphella* included three unrelated fungi referable to three distinct genera. Because of this Cooke's definition of the genus has had to be emended in the present paper to exclude all but *S. conglobata*.

STROMATOCYPHELLA CONGLOBATA (Burt) W. B. Cooke—Fig. 44

Cyphella conglobata Burt *in* Ann. Mo. bot. Gdn **1**: 375. 1915. — *Stromatocyphella conglobata* (Burt) W. B. Cooke *in* Beih. Sydowia **4**: 104. 1961.

Sporophores consisting of from 1–30 densely crowded cups borne on a common stroma. These cups become fused together and terminate at roughly the same level to form what looks like small, circular, poroid fruitbodies, up to 5 mm in diam. These compound fructifications, which are associated in many instances, and perhaps constantly, with effete stromata of pyrenomycetes, are usually sessile, but when growing from the sides of twigs they may be narrowed below in a stipe-like base and are then somewhat pendulous and turbinate. The individual cups are ashy grey with a disc which is either concolorous, dark slate-grey or almost black. When examined under a lens these cups appear minutely furfuracous due to their being clothed on the outside with small, branched hairs. *Structure*: in section the colonies can be seen to arise from pyrenomycete stromata, and to consist of cups up to 1000 μ in diam. The degree of fusion between adjacent cups varies according to the crowding of the colony. In some instances the outer walls of the individual cups cannot be distinguished while in less crowded colonies these walls are still visible. The cups consist of a number of zones. On the very outside there is a layer of hairs. These hairs vary in appearance according to their position on the cup. Near the rim, where the hairs are most highly developed, they are branched and coralloid and tend to have distinct brownish walls, at least in their basal portions. They are also heavily encrusted with granular material which dissolves extremely rapidly in 10% potassium hydroxide solution, but they are scarcely diverticulate as stated by Singer (*1945*). These hairs originate anywhere on the surface of the cups from similar, less highly branched hyphae to which they are joined by a clamp-connexion. These latter hyphae which tend to be wider, 4.5(–5) μ in diam., also have brown, granule encrusted walls. The hairs themselves which vary in width from 1.75–3 μ (without the encrustation), stand out from the surface at right angles and form a 'layer' up to 52 μ wide near the rim of the cups. However, the nearer the base of the cup the less specialized the hairs. They become more elongated, the branching becomes less condensed, the side branches become longer, and the walls tend to be thinner, until near the very base of the cups the hairs degenerate into little more than elongated branched hyphae with clamp-connexions at the septa. Nevertheless, there is still the tendency to produce some short side branches of limited growth. These degenerate hairs still have distinct brownish, granule encrusted walls. Furthermore they also tend to stand out from the surface at right angles and form a tangled, twisted weft, up to 150 μ in thickness. In some collections this 'layer' of hairs becomes matted down and flattened. Other variations involve the depth of colour of the brown pigment in the walls of the hairs. In some instances the hairs may be almost hyaline whereas in others they appear brown. The hairs arise from the outermost region of a well defined (context?) layer, formed of very loosely arranged, thin-walled, hyaline hyphae with clamp-connexions at the septa. These hyphae appear to be held in a mucilaginous matrix, and probably they themselves break down to form this mucilage. They are sparingly branched, and are up to 2.5 μ in diam., while the zone of which they are a part is up to 100 μ wide. Furthermore the hyphae in this zone tend to spread out at right angles to the hymenium, except in fruitbodies which are crowded together and under mutual pressure. Toward the outermost region of this zone some of the hyphae become wider, 4.5(–5) μ in diam., and develop thicker, somewhat brownish, granule encrusted walls. It is from these hyphae that the hairs arise. Toward the innermost region this zone gradually passes into a subhymenial layer, 13–18 μ wide, formed of freely branched, densely compacted and entwined hyphae, up to 2.5 μ in diam. These hyphae may have either hyaline or distinctly brownish walls. In old fruitbodies the innermost hyphae of the context, and possibly also the subhymenial tissue, may become completely gelatinized to form a dark, brown, structureless, granular layer. From the subhymenium the basidia arise, forming a palisade 13–24 μ wide. *Cystidia* and *gloeocystidia* absent. *Basidia* 16–20.8 × 5–6 μ, 4-spored, hyaline, clavate, with a clamped basal septum. *Spores* as seen in copious white spore prints are thin-walled, hyaline, nonamyloid, and vary in shape from subcylindric or narrowly elliptical to slightly allantoid. They have an ill defined lateral apiculus and often contain either one large or two smaller guttules. In the print of the Pike Lake collection the spores measure 7.2–9 × 3.2–3.75(–4) μ and in the print of the Barque Point gathering they measure 7.2–9.75 × 2.75–3.5 μ.

HABITAT: This fungus, which is only known from North America, is usually found growing on small dead branches of *Alnus* spp., sometimes while still attached to the tree. W. B. Cooke has also recorded it on *Betula* sp. and on *Juglans cinerea*.

COLLECTIONS EXAMINED: On *Alnus incana*, Bell's Lake, North Parry Sound, Ontario, coll. H. S. Jackson (No. 5452), 20–22 Sept. 1934; on *Alnus*, Pike Lake, Michigan, coll. D. A. Reid, 12 Aug. 1961; on *Alnus*, Michigan, coll. D. A. Reid, 14 July 1961; on *Alnus*, Garden Peninsula, Barque Point, Michigan, coll. D. A. Reid, 16 Aug. 1961.

When Burt (*1915*) described this species he wrote "One might regard this fungus as the type species of a new genus . . .", and Singer (*1945*) after quoting Burt's comment added "He is probably right in this though we would prefer to delay the proposal of a new generic name for this group until the Cyphellaceae are reorganized more logically than they are now." There is, therefore, some good measure of support for the recognition of *Stromatocyphella*.

As to the affinities of this genus Singer (l.c.) remarked "*C. conglobata* is, in a certain sense, a prototype of the laschioid Cyphellineae, i.e. *Campanella* and *Favolaschia*."

Leptoglossum Karst.

Corniola S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 637. 1821.
Leptoglossum Karst. *in* Bidr. Känn. Finl. Nat. Folk **32**: xvii, 242. 1879.
Leptotus Karst. *in* Bidr. Känn. Finl. Nat. Folk **32**: xvii, 242. 1879.
Dictyolus Quél., Ench. Fung. 139. 1886.

Fructifications growing on or associated with mosses. The individual sporophores are either Agaricoid or Cyphelloid. When Agaricoid the fructifications are typically dimidiate or spathulate with a lateral stalk, but some authorities (Singer, *1962*) include small, centrally stipitate, Omphalinoid agarics. When Cyphelloid the fruit-bodies are small pendant, and either cupulate or saucer-shaped. The fructifications, which are dirty grey-brown or white in colour have an hymenial surface which may be smooth, thrown into a network of veins or lamellate. The sterile surface of these sporophores is devoid of hairs. *Hyphal structure* monomitic, consisting of rather broad, hyaline hyphae, up to 16 μ in diam, which may or may not possess clamp-connexions at the septa. When clamp-connexions are absent the hyphae are often conspicuously constricted at the septa, the segments tend to be relatively short, and "H"-connexions are frequent. *Basidia* clavate. *Spores* thin-walled, hyaline, nonamyloid, varying in

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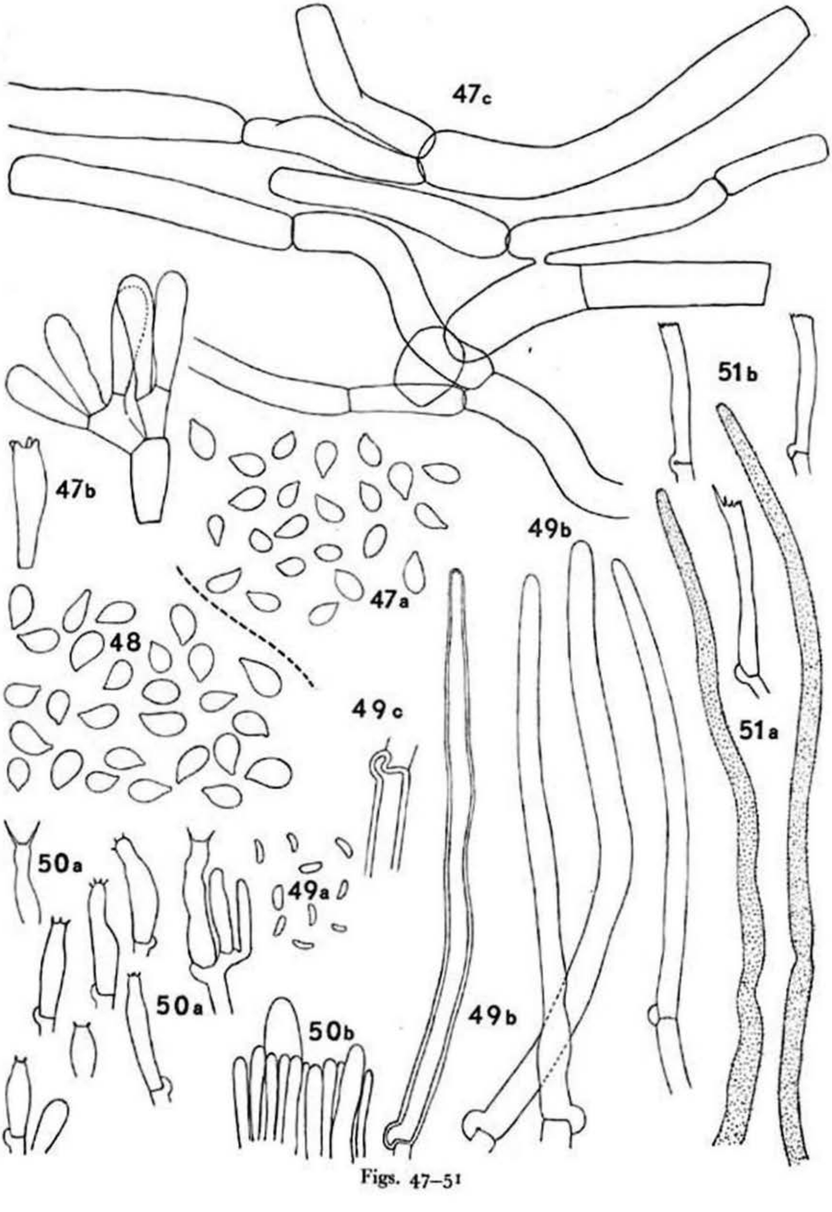
EXPLANATION OF FIGURES 47–51

Figs. 47–51. — 47, 48. *Leptoglossum retirugum*. — 47. Cheboygan, 29 July 1934. a. Spores. b. Basidia. c. Hyphae. — 48. Thursley, 19 Nov. 1939. Spores from a spore-print. — 49, 50. *Plicaturopsis crispa*. — 49. Tahquamenon, 2 Aug. 1961. a. Spores. b. Hairs, three of which appeared solid and glassy. c. Base of hair. — 50. Pellston Hills, 7 Aug. 1961. a. Basidia. b. Sterile element in the hymenium. — 51. *Sterile Cyphelloid fungus*. Onaway, 8 July 1961. a. Hairs. b. Three bases of hairs. — All figures × 866.



Figs. 47–51

shape from elliptical, broadly elliptical or ovate to pip-shaped (broadest toward the apex) and with a distinct apiculus.

It should be noted that many authorities have regarded the genus *Leptoglossum* as forming part of a distinct family i.e.: the Leptotaceae R. Maire (not the Leptoglossaceae as cited by W. B. Cooke on p. 129). More recently Singer (*1962*) has included *Leptoglossum* in the Tricholomataceae. However, species belonging to this genus have been included in the present work owing to their cyphelloid aspect. It is probably true to say of the species of *Leptoglossum* that they are amongst the most perplexing and difficult of all the cyphellaceous fungi to name. This is because the old descriptions are often inadequate with the result that there have been many different applications of the various epithets. This confusion has, if anything, been made worse by Cooke's treatment of the genus, since he has made a number of errors in his synonymy and in his specific descriptions, some of which are tabulated below:

(1) In his key to the species (p. 130) he gives the spores of *L. retirugum* as 5–7 × 1–2 μ. This is an error for reference to p. 134 will show that these measurements are those of crystals found by Cooke in a Pennsylvanian collection. The actual spore measurements of this species, according to Cooke, are 5.5–(10)–11 × 3.5–7 μ.

(2) Under *L. laeve* Cooke refers to clamp-connexions being abundant. In fact this small-spored species is characterized by its thin-walled, narrow hyphae, 2–3 μ in diam., which lack clamp-connexions at the septa, and by its small broadly elliptical spores, 3–4 × 2–2.5 μ. The type collection of *Craterellus pogonati* Peck, which Cooke lists in synonymy under *L. laevis*, likewise lacks clamp-connexions and bears broadly elliptical spores 3–4.2(–4.5) × 2–2.2(–2.5) μ and has therefore to be regarded as a synonym of the latter species.

(3) Cooke places *Stereophyllum boreale* Karst. in synonymy under *L. retirugum*—whereas it should be placed in synonymy under *L. laeve* since the type collection has the characteristic small spores and narrow hyphae lacking clamp-connexions referred to above.

(4) Under *L. galeatum* W. B. Cooke, he lists as a synonym "*Cyphella muscicola* Berk. & Mont., J. Linn. Soc. 10: 337, 1868. not *Cyphella muscicola* Fr. Syst. Myc. 2, 202, 1822". Reference to the "Journal of the Linnean Society" (**10**: 337. 1868) shows that there is no *C. muscicola* Berkeley & Montagne, but there is a *Cyphella musaecola* Berkeley & Curtis!! However, it is to be presumed that Cooke does not intend to suggest that this cyphelloid fungus on mosses is the same as the fungus described by Berkeley & Curtis on *Musa*.

LEPTOGLOSSUM RETIRUGUM (Bull. ex Fr.) Ricken—Figs. 47, 48

Helvella retiruga Bull., Herb. Fr. *pl.* 498 *fig.* 1. 1790; Hist. Champ. **1**: 289. 1791. — *Merulius retirugus* (Bull.) Pers., Syn. Fung. 494. 1801 (devalidated name). — *Cantharellus retirugus* (Bull.) Fr., Syst. mycol. **1**: 324. 1821. — *Merulius retirugus* (Bull.) St. Amans, Fl. agen. 557. 1821. — *Leptotus retirugus* (Bull. ex Fr.) Karst. *in* Bidr. Känn. Finl. Nat. Folk **32**: xvii, 243. 1879. — *Dictyolus retirugus* (Bull. ex Fr.) Quél., Ench. Fung. 140. 1886. — *Leptoglossum retirugum* (Bull. ex Fr.) Ricken, Blätterp. **1**: 6. 1915.

Sporophores up to 1.5 cm in length and 1 cm in width, varying in shape from very small, pendant, centrally attached cups to larger flattened irregularly discoid fruitbodies with an excentric point of attachment, but not laterally stipitate. When fresh the fructifications are pale brownish-grey but become brownish-grey with a distinctly brown hymenium in the herbarium. As seen in dried material the hymenial surface is smooth in young fructifications but is radially wrinkled, especially toward the margin, in more mature sporophores. *Structure*: the fruitbodies consist of broad, thin-walled, hyaline, branched hyphae, up to 16 μ in diam. These hyphae are formed of distinct segments which may be short and barrel-shaped or rather elongated, but in either instance tend to be markedly constricted. at the septa. There are no clamps, but 'H'-connexions between hyphae are frequent. The hyphae are more or less parallel and loosely arranged. There is no well defined cuticle; the hyphae forming the surface of the fruitbody develop very slightly thickened, brownish walls, and tend to collaps in dried material. Toward the innermost region of the flesh the hyphae produce branches which curve downward/inward to form a well developed subhymenial layer. Nearest the flesh the subhymenial hyphae are very loosely and irregularly arranged and also rather entwined. Furthermore they are formed of relatively long segments. Nearer the hymenium these become progressively shorter and more densely compacted until finally they appear as short cuneate segments. It is from these cuneate segments that the basidia arise, forming a palisadelike layer. *Cystidia* and *gloeocystidia* absent. *Basidia* 4-spored, hyaline, clavate, up to 25×7.2 μ. *Spores* varying much in size from $4–8 \times 2.75–4.5$ μ—the smaller ones apparently immature. Mains found them to be $4–6 \times 2–3$ μ according to a note on the packet. They are thin-walled, hyaline, variable in shape, ranging from elliptical in side view to ovate when seen from above, and have a distinct, often prominent apiculus.

Habitat: growing attached to various moses.

Collections examined: University Biological Station, Pellston, Michigan, coll. A. H. Smith, 29 July 1934. Also a number of British and other European gatherings.

As previously indicated the species of *Leptoglossum* are exceptionally difficult to name, but the collection described above seems to agree well with Bulliard's original account of *Helvella retiruga* and also with his published illustration of this species (pl. 498. fig. 1). In his description Bulliard notes that his fungus is "fort mince et d'une forme arrondie. Elle naît dans une direction verticale qu'elle conserve presque tout le temps de son existence" and that "elle . . . est insérée par sa surface supérieure". Bulliard also noted that his *H. retiruga* was very closely related to his *H. dimidiata* which Fries (*1821*) placed in synonymy under *Cantharellus muscigenus*. In fact Bulliard wrote under *H. retiruga* "*Rapproch.* L'helvelle réticulée n'a de rapport qu'avec la suivante; mais celle-ci naît toujours dans une direction horizontale; elle n'est point attachée à la mousse par sa surface supérieure, et n'a point, comme l'helvelle réticulée, ses nervures disposées comme les mailles d'un filet." The only difference between Bulliard's figure and the Michigan collection is that he includes in his plate some larger and more mature specimens in which the hymenium has developed a network of fine veins. However, he also figures young fruitbodies which are shown as small cups with a smooth hymenial surface. Since Fries (l.c.) had only seen Bulliard's figure when he published his account of the species in the Systema it follows *a priori* that the Friesian interpretation of this fungus must be identical with that of Bulliard.

As interpreted in the present work the fungus seems to be identical with *Dictyolus retirugus* sensu Donk (*1941*), *Leptoglossum retirugum* sensu Kühner & Romagnesi (*1953*) and *Phaeocyphella muscicola* sensu Pilát (*1925*) [the collection on which Pilát based his description was examined and found to bear hyaline spores (5.75–)6.2–8.5 × × (3.2–)3.5–4.75 µ and to have hyphae up to 10.5 µ wide which lacked clamp-connexions at the septa]. It is also in all probability identical with Coker's (*1920*) concept of *Cantharellus retirugus* for his illustration (pl. 7) portrays a fungus with exactly the habit of the Michigan collection. Likewise his description applies quite well except that he describes his gathering as "nearly pure white . . . when young" and adds that the hymenium is also "nearly white, then pale ashy-straw". Unfortunately he gives no data concerning the hyphae and as there is a pure white cyphelloid species of *Leptoglossum* in North America (see the account of the following species below) which differs from *L. retirugum* in having clamp-connexions one cannot be certain which of these two fungi Coker had without an examination of his material.

Singer's (*1945*) concept of *L. retirugum* is quite different and comes nearer to *Leptoglossum lobatum* (Pers. ex Fr.) Karst. as interpreted by such European authors as Favre (*1948*), Kühner & Romagnesi (*1953*), M. Lange (*1955*) and possibly also with that of W. B. Cooke, although, unlike previous workers, he claims that there are no clamps present in this species.

Just what relationship exists between *L. retirugum* and *L. muscigenum* (Bull. ex Fr.) Karst. is difficult to determine. As currently interpreted in Europe *L. muscigenum* differs from *L. retirugum* in being laterally stipitate and in having well developed, radiating gill-like folds on the hymenium, at least in well developed specimens. In so far as the Kew collections of these fungi are concerned the habit would seem to be quite constant, and even minute fruitbodies of *L. muscigenum* appear to be laterally stipitate. However Donk (*1931*) has observed that *L. retirugum* may be laterally attached! It is just possible therefore, that the distinctions between these two fungi are more apparent than real. Certainly there is little difference in microscopic features between the two species!

As to the spore size of the Michigan collection described above, it is interesting to note that the overall range is very similar to that obtained from a spore print of a British gathering (Thursley, Surrey, coll. A. A. Pearson, 19 Nov. 1939). The spores from this print measured 6–8.2(–9) × 3.5–4(–5) µ and showed similar variation in size and shape to that which was observed in the American gathering. However, although the overall range was similar the spores obtained from the print were distinctly larger on average, but when spores from the fruitbodies of the two collections were compared there was very close agreement.

LEPTOGLOSSUM SP.—Fig. 46

Sporophore up to 2 mm. in diam., pure white, pendant, cupulate, sessile and centrally attached. Hymenium smooth. *Structure*: the flesh is formed of hyaline, branched hyphae, up to 7 µ in diam., with clamp-connexions at the septa. These hyphae have much longer segments than those of *L. retirugum*, furthermore they are less constricted at the septa and have more distinct highly refractive walls. The surface of the fruitbody is devoid of any specialized hairs or coralloid Rameales-structures (see Singer, *1962*). *Basidia* up to 22 μ long and 6 μ wide, clavate with a basal clamp-connexion. *Spores* 5.75–8.2 × 3.75–4.5 μ, thin-walled, hyaline, varying in shape from elliptical, broadly elliptical or ovate to pip-shaped (broadest near the apex) and with a distinct apiculus.

HABITAT: On moss.

COLLECTION EXAMINED: On moss in bog, Onaway, Michigan, coll. D. A. Reid, 22 July 1961.

This fungus does not appear to match any of the European species of *Leptoglossum*. The only white species of this genus keyed out by Kühner and Romagnesi (*1953*) is *L. bryophilum* (Pers. ex Fr.) Ricken (*Dictyolus juranus* Quél. is said to be essentially the same as this species), but this, although pendant, cupulate and centrally attached is said to have gills which "concourant vers un point central, dichotomes, larges et assez aiguës comme celles d'un *Pleurotellus*". Recently Donk & Singer apud Singer (*1962*) and Donk (*1962*) have transferred *L. bryophilum* to a new genus *Mniopetalum* Donk & Sing. with *M. globisporum* Donk as the type species ["*Cyphella muscicola* Fr. sensu Pat." of Donk *1931*]. The fungi belonging to this genus are said by Singer to resemble species of *Leptoglossum* in habit and habitat, but are entirely without pigment. They have smooth, hyaline, nonamyloid, subglobose spores, and clamped hyphae. Furthermore the external surface is said to bear "occasional projecting hyphal elements which may be irregularly and often scantily diverticulate or with nodulose outgrowths or forking hyphal ends, or appressed and smooth". The hymenial surface is said to be "smooth, but sometimes with veins which may become lamellar (not in the type species)". Further a true stipe is said to be lacking, although a pseudostipe is sometimes present, although even then it is "short and little differentiated". Clearly the unnamed fungus described above shows some of the characters of this new genus but it lacks both the subglobose spores and the peculiar hyphal structure of the sterile surfaces. In fact the spores of this collection are virtually indistinguishable from those of *L. retirugum* and I am convinced that its affinities lie with the species of *Leptoglossum*, despite the lack of pigment, rather than with members of the genus *Mniopetalum*. Unfortunately, although the Michigan collection appears to represent an undescribed species it is too scanty to form the basis of a new taxon. However, it should be sought for again and if adequate material comes to hand it should be redescribed and named.

STROMATOSCYPHA Donk

Porotheleum (Fr. ex Fr.) Fr., Syst. Orb. veg. 80. 1825 [non *Porothelium* Eschw. (1824; *Trypetheliaceae*, Lichenes)].

Stromatoscypha Donk *in* Reinwardtia **1**: 218. 1951.

Fructifications consisting of a well developed stroma bearing numerous discrete cups which at length coalesce to form a *Poria*-like fructification. Initially these cups are globose with a small apical pore but they gradually expand and become tubular, cup-shaped or saucer-shaped and when they finally coalesce they often appear angular owing to mutual pressure. The stroma forms a spreading, resupinate, membranous-fibrous, tough layer which is easily separable from the substratum;

often with a broad sterile byssoid or conspicuously fringed rhizomorphic margin. *Hyphal structure* monomitic in the cups but weakly dimitic in the stroma. The stroma consists of generative and skeletal hyphae. The skeletal hyphae are very thick-walled to almost solid but taper to a very narrow, elongated, thin-walled apex which may be secondarily septate. These skeletal hyphae are usually unbranched and lack clamp-connexions. The generative hyphae are thin-walled, branched and bear scanty clamp-connexions. This hyphal differentiation is not always absolutely clear-cut for the generative hyphae may become thick-walled while occasional skeletal hyphae may fork and bear the odd clamp-connexion. Nevertheless there is hyphal differentiation! The context of the cups is formed of thin-walled, hyaline, branched hyphae with clamp-connexions at the septa. Toward the outer surface of the cup some of these hyphae may diverge slightly to form extremely poorly differentiated 'hairs'. However these 'hairs' cannot be regarded as anything more than divergent clamped hyphae. *Basidia* clavate. *Spores* short elliptical, smooth, thin-walled and nonamyloid.

Donk (*1951*, *1959*) has set out the reasons for regarding *Porotheleum* (Fr. ex Fr.) Fr. as a later homonym of *Porothelium* Eschw. and most mycologists will feel bound to accept his argument. However, W. B. Cooke (*1957*, *1961*) has seen fit to continue using *Porotheleum* in preference to *Stromatoscypha*.

The genus *Porotheleum* has often been regarded in the past as a member of the Polyporaceae, but Murrill (*1916*) made it the type genus of a new family—the Porotheleaceae.

STROMATOSCYHPA FIMBRIATA (Pers. ex Fr.) Donk—Fig. 45

Poria fimbriata Pers. *in* Neues Mag. Bot. **1**: 109. 1794 (devalidated name). — *Boletus fimbriatus* (Pers.) Pers., Syn. Fung. 546. 1801 (devalidated name). — *Porotheleum fimbriatum* (Pers.) Fr., Obs. mycol. **2**: 272. 1818 (devalidated name). — *Polyporus fimbriatus* Pers. *ex* Fr., Syst. mycol. **1**: 506. 1821. — *Boletus fimbriatus* (Pers. ex Fr.) Schw. *in* Schr. naturf. Ges. Leipz. **1**: 99. 1822. — *Porotheleum fimbriatum* (Pers. ex Fr.) Fr., Syst. mycol. **3** (Ind.): 150. 1832. — *Poria fimbriata* (Pers. ex Fr.) Lloyd, Mycol. Writ. **5**: 740. 1917. — *Stromatoscypha fimbriata* (Pers. ex Fr.) Donk *in* Reinwardtia **1**: 219. 1951.

Peziza porioides A. & S., Consp. Fung. 327. 1805 (devalidated name). — *Peziza porioides* A. & S. *ex* Pers., Mycol. europ. **1**: 275. 1822. — *Solenia porioides* (A. & S. ex Pers.) Fuck. *in* Jb. nassau. Ver. Naturk. **27–28**: 6. 1873. — *Phialea porioides* (A. & S. ex Pers.) Gillet, Champ. Fr. (Disc.) 112. 1881. — *Cyphella porioides* (A. & S. ex Pers.) Quél., Ench. Fung. 215. 1886. — *Eriopeziza porioides* (A. & S. ex Pers.) Rehm *in* Rab. Krypt.-Fl., 2. Aufl., Pilze **3** (2): 697. 1892. — *Henningsomyces porioides* (A. & S. ex Pers.) O. Kuntze, Rev. Gen. Pl. **3**: 483. 1898.

Boletus pezizoides Schw. *in* Schr. naturf. Ges. Leipz. **1**: 100. 1822. — *Polyporus pezizoides* (Schw.) Steud., Nomencl. bot. Pl. crypt. 348. 1824. — *Porotheleum pezizoides* (Schw.) Schw. *in* Trans. Amer. phil. Soc. II **4**: 160. 1832.

Porotheleum lacerum Fr., Obs. mycol. **2**: 273. 1818 (devalidated name). — *Porotheleum lacerum* Fr. *ex* Fr., Elench. Fung. **1**: 125. 1828.

Boletus byssinus Schrad., Spic. Fl. germ. 172. 1794 (devalidated name). — *Poria byssina* (Schrad.) Fr., Syst. mycol. **3** (Ind.): 149. 1832 (as a synonym). — *Poria byssina* (Schrad.) Quél., Fl. mycol. Fr. 383. 1888. — *Physisporus byssinus* (Schrad. ex Quél.) Cost. & Duf., Nouv. Fl. Champ. 138. 1891. — *Tyromyces byssinus* (Schrad. ex Quél.) Bond., Trutov. Griby 164. 1953.

Poria brevipora Speg. *in* An. Mus. nac. Hist. nat. Buenos Aires **4**: 172. 1899.

Fruitbodies consisting of a well developed stroma bearing numerous discrete cups which at length coalesce to form a *Poria*-like fructification. Initially these cups are globose with a small apical pore but they gradually expand and become cup-shaped or saucer-shaped, and when they finally coalesce they often appear angular owing to mutual pressure. However, if a well developed 'poroid' fructification is examined under a lens it is usually possible to see areas near the margin in which there are still isolated cups present. The stroma forms a tough, spreading, resupinate, fibrous layer, which is easily separable from the substrate. In most fruitbodies there is a very broad sterile margin, up to 1 cm wide, which is white in colour and either byssoid or fringed with conspicuous rhizomorphic strands. When fresh the fungus is either white or cream, becoming more deeply coloured when dried, although retaining a white margin. *Structure*: in section the cups near the margin of the fruitbody can be seen to arise at widely scattered points and to have a very superficial origin with only the lowest portions appearing to be slightly sunken in the stromatic tissue. Later as the adjacent tissue grows up round them they may appear to be more deeply imbedded. In the living plant the isolated cups normally appear distinctly cupulate but in herbarium specimens they are usually shallowly saucer-shaped. On 'poroid' portions of the fruitbody the 'tubes' are commonly shallow with thick dissepiments but in certain gatherings the 'tubes' may be up to 1 mm deep. The stroma, which is dimitic, is formed of generative and skeletal hyphae. The skeletal hyphae, up to 500 μ long and up to 2.5 μ wide, are often almost solid but they taper to very narrow, elongated, thin-walled apices which may be secondarily septate. The generative hyphae are similar but they are thin-walled, branched, bear clamp-connexions at the septa and are up to 3 μ wide. Generative hyphae may be difficult to demonstrate in the stroma but are most easily seen near the growing margins and in the region of the cups. The hyphal differentiation is not always absolutely clear-cut for the generative hyphae may become thick-walled and sometimes a skeletal hypha may fork or even bear an occasional clamp-connexion. Sections show that the stroma is formed throughout of these two types of hyphae. They are arranged more or less parallel to the substrate in the basal portion but become more irregularly arranged and somewhat entwined nearer the surface. There is also a tendency for the hyphae to form rope-like strands within the stroma. The cups have very thin walls which are often less than 26 μ wide. These are entirely formed of densely compacted, thin-walled generative hyphae, with clamp-connexions at the septa. The hyphae are freely branched and more or less parallel with the hymenial surface. It is also possible that they may be slightly agglutinated although not gelatinized. Towards the outer surface of discrete cups the context hyphae may diverge and form undifferentiated 'hairs'. However these 'hairs' cannot be regarded as anything more than divergent, clamped vegetative hyphae. Within the context is an hymenium consisting of a palisade layer of basidia up to 20.8 μ wide. *Cystidia* and *gloeocystidia* absent. *Basidia* clavate, up to 18.2 × 5 μ. *Spores* as seen in copious white spore prints are thin-walled, hyaline, monoguttulate, elliptical, 4–5.2 × 2.2–3.2 μ.

HABITAT: This fungus which has an almost worldwide distribution occurs on dead wood of both coniferous and deciduous trees and rarely even on bare soil. It is very common in Michigan.

COLLECTIONS EXAMINED: On *Pinus*, Colonial Point, Burt Lake, Michigan, coll. D. A. Reid, 16 July 1961; Pellston, Michigan, coll. D. A. Reid, 17 July 1961; on wood, Harbor Springs Hills, Michigan, coll. D. A. Reid, 27 July 1961; on mossy soil, Harbor Springs Hills, Michigan, coll. D. A. Reid, 27 July 1961. Also many other American and European gatherings.

For a more fully documented synonymy see Donk (*1959*). In his account of this fungus W. B. Cooke (*1957*) lists *Poria fatiscens* (Berk. & Rav.) M. C. Cooke in synonymy, but this is erroneous.

Plicaturopsis Reid. *gen. nov.*

Sporophora submembranacea, flaccida, pendula, a parte pilei medio et superiore affixa, flabellata vel reniformes, saepe lobata vel confluentes, saepe sulcato-zonata, sub lente villosula, alba vel rufo-brunnescentes; lamellae albae, radiatae, confertae, pliciformes, ramosae vel furcatae, crispae. Stipes brevis vel rudimentalis. *Hypharum systema* monomiticum. Hyphae contextae versus subhymenium hyalinae ramosae, septatae, fibulatae, muris tenuibus vel leviter crassiusculis; versus superficiem exteriorem latiores, lutescentes, muris crassis instructae. Hyphae subhymeniales hyalinae, vitreae, ramosae, fibulatae, muris valde incrassatis. Superficies exterior pilis vestita. Pili vitrei hyalini vel pallido-lutescentes, septati, fibulati, angustati, versus apicem obtusi, muris crassis instructi. *Cystidia* et *gloeocystidia* absentia. *Basidia* parva, irregulariter cylindrica. *Sporae* minutae, hyalinae, anguste allantoideae vel anguste ellipticae. — TYPUS: *Plicatura crispa* (Pers. ex Fr.) Rea.

Fructifications commonly pendant, cupulate or campanulate and centrally attached from the dorsal surface by a short stipe. Fruitbodies growing from the sides of branches often have a longer, pendant stipe which expands unequally on one side to form what looks like a flabellate or reniform pileus, but in such instances there is usually a distinct ridge on the side of the stipe nearest the substrate indicating that the pileus is really dorsally attached. Frequently adjacent fruitbodies become confluent, or pilei may be intricately lobed. Yet again more than one pileus may arise from a common stalk. These modifications make for great diversity in growth form. The pileus is membranaceous, flaccid, often sulcate-zonate, villose under a lens, and pure white when young becoming reddish-brown with age. The white hymenial surface is initially smooth, becoming thrown into densely crowded, radiating, irregularly or dichotomously branched, crisped gill-like folds. Stipe short or rudimentary. *Hyphal system* monomitic. The hyphae of the context toward the subhymenium are hyaline, branched, septate with clamp-connexions and have thin or slightly thickened walls. Nearer the outer surface of the fruitbody the hyphae become broader, and at length develop thick yellowish walls. Subhymenial hyphae are hyaline, freely branched, with clamp-connexions at the septa and have very strongly thickened (or internally gelatinized?), highly refractive, glassy walls. The outer surface of the fruitbody is covered with long 'hairs'. These 'hairs' which bear clamped septa along their length have thickened, hyaline or yellowish-brown, glassy walls and may appear almost solid except sometimes in the ultimate segment. This terminal portion of the hair may on occasion be thin-walled or it may have slightly thickened walls. Furthermore it tapers gradually toward an obtuse apex. *Cystidia* and *gloeocystidia* absent. *Basidia* small, irregularly cylindrical and often constricted toward the apex. *Spores* minute, hyaline, narrowly allantoid or narrowly elliptical.

The new genus *Plicaturopsis* has had to be described because the type species of the genus *Plicatura* Peck (i.e. *P. alni*) would seem to be a more or less resupinate member of the genus *Merulius* Fr. sensu stricto, which amongst other features shows a quite different growth form, hymenial configuration and type of basidium from that found in *Plicatura crispa*. However, while it is not denied that the affinities of *Plicaturopsis* may ultimately be shown to lie with *Merulius* sensu stricto and *Phlebia* Fr. emend. Donk it is thought that *P. crispa* is sufficiently distinct to warrant separation from existing genera.

Plicaturopsis crispa (Pers. ex Fr.) Reid, *comb. nov.*—Figs. 49, 50

Cantharellus crispus Pers. *in* Neues Mag. Bot. **1**: 106. 1794 (devalidated name). — *Merulius crispus* (Pers.) Pers., Icones Descr. Fung. 32. 1800 (devalidated name). — *Cantharellus crispus*

Pers. *ex* Fr., Syst. mycol. **1**: 323. 1821. — *Merulius crispus* (Pers. ex Fr.) Fr., Syst. mycol. **3** (Ind.): 116. 1832. — *Trogia crispa* (Pers. ex Fr.) Fr., Monogr. Hym. Suec. **2**: 244. 1863. — *Plicatura crispa* (Pers. ex Fr.) Rea, Brit. Bas. 626. 1922.

Merulius fagineus Schrad., Spic. Fl. germ. 137. 1794 (devalidated name). — *Plicatura faginea* (Schrad.) *ex* Karst. *in* Bidr. Känn. Finl. Nat. Folk **48**: 342. 1889.

Sporophores up to 1.5 cm in diam., but varying considerably in shape according to their position on the substrate. When growing from the undersides of branches they are pendulous, cupulate or campanulate and centrally attached from the dorsal surface by a very short or rudimentary stipe. By contrast fruitbodies growing from the sides of branches have longer pendulous stipes which expand into a cupulate pileus. Such pilei subsequently tend to grow out in one direction to form what at first sight appears to be a laterally attached, flabellate or reniform pileus. However, there is usually a distinct ridge on the side of the stipe nearest the substrate representing the undeveloped portion of the pileus, indicating that the fructification is really dorsally attached. Truly lateral fruitbodies are very seldom, if ever, produced. The basic growth form of this fungus may be modified in a number of ways. Thus the sporophores may be very much lobed, and may even proliferate from the margin to form a large spathulate extension of the pileus, or yet again fruitbodies may fuse and form compound brackets. In other instances the fungus may burst through the bark of the host as a mass of tissue from which arises a group of densely imbricate pilei. Since the fungus is inclined to burst out through the lenticels of the host, striking effects are sometimes observed on such hosts as *Betula* spp. where the lenticels are elongated transversely (as seen on the tree) for the fungus following their distribution on fallen branches may produce many tiers of densely imbricate pilei in single file one above the other in a direction at right angles to the length of the branch. The pileus is membranaceous, flaccid and often sulcate-zonate. It is white when young but becomes reddish-brown with age. Further it is minutely tomentose or hispid when seen under a lens. The white hymenial surface is at first more or less smooth but soon becomes thrown into densely crowded, radiating, irregularly or dichotomously branched, crisped, gill-like folds. At the very centre the radiating gill-like folds are often replaced by irregular wrinkles. *Stipe* short or rudimentary except when growing out from beneath loose bark when it may reach 1 cm. in length. *Structure*: in section the flesh of the sporophore can be seen to be formed of more or less parallel, loosely organised, hyaline hyphae, 2.5–4 μ (mostly 3.5 μ) in diam., with thin or very slightly thickened walls, and which bear clamp-connexions at the septa. Nearer the surface of the pileus the hyphae become wider, up to 5 μ in diam., and tend to develop distinctly thickened walls. These hyphae gradually give to way others which have much thicker yellow tinted walls. Furthermore they may be up to 7 μ wide in some collections. These hyphae branch, and at the surface of the pileus some of the branches diverge and grow out to form long, gradually tapering, thick-walled 'hairs' with clamp connexions at intervals along their length. The 'hairs' which are up to 7 μ wide near the base narrow to 2.5–3(–4) μ in diam. at the obtuse apex. These 'hairs' are grouped together into rope-like strands to form the villose or hispid covering of the pileus. The degree of thickening of the walls of both hyphae and 'hairs' varies in different collections: in some instances they may retain a wide lumen but more often they appear almost solid and glassy. Toward the innermost region of the flesh the hyphae give way to a subhymenial layer 26–39 μ wide formed of freely branched hyphae with strongly thickened glassy walls. These hyphae which bear clamp-connexions are up to 3 μ wide. From this subhymenial layer there arises a palisade of basidia up to 13 μ wide. *Cystidia* and *gloeocystidia* absent, but there are occasional, thin-walled, hyaline, subcylindrical bodies, up to 7 μ wide which project beyond the basidia. It is not known whether these represent giant basidia or special sterile organs. *Basidia* up to 22 × 4.5 μ, more or less cylindrical, but often constricted near the apex, and frequently narrowed to a distinct neck bearing 2 or 4 sterigmata (2-spored basidia are frequent in some collections). The basidia have broad clamped bases. It should also be noted that the basidia seem to mature at different times so that only a few are capable of producing spores at any given moment, and these protrude conspicuously beyond the hymenial surface. *Spores* (2.2–)3.2–4.2 × × 0.75–1.5(–1.75) μ, thin-walled, hyaline, nonamyloid, varying in shape from very narrowly elliptical or subcylindrical to slightly allantoid.

HABITAT: This fungus was gathered abundantly in Michigan from July onward, but until the middle of August most collections were found to be sterile. The species is widely distributed in northern North America and Europe, and is also known from West Pakistan (Himalayas). It has been reported on fallen branches of a wide range of trees including *Acer* spp., *Alnus* spp., *Betula* spp., *Cedrus deodora*, *Corylus*, *Fagus*, *Juglans* and *Pinus strobus*.

COLLECTIONS EXAMINED: On Maple, Sturgeon Bay, Michigan, coll. D. A. Reid, 5 July 1961; Colonial Point, Douglas Lake, Michigan, coll. D. A. Reid, 16 July 1961; on *Betula lutea*, Tahquamenon, Michigan, coll. D. A. Reid, 2 Aug. 1961; Pellston Hills, Michigan, coll. D. A. Reid, 7 Aug. 1961; Wilderness State Park, Michigan, coll. D. A. Reid, 10 Aug. 1961; Pellston Hills, Michigan, coll. D. A. Reid, 20 Aug. 1961, Also numerous other collections from both America and Europe.

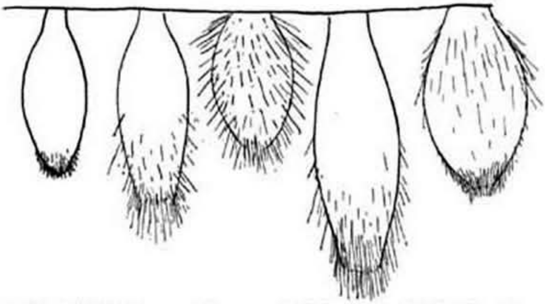


Fig. 52. Sterile Cyphelloid fungus. Onaway, 8 July 1961. Habit sketch. × 100 approx.

UNIDENTIFIED STERILE CYPHELLOID FUNGUS—Figs. 51, 52

Sporophores up to 450 μ long and 200 μ wide, occurring in very small or fairly extensive colonies. The individual fructifications are just visible to the naked eye as small white specks, but under a lens they are seen to consist of a conical or ovoid (Ainsworth & Bisby's Dictionary of the Fungi, pl. 14 fig. 12) head, which is narrowed below to a short stalk-like base. Sometimes the sporophores become more elongated and may appear almost subcylindrical although slightly enlarged below before narrowing again into the stipe-like base. When young the fruitbodies are entirely white and covered with stiff spreading hairs, but as they mature they become black from below upward. When fully mature they are entirely black and glabrous, resembling small seeds. *Structure*: when sectioned the fruitbodies were found to be solid, with the central portion formed of very irregularly arranged hyphae which are densely entwined in all directions. These hyphae, up to 2.5 μ wide are thin-walled, hyaline and bear clamp-connexions at the septa. Toward the outer surface of the fruitbody these hyphae give rise to stiff, spreading hairs. These hairs, which mostly arise toward the base of the fruitbody are thin-walled and taper gradually to an obtuse apex. They are up to 5 μ wide at the base and about 2 μ wide at the apex (when measured in 10% potassium hydroxide solution) and are completely covered by a fine granular encrustation. The hairs are at first hyaline, except toward the extreme base where they are faintly tinted brown. As the fruitbody matures the hairs become dark brown in colour and furthermore they become agglutinated to form what is virtually an outer sheathing layer to the sporophore. *Hymenial elements* lacking. *Spores* and *conidia* absent.

HABITAT: This fungus which is known from a single collection from both Europe and North America, occurs on remains of grasses and rushes in damp places.

COLLECTIONS EXAMINED: AMERICA: On *Glyceria* sp., Onaway, Michigan, coll. D. A. Reid, 8 July 1961. EUROPE: on *Juncus*, in the hills behind Genoa, Italy, coll. J. T. Palmer, July 1956.

Since this fungus is only known in the sterile condition it cannot be assigned to the 'Cyphellaceae' with any confidence. It is even possible that it may prove to be an imperfect state of some quite unrelated Basidiomycete. However on account of its shape and the fact that it is clothed with granule encrusted hsairs, it might reasonably be sought for amongst the Cyphelloid fungi. It is for this reason that it has been included in the present paper.

REFERENCES

BOURDOT, H. & A. GALZIN, (1928). Hyménomycètes de France 146–166.

BRESADOLA, G. (1903). Fungi polonici. *In* Ann. mycol., Berl. **1**: 84.

BURT, E. A. (1915). The Thelephoraceae of North America III. *Craterellus borealis* and *Cyphella*. *In* Ann. Mo. bot. Gdn **1**: 375–376. "1914".

COKER, W. C. (1920). *Craterellus*, *Cantharellus* and related genera in North Carolina; with a key to the genera of gill fungi. *In* J. Elisha Mitchell sci. Soc. **35**: 38.

COOKE, W. B. (1957). The Porotheleaceae: *Porotheleum*. *In* Mycologia **49**: 680–693.

——: (1961). The Cyphellaceous Fungi. A study in the Porotheleaceae. *In* Beih. Sydowia **4**.

DONK, M. A. (1931). Revisie van de Nederlandse Heterobasidiomycetae . . . en Homobasidiomycetae-Aphyllophoraceae. Deel I. *In* Meded. Ned. mycol. Ver. **18–20**: 127–134.

——: (1951) The generic names proposed for Hymenomycetes—I. 'Cyphellaceae'. *In* Reinwardtia **1**: 219.

——: (1959). Notes on 'Cyphellaceae'—I. *In* Persoonia **1**: 78–107.

——: (1962). Notes on 'Cyphellaceae'—II. *In* Persoonia **2**: 332.

FAVRE, J. (1948). Les associations fongiques des hauts-marais jurassiens. *In* Beitr. Kryptogamenfl. Schweiz **10** (3): 41–42.

FRIES, E. M. (1821). Systema mycologicum **1**: 323.

FUCKEL, K. W. G. L. (1871). Beiträge zur Kenntniss der rheinischen Pilze. *In* Jb. nassau. Ver. Naturk. **25–26**: 290–291.

KARSTEN, P. A. (1890). Fragmenta mycologica. XXXI. *In* Hedwigia **29**: 271.

KÜHNER, R. & H. ROMAGNESI, (1953). Flore analytique des Champginons supérieures 64–65.

KUNTZE, C. E. O. (1898). Revisio Generum Plantarum **3**: 483.

LANGE, M. (1955). Den Botaniske Ekspedition til Vestgronland 1946. Macromycetes. Part II. Greenland Agaricales. *In* Medd. Gronland **147** (11): 20.

LANJOUW, J. & F. A. STAFLEU (1959). Index Herbariorum. Part. I. The Herbaria of the world. Fourth edition. (Regnum vegetabile **15**).

MURRILL, W. A. (1916). A new family of Hymenomycetes. *In* Mycologia **8**: 56.

PATOUILLARD, N. (1886). Tabulae analyticae fungorum. **1**/Fasc. 5: 201, 203–304.

——: (1900). Essai taxonomique sur les familles et les genres des Hyménomycètes 55.

PILÁT, A. (1924). Beiträge zur Kenntnis der Thelephoraceen. I. Die Cyphellaceen Böhmens. *In* Ann. mycol., Berl. **22**: 204–218.

——: (1925). Zweiter Beitrag zur Kenntnis der tschechoslowakischen Cyphellaceen. *In* Ann. mycol., Berl. **23**: 144–173.

——: (1933). Additamenta ad floram Asiae Minoris Hymenomycetum. Pars tertia: Meruliaceae, Hydnaceae, Stereaceae, Cyphellaceae, Clavariaceae, Asterostromellineae. *In* Bull. Soc. mycol. Fr. **49**: 47.

QUÉLET, L. (1879). Quelques espèces nouvelles de champignons. *In* Bull. Soc. bot. Fr. **25**: 290. "1878".

——: (1888). Flore mycologique de la France 28.

REID, D. A. (1961). Fungi Venezuelani: V. The Cyphellaceae of Venezuela. *In* Kew Bull. **15**: 266.

SINGER, R. (1945). The *Laschia*-complex (Basidiomycetes). In Lloydia **8**: 185–190.

——: (1962). The Agaricales in modern taxonomy, 2nd Ed., 915 pp.

SMITH, W. G. (1908). Synopsis of the British Basidiomycetes 427.

WINTER, G. (1884). Schizomyceten, Saccharomyceten und Basidiomyceten. *In* Rabenhorst's Krypt.-Fl. Deutschl. **1** (1): 392.

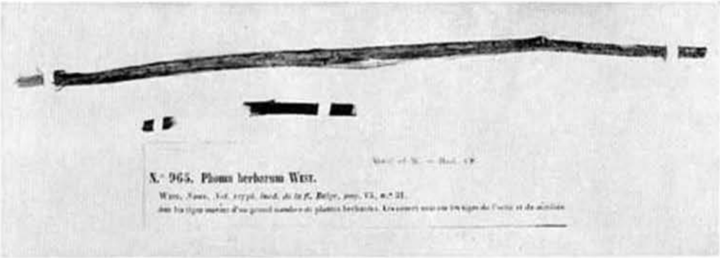


Fig. 1

Fig. 3

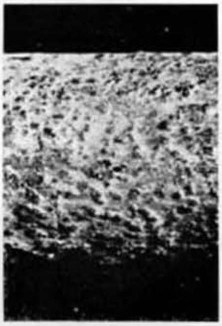


Fig. 2

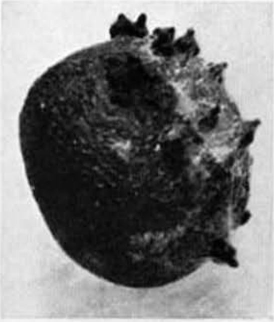


Fig. 4

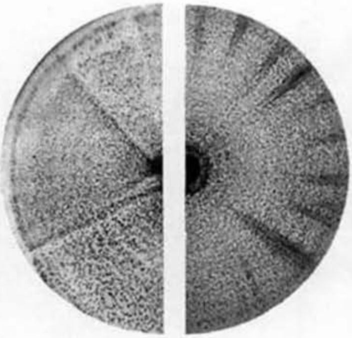


Fig. 5

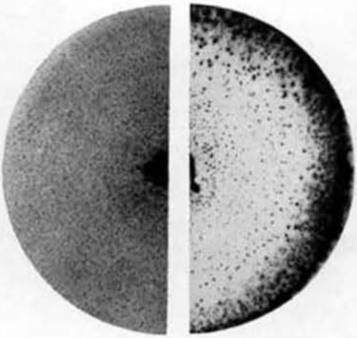


Fig. 6

Fig. 1

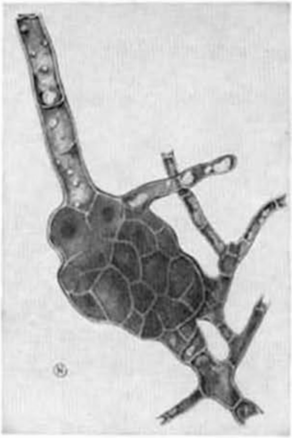


Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6