PERSOONIA
Published by the Rijksherbarium, Leiden
Volume 3, Part 1, pp. 97–154 (1963)

NOTES ON SOME FUNGI OF MICHIGAN—I

'Cyhellaceae'

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(*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*, Mnišek, 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

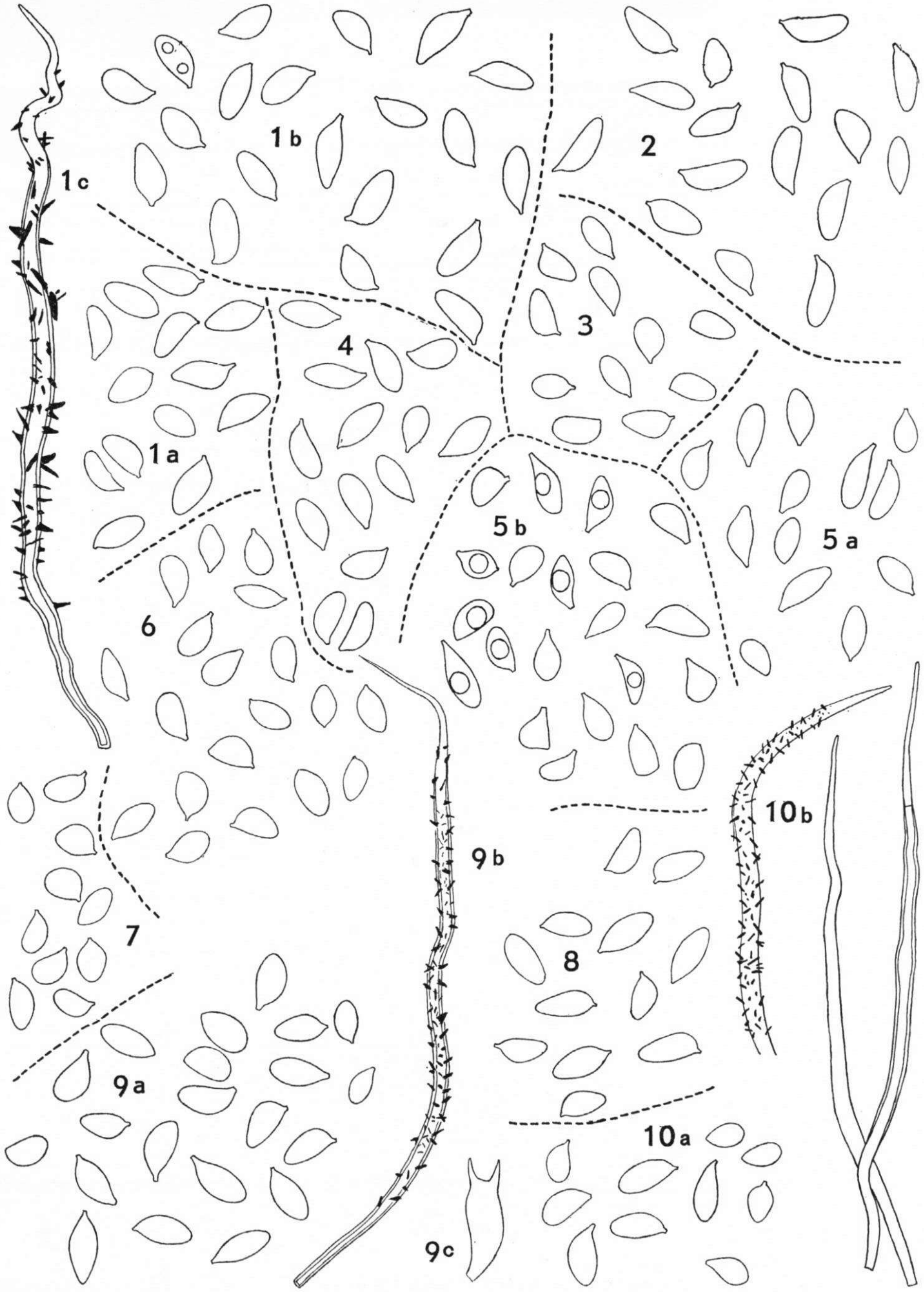
Spore measurements of Michigan material of *Flagelloscypha citrispora*

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*, Mníšek, 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
F r a n c e	
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.
B r i t a i n	
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.

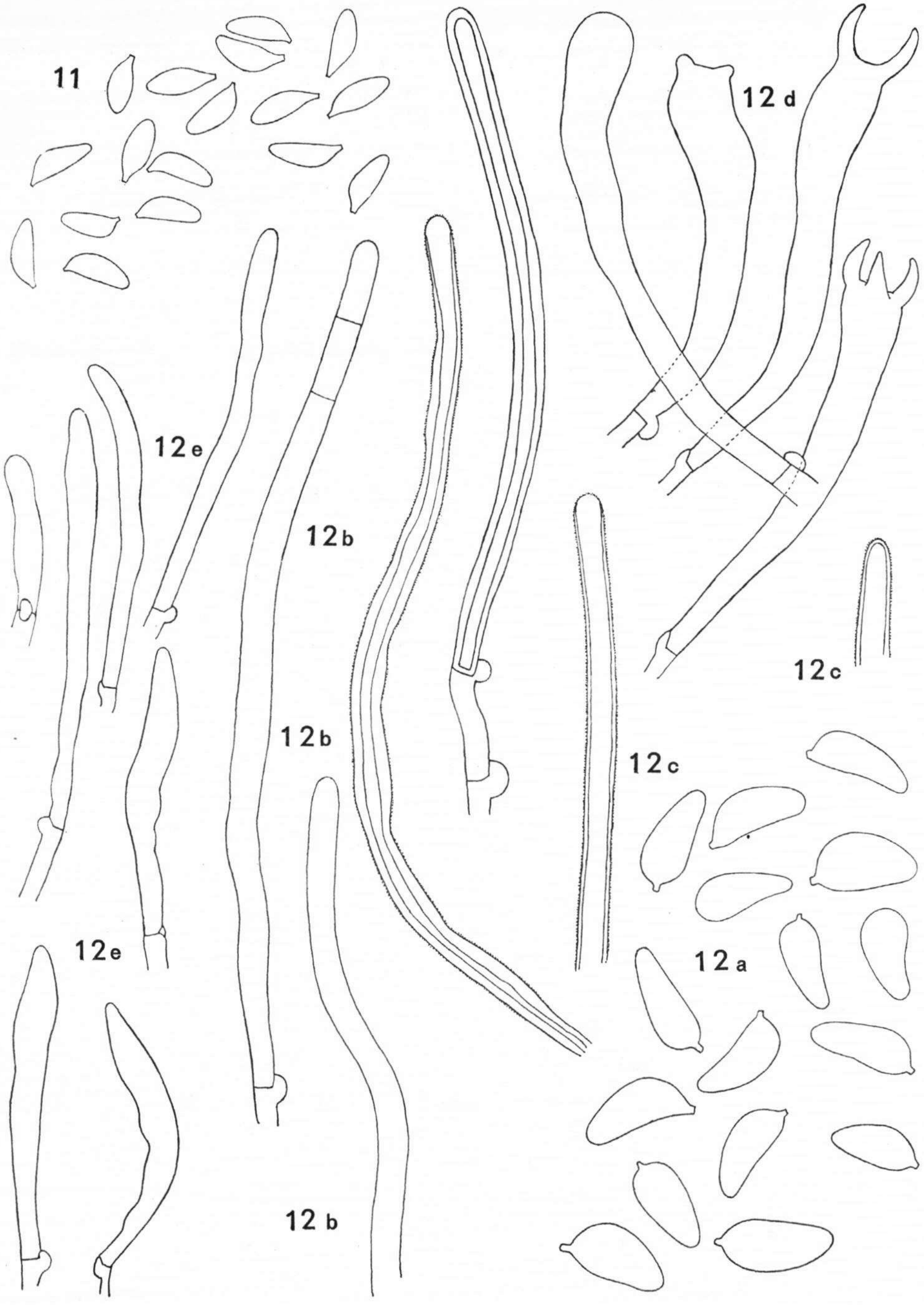
LACHNELLA TILIAE (Peck) Donk apud Sing.—Fig. 12

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,

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.

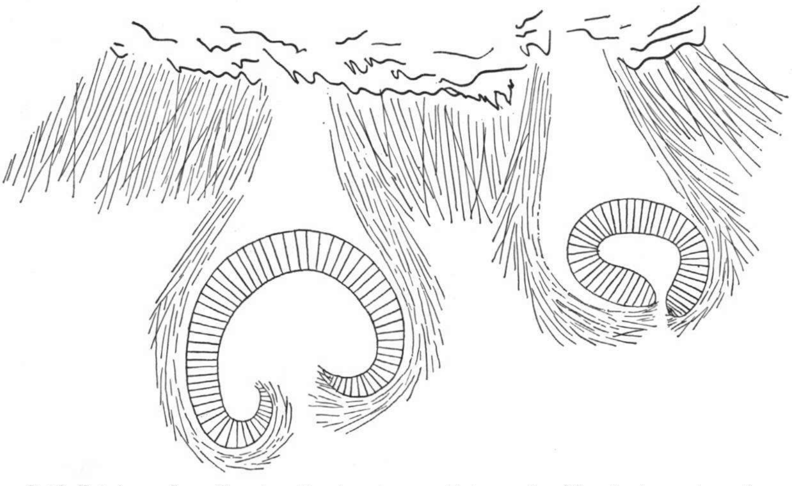


Fig. 13. *Cyphellopsis confusa*. Garden Peninsula, 14 July 1961. Vertical section through two fruitbodies. × 160 approx.

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.

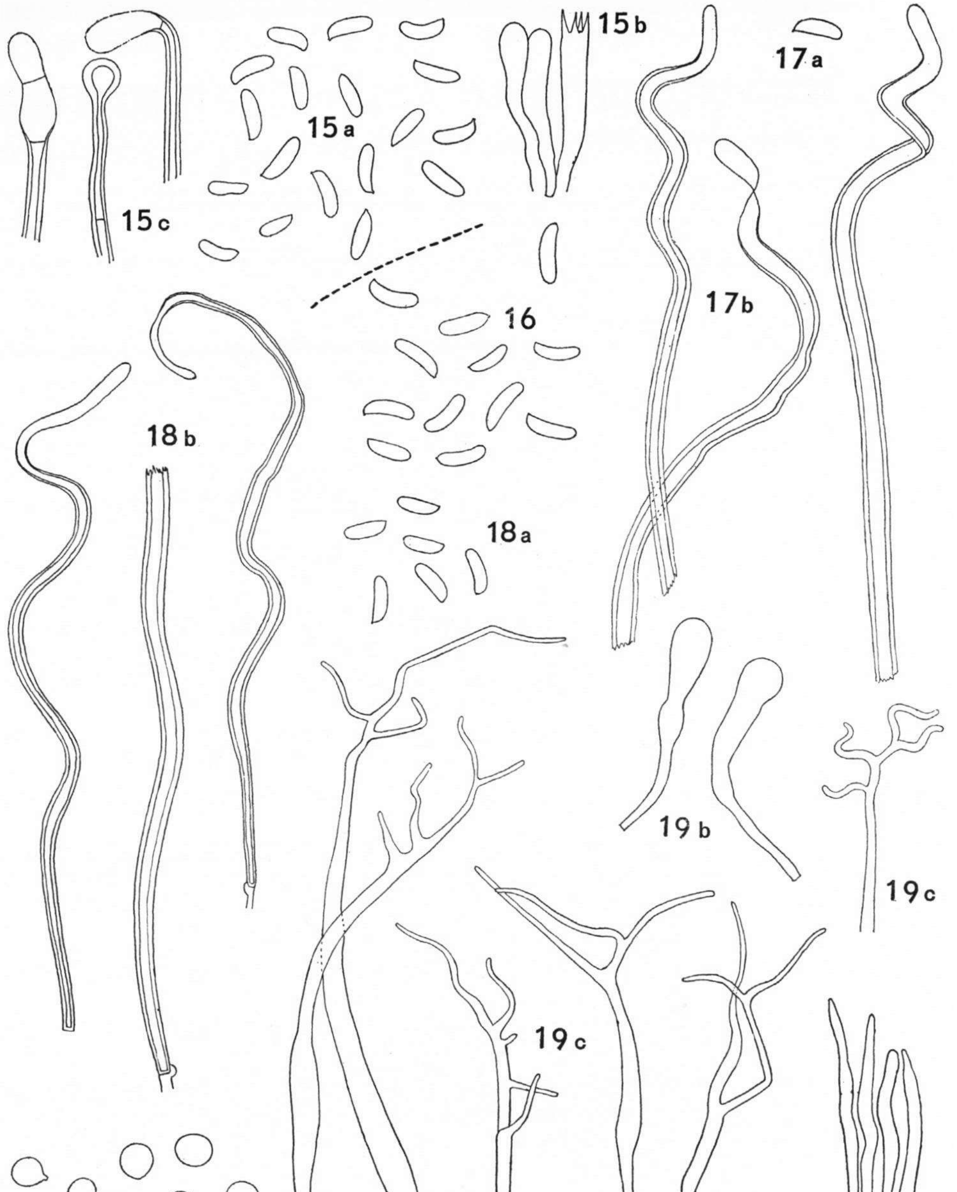
Fructifications solitary, in scattered groups or in densely crowded colonies of 20 or more sporophores, and emerging from a more or less well developed subiculum formed of erect hyphae resembling the surface hairs which clothe the fruitbodies. The individual fructifications are yellowish-brown to brown 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*.

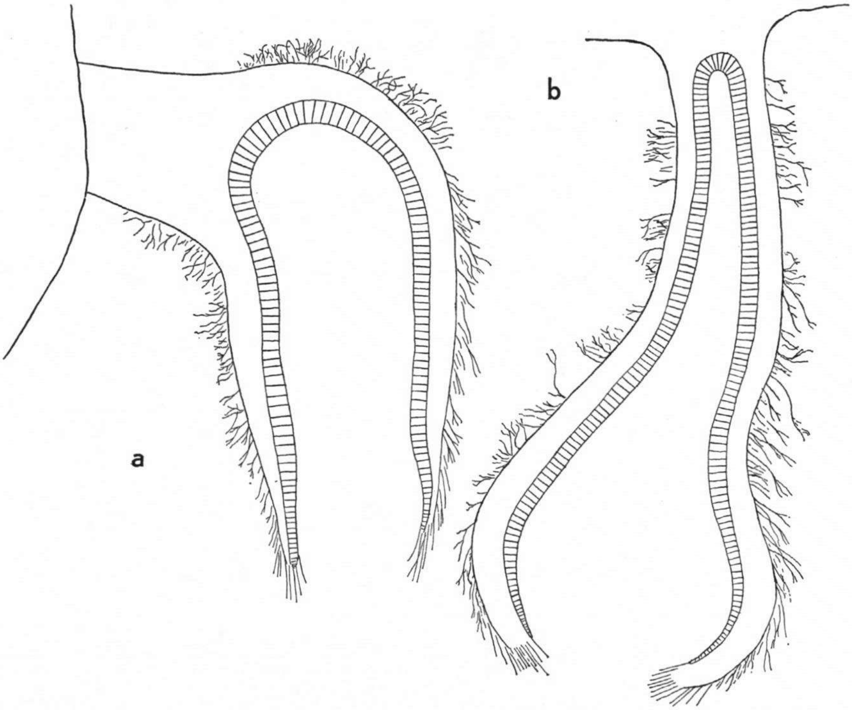


Fig. 20. *Henningsomyces pubera*. a. *H. pubera* var. *americana*. Type collection. Vertical section through a fruitbody. × 160 approx. b. *H. pubera* var. *pubera*. Type collection. Vertical section through a fruitbody. × 160 approx.

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.).

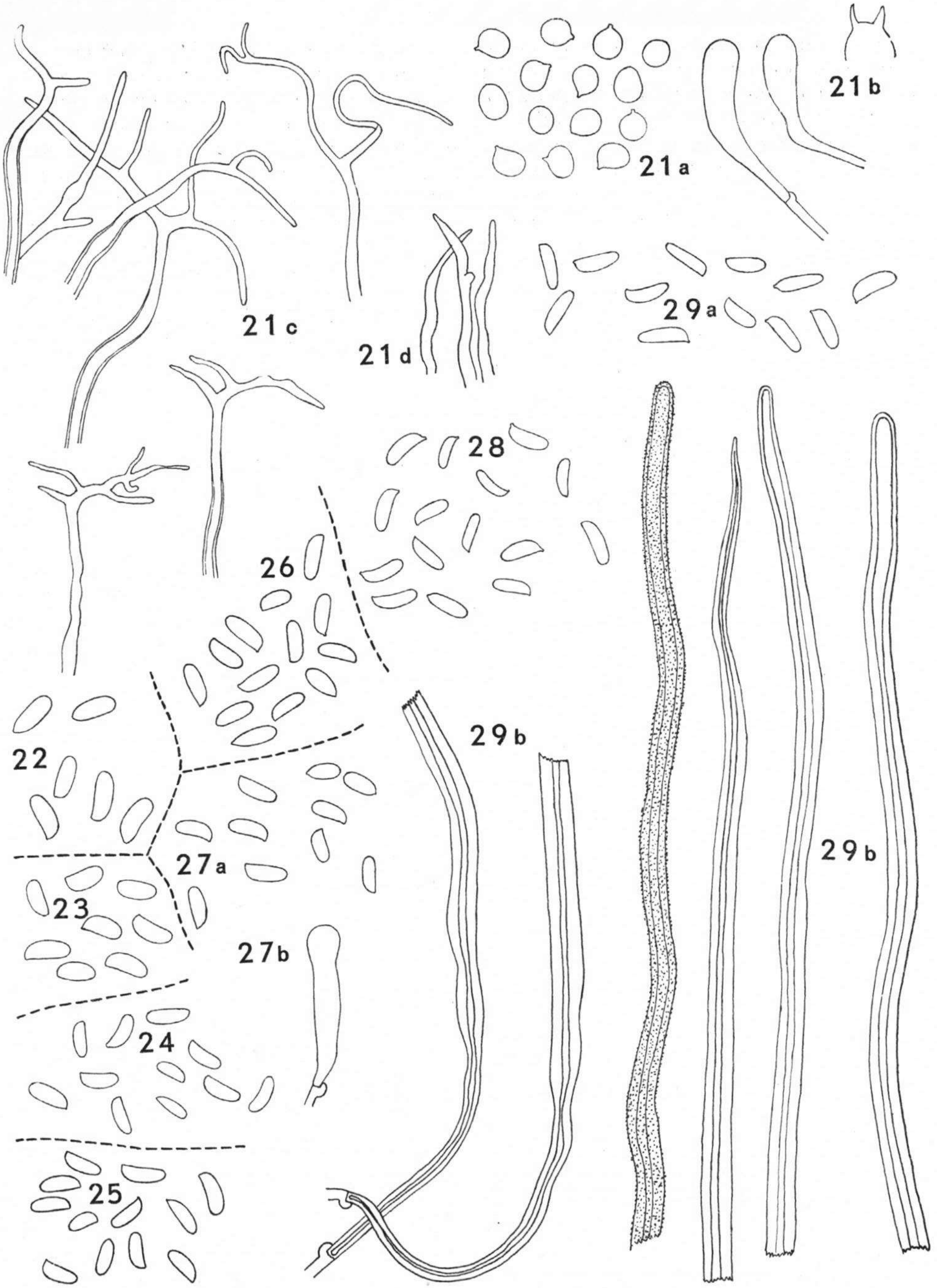
This variety would seem to differ from variety *pubera* solely in its hyphae having clamp-connexions at the septa. However, unlike W. B. Cooke who reports that the fruitbodies of the type collection of *H. pubera* var. *pubera* bear 4-spored basidia, I have only found 2-spored basidia on the sporophores 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

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., Ärentuna 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

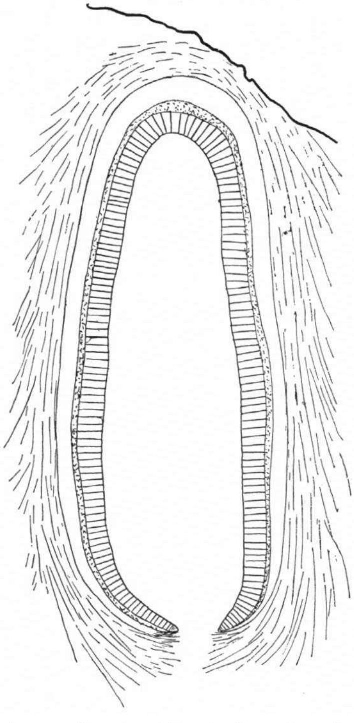


Fig. 30. *Calathella davidii*. Type collection. Vertical section through fruitbody. × 160 approx.

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.

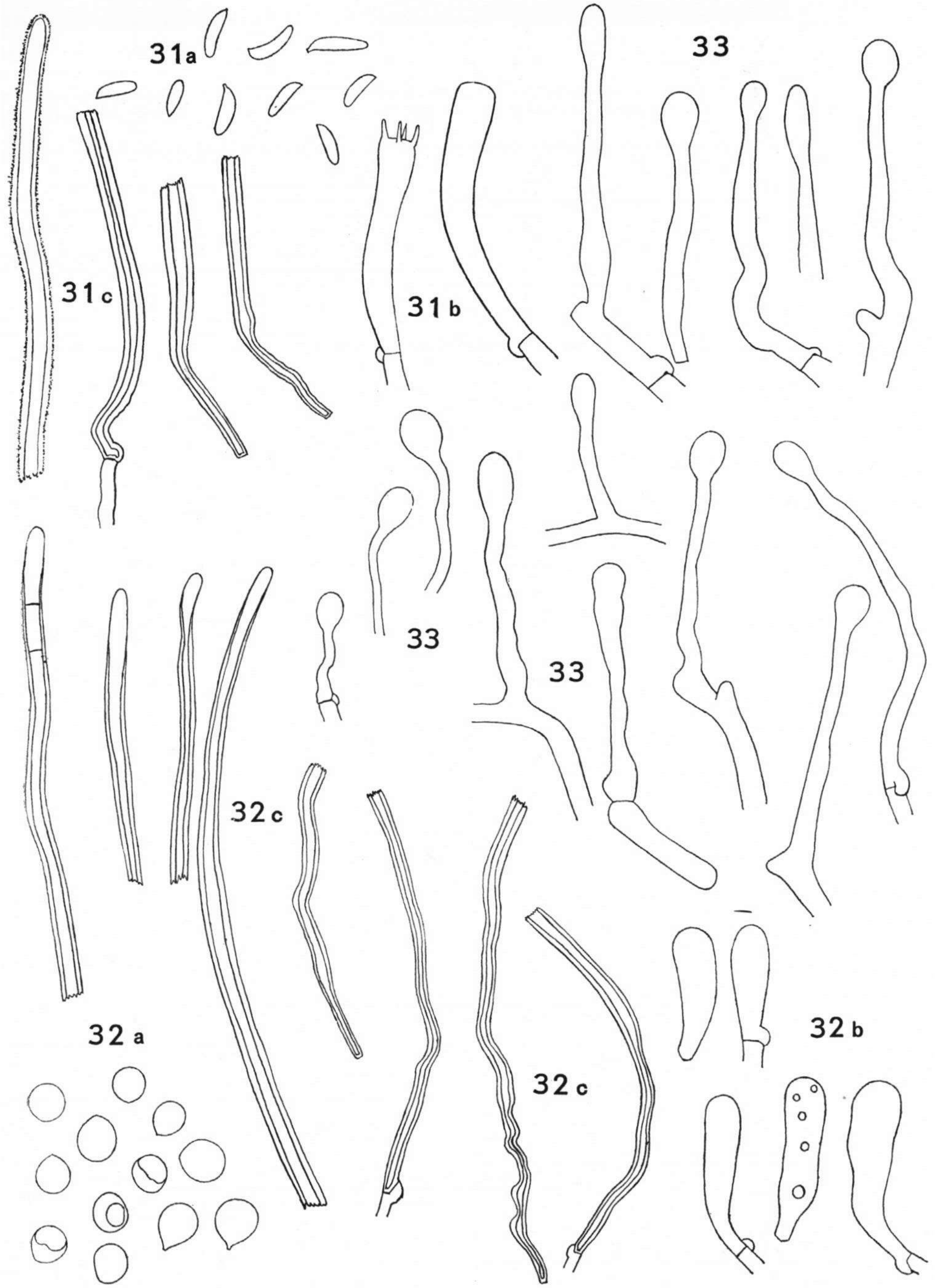
HABITAT: On dead wood.

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

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.

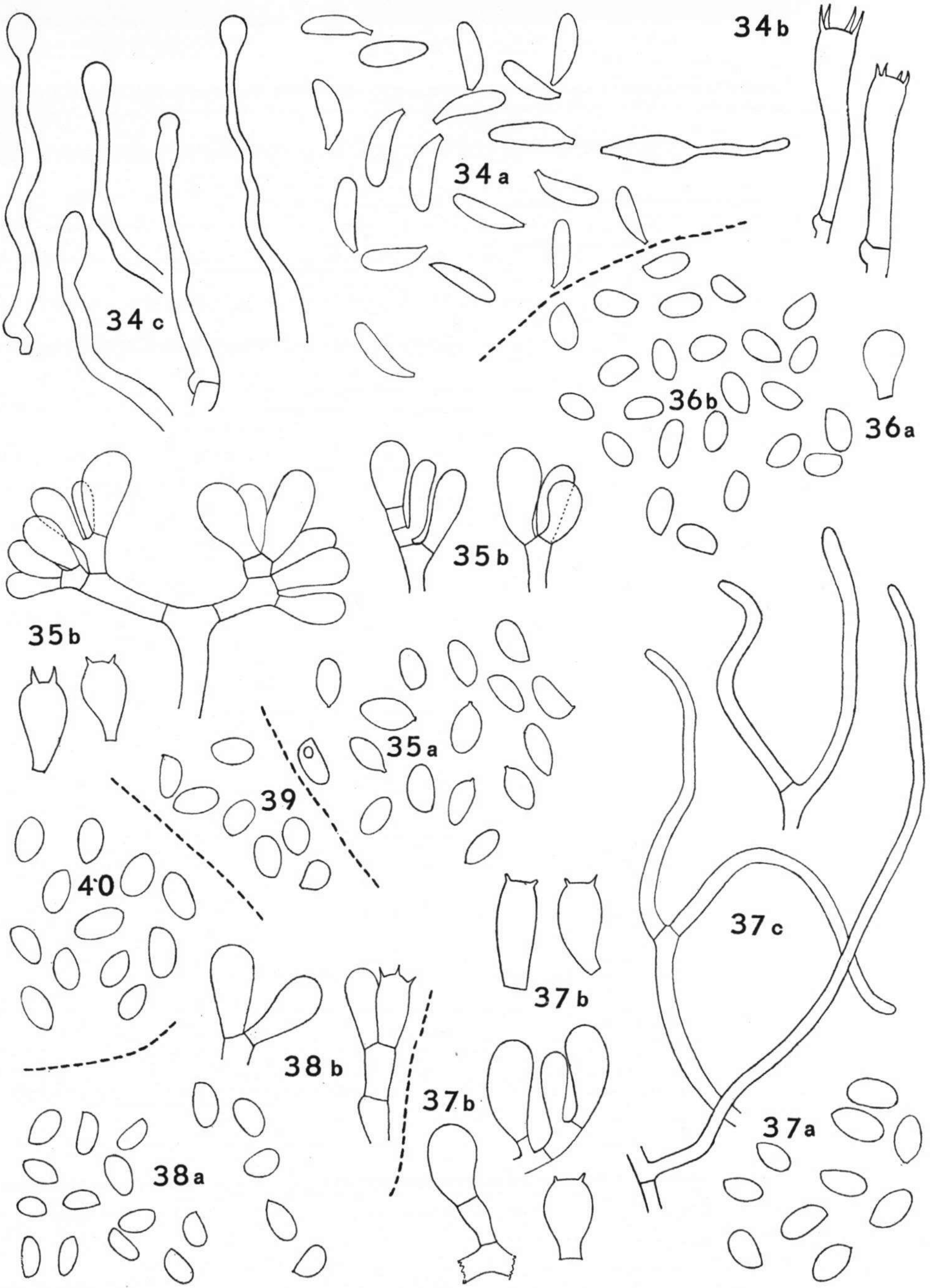
Cyphella malbranchei Pat., Tab. anal. Fung. **1**: 204. 1886.— *Solenia malbranchei* (Pat.) Pat., Hym. Eur., caption to Pl. 3 fig. 30. 1887. — *Chaetocypha malbranchei* (Pat.) O. Kuntze, Rev. Gen. Pl. **2**: 847. 1891.

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 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.

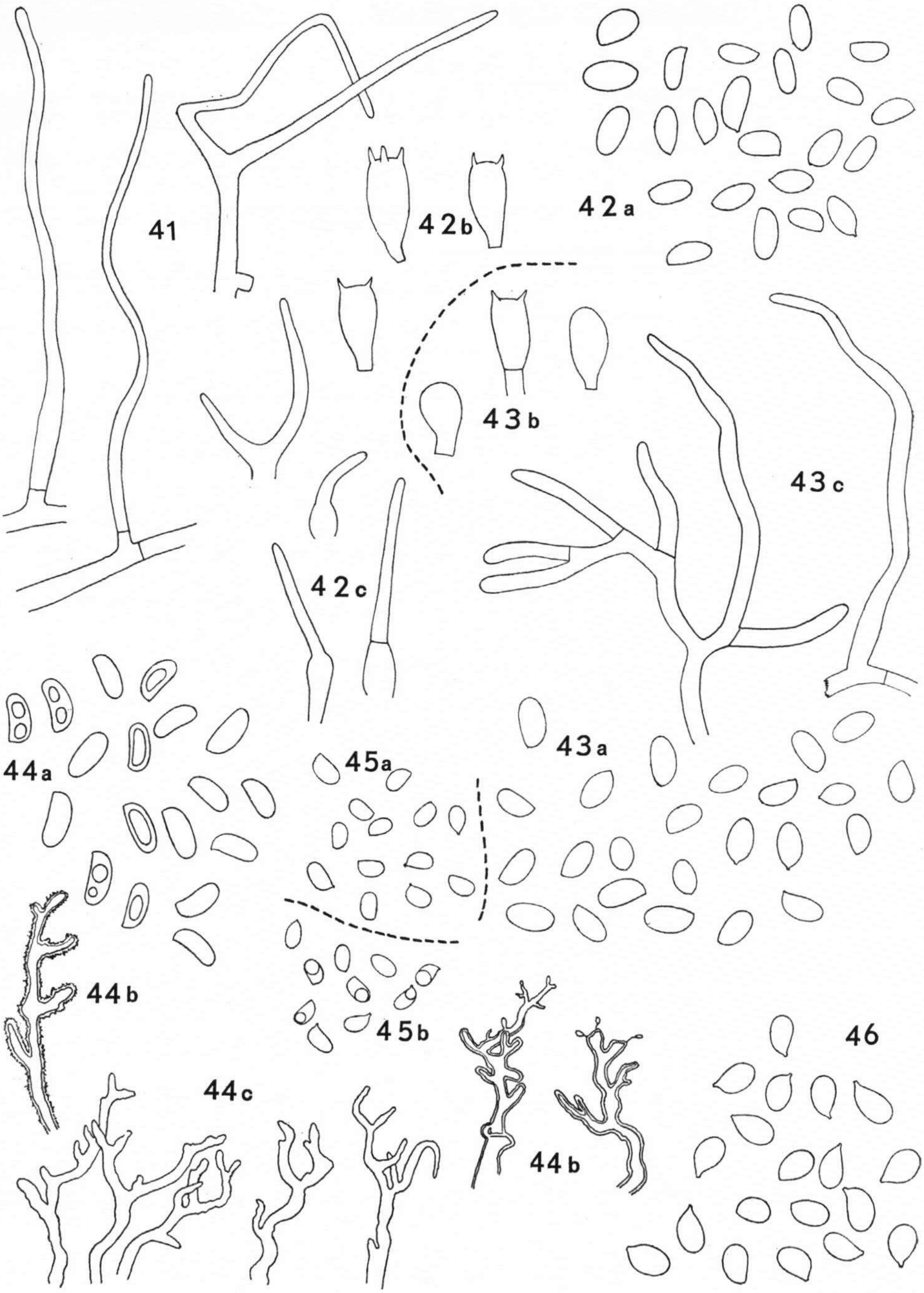
Cyphella sessilis Burt *in* Ann. Mo. bot. Gdn **13**: 317–318. 1926. — *Phaeoglabrotricha sessilis* (Burt) W. B. Cooke *in* Beih. Sydowia **4**: 117. 1961.

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

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*, Řičany, 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. bloxamii: Type (K): 6–7.5 × 3.75–5 μ.
North American collections of *Pellidiscus pallidus*:
Newfield, New Jersey: 6–8 × 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*."

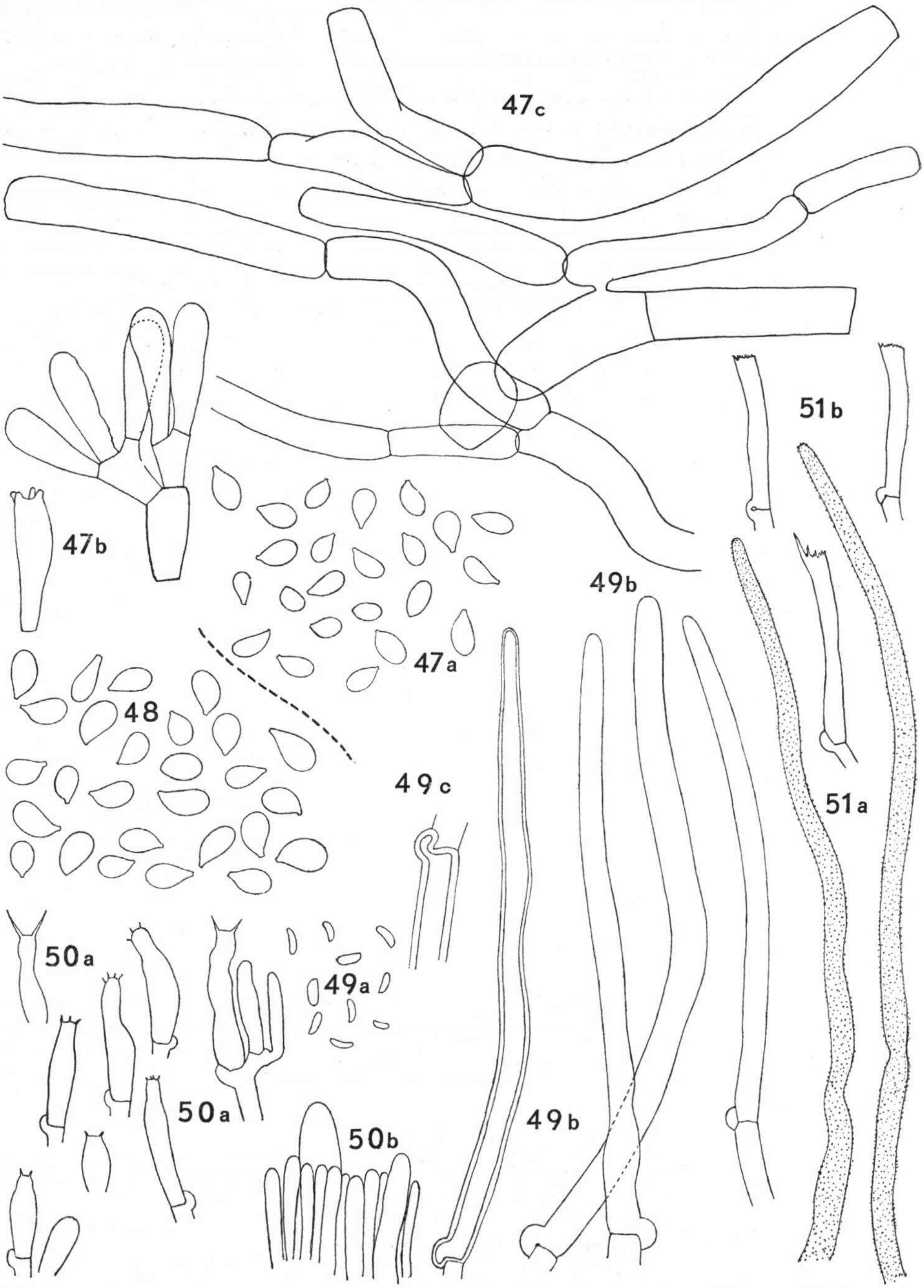
Leptoglossum Karst.

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

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 palisade-like layer. *Cystidia* and *gloeocystidia* absent. *Basidia* 4-spored, hyaline, clavate, up to 25 × 7.2 μ. *Spores* varying much in size from 4–8 × 2.75–4.5 μ—the smaller ones apparently immature. Mains found them to be 4–6 × 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.

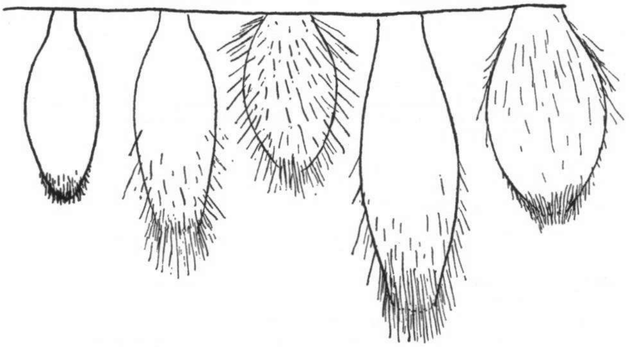


Fig. 52. Sterile Cyphelloid fungus. Onaway, 8 July 1961. Habit sketch. × 100 approx.

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.

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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'.